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NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY

AND NEW ENGLAND POWER COMPANY d/b/a NATIONAL GRID

Acushnet to Fall River Reliability Project

Analysis to Support the Petition before the Energy Facilities Siting Board

Volume I of III

nationalgrid
EVERSOURCE

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APPENDIX 2-2 Revised SEMA/RI 2029 Needs Assessment Update. November 2020 – Revision 1 (Redacted)

APPENDIX 2-3 Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment. May 2016 (Redacted)

APPENDIX 4-1 Candidate Routes Environmental Constraints Map Book

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APPENDIX 5-4 Line 114 Extension Project: Current Status of Epidemiologic Research on Electric and Magnetic Fields. July 28, 2021

ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
AFRRP	Acushnet to Fall River Reliability Project or Project
Bioreserve	Southeastern Massachusetts Bioreserve
BMP	Best Management Practice
BMP Manual	Eversource's Construction & Maintenance Environmental Requirements: Best Management Practices Manual for Massachusetts and Connecticut.
CELT	Capacity, Energy, Loads and Transmission Report
Certificate	Certificate on the Expanded Environmental Notification Form filed with the Massachusetts Environmental Policy Act Unit
CLL	Critical Load Levels
CMP	Conservation and Management Permit
C.M.R.	Code of Massachusetts Regulations
Companies	Eversource and National Grid
CVP	Certified Vernal Pool
dBA	A-weighted decibels
DCT	Double-Circuit Transmission
Department	Department of Public Utilities
DPW	Department of Public Works
EE	Energy Efficiency
EEA	Executive Office of Energy and Environmental Affairs
EENF	Expanded Environmental Notification Form
EG303NE	National Grid's Environmental Guidance: ROW Access, Maintenance and Construction Best Management Practices for New England
EJ	Environmental Justice
EMF	Electric Magnetic Field
ENF	Environmental Notification Form
Eversource	NSTAR Electric Company d/b/a Eversource Energy
FAA	Federal Aviation Administration
GHG	Greenhouse Gas
GIS	Geographic Information System
G.L.	General Law
GNIS	Geographic Names Information System
GWSA	Global Warming Solutions Act
I-195	Interstate Route 95
ICES	International Committee for Electromagnetic Safety
ICNRP	International Committee on Non-Ionizing Radiation Protection
ISO	Independent System Operator
ISO-NE	ISO New England Inc., the Independent System Operator for New England
kV	kilovolt
LTE	Long-time Emergency
MACRIS	Massachusetts Cultural Resources Information System
MA DCR	Massachusetts Department of Conservation Recreation
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassGIS	Massachusetts Geographic Information System
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
mG	milligauss

MHC	Massachusetts Historical Commission
MVA	Megavolt Amperes
MVAr	Megavolt Amperes Reactive
MW	Megawatt
N-1	A first contingency; the largest impact on the system when a first power element (generation or transmission facility) of a system is lost.
N-1-1	A second contingency; the loss of the facility that would have the largest impact on the system after the first facility is lost.
National Grid	New England Power Company d/b/a National Grid
NEPOOL	New England Power Pool
NERC	North American Electric Reliability Corporation
NHD	National Hydrography Dataset
NHESP	Natural Heritage and Endangered Species Program
NPCC	Northeast Power Coordinating Council
NRHP	National Register of Historic Places
NTA	Non-Transmission Alternative
OPGW	Optical Ground Wire
ORW	Outstanding Resource Water
OSHA	Occupational Health and Safety Administration
PAC	Planning Advisory Committee
PAL	Public Archaeological Laboratory
PCN	Pre-Construction Notification
POWER	POWER Engineers, Inc.
Project	Acushnet to Fall River Reliability Project or AFRRP
PTF	Pool Transmission Facilities
p.u.	per unit
PV	Photovoltaic
PVC	Polyvinyl Chloride
RAO	Response Action Outcome
ROW(s)	Right(s)-of-Way
RSP	Regional System Plan
SEIR	Single Environmental Impact Report
SEMA-RI	Southeastern Massachusetts - Rhode Island
Siting Board	Energy Facilities Siting Board
Study Area	300-foot study area buffer
SWPPP	Stormwater Pollution Prevention Plan
TBD	To Be Determined
U.S.	United States
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMP	Vegetation Management Plan

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1.0 PROJECT OVERVIEW

1.1 Introduction

Pursuant to General Law ("G.L.") c. 164, § 69J, NSTAR Electric Company d/b/a Eversource Energy ("Eversource") and New England Power Company d/b/a National Grid ("National Grid") (together, the "Companies") submit this analysis ("Analysis") to the Energy Facilities Siting Board ("Siting Board") in support of their petition for authority to construct, operate, and maintain an approximately 12.1-mile 115-kilovolt ("kV") primarily overhead electric transmission line along existing rights-of-way ("ROW") between Eversource's Industrial Park Tap in Acushnet, Massachusetts and National Grid's Bell Rock Substation in Fall River, Massachusetts (the "New Line"). Of the New Line, 7.9 miles will be in Acushnet, New Bedford and Dartmouth and will be owned and operated by Eversource; 4.2 miles will be in Fall River and will be owned and operated by National Grid.[1]

As discussed in Section 1.5, in conjunction with the New Line, National Grid will be performing protection and control upgrades, including installing a line trap and its structure and a line tuner at the Bell Rock Substation. Eversource will be performing protection and control upgrades at its Tremont Substation in Wareham and its Acushnet Substation in Acushnet (the "Station Work"). The New Line and the Station Work comprise the proposed Acushnet to Fall River Reliability Project ("AFRRP" or "Project").

Construction of the Project will serve the public interest by increasing the reliability of the regional electric transmission system. The Project will provide a reliable energy supply for the Southeastern Massachusetts and Rhode Island ("SEMA-RI") area with a minimum impact on the environment at the lowest possible cost.

The proposed routing for the New Line between the Industrial Park Tap and the Bell Rock Substation, and the locations of the Tremont and Acushnet Substations, are shown on a United States Geological Survey ("USGS") quadrangle base map (see Figure 1.1). Figure 1.2 shows the proposed routing of the New Line on a 2019 Massachusetts Geographic Information System ("MassGIS") aerial photo. The proposed New Line will pass through the municipalities of Acushnet, New Bedford, Dartmouth, and Fall River along existing ROW.

The balance of Section 1 presents an overview of the Project. The remaining sections of this Analysis provide detailed information to support the Project, specifically: a discussion of the ISO New England Inc. ("ISO-NE") SEMA-RI study process and the need for the Project (Section 2); a comparison of project alternatives (Section 3); a description of the route selection process that was used to identify the Preferred Route (Section 4); an analysis of the Preferred Route, including impacts and cost (Section 5); and an analysis of the Project's consistency with the health, environmental protection, resource use, and development policies of the Commonwealth of Massachusetts (Section 6).

[1] The New Line is an extension of Line 114, an existing approximately 16-mile 115-kV transmission line that currently travels between Eversource's existing: Tremont Substation to SEMass Tap to the Rochester Substation to the Crystal Spring Tap; the Crystal Springs Substation to the Crystal Spring Tap; the Crystal Spring Tap to the Industrial Park Tap; and from the Industrial Park Tap to the Wing Lane Substation and then to the Acushnet Substation. The extent of the existing Line 114 is shown on Figures 1.1 and 1.2.

1.2 Project Purpose and Need

The Eversource and National Grid transmission systems are an integral part of the regional power system delivering electricity to customers throughout New England. To maintain the integrity of this system, the Companies must ensure that adequate transmission capacity exists to meet existing and projected load requirements. As transmission providers, Eversource and National Grid must also maintain their respective systems consistent with the reliability standards and criteria developed by: (1) the North American Electric Reliability Corporation ("NERC"), which sets the minimum standards for electric power transmission for all North America; (2) the Northeast Power Coordinating Council ("NPCC"); (3) ISO-NE; and (4) the Companies themselves. These reliability standards and criteria expressly require transmission owners, planners, and operators to design and test their systems to withstand representative contingencies as specified in the criteria. The design adequacy is demonstrated by computer simulation of system performance under these representative contingencies. If the area transmission systems for Eversource and National Grid do not have sufficient capability to serve forecasted load under the conditions specified in these reliability criteria, the Companies must plan and implement system additions and upgrades to address the identified reliability issues and remain in compliance with the standards.

The proposed Project will address ISO-NE's determination of a need for additional transmission capacity within a load pocket consisting of Fall River, Westport, Dartmouth, Freetown, New Bedford, Acushnet, Fairhaven, Rochester, Mattapoisett, Marion, and Wareham in Massachusetts, as well as Jamestown, Newport, Middletown, Portsmouth, Tiverton, and Little Compton in Rhode Island (referred to herein as the "Load Pocket"). Results from the SEMA-RI studies, including a description of the process by which system reliability was analyzed and the need for the Project was determined, as well as a discussion of Project need, are provided in detail in Section 2 of this Analysis.

1.3 Project Alternatives

In accordance with Siting Board precedent, the Companies evaluated alternative means of addressing the identified need for the Project. The Companies evaluated: (1) a "No-Action Alternative;" (2) an Undersea Cable Alternative based on Alternative 1 identified in the ISO-NE's "Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study" ("2026 Solutions Study") (see Appendix 2-1); (3) a Synchronous Solution consisting of the reconductoring of two transmission lines and installation of two 30 MVAR synchronous condensers; and (4) traditional non-transmission alternatives ("NTAs") such as new generation, energy efficiency, solar and battery storage, demand response programs, and distributed generation. As described more fully in Section 3 of this Analysis, through this assessment, the Companies determined that building the Project is the superior alternative that, on balance, best meets the identified need at the lowest possible cost with a minimum impact to the environment.

1.4 Routing Analysis

Section 4.0 of this Analysis presents the routing analysis used to select the Preferred Route connecting the Industrial Park Tap and the Bell Rock Substation with the New Line. As discussed in Section 4, no reasonable, feasible or practical Noticed Alternative Route emerged from the routing analysis evaluation. The Preferred Route is described below and is shown on Figure 1.2.

In summary, the Companies conducted a detailed routing assessment to select the Preferred Route for the Project. As an initial matter, the Companies identified a Routing Study Area that encompassed possible routes for an overhead, underground, or hybrid (combination of overhead and underground) transmission

line between the Industrial Park Tap and the Bell Rock Substation. The Routing Study Area and the routing opportunities and constraints within it are described in Section 4.2.

Twenty-four potential routes were identified and were screened using recent aerial photos, MassGIS data on land use and environmental constraints, and field reconnaissance, as well as information gathered in discussions with municipal officials.[2] Routes were dismissed if they were clearly inferior on the basis of environmental impact, cost or reliability. Based on this screening analysis, the universe of potential routes described in Section 4.5 was narrowed to a set of seven "Candidate Routes."

The Candidate Routes were evaluated, scored, and ranked using a set of natural and social/developed environmental impacts and constructability constraints, as well as cost and reliability. The existing transmission line ROW between the Industrial Park Tap and the Bell Rock Substation received the lowest (best) score and was found to be less than one-third the cost of any other Candidate Route. It was therefore selected as the Companies' Preferred Route. Given the significant cost differential between the Preferred Route and all other Candidate Routes, the Company did not select a Noticed Alternative Route.

The Preferred Route runs for approximately 12.1 miles along existing Eversource and National Grid transmission ROW from the Industrial Park Tap in Acushnet to the Bell Rock Substation in Fall River. The Preferred Route consists primarily of overhead transmission line installation with two small sections of underground cable proposed (a total of approximately 600 linear feet) to avoid multiple overhead line crossings at the Industrial Park Tap and High Hill Switching Station. The Preferred Route is located entirely within the existing ROWs, varying in width from 150 to 210 feet wide.

A full discussion of the comparison of Candidate Routes is provided in Section 4, while an impact analysis of the Preferred Route is discussed in greater detail in Section 5.

1.5 Ancillary Facilities

Construction of the Project adds a terminal to the existing two-terminal line that will require that certain ancillary facilities be installed at the existing terminals (Eversource's Tremont and Acushnet Substations in Wareham and Acushnet, respectively) and at the new terminal (National Grid's Bell Rock Substation in Fall River). These substations are shown on the locus map provided as Figure 1.1. The work activities at each station are described below.

1.5.1 Tremont Substation

Eversource's Tremont Substation is located off North Carver Road in Wareham. The Substation is located on an approximately 2.1-acre site within the limits of Eversource fee-owned property. The Tremont Substation is set back approximately 15 feet west of North Carver Road and is bordered by overhead transmission ROW to the east, Eversource-owned land and road ROW (Doty Street) to the south/west, and Eversource-owned land/overhead transmission ROW to the north.

Protection and control upgrades will be installed at Eversource's Tremont Substation including replacing or installing new relays, installing new control cable from yard equipment to the control enclosures, modifying the telecommunication architecture, and testing the new equipment. The station improvements

[2] The Companies held over 29 meetings with municipal and state officials and other stakeholders, including a series of open houses for interested members of the public.

will occur within the existing footprint of the Tremont Substation. No other work or equipment is required at Tremont Substation in connection with the Project.

An aerial photograph showing the location of the existing substation is provided as Figure 1.3.

1.5.2 Acushnet Substation

Eversource's Acushnet Substation is located off Beech Street in Acushnet. The substation is located on an approximately 13.75-acre site within the limits of Eversource fee-owned property. The Acushnet Substation is set back approximately 65 feet north of Beech Street and is bordered by the Acushnet River to the west, overhead transmission ROW to the north, Acushnet River Preserve to the east, and Beech Street to the south.

Protection and control upgrades will be installed at Eversource's Acushnet Substation including replacing or installing new relays, installing new control cable from yard equipment to the control enclosures, modifying the telecommunication architecture, and testing the new equipment. The station improvements will occur within the existing footprint of the Acushnet Substation. No other work or equipment is required at the Acushnet Substation in connection with the Project.

An aerial photograph showing the location of the existing substation is provided as Figure 1.4.

1.5.3 Bell Rock Substation

National Grid's Bell Rock Substation is located off Bell Rock Road in Fall River. The Bell Rock Substation lies within National Grid's existing 2.75-acre substation easement. Eversource holds a 1.06-acre easement adjacent (south) to the National Grid easement. The station easements were granted by the City of Fall River in the early 1960s. Access drives are located on the west side of the substation extending into the site from Bell Rock Road. Adjacent land uses are primarily undeveloped forest and wetlands, protected watershed lands, and electric utility ROW. National Grid's existing overhead transmission line ROWs extend to the west (two 115-kV lines), south (two 115-kV lines), and east (a single 115-kV line) of the substation.

Protection and telecommunications changes, including installation of a 115-kV line trap and tuner, will be implemented and commissioned to complete the termination for the New Line. No fence line expansion or removal of existing equipment is required to accommodate these necessary improvements related to the New Line.[3]

An aerial photo showing the location of the existing substation is provided as Figure 1.5.

1.6 Project Schedule and Cost

Assuming receipt of all necessary permits and approvals, construction of the New Line is anticipated to commence in the winter (first quarter) of 2024. Current plans call for the New Line to be energized by the end of 2024. The Station Work will be timed to coincide with energization of the New Line.

[3] There is additional work currently being done at the Bell Rock Substation (EEA No. 15941) that is being performed to address separate needs on National Grid's system that are independent of the needs being addressed by the Project; thus, the additional work is not ancillary to the Project and is not described further in this Analysis.

The current cost estimate for the Project is approximately $52.7 million (2021 dollars) and is presented at the -25%/+25% estimate level. This includes $13.9 million for construction of National Grid's portion of the New Line, $36.6 million for construction of Eversource's portion of the New Line and $2.2 million for the Station Work at the three stations identified herein.

1.7 Construction Overview

This section provides an overview of proposed construction methods, which are discussed in more detail in Section 5 of this Analysis. The New Line will generally be constructed on self-weathering or galvanized steel H-frame and monopole structures directly embedded into the ground. Structures located at angle points, dead-end structures, and certain select structure locations within the ROW will consist of self-supported steel pole structures on concrete caisson foundations.

Two short sections of underground cable totaling approximately 600 linear feet will be installed to avoid multiple overhead line crossings at the Industrial Park Tap and High Hill Switching Station. These underground cable sections will be installed within the limits of Eversource's existing overhead transmission line ROW easement.

Generally, there are seven phases of construction for an overhead transmission line project: (1) survey and removal of vegetation, tree clearing, and ROW mowing in advance of construction; (2) installation of soil erosion and sediment controls; (3) construction of access roads, road spurs and access road improvements; (4) construction of equipment work pads and construction staging areas; (5) installation of foundations and transmission structures; (6) installation of overhead conductor, optical ground wire ("OPGW"), and shield wire; and (7) restoration and stabilization of the ROW. Several different phases of construction may be ongoing simultaneously in different sections of the route. The various construction activities occur as a progression of work activities along the ROW and each transmission structure location will be visited intermittently to complete each phase of construction.

The construction phase for the two short sections of proposed underground cable installation will include: (1) installation of soil erosion and sediment controls; (2) trenching and duct bank installation, including communication handholes; (3) cable pulling; (4) testing and commissioning; and (5) final restoration. Due to the installation of transition structures, no manholes are required for the underground cables to be installed along the Preferred Route. Each phase of underground construction is described further in Section 5.3.2.

Restoration and stabilization of the ROW will occur after construction of the overhead and underground facilities. Each sequence of construction is described in detail in Section 5.3.1.

1.8 Agency and Community Outreach

Eversource and National Grid are committed to working with municipal officials, local businesses, residents, and other interested stakeholders to provide proactive and transparent communication throughout the life of the Project. The Companies' initial outreach efforts have been aimed at briefing local officials and other stakeholders on the need for the Project; providing stakeholders details regarding the Project route; detailing the overall Project schedule; and explaining the permitting and siting processes, including opportunities for public input. The Companies will continue these efforts during the licensing and permitting process and will maintain a focused communications program throughout construction. This outreach program is designed to engage the community, foster public participation, and solicit feedback from stakeholders.

Key elements of the Companies' outreach program are described below.

Open Houses: The Companies held four Open Houses to introduce the need for and the benefits of the Project. All Open Houses were held in interactive settings that provided the public with opportunities to speak with subject matter experts, ask questions, and share concerns about the Project. In-person Open Houses were held on September 26, 2018, in Acushnet, Massachusetts, and on September 27, 2018, in Dartmouth, Massachusetts. Virtual Open Houses were held on June 29, 2021, and July 8, 2021. At each Open House, the Companies provided a Project overview with a focus on the need, the benefits, the siting process, route selection criteria, identified potential routes, location, design, schedule, anticipated construction activities, as well as a summary of participation opportunities for all interested persons.

In preparation for the 2021 virtual Open Houses, the Companies actively sought meaningful conversations with all interested stakeholders, including residents of environmental justice ("EJ") populations by creating and mailing trilingual invitations (featuring, in equal parts: English, Spanish, and Portuguese) to all property owners along the Project route in each city/town as well as the corresponding municipal officials. The invitation also included a QR code that provided instant access to each virtual Open House via a simple scan using any smartphone/device. Newspaper advertisements for the Open Houses were published in *The Chronicle* (weekly newspaper of Dartmouth and Westport), *The Standard Times* (daily newspaper for the South Coast area, including Fall River and New Bedford), *The Herald News* (daily newspaper for the South Coast area, including Fall River and New Bedford), and *O Jornal* (weekly Portuguese and English language newspaper for Southeastern Massachusetts). The Open Houses were also advertised on-line at www.southcoasttoday.com.

During each virtual Open House, the presentation material was narrated in English with live, simultaneous Portuguese and Spanish interpretation. This was made possible by having four experienced professional interpreters at the virtual Open House—two in the Portuguese meeting room and two in the Spanish meeting room—to provide smooth, continuous coverage of the Open House. The interpreting was bi-directional with the dominant amount from English into Portuguese and Spanish. To achieve the best possible experience for the virtual Open House attendees, the Companies sent a prepared tri-lingual presentation to all interpreters so that they had sufficient opportunity to familiarize themselves with the content and resolve any questions/concerns prior to the virtual Open Houses.

Websites: There are two Project websites. Each company hosts its own Project website, and cross links to the other. The Eversource website is https://www.eversource.com/content/nh/about/projects-infrastructure/projects/massachusetts-transmission-projects/acushnet-to-fall-river-reliability-project; the National Grid website is www.southcoastreliabilityprojects.com/Acushnet-FallRiver/index.html. Both websites provide basic Project information, maps, regular updates, and contact information. The websites will be maintained and updated for the duration of the Project.

Project Hotlines: Eversource has a toll-free number (1-800-793-2202) designated as the Project hotline; National Grid has a dedicated toll-free number (1-833-233-7277) for the Project, as well. Both Project hotline numbers are or will be included in all Project outreach materials, including fact sheets, subsequent mailings, the websites, and at all community events. Eversource and National Grid commit to responding promptly to all inquiries received via the Project hotlines.

Project Emails: Eversource has designated ProjectInfo@Eversource.com as its Project email address; National Grid has designated info@southcoastreliabilityprojects.com as its Project email address. Both email addresses are and will be included in all Project outreach materials, including fact sheets, subsequent mailings, the websites, and at all community events. As with the hotline, Eversource and National Grid commit to responding promptly to all inquiries received via the Project emails.

Multilingual Materials: Select materials, including a fact sheet and a map, are available in English, Portuguese, and Spanish. The Project websites will provide content in English, Portuguese, and Spanish. Additionally, the virtual Open Houses, held in June and July of 2021, included a tri-lingual presentation that featured content in English, Portuguese, and Spanish along with live interpretation and chat option.

Municipal and Stakeholder Briefings: The Companies have met with municipal officials and other stakeholders in Acushnet, Dartmouth, Fall River and New Bedford, Massachusetts. A list of outreach meetings with the municipalities, regulatory agencies and other officials is provided in Table 1-1.

TABLE 1-1 PROJECT OUTREACH MEETINGS

DATE/LOCATION	GROUP	TOPIC
March 27, 2018	Natural Heritage and Endangered Species Program ("NHESP")	Introduction to the Project, review of scope of work in rare species habitat.
April 27, 2018	Fall River: City Planner, City Engineer, Superintendent for Fall River Water Department, Special Projects/ Media Rep., Building Inspector	Introduction to the Project, review of scope of work for Bell Rock Substation and Acushnet to Fall River Reliability Project.
June 21, 2018	NHESP	Coordination regarding Project activities in rare species habitat.
June 27, 2018	Executive Office of Environmental Affairs ("EEA"), Massachusetts Environmental Policy Act ("MEPA") Office	Introduction to the Project, review of scope of work.
July 11, 2018	Dartmouth: Building Inspector, Director of Development, Town Administrator, Fire Chief, Engineer Dept. of Public Works, Environmental Coordinator	Introduction to the Project, scope of work to be done in town.
July 13, 2018	New Bedford: Commissioner Dept. of Public Infrastructure, Deputy Commissioner Dept. of Public Infrastructure	Introduction to the Project, scope of work to be done in town.
July 17, 2018	Massachusetts Department of Conservation and Recreation	Introduction to the Project and review of scope of work.
July 17, 2018	Massachusetts Department of Environmental Protection	Introduction to the Project, review of scope of work in relation to water resources.
July 23, 2018	Dartmouth Board of Selectman	Introduction to the Project, scope of work to be done in town.
August 7, 2018	United States Army Corps of Engineers ("USACE")	Introduction to the Project, review of scope of work in relation to water resources.
August 21, 2018	Acushnet: Town Administrator, Dept. of Public Works ("DPW") Business Manager, Police Chief, Conservation Agent, Building Inspector	Introduction to the Project, scope of work to be done in town.
September 11, 2018	Acushnet Board of Selectman	Introduction to the Project, scope of work to be done in town.
September 26, 2018	Acushnet: Open House	In-person Open House to inform public of the Project.
September 27, 2018	Dartmouth: Open House	In-person Open House to inform public of the Project.
September 28, 2018	NHESP	Coordination and Project updates for activities within rare species habitat.
November 27, 2018	EEA MEPA Unit	MEPA Site Review
November 15, 2019	Fall River: City Engineer	Project status update
January 28, 2020	Fall River: City Utilities, Traffic & Parking Control, City Engineer, City Water Dept.	Project status update

DATE/LOCATION	GROUP	TOPIC
September 9, 2020	Fall River: City Engineer	Project status update
November 19, 2020	Fall River: City Engineer	Project status update
February 4, 2021	Fall River: City Engineer	Project status update
March 24, 2021	NHESP	Follow up meeting to re-introduce the Project, to discuss Conservation and Management Plan ("CMP") and mitigation.
April 20, 2021	USACE	Follow up meeting to re-introduce the Project, discuss Pre-Construction Notification ("PCN") application and mitigation.
May 10, 2021	Fall River: City Engineer	Project status update
May 13, 2021	Acushnet: Town Administrator, Executive Administrative Assistant to Town Administrator, Fire Chief, Police Chief, Police Sargent, DPW Director, DPW Business Manager	Project re-introduction and status update.
May 17, 2021	Dartmouth: DPW Director, Fire Chief (District 3), Police Sargent	Project re-introduction and status update.
June 3, 2021	New Bedford: Dept. of Public Infrastructure Commissioner	Project re-introduction and status update.
June 29, 2021	Acushnet, New Bedford, Dartmouth, Fall River, Freetown	Virtual Open House to inform public of the Project.
July 8, 2021	Acushnet, New Bedford, Dartmouth, Fall River, Freetown	Virtual Open House to inform public of the Project.
December 20, 2021	Fall River: City Mayor, City Engineer, City Water Dept., City Utilities, Police Chief	Project status update

Construction Community Outreach Plan: The Companies will execute a comprehensive construction community outreach plan to keep property owners, businesses, and municipal officials, including fire, police, and emergency personnel, updated on planned construction activities. The Companies will notify abutting property owners and municipal officials of their planned construction start date and work schedule prior to commencing construction and will work closely with both groups to limit construction impacts. In addition to the Project website and hotline, this outreach plan will include:

- In-person pre-construction briefings with municipalities and other stakeholder groups.
- Regular e-mail updates to municipal officials.
- Periodic letters to abutters and other stakeholders regarding advance notice of scheduled construction activities and/or milestone construction activities.
- Opportunity to sign up for email updates by scanning a QR code.
- Work area signage as appropriate.
- Meeting with affected property owners prior to each major stage of construction.

1.9 MEPA Status

The Companies submitted an Expanded Environmental Notification Form ("EENF") to the MEPA Office on November 15, 2018 (see Appendix 1-1). On November 21, 2018, the MEPA Office published notice of the EENF for public review in the *Environmental Monitor*, stating that public comments would be due on

December 21, 2018. On December 28, 2018, the Secretary of Energy and Environmental Affairs issued a Certificate ("Certificate") on the EENF filed with the Massachusetts Environmental Policy Act Unit for the Bell Rock Substation Rebuild Project and the Acushnet to Fall River Reliability Project (EEA No. 15941). The Secretary issued a Phase 1 Waiver for the Bell Rock Substation Rebuild Project to allow the reconstruction and expansion of the station to proceed to permitting prior to completion of the Environmental Impact Report for the AFRRP. The Secretary scoped the AFRRP for the preparation of a Single Environmental Impact Report ("SEIR"). A Draft Record of Decision was also issued by the Secretary on December 28, 2019, and the public comment period ended on January 23, 2019. The Secretary issued the Final Record of Decision on January 25, 2019. Copies of the Secretary's Certificate on the EENF, Draft Record of Decision and Final Record of Decision are contained in Appendix 1-2.

The MEPA Office has recently issued new regulations as well as EJ outreach protocols which become effective on December 24th, 2021 and January 1, 2022, respectively. While the AFRRP EENF filing was submitted prior to the establishment of these regulations, as documented above, the Companies have taken steps to promote public involvement by EJ populations, including the use of multi-lingual project fact sheets, website content, meeting invitations and providing translation services for the 2021 Open House presentations in Spanish and Portuguese (both in writing and in-person).

The Companies are actively preparing the SEIR to address Project updates and the items scoped by the Secretary in the Certificate. The Companies will also comply with any applicable new EJ regulations and/or protocols and will coordinate with the MEPA office regarding ongoing outreach and communications to EJ populations within one mile of the Project during the SEIR review process.

1.10 Project Team

The Companies have assembled a capable team of planners, engineers, environmental scientists, attorneys, and project outreach specialists for the Project. The team's principal organizations are outlined below.

NSTAR Electric Company d/b/a Eversource Energy (Project Proponent)

NSTAR Electric Company is a Massachusetts corporation and a wholly-owned subsidiary of Eversource Energy, which operates New England's largest energy delivery system. The Company transmits and delivers electricity to approximately 1.2 million electric customers in Boston and 80 surrounding cities and towns in Massachusetts, covering an area of approximately 1,700 square miles.

New England Power Company d/b/a National Grid (Project Proponent)

New England Power Company is a Massachusetts corporation doing business as National Grid. New England Power is a wholly-owned subsidiary of National Grid USA, which is itself a wholly-owned subsidiary of National Grid plc. New England Power Company is a transmission affiliate of National Grid plc and owns and operates approximately 6,000 miles of interconnected electrical infrastructure in the Commonwealth of Massachusetts.

Keegan Werlin LLP (Outside Counsel)

Keegan Werlin LLP, based in Boston, serves as regulatory counsel for the Project on siting, permitting, and licensing matters. The firm specializes in representing clients in all aspects of energy, environmental and regulatory processes. Keegan Werlin's attorneys include former utility regulators and attorneys from energy, environmental and resource management agencies. Attorneys in the firm have represented transmission companies and project developers in numerous applications to the Siting Board, Department

and other permitting agencies for approval to construct electric transmission lines, bulk generating facilities and natural gas pipelines.

POWER Engineers (Environmental and Engineering Consultants)

POWER Engineers, a professional services corporation, is an affiliate of POWER Engineers, Inc., and is registered as a foreign corporation in New York, Massachusetts, North Carolina, and Michigan in order to satisfy engineering licensing requirements in those states. For the AFRRP, POWER Engineers provided local, state, and federal environmental permitting support for Eversource and National Grid; as well as engineering design and services for the National Grid portion of the Project.

TRC Companies, Inc. (Engineering Consultants)

TRC Companies, Inc. is a national engineering, environmental consulting and construction management firm providing integrated services to the power, environmental, infrastructure, oil, and gas markets. With more than 120 offices in the United States ("U.S.") and the UK, along with steady growth through mergers and acquisitions. For the AFRRP, TRC provided engineering design and services for the Eversource portion of the Project.

Exponent Inc.

Exponent Inc., based in New York City, is a multidisciplinary organization of scientists, physicians, and engineers that performs in-depth investigations including evaluation of complex human health and environmental issues. Exponent Inc. has been contracted to assess the effect of the Project on Electric Magnetic Field ("EMF") levels at the edge of the ROW and Project vicinity. The analysis also summarizes current research on exposure to EMF and health, and includes an assessment of Project compliance with exposure guidelines and regulatory guidance.

The Public Archaeology Laboratory, Inc.

The Public Archaeology Laboratory, Inc. ("PAL"), based in Pawtucket, Rhode Island, is a cultural resource management organization providing a wide range of expertise and experience in regulatory compliance, archaeological and historical background research, and field testing. PAL performed the archaeological and historical resources studies for the Project.

1.11 Conclusion

The Project will address critical reliability issues affecting the existing transmission system. The Companies seek authority to construct the Project to fulfill their obligations to ensure safe and reliable transmission service to their customers. The Companies will meet this objective through construction and operation of the Project. For the reasons described in greater detail in the subsequent sections of this Analysis, the Project conforms to the Siting Board's standards on need, reliability, alternatives, routing, minimization of environmental impacts and costs, and consistency with the Commonwealth's policies under G.L. c. 164, § 69J, and therefore, should be approved by the Siting Board.

2.0 PROJECT NEED

2.1 Introduction

The Eversource and National Grid transmission systems are integral parts of the regional power system delivering electricity to customers throughout New England. To maintain the integrity of this system, the Companies must ensure that adequate transmission capacity exists to meet existing and projected load requirements. As transmission providers, Eversource and National Grid must also maintain their respective systems consistent with the reliability standards and criteria developed by: (1) NERC, which sets the minimum standards for electric power transmission for all North America; (2) NPCC; (3) ISO-NE; and (4) the Companies themselves. These reliability standards and criteria expressly require transmission owners, planners, and operators to design and test their systems to withstand representative contingencies as specified in the criteria. The design adequacy is demonstrated by computer simulation of system performance under these representative contingencies. If the area transmission system does not have sufficient capability to serve forecasted load under the conditions specified in these reliability criteria, the Companies must plan and implement system additions and upgrades to address the identified performance issues and remain in compliance with the standards.

The need for the Project was first identified in ISO-NE's "Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study" ("2026 Solutions Study"), issued in March 2017 and provided as Appendix 2-1. The continuing need for the Project was confirmed in ISO-NE's "Southeastern Massachusetts and Rhode Island Area 2029 Needs Assessment Update" ("2029 Needs Update"), issued in November 2020 and based on ISO-NE's 2020 Capacity, Energy, Loads and Transmission ("CELT") Report forecasts. The 2029 Needs Update is provided as Appendix 2-2. The Companies are making this Application in accordance with ISO-NE's directive to "bring the identified projects to completion" (2029 Needs Update).

As more fully described below, the Project addresses the potential for thermal overloads on Eversource's 115-kV 111 and 112 Lines following an N-1-1[4] contingency by providing an additional 115-kV transmission path running in parallel with these two lines within the same ROW. The Project also resolves emerging voltage concerns, including low voltages[5] at multiple 115-kV stations in the load pocket and the potential for widespread voltage collapse following an N-1-1 contingency at load levels not much higher than the 2020 and 2021 actual peak loads. In so doing, the Project supports continued compliance with applicable federal and regional transmission reliability standards and criteria and maintains reliable electric service to the Southeastern Massachusetts and Rhode Island area.

2.2 Description of Existing Transmission System – Load Pocket Area

The Project will reinforce the electric transmission system serving portions of Massachusetts and Rhode Island between Buzzards Bay and Narragansett Bay. The electrical substations and the municipalities included in this area of the system are listed in Table 2.1 and Table 2.2, respectively. Eversource's substations and municipalities are shaded in green; National Grid's are not shaded.

[4] An N-1-1 contingency refers to the occurrence of an initial contingency, followed by system adjustments to prepare for a second contingency, and then the occurrence of a second contingency.

[5] Low voltage refers to a voltage level that is below the acceptable voltage criteria. For purposes of this review, bus voltages of less than 0.85 p.u. are assumed to result in voltage collapse.

TABLE 2-1 ELECTRICAL SUBSTATIONS

SUBSTATION	VOLTAGE
Acushnet	115 kV
Arsene	115 kV
Bates Street	115 kV
Bell Rock	115 kV
Cross Road	115 kV
Crystal Springs	115 kV
Dartmouth	115 kV
Dexter	115 kV
Fisher Road	115 kV
High Hill	115 kV
Industrial Park	115 kV
Jepson	115 kV
Pine Street	115 kV
Rochester	115 kV
Tremont	115 kV
Tiverton	115 kV
Wing Lane	115 kV
Gate	69 kV
Navy	69 kV
Newport	69 kV

TABLE 2-2 MUNICIPALITIES

TOWNS SERVED	STATE
Acushnet	MA
Dartmouth	MA
Fairhaven	MA
Fall River	MA
Freetown	MA
Marion	MA
Mattapoisett	MA
New Bedford	MA
Rochester	MA
Westport	MA
Jamestown	RI
Little Compton	RI
Middletown	RI
Newport	RI
Portsmouth	RI
Tiverton	RI

Figure 2-1, below, shows a transmission system one-line diagram, and Figure 2-2 shows a transmission system geographical map for the area. As shown in the figures, this area is served from the east by 115-kV lines extending from Eversource's Tremont Substation, and from the west by 115-kV lines extending from

National Grid's Pottersville Substation.[6] For purposes of this filing, the area will be referred to as the "Load Pocket."

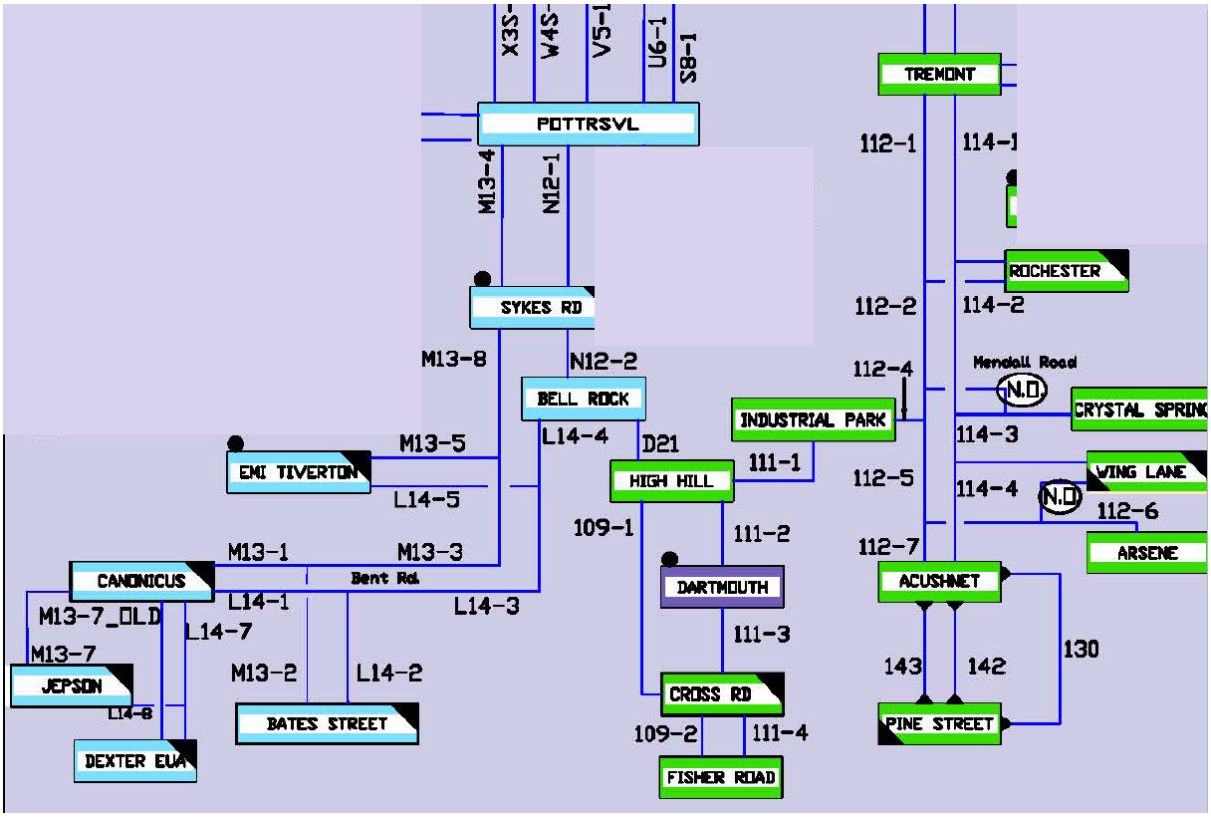
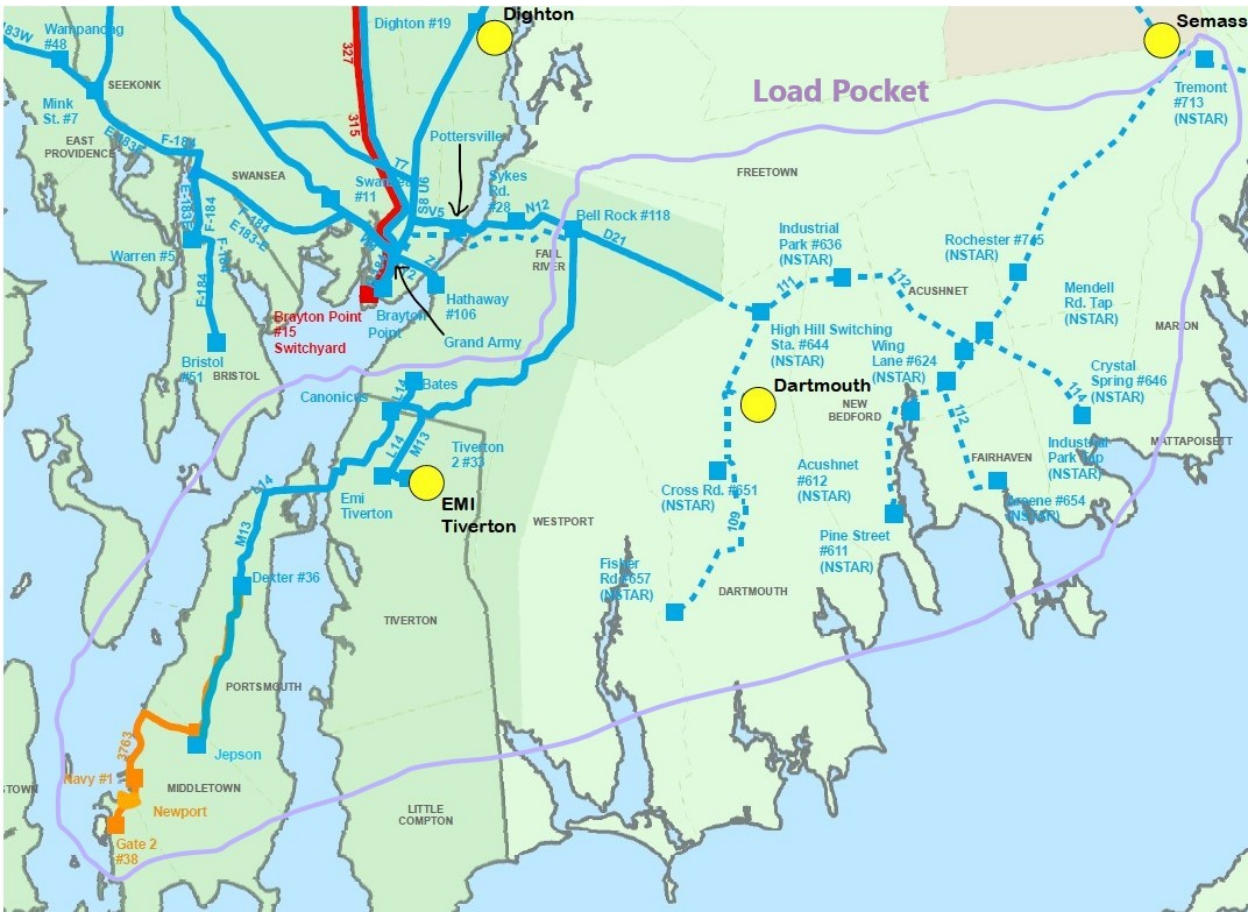


FIGURE 2.1 LOAD POCKET TRANSMISSION SYSTEM ONE-LINE

[6] Pottersville Substation was formerly known as Somerset Substation. The name was changed when the substation was completely rebuilt as a part of a National Grid Asset Condition improvement project.



* Color Key: Red 345 kV, Blue 115 kV, Orange 69 kV; Solid lines are owned by National Grid; dashed lines are owned by Eversource

FIGURE 2.2 LOAD POCKET TRANSMISSION SYSTEM MAP

As shown in the figures, National Grid's N12 Line runs between its Pottersville and Bell Rock Substations, serving the Load Pocket from the west. National Grid's M13 Line runs between National Grid's Pottersville and Dexter Substations and, while the line passes through Bell Rock Substation, it does not currently interconnect there. The N12 and M13 lines share a ROW between Pottersville and Bell Rock and are currently double-circuited, i.e., share the same transmission tower, for a portion of the ROW between Pottersville and Sykes Road Substations.

Eversource's Line 112 runs between its Tremont, Industrial Park, and Acushnet Substations, serving portions of the Load Pocket from the east. From the Industrial Park Substation, Line 111 continues to High Hill Switching Station and then, along with Line 109, extends south to serve Cross Road and Fisher Road Substations. The D21 Line extends west from High Hill Switching Station to Bell Rock Substation. Eversource's Line 114 runs between its Tremont Substation and Acushnet Substation, also serving the Load Pocket from the east. Lines 112 and 114 share a ROW from the Tremont Substation to Acushnet Substation.

2.3 Transmission Planning Standards

Eversource and National Grid must adhere to reliability standards and criteria that are established by NERC, which has national authority to ensure the reliability of transmission systems across most of North America. NERC oversees a number of regional councils, including NPCC, which covers New York, New England and eastern Canada. Within NPCC, New England is a "control area" subject to the supervision and control

of ISO-NE, which has responsibility for dispatching generation and for conducting the day-to-day operation of the integrated transmission system. The standards established by NERC, NPCC and ISO-NE have been developed to ensure that the electric power system serving New England, including the Eversource and National Grid service territories, is designed, constructed and maintained to provide adequate and reliable electric power to the region. NERC establishes a general set of rules and criteria applicable to all geographic areas. NPCC establishes a set of rules and criteria that are particular to the northeast, and also encompass the more general NERC standards. In turn, ISO-NE develops standards and criteria that are specific to New England but are also coordinated with NPCC and NERC.

The Companies are required to comply with the following reliability and planning standards when planning the transmission system:

- NERC TPL-001-4 Transmission System Standards.
- NPCC Regional Reliability Reference Directory # 1, "Design and Operation of the Bulk Power System."
- ISO-NE Planning Procedure 3 ("Planning Procedure 3" or "PP3"), "Reliability Standards for the New England Pool Transmission Facilities."
- ISO-NE Planning Procedure 5-3, "Guidelines for Conducting and Evaluating Proposed Plan Application Analyses."

2.4 ISO-NE Planning Process

In administering the regional system planning process, ISO-NE has a number of responsibilities relating to transmission resources. ISO-NE's primary functions are to: (1) conduct periodic needs assessments on a system-wide or specific-area basis, as appropriate; and (2) develop an annual regional transmission plan using a 10-year planning horizon.

Needs assessments are designed to identify future system needs on the regional transmission system, or within a subarea of the system, with consideration of available market solutions. Needs assessments examine various aspects of system performance and capability, identify the timing and details of system needs, and analyze whether pool transmission facilities ("PTFs") in the New England transmission system: (1) meet applicable reliability standards; (2) have adequate transfer capability to support local, regional and inter-regional reliability; (3) support the efficient operation of the wholesale electric markets; and (4) are sufficient to integrate new resources and loads on an aggregate or regional basis. Needs assessments identify the location and nature of any potential problems with respect to PTFs and situations that significantly affect the reliable and efficient operation of the PTFs, along with any critical time constraints for addressing the specified needs to facilitate the development of market responses and the pursuit of a regulated transmission solution.

The ISO-NE annual 10-year transmission plan is referred to as the Regional System Plan ("RSP"). The Companies' planning processes are integrated with and coordinated by ISO-NE as part of its regional planning process and RSP.

The RSP represents a compilation of the regional system planning process activities conducted by ISO-NE and stakeholders during a given year and presents the results and findings of the ongoing ISO-NE regional planning process. The RSP addresses system needs and deficiencies as determined by ISO-NE through its periodic needs assessments, with updates occurring on a going forward basis to: (1) account for changes in

PTF system conditions; (2) ensure reliability of the transmission system; (3) comply with national and regional planning standards, criteria and procedures; and (4) account for market performance and economic, environmental and other considerations. The regional planning process is carried out by ISO-NE as part of an open and transparent stakeholder process involving the New England Power Pool ("NEPOOL") Reliability Committee, the Environmental Advisory Group and the Planning Advisory Committee ("PAC"). Membership in the PAC includes market participants, public utility commissions, consumer advocates and Attorneys General, environmental regulators and other interested parties. The PAC provides input and feedback to ISO-NE regarding the regional system planning process including, in the context of the development and review of needs assessments, the preparation of solution studies and the development of the RSP. Specifically, the PAC serves to review and provide input on: (1) the development of the RSP; (2) assumptions for studies performed; (3) the results of needs assessments and solutions studies; and (4) potential market responses to the needs identified by ISO-NE through a needs assessment or the RSP. Based on input and feedback provided by the PAC, ISO-NE refers issues and concerns to the appropriate technical committees for further investigation and consideration of potential changes to rules and procedures.

Therefore, for major transmission upgrades, the regional transmission planning process includes the following steps: (1) system needs are identified through a periodic needs assessment undertaken by ISO-NE subject to stakeholder review and input; (2) regulated transmission solutions are suggested to meet identified system needs; (3) solution studies are prepared to identify the most cost-effective regulated transmission solution; (4) proposed regulated transmission solutions are reviewed and approved by ISO-NE; and (5) a transmission cost allocation review is conducted.

2.5 The 2026 SEMA-RI (Southeastern Massachusetts and Rhode Island) Area Study

ISO-NE led a needs assessment study to evaluate the performance of the transmission system serving SEMA-RI under the reliability standards listed in Section 2.3, to determine if the system meets the reliability compliance requirements. The results of the study were documented in the SEMA-RI Needs Assessment ("2026 Needs Assessment"), which is provided as Appendix 2-3. As documented in the 2026 Solutions Study (provided as Appendix 2-1) that followed the 2026 Needs Assessment, the Project was included in a suite of projects required to address the needs in the Load Pocket.

2.6 The ISO-NE 2029 Needs Update

The 2026 Needs Assessment and 2026 Solutions Study relied on load forecasts from the 2015 CELT report. Since the time of the 2026 Needs Assessment, new CELT forecasts have been published. In general, the newer forecasts project lower load growth and greater energy efficiency and distributed generation than did the 2015 CELT Report.

Consequently, in 2020, ISO-NE undertook the 2029 Needs Update to re-evaluate the solution components from the 2026 Solutions Study that had not yet started construction, to determine which solution components would still be needed to solve any criteria violations identified in the SEMA/RI study area for the year 2029. The 2029 Needs Update considered the following:

- Future load conditions as presented in the 2020 CELT forecast.
- Reliability over a range of generation patterns and transfer levels, similar to those used in the SEMA/RI 2026 Needs Assessment.
- Resource changes in the study area based on Forward Capacity Auction 13 results.

- Retirement of the Mystic 8 and 9 generators.
- All applicable NERC, NPCC and ISO-NE transmission planning reliability standards.

Solution components from the 2026 Solutions Study that were under construction or in service at the start of the 2029 Needs Update were assumed in service in the cases, while those that were not yet in construction were excluded from the cases in order to have their need reevaluated. Table 2.3 shows the Load Pocket solution elements that were reevaluated in the study, including the Project (Project IDs 1722 and 1730).

TABLE 2-3 LOAD POCKET SOLUTIONS REEVALUATED IN 2029 NEEDS UPDATE

PROJECT ID	PROJECT DESCRIPTION
1720	Separate the N12/M13 DCT ("double-circuit tower") and reconductor the N12 and M13 lines between Somerset and Bell Rock substations
1722	Extend Line 114 – Eversource/National Grid border to Bell Rock
1730	Extend Line 114 – Eversource/National Grid border to Industrial Park tap
1721	Install a 37.5-megavolt ampere reactive ("MVAR") capacitor at Bell Rock, reconfigure Bell Rock to breaker-and-a-half station, split the M13 line at Bell Rock substation, and terminate 114 line at Bell Rock; install a new breaker in series with N12/D21 tie breaker, and upgrade D21 line switch
1731	Install a 35.3 MVAR capacitor at High Hill substation and install a 35.3 MVAR capacitor at Wing Lane substation
1723	Reconductor L14 and M13 lines from Bell Rock substation to Bates Tap

The 2029 Needs Update identified thermal overloads in the Load Pocket area under both N-1 and N-1-1 contingencies. These overloads are listed below in Tables 2.4 and 2.5.

TABLE 2-4 2029 NEEDS UPDATE: N-1 THERMAL RESULTS

ELEMENT ID	ELEMENT	LTE RATING (MVA)	% LTE LOADING
112-4	Industrial Park Tap to Industrial Park	246	153.7
111-1	High Hill to Industrial Park	243	138.7
L14-3	Bent Rd to Tiverton	210	119.0
L14-4	Bell Rock to Tiverton	250	111.8
L14-7	Canonicus to Dexter W	165	101.8

Notes: LTE = Long-time Emergency; MVA = megavolt ampere.

TABLE 2-5 2029 NEEDS UPDATE: N-1-1 THERMAL RESULTS

ELEMENT ID	ELEMENT	LTE RATING (MVA)	% LTE LOADING
112-1	Tremont N. to Rochester	357	138.2
112-2	Rochester to Crystal Tap	357	137.3
112-3	Industrial Park Tap to Crystal Tap	357	137.3
112-4	Industrial Park Tap to Industrial Park	246	155.3
111-1	High Hill to Industrial Park	243	139.8
L14-3	Bent Rd to Tiverton	210	120.4
L14-4	Bell Rock to Tiverton	250	112.8
L14-7	Canonicus to Dexter W	165	103.6
N12-1	Somerset to Sykes Road	284	125.9
N12-2	Sykes Rd to Bell Rock	284	115.2
M13-4	Somerset to Sykes Road	284	129.8
M13-8	Tiverton to Sykes Road	250	134.9

Notes: LTE = Long-time Emergency; MVA = megavolt ampere.

The 2029 Needs Update also identified low voltage issues in the Load Pocket area under N-1 and N-1-1 contingencies. These low voltages are listed in Tables 2.6 and 2.7.

TABLE 2-6 2029 NEEDS UPDATE: N-1 VOLTAGE RESULTS

BUS NAME	BASE KV	VOLTAGE (P.U.)[1]
Jepson	115	0.672
Wing Lane	115	0.884
High Hill	115	0.796
Dexter W	115	0.676
Bell Rock	115	0.758
Industrial Park	115	0.822

Notes: kV = kilovolt.
[1]p.u. stands for per unit, which equals percentage divided by 100; for the Load Pocket, voltage < 0.95 p.u. violates Eversource criteria, while voltage < 0.90 p.u. violates National Grid criteria. For purposes of this discussion, voltage levels at one or more area buses less than 0.85 p.u. are assumed to cause voltage collapse.

TABLE 2-7 N-1-1 VOLTAGE RESULTS

Bus Name	Base kV	Voltage (p.u.)
Jepson	115	0.584
Wing Lane	115	0.760
High Hill	115	0.692
Dexter W	115	0.588
Bell Rock	115	0.659
Industrial Park	115	0.716

Notes: kV = kilovolt; p.u. = per unit.

The 2029 Needs Update further identified the potential for a consequential loss of 449 megawatts ("MW") of gross load in the Load Pocket area under N-1-1 contingencies. This load loss includes approximately 66,000 National Grid customers and 95,000 Eversource customers.

The ISO-NE performed a time-sensitivity analysis to determine whether the region has a need to address the reliability criteria violations within three years of the completion of the 2029 Needs Update. ISO-NE confirmed that all needs identified in the 2029 Needs Update were time-sensitive.

With the 2029 Needs Update concluding that the projects listed in Table 2.8 would solve the confirmed needs in the Load Pocket area, ISO-NE directed Eversource and National Grid to bring these projects to completion.[7] The confirmed projects include the Project (Project ID 1722 and 1730) proposed herein by the Companies.

TABLE 2-8 LOAD POCKET PROJECTS TO BE RETAINED

PROJECT ID	PROJECT DESCRIPTION
1720	Separate the N12/M13 DCT and reconductor the N12 and M13 lines between Somerset and Bell Rock substations[1]
1722	Extend Line 114 – Eversource/National Grid border to Bell Rock
1730	Extend Line 114 – Eversource/National Grid border to Industrial Park tap

[7] Project 1723 (Reconductor L14 and M13 lines from Bell Rock Substation to Bates Tap) was not found to be needed and thus was not retained.

PROJECT ID	PROJECT DESCRIPTION
1721	Install a 37.5 MVAR capacitor at Bell Rock, reconfigure Bell Rock to breaker-and-a-half station, split the M13 line at Bell Rock substation, and terminate 114 Line at Bell Rock; install a new breaker in series with N12/D21 tie breaker, and upgrade D21 line switch
1731	Install a 35.3 MVAR capacitor at High Hill substation and install a 35.3 MVAR capacitor at Wing Lane substation

[1] The N12/M13 DCT separation and reconductoring project (Project 1720) addresses different contingencies and is geographically distinct from the Project; therefore, it will be presented separately to the Department of Public Utilities pursuant to G.L. c. 164, § 72.

2.7 Additional Needs Analysis Performed by Eversource and National Grid

To address the changing load forecasts and inconsistency with observed actual loads (see Section 2.7.1), and to serve as a basis for an updated alternatives analysis (since ISO-NE did not issue an updated Solutions Study report), Eversource and National Grid analyzed the performance of the transmission system with all required SEMA-RI upgrades in place except for the Project (ID 1722 and 1730) under: (1) two distinct 2031 load forecast scenarios; and (2) two scenarios representing weather-normalized peak loads experienced in 2020 and 2021. Under each of these additional scenarios, the Companies' analyses confirm that the need for the Project remains.

2.7.1 Load Forecast Scenarios

For consistency with the traditional 10-year horizon used for planning purposes, the Companies examined 2031 load projections for two different net peak load forecasts for the Load Pocket -- (1) the 2021 ISO-NE CELT Forecast; and (2) a forecast that combines internal National Grid and Eversource forecasts for substations within the Load Pocket ("Companies' Forecast").

Table 2.9, below, presents the projected 90/10[8] net load level for the year 2031 for each forecast.

TABLE 2-9 LOAD FORECAST SCENARIOS ANALYZED

LOAD SCENARIO	EVERSOURCE	NATIONAL GRID	TOTAL LOAD
2021 CELT 2031 Forecast	186	217	403
Companies' 2031 Forecast	319	236	555

As illustrated above, there are significant differences between the total loads forecasted by ISO-NE and the Companies, which influence the size and scale of the need for the Project. Most of the difference between the ISO-NE CELT Forecast and the Companies' Forecast is attributable to loads projections for the Eversource portion of the Load Pocket. Table 2.10 below presents a more detailed breakdown of the differences between the Eversource and ISO-NE net load forecasts for the Load Pocket. As can be seen in Table 2.10, the ISO-NE forecast assumes substantially higher peak-hour contributions from both energy efficiency and photovoltaic distributed generation than does the Eversource forecast.

[8] 90/10 load forecast specifies a 10% probability that the forecast could be exceeded.

TABLE 2-10 EVERSOURCE AND ISO-NE 90/10 FORECAST COMPARISONS

EVERSOURCE					ISO-NE				
Year	Gross Load	EE	PV	Net Load	Year	Gross Load	EE	PV	Net Load
2022	298.7	-4.2	-3.5	290.9	2022	298.0	-30.7	-42.6	224.7
2023	301.3	-4.8	-4.0	292.5	2023	299.9	-32.6	-47.8	219.5
2024	303.3	-5.4	-4.1	293.7	2024	301.9	-34.4	-51.6	215.9
2025	305.1	-6.0	-4.1	295.0	2025	304.6	-37.9	-55.4	211.3
2026	307.1	-6.6	-4.1	296.4	2026	290.6	-39.3	-59.1	192.2
2027	309.3	-7.2	-4.1	298.0	2027	292.9	-41.9	-62.1	188.9
2028	311.7	-7.8	-4.1	299.8	2028	295.2	-44.0	-64.2	187.1
2029	314.2	-8.4	-4.1	301.7	2029	299.7	-45.8	-66.2	187.7
2030	316.9	-9.0	-4.1	303.8	2030	303.1	-47.1	-68.2	187.8
2031	318.7	-9.0	-4.1	305.6	2031	304.1	-47.7	-70.2	186.2

Notes: EE = Energy Efficiency; PV = photovoltaic.

A similar disparity between the ISO-NE and Eversource forecasts was examined extensively by the Department of Public Utilities (the "Department") in Docket No. D.P.U. 20-67. As explained during that proceeding, two major drivers of this disparity are: (1) the timing of the peak load, which affects the assumed levels of output from photovoltaic distributed generation in the load pocket; and (2) certain simplifying assumptions made by ISO-NE with respect to the physical location of certain photovoltaic resources and energy efficiency measures. These same factors have created a gap between ISO-NE and Eversource forecasts for the Load Pocket.

With respect to the timing of peak load, ISO-NE examines peak load at the hour coincident with the time of the regional system peak load. Since 2017, this coincident peak has occurred at the hour ending 17:00 or 18:00. Based on the timing of this coincident peak, ISO-NE assumes that the output of photovoltaic ("PV") distributed generation for which it has locational information (1.0 MW and above) is 26% at the time of peak.

In contrast, Eversource forecasts the SEMA region using actual Eversource SEMA coincident peak load values from the prior year as a baseline. This actual coincident peak load falls later in the day than the regional peak, and thus at a time when the PV output is much less significant. In recent years, the Eversource portion of the Load Pocket has peaked at or near the hour ending 19:00, at which time the output of PV distributed generation is approximately 9%. This results in a substantially lower contribution from PV distributed generation on peak.

In D.P.U. 20-67, Eversource also identified assumptions regarding the location of PV and energy efficiency ("EE") that contribute to the disparity in forecasts. For PV for which ISO-NE does not have locational information (less than 1.0 MW and future PV), ISO-NE allocates the statewide levels on a bus-by-bus basis proportional to the gross load at the buses. ISO-NE similarly allocates statewide projections of EE on a bus-by-bus basis, since locational information is not available. In both cases, this tends to lead to higher levels of PV and EE penetration in the Load Pocket than modeled by Eversource.

For the National Grid portion of the Load Pocket, the difference between the National Grid and the ISO-NE 2031 Load Pocket forecasts is 19 MW, or about 8%. This difference is attributable to similar factors, including more granular forecasts of peaks in specific load zones, and the use of Company-specific information and methodologies for forecasting energy efficiency, solar PV, electric vehicles, electric heat

pumps, energy storage, and Company-run demand response programs. Like Eversource, National Grid adjusts the assumed PV contribution based on the anticipated hour of peak load. In 2020, this part of National Grid's service territory peaked in the hour ending at 18:00, when the PV contribution is assumed to be 16% of nameplate). In 2021, this part of the service territory peaked in the hour ending at 19:00.

2.7.2 Comparison with Actual and Weather-Adjusted Loads

A comparison of ISO-NE forecasts with recent load data confirms that, even in the very short term, the CELT Forecast is not a good predictor of peak loads within the Load Pocket. Table 2.11 compares actual and weather-adjusted peak loads for 2020 and 2021 for the Load Pocket to the ISO-NE projected 2021 load from the 2020 CELT Report. As can be seen from Table 2.11, the 2021 CELT Forecast for the Load Pocket (450 MW) is well below the actual net peak loads experienced in the Load Pocket in both 2020 and 2021. It falls even further below the 2020 and 2021 weather-adjusted peak loads, which represent the net peak load that would have been expected had 90/10 weather been experienced in either year.

TABLE 2-11 NET PEAK LOADS (MW)

	2020 CELT	REAL TIME NET LOADS		WEATHER-ADJUSTED NET LOADS	
	2021 Forecast (90/10)	2020 Peak (8/28/2020)	2021 Peak (8/26/2021)	2020 Peak (8/28/2020)	2021 Peak (8/26/2021)
Eversource	230	275	257	300	278
National Grid	220	218	210	228	236
Total Load	450	493	467	528	514

Moreover, ISO-NE's forecasts show declining loads within the Load Pocket over time, resulting in a peak forecast of only 403 MW for the Load Pocket in 2031 – 111 MW, or 22%, lower than the 2021 weather-adjusted peak. This projection appears inconsistent with the Commonwealth's plans for increasing electrification within Massachusetts. The 2020 and 2021 Weather-Adjusted scenarios analyzed below show the anticipated transmission system impacts of 90/10 weather at present-day load levels.

2.7.3 Results of Scenario Analysis

Table 2.12 provides the thermal loading violations identified in the Companies' analyses for: (1) the 2031 ISO-NE forecast load based on the 2021 CELT; (2) the 2020 weather-adjusted peak load; (3) the 2021 weather-adjusted peak load; and (4) the Companies' 2031 internal forecast load. As shown in Table 2.12, large thermal overloads were observed on segments of Eversource's 115-kV Lines 111 and 112 for all instances under N-1-1 contingency conditions. These overloads will be addressed by the Project.

TABLE 2-12 N-1-1 THERMAL OVERLOADS

OVERLOADED ELEMENT	LTE RATING (MVA)	THERMAL LOADINGS (% LTE)			
		2031 ISO-NE Forecast (based on 2021 CELT)	2020 Weather-Adjusted Load	2021 Weather-Adjusted Load	2031 Companies' Forecast
		Load Pocket 403 MW	Load Pocket 528 MW	Load Pocket 514 MW	Load Pocket 555 MW
Industrial Park - Industrial Park Tap 115-kV (Line 112)	246	114%	148%	146%	N/A[1]

OVERLOADED ELEMENT	LTE RATING (MVA)	THERMAL LOADINGS (% LTE)			
		2031 ISO-NE Forecast (based on 2021 CELT)	2020 Weather-Adjusted Load	2021 Weather-Adjusted Load	2031 Companies' Forecast
		Load Pocket 403 MW	Load Pocket 528 MW	Load Pocket 514 MW	Load Pocket 555 MW
Industrial Park – High Hill 115-kV (Line 111)	243	107%	132%	132%	N/A

Notes: LTE = Long-time Emergency; MVA = megavolt ampere; MW = megawatt; kV = kilovolt.
[1]The thermal overloads for the 2031 Companies' Forecast scenario cannot be specified because the voltage collapses in the Load Pocket and the power flow case does not solve in the Companies' modeling.

Table 2.13 provides the voltage results for Companies' analyses for the same four instances shown in Table 2.12. The table shows acceptable voltages for the 2031 ISO-NE forecast load based on the 2021 CELT Report and for the 2020 and 2021 weather-adjusted peak loads. However, under N-1-1 conditions, the Companies' 2031 forecast load reveals that total voltage collapse[9] in the Load Pocket is a substantial risk. The risk of voltage collapse will also be fully addressed by the Project.

TABLE 2-13 N-1-1 VOLTAGE RESULTS

Load Pocket Buses	2031 ISO-NE Forecast (based on 2021 CELT)	2020 Weather-Adjusted Load	2021 Weather-Adjusted Load	2031 Companies' Forecast
	Load Pocket 403 MW	Load Pocket 528 MW	Load Pocket 514 MW	Load Pocket 555 MW
115-kV Bus Voltage	Acceptable	Acceptable, but approaching voltage collapse	Acceptable, but approaching voltage collapse	Voltage Collapse

Additional sensitivity analysis was performed in order to determine the minimum load levels within the Load Pocket that would result in low voltages and voltage collapse. These load levels are known as Critical Load Levels ("CLLs"). The CLLs are determined by scaling (increasing) the load from an initial load level to a level that results in low voltages and then voltage collapse. Using both the 2020 and 2021 weather-adjusted loads as starting points yields two different sets of CLLs. Based on these starting points, the low voltage CLL is in the range of 526-534 MW, while the voltage collapse CLL is in the range of 549-555 MW. The reason the CLLs vary depending on the starting load point is that the load distribution across the Load Pocket substations vary between the 2020 and 2021 weather-adjusted loads.[10]

To summarize, under all forecasts, N-1-1 contingencies could lead to thermal overloads on Eversource's 115-kV Lines 111 and 112; however, load levels just slightly higher than 2021 actual peak loads, adjusted for weather, could lead to low voltages and, at load levels consistent with the Companies' Forecast for 2031, complete voltage collapse. Voltage collapse would lead to the loss of service to as many as 161,000 electric customers across the 16 communities in the Load Pocket.

[9] Voltage collapse occurs when the power system is not electrically strong enough to support the amount of power that must be transferred into a load pocket to supply its electrical load. It can be thought of as a "breaking point." As the load in the pocket increases, the power transfer must also increase, which causes the voltage to drop. When the voltage drops, the power system becomes weaker. At a certain point, the system becomes so weak that it "breaks," as the voltage collapses and the power transfer ceases. When this happens, the electric load is dropped and the load pocket "blacks out."

[10] The differences in the load distributions are due to differences in load components across the substations or the additions of new "spot loads." The load components include gross load, energy efficiency, solar, and demand reduction. Spot loads are new large loads that could include a large shipping distribution center, a manufacturing facility, a hospital, etc.

2.8 Summary of Project Need

The need for the Project was first identified in the 2026 SEMA-RI Needs Assessment and was confirmed by ISO-NE in the recently issued 2029 Needs Update. In that update, ISO-NE also concluded that the need for the Project is time-sensitive and directed Eversource and National Grid to bring the Project to completion.

Additional load flow analysis conducted by the Companies confirms that the Project is required to avoid thermal overloading of 115-kV lines under two distinctly different load forecast scenarios and at weather-adjusted net load levels experienced in 2020 and 2021. The Companies' analysis also demonstrates the potential for voltage violations and voltage collapse for certain reasonably foreseeable load and contingency conditions. For these reasons, there is a strong and immediate need for the Project.

3.0 PROJECT ALTERNATIVES

3.1 Introduction

This section summarizes the alternatives analysis performed by the Companies to assess the means of meeting the thermal and voltage needs identified in Section 2. To address these needs, the Companies considered the following alternatives in addition to the Project:

- No-Action Alternative.
- An Undersea Cable Alternative based on Alternative 1 in the ISO-NE 2026 Solutions Study.
- A Synchronous Solution involving the reconductoring of 6.5 miles of 115-kV transmission line and the installation of two 30 MVAR synchronous condensers.
- NTAs such as new generation, energy efficiency, solar, battery storage, demand response programs, and distributed generation.

Through this assessment and the discussion below, the Companies demonstrate that the Project is the alternative that best meets the identified need at the lowest possible cost with a minimum impact to the environment.

3.2 No-Action Alternative

Under the No-Action Alternative, the Companies would not construct any new facilities to address the transmission reliability needs identified in Section 2. The current transmission system would remain unchanged.

As discussed in Section 2, ISO-NE in its recently-issued 2029 Needs Update has identified a set of time-sensitive thermal, voltage, and contingent loss-of-load issues within the Load Pocket, and has confirmed that certain transmission upgrades, including the Project, are needed to address these issues. Additional analysis by the Companies has confirmed that the Project is needed to address the potential for thermal overloads on two 115-kV transmission lines and, at load levels consistent with the Companies' forecast for 2031, voltage collapse across the Load Pocket under certain N-1-1 contingencies.

If these issues are not addressed, the transmission system would not meet relevant transmission reliability planning standards and criteria and the Companies would not meet their obligations to provide reliable electric power service to approximately 161,000 customers in the Load Pocket. The No-Action Alternative does not meet the need identified in Section 2 and would therefore not satisfy applicable transmission planning reliability criteria. Accordingly, it was not considered further.

3.3 Undersea Cable Alternative (ISO-NE 2026 Solutions Study Alternative 1)

3.3.1 ISO-NE Solutions Study

In the 2026 Solutions Study, ISO-NE identified four potential solution sets (i.e., combinations of transmission upgrades) that would meet the full range of Load Pocket needs identified in the 2026 Needs Assessment. These needs include the specific needs described in Section 2. Each solution set consisted of

(1) two transmission projects selected from a set of four alternatives, and (2) a set of projects that are required regardless of the combination ("Common Projects").[11]

The four alternatives can be summarized as follows:

- Install new undersea cable and switching station in Rhode Island ("ISO Alternative 1")
- Separate and reconductor Lines M13 and N12 between Pottersville[12] and Sykes Road Substations ("ISO Alternative 2")
- Install new 115-kV line between Pottersville and Bell Rock Substations ("ISO Alternative 3")
- Extend Line 114 from Industrial Park Tap to Bell Rock Substation ("ISO Alternative 4")

The Solutions Study determined that any of the following four combinations of the alternatives, together with the Common Projects, would fully address the Load Pocket needs identified in the 2026 Needs Assessment:

- ISO Alternative 1 + any other ISO Alternative, or
- ISO Alternative 4 + ISO Alternative 2 or 3.[13]

ISO-NE then selected the combination of ISO Alternative 2 + ISO Alternative 4 as the preferred solution for the Load Pocket based on a comparison of costs.[14,15]

Following the 2029 Needs Update, the Companies revisited the alternatives presented in the 2026 Solutions Study to determine whether any should be presented as an alternative to the Project in this Analysis. The Companies noted that any solution set that does not include the Project must necessarily include ISO Alternative 1, the new undersea cable and switching station in Rhode Island. In this respect, ISO Alternative 1 can be regarded as an alternative to the Project. Consequently, in Sections 3.3.2 to 3.3.3 below, the Companies summarize and compare ISO Alternative 1, hereinafter called the Undersea Cable Alternative, and the Project, based not only on cost, but also on their reliability and environmental impacts.

3.3.2 Undersea Cable Alternative: Description

The Undersea Cable Alternative includes:

- Construction of a new switching station in Portsmouth, Rhode Island;

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[11] See ID #13 – 17, Table 7-2, Pg. 55 of the Solutions Study.

[12] Pottersville Substation was formerly known as Somerset Substation. The name was changed when the substation was completely rebuilt as a part of a National Grid Asset Condition improvement project.

[13] The Solutions Study noted that the combination of ISO Alternatives 2 and 3 is not feasible and that the combinations of ISO Alternatives 2 and 4 and ISO Alternatives 3 and 4 are the same from an electrical performance standpoint.

[14] The N12/M13 DCT separation and reconductoring project (ISO Alternative 2) addresses additional needs and contingencies as compared to the Project. It will be presented separately to the Department pursuant to G.L. c. 164, § 72.

[15] As noted in Section 2, the need for the Project was confirmed in ISO-NE's 2029 Needs Update. ISO-NE did not issue an updated Solutions Study, instead directing the Companies to bring the Project (and other identified projects) "to completion." Appendix 2-2 (2029 Needs Update), at 27.

- Installation of an approximately 5.0-mile new 115-kV underground cable from Bristol Substation in Bristol, Rhode Island to the new switching station, including a 4,300 linear foot undersea segment beneath Mount Hope Bay (see Figure 3.1), and
- Reconductoring of 5.1 miles of the existing 115-kV F-184 line from Merriman Junction Tap in Swansea, MA to Bristol Substation in Bristol, RI (see Figure 3.2).



FIGURE 3.1 NEW 115-KV UNDERGROUND CABLE FROM BRISTOL SUBSTATION TO A NEW SWITCHING STATION

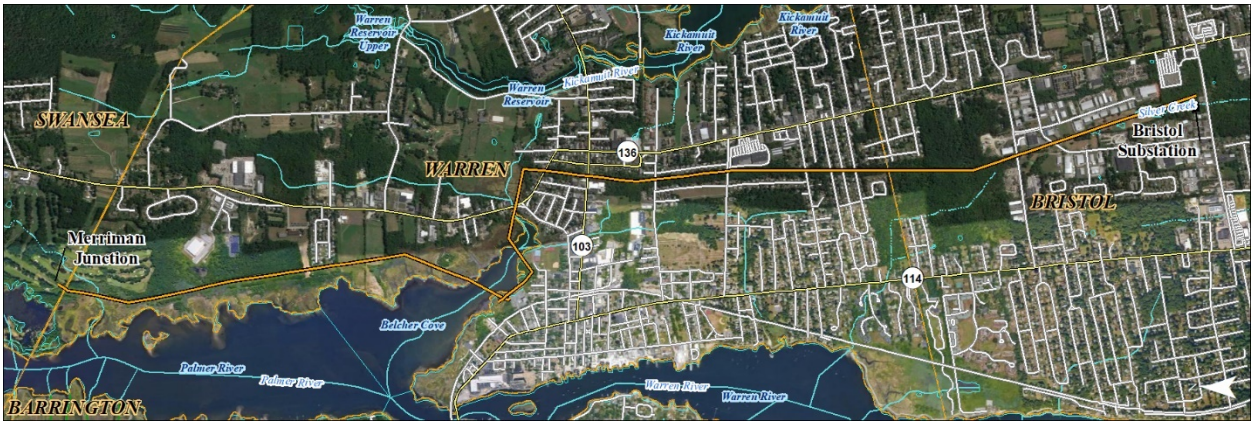

FIGURE 3.2 RECONDUCTORING OF 5.1 MILES OF THE EXISTING 115-KV F-184 LINE

3.3.3 Comparison

Below, the Companies compare the Undersea Cable Alternative and the Project based on cost, reliability, and environmental impacts.

Cost Comparison

The estimated cost of the Undersea Cable Alternative, as presented in the 2026 Solutions Study, is approximately $102.3 million.[16] Given the general increase in both material and labor costs since the 2026

[16] This cost estimate for the Undersea Cable Alternative is derived from the summation of each of the cost elements of ISO Alternative 1 as identified in Table 7-2 of the 2026 Solutions Study (see page 55 of Appendix 2-1). More specifically, it is the total of Project ID#1 ($70.4 million); Project ID#2 ($5.5 million); Project ID#3 ($14.4 million) and Project ID#4 ($12 million).

Solutions Study, it is reasonable to assume that $102.3 million may understate the current cost for the Undersea Cable Alternative.

As discussed in Section 1, the current cost estimate for the Project is $52.7 million, or approximately half the original estimate for the Undersea Cable Alternative. Thus, the Project is significantly less expensive than the Undersea Cable Alternative.

Reliability Comparison

Per the 2026 Solutions Study, the Undersea Cable Alternative and the Project each can be combined with another ISO alternative to address the reliability needs identified in the 2026 Needs Assessment. Since the Companies' 2031 peak load forecast for the Load Pocket (555MW) is very close to the load forecast used in the 2026 Solutions Study (543MW), and all the 2026 solutions included a reliability margin, it is more than reasonable to conclude that the Undersea Cable Alternative remains a viable alternative to the Project and either project would address the reliability needs identified in Section 2. [17]

Environmental Comparison

In comparing project alternatives, the Companies give preference to alternatives that minimize impacts to the natural and social environments. Here, the Undersea Cable Alternative includes construction of a new substation on a currently undeveloped site resulting in permanent land use impacts; it also requires a horizontal directional drill of approximately 4,300 linear feet beneath Mount Hope Bay requiring special oversized and overweight reel handling and construction equipment. In addition, it includes onshore underground and overhead transmission installation. The underground installation in a medium density residential area would have the typical temporary impacts from traffic restrictions and construction noise associated with underground construction within public streets.

In contrast, the Project is located entirely within an existing overhead transmission line ROW. Its primarily overhead design allows it to span wetlands and other sensitive resource areas, thus minimizing impacts to the natural environment. In addition, the existing ROW is located in predominantly undeveloped or low-density residential areas, helping to minimize impacts to the developed environment. As a result, the Project would be significantly less impactful to the natural and social environments than the Undersea Cable Alternative.

3.3.4 Conclusion (Project vs. Undersea Cable Alternative)

After comparing the Project with the Undersea Cable Alternative, the Companies concluded that the Project is the superior solution when balancing considerations of system reliability, costs to customers, and environmental impacts. Based on the evaluation of the relative merits and disadvantages of each alternative, the Project is superior to Undersea Cable Alternative for the following reasons:

- It provides the lowest cost solution to meet the identified need
- It addresses the voltage collapse and thermal line overload needs identified in Section 2 in a less impactful manner:

[17] Given the passage of time and the implementation of certain of the Common Projects, additional load flow analysis would be required to demonstrate with certainty that the Undersea Cable Alternative, taken in combination with either ISO Alternative 2 or ISO Alternative 3, would be sufficient to address the needs identified in Section 2.

- It uses existing ROWs dedicated to overhead transmission lines where wetlands and other sensitive resource areas will be spanned to the greatest extent practicable; or where impacts can be minimized and mitigated.
- It uses a network of existing access roads and access routes within the managed ROWs.
- It does not require the acquisition of new ROW and/or easements.

3.4 The Synchronous Solution

3.4.1 Description

As discussed in Section 2, ISO-NE has confirmed the ongoing need for the Project in the 2029 Needs Assessment and has directed the Companies to implement the Project. Additional modeling by the Companies determined that, with all other Load Pocket solutions in place, Line 114 is needed to address the potential for thermal overloads on Eversource Lines 111 and 112 and for low voltages or a voltage collapse that would result in loss of power to the entire Load Pocket.

In order to confirm that the Project remains the most cost-effective, least environmentally impactful solution to meet the updated need, the Companies reviewed other means of addressing these specific needs. As part of this review, the Companies revisited an option that was considered and dismissed early in the 2026 Solutions Study process: to address thermal violations by increasing the capacity of overloaded transmission lines, and to address voltage issues by installing a dynamic reactive device within the Load Pocket. The Companies designed a solution (the "Synchronous Solution") that addresses the needs identified in Section 2 in this fashion. The Synchronous Solution includes:

- Reconductoring 4.1 miles of the 115-kV 112 Line from Industrial Park Tap to Industrial Park Substation (see Figure 3.3);
- Reconductoring 2.4 miles of the 115-kV 111 Line from Industrial Park Substation to High Hill Switching Station (see Figure 3.4); and
- Installing two 30 MVAR synchronous condensers at National Grid's 115-kV Dexter Substation.

Synchronous condensers were selected as the dynamic reactive device. They are used to provide voltage support, supplying reactive power to the transmission network to regulate voltage. At the transmission level, ISO-NE and the Companies prefer to use synchronous condensers for voltage support rather than an alternative compensation device, such as a static var compensator ("SVC"). Synchronous condensers are superior in that they strengthen the system in terms of short circuit current and provide inertia to improve system stability.[18]

The Companies initially considered four possible locations for the synchronous condensers: Eversource's High Hill and Industrial Park substations in Massachusetts, and National Grid's Dexter and Tiverton Substations in Rhode Island. Initial load flow analysis indicated that voltage support would be most effective if located at the downstream end of the Load Pocket; consequently, the Companies further evaluated the Dexter and Tiverton sites based on availability of space within or in proximity to the substation sites, ease of interconnection, and potential environmental impacts. While both sites had sufficient space, further investigation revealed that the Tiverton site presented prohibitively difficult

[18] ISO-NE presented a PowerPoint on the topic of dynamic reactive device technologies at the February 17th, 2021 Planning Advisory Committee meeting.

challenges in terms of the ability to provide relay protection for the local transmission system. No such challenges exist at the Dexter Substation; therefore, the Tiverton location was not pursued further and the Dexter Substation was selected as the preferred location for the synchronous condensers. Additional load flow modeling showed that the installation of two 30 MVAR synchronous condensers at this location would be sufficient to address the voltage concerns identified in Section 2. These synchronous condensers could be accommodated within the site boundaries, although they would require an expansion of the existing fence line, clearing of trees and vegetated areas and, potentially, impacts to wetlands.

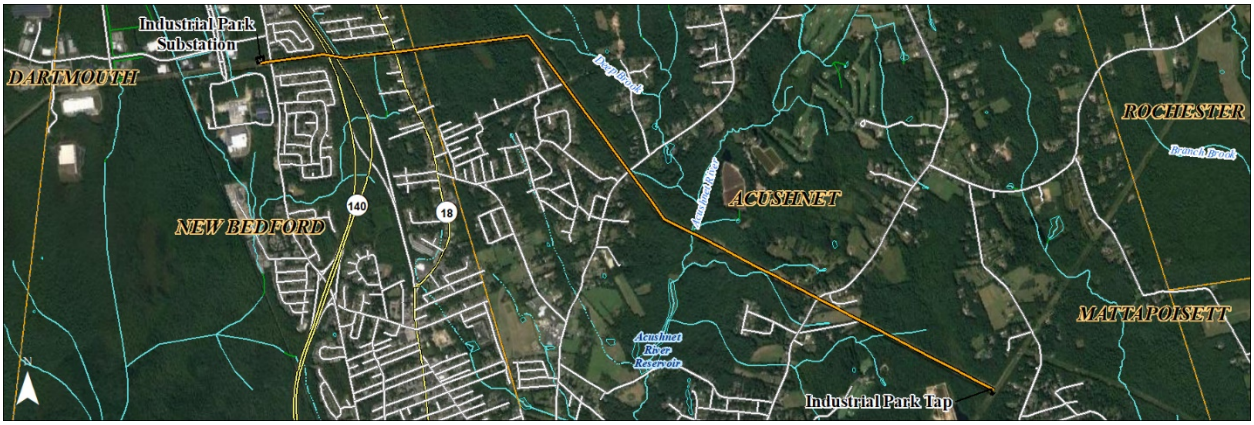

FIGURE 3.3 RECONDUCTORING 4.1 MILES OF THE 115-KV 112 LINE

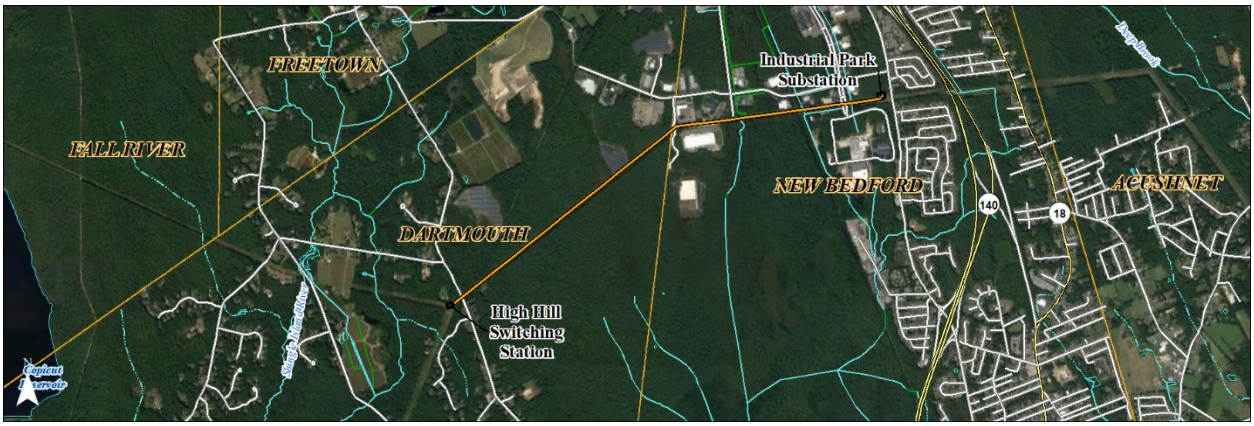

FIGURE 3.4 RECONDUCTORING 2.4 MILES OF THE 115-KV 111 LINE

3.4.2 Comparison

Similar to the above comparison of the Project to the Undersea Cable Alternative, the Companies compared the Project and the Synchronous Solution on the basis of cost, reliability, and environmental impacts. This comparison is described below.

3.4.2.1 Cost Comparison

The estimated cost of the Synchronous Solution is $60.2 million, consisting of $9.2 million for the reconductoring and $51.0 million for the synchronous condensers. This is $7.5 million (14%) more than the estimated cost of the Project. As a result, the Project is less expensive than the Synchronous Solution.

3.4.2.2 Reliability Comparison

Both the Project and the Synchronous Solution address the reliability needs identified in Section 2. However, the Project has several attributes that make it a more reliable alternative than the Synchronous Solution. First, the Project (a transmission line) is a static device with no moving parts and limited maintenance requirements. Once in place, it is a passive carrier of electricity from one location to another. In contrast, a synchronous condenser is a dynamic device that must respond to constantly changing system conditions and is subject to multiple modes of failure. Although a reliable transmission alternative, it is thus inherently less reliable than a static solution such as a transmission line.

In addition, the Project, unlike the Synchronous Solution, provides a new transmission path into and out of the Load Pocket. This additional path will facilitate the integration of new wind and solar generation, battery storage, and other distributed energy resources. It also will reduce the risk associated with transmission line maintenance within the Load Pocket. At present, when one of the three transmission supplies into the Load Pocket is removed from service for maintenance, the Load Pocket is dependent on the two remaining transmission lines for service. Loss of one of the remaining lines could overload the third, resulting in loss of service to customers. A fourth source into the Load Pocket provides not just voltage support, but also a layer of redundancy that protects customers from loss of service.

Overall, the Project is less subject to failure than the Synchronous Solution and requires less operator engagement and less maintenance. It also provides an additional transmission path into the Load Pocket, making it easier to integrate new energy resources and reducing the risk associated with routine maintenance of the transmission system. Consequently, the Project is superior to the Synchronous Solution from a reliability perspective.

3.4.2.3 Environmental Comparison

Both solutions have limited impacts to the natural and social/developed environments when compared to other potential alternatives. Impacts are minimized for the Project and for the transmission line components of the Synchronous Solution, as both are located entirely within existing overhead transmission line ROWs in undeveloped or low-density residential areas. While much of the Project resides in ROW that has been cleared, some additional clearing is required to accommodate the New Line. No additional clearing would be required for the transmission portion of the Synchronous Solution. By incorporating the new transmission components within an existing ROW and transmission line corridor in a sparsely populated region, new impacts to the natural and social/developed environments for both the Project or the Synchronous Solution are limited.

As described above, the substation component of the Synchronous Solution would be located at the existing Dexter Substation. The existing Dexter Substation is located off a residential street with residences located to the north on the opposite side of Freeborn Street. To accommodate the Synchronous Solution, it will be necessary to perform some new tree clearing and land disturbance, which may disturb freshwater wetlands located around the perimeter of the existing station. While the synchronous condenser itself will be a source of noise, any such noise would be mitigated by its enclosure and would not be expected to be a public nuisance.

Therefore, new impacts to the natural and social/developed environments for both the Project or the Synchronous Solution are expected to be minimal as the new transmission components are located within an existing transmission line corridor, and any new station equipment will be at an existing substation location. Since both solutions are expected to have minimal impacts, they are generally comparable from an environmental perspective.

3.4.2.4 Conclusion (Project vs. Synchronous Solution)

After comparing the Project with the Synchronous Solution, the Companies confirmed that the Project is the superior solution when balancing considerations of system reliability, costs to customers, and environmental impacts. Based on the evaluation of the relative merits and disadvantages of each alternative, the Project is superior to the Synchronous Solution for the following reasons:

- It provides a lower cost solution to meet the identified need
- It relies on static, rather than dynamic, technology and thus is an inherently more reliable solution
- It creates a new transmission path into the Load Pocket, providing robustness and flexibility to facilitate a multitude of future system states and facilitating routine maintenance activities on transmission equipment serving the Load Pocket

With respect to environmental impacts, the Project and the Synchronous Solution are largely comparable and their impacts are minimal.

3.5 Non-Transmission Alternatives

In addition to transmission alternatives, the Companies also evaluated NTAs to the Project. The Companies completed an analysis of the locations and sizes of energy injections that would be needed to mitigate the transmission reliability needs addressed by construction of the proposed Project and then assessed the feasibility and potential costs of deploying potential NTAs.

3.5.1 NTA Methodology

At the outset of the NTA assessment, the Companies conducted an analysis to determine the amount of energy injection required to meet thermal and voltage needs within the Load Pocket under N-1-1 contingency conditions at the 2020 peak real time net load level of 493 MW. The Companies determined that the minimum level of resources necessary to resolve the projected transmission reliability needs from the N-1-1 contingencies addressed by the Project at this load level is 85 MW. A somewhat higher level of energy injections would be required to resolve the needs identified in Section 2, which are based on the Companies' 2031 peak load forecast of 555 MW.[19]

In order to address the observed transmission reliability needs, NTA resources would ideally be located at or near the High Hill or Bell Rock substations. These locations provided the optimum thermal and voltage performance for the load pocket during system contingency events. An NTA located upstream from High Hill or Bell Rock (e.g., east of High Hill or west of Bell Rock) would not be as effective at mitigating transmission thermal overloads and voltage issues due to an increased distance from the far end of the load pocket under certain contingency events. However, as discussed in more detail in Section 5, the Bell Rock Substation lies within the Southeast Massachusetts Bioreserve, a 13,600-acre protected open space jointly managed by the City of Fall River Water Division, the MA DCR, the Massachusetts Division of Fisheries and Wildlife, and the Trustees of Reservations, a protected Outstanding Resource Water area, and protected species habitat. Development in the area surrounding the Bell Rock Substation would be significantly restricted. Therefore, the High Hill Switching Station was deemed to be the optimal location for the interconnection of a hypothetical NTA.

[19] The NTA analysis was conducted prior to the development of the Companies' 2031 Forecast.

3.5.2 NTA Feasibility and Practicality Assessment

The Companies considered whether NTA technologies could hypothetically be developed as an alternative to the Project, either alone or in combination. Possible NTA technologies include:

- Active demand response.
- Passive demand response ("EE").
- Utility-scale or distribution-scale solar PV, with and without energy storage.
- Energy storage.
- Conventional generation (such as combined cycle gas turbines, aeroderivative combustion turbines, large frame combustion turbines, etc.).

A technically feasible NTA technology is defined as one that could effectively resolve the transmission need with sufficient performance and response time. When considering whether a specific technology has the operating characteristics (performance and response time) needed to respond to contingency conditions, the Companies used a threshold response time of within 30 minutes of the occurrence of the first contingency.[20] The resource must then be able to continue to operate until the failed transmission system element is repaired and placed back into service or until loads decline.

Active Demand Response and EE

Neither active demand response nor EE is deployable to the scale necessary to mitigate the needs addressed by the Project. For example, future EE is already forecasted to reduce the area load by approximately 58 MW (or a reduction of 8% of gross area load) by 2029. Thus, in order for EE efforts to produce the needed demand savings, it would require installing *additional* EE measures in the area of the affected load that produces at least 85 MW in demand savings, over and above the planned 58 MW. This amount of incremental EE beyond the Companies' already aggressive EE forecasts is simply not achievable. Therefore, EE is not a feasible alternative taken alone to meet the identified need.

Solar PV and Energy Storage

Based on the Companies' analysis, which considered the historical load curve and dispatch patterns in the Load Pocket, the Companies determined that the projected overload duration of the N-1-1 contingency conditions is 14 hours out of 24 hours in each daily load cycle. Given the intermittency of solar PV, it is not technically feasible to provide sufficient energy injection for the duration of the overload. Likewise, energy storage technologies alone are not feasible due to the lack of transmission capacity available to provide energy for storage to charge in the off-peak hours. The 14-hour projected overload would leave only 10 hours of charging available and this would not be enough time to recharge an energy storage device in preparation for the next daily load cycle. Although the duration of the overload prohibits solar PV or energy storage from functioning independently, these technical limitations could potentially be overcome when solar PV is paired with storage.

The Companies have reviewed the solar PV, energy storage, and combination solar PV and energy storage projects in the ISO-NE interconnection queue that have been proposed by developers at or downstream of

[20] See the ISO-NE Transmission Planning Technical Guide (https://www.iso-ne.com/static-assets/documents/2017/03/transmission_planning_techincal_guide_rev6.pdf), Section 3.4.2 (page 48), which allows up to 30 minutes for system adjustments following a first contingency.

High Hill Switching Station. Although battery duration is not stated in the interconnection queue, the Companies' experience shows that energy storage projects in the queue tend to be short duration in the energy production (e.g., 2 to 4 hours) and would not be able to cover the full duration of the reliability needs. Furthermore, all projects in the interconnection queue are relying on the Project in their interconnection studies. Removing the Project from interconnection studies could result in the need to restart studies and the new studies would potentially identify the Project as a required interconnection upgrade. Additionally, any or all of the projects may withdraw from the queue at any time. Thus, these resources were deemed to be infeasible for meeting the identified need in a timely and reliable manner.

Conventional and Offshore Wind Generation

There are no proposed conventional generation units in the ISO-NE interconnection queue that could serve to obviate the need for the Project. As of December 2021, the Companies are aware of two offshore wind projects in the ISO-NE interconnection queue that would potentially interconnect in the Load Pocket. The first project, QP1118[21], is 1,200 MW net injection and is requesting interconnection at Bell Rock substation. The second project, QP1153, is 440 MW net injection and is requesting interconnection at either the Acushnet or Pine Street substations. Like the queued solar and storage projects, neither QP1118 nor QP1153 has a completed System Impact Study and each will rely on the Project in their interconnection studies. Additionally, both QP1118 and QP1153 do not yet have Power Purchase Agreement contracts and do not plan to be online until 2027 and 2026, respectively, well beyond the in-service date of the Project.

As a result, neither conventional generation nor offshore wind generation would be available to meet the identified need in a timely or reliable manner.

3.5.3 Challenges for Technically Feasible NTAs

After determining that the queued generation in the Load Pocket has too many challenges preventing it from addressing the transmission reliability needs in an adequate and timely manner, the Companies looked to design a hypothetical NTA consisting of conventional generation or solar paired with storage. Although solar PV paired with storage and conventional generation are technically feasible NTA technologies, there are several practical challenges that would prevent these NTA technologies from being developed. These challenges include the necessary development time, land requirements, and infrastructure requirements.

Development of conventional generation or a paired solar and energy storage project as part of an NTA solution would entail, among other requirements, identification of an appropriate site in proximity to High Hill Switching Station, timely completion of permitting and siting processes, timely completion of the required interconnection studies with ISO-NE, securing an available fuel supply (in the case of a conventional generation project) and contracting with equipment suppliers and construction vendors. These hurdles make it impractical to develop a generation project within the same time frame as the Project. As an example, Canal Unit 3 in the Town of Sandwich entered the ISO-NE interconnection queue in March of 2014, completed interconnection studies more than one year later (in June of 2015), and went into service in July of 2019. Canal Unit 3 was developed at the site of an existing generator, and the Companies would expect a lengthier development time for a conventional generation or paired solar PV and energy storage project in the vicinity of High Hill Switching Station because a greenfield site would be required.

A generating facility or solar plus battery solution would need to be developed in the vicinity of High Hill Switching Station and would require an amount of land in that area appropriate for each technology. In

[21] QP1118 is incremental to QP909 and increases QP909's 800 MW net injection to 1200 MW net injection.

order to install a solar PV array and energy storage facility that would resolve the identified need, at least 1,100 acres would be required, over 175 times the size of High Hill Switching Station. Any generation project, including a paired solar PV and energy storage project, would likely require additional transmission upgrades, potentially including the expansion of High Hill Switching Station, construction of additional new substations, and new or upgraded transmission or distribution lines, to allow for delivery of the energy.

New conventional generation, such as a gas-fired generator, would require an appropriately-zoned site and land or leasehold rights for a gas supply lateral to the nearest natural gas pipeline. Upgrades to existing pipelines may be needed to ensure adequate delivery pressures and volumes. A dual-fueled generator would also require a backup supply of oil to ensure year-round availability, which would increase costs, further complicate the permitting process, and increase land requirements. In addition to land use requirements and the need for a reliable fuel source, conventional generation would result in substantial emissions, negatively affecting air quality and making it more difficult to achieve the Commonwealth's climate change goals.

Additionally, either NTA solution would likely require land acquisitions or leasehold interests to complete access to a transmission ROW in order to interconnect the facility to the transmission system. The expected changes in land use from either of the NTA solutions would significantly exceed the land requirements associated with the Project, which utilizes existing ROW and does not require any additional easements or land rights.

While noting the significant practical challenges associated with development of each of the technically feasible NTA technologies, the Companies also considered the potential costs of developing a technically feasible NTA as an alternative to the proposed Project. The Companies concluded that the potential costs of any technically feasible NTA would be higher than the cost of the proposed Project. In particular, the least expensive NTA technology (a single frame peaker gas turbine) is estimated to have levelized costs of approximately $7.0 million per year. The estimated levelized costs for a combined solar and battery storage solution are approximately $25.4 million per year. By contrast, the levelized cost of the Project is estimated at $6.4 million per year. Accordingly, even a hypothetically available NTA alternative would be more expensive than the Project, and thus, an inferior option.

3.5.4 Conclusions on Non-Transmission Alternatives

The higher cost to customers of any NTA compared to the cost of the Project, combined with the physical and logistical difficulties of implementing such a solution in a timely fashion, make an NTA or any combination of NTAs a substantially inferior solution to the identified need than the Project.

Active and passive demand response are not deployable to the scale necessary to mitigate the needs addressed by the Project. Neither solar PV nor storage alone is feasible due to technical limitations. Conventional generation would need to overcome significant challenges including the necessary development time, land requirements, and infrastructure requirements, and therefore would not be practical.

Overall, the Project, compared to any feasible NTA, better meets the goal of providing a robust, secure, and reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

3.6 Conclusion on Project Alternatives

The Companies' analysis demonstrates that the Project is the best solution when balancing considerations of reliability, cost and environmental impacts.

4.0 ROUTE SELECTION PROCESS

As discussed in Section 3, the Companies' proposed solution to address the electrical system need identified in Section 2 involves the construction of a new 115-kV transmission line between Eversource's existing Industrial Park Tap and National Grid's existing Bell Rock Substation. The proposed solution includes the installation of the new 115-kV primarily overhead line within the Companies' existing electric transmission line ROWs that have been held either in fee or easement by the Companies for decades extending from the Industrial Park Tap to the Bell Rock Substation.

This Section of the Application describes the process by which the Companies identified and evaluated feasible route alternatives to confirm that no clearly superior route exists. The evaluation led to a determination that the Companies would present a single Preferred Route for the Project. The Preferred Route was the best ranked route as compared with other routes evaluated on the basis of cost and environmental impacts. This evaluation was conducted to ensure that, consistent with the Siting Board's standards, a reasonable array of potential routes was evaluated including routes with geographic diversity, that no clearly superior route was overlooked, and that the route selected best balances considerations of reliability, minimizing environmental impacts, and minimizing costs.

4.1 Overview of Siting Methodology

The objective of the Companies' routing analysis was to identify a technically feasible route that minimizes impacts on the natural and social environments and is cost effective. The route selection study began with the Companies defining a routing study area, centered on the Companies' existing transmission line ROW, and developing a general set of route selection criteria. The Companies then identified a wide variety of potential overhead and underground routes using the most recent available mapping, databases and aerial photography, focusing first on finding linear corridors located within or adjacent to existing ROW, including electric transmission line ROW and municipal utility corridors, railroad corridors, highways and roadway corridors, and natural gas pipeline corridors. The Companies developed a number of potential routes along these corridors to allow for a comparison of constraints (engineering/technical feasibility) and impacts (natural and social environments) and screened the potential routes against the route selection criteria to evaluate their feasibility. This iterative process narrowed the route options down to a short list of candidate routes and several route variations. Following the development of this final list of feasible routing alternatives, the Companies proceeded to evaluate, score, weigh and rank the routes based on more route-specific information to assess the constraints and impacts of each route. A scoring and weighting system was developed to allow for ranking of the alternative routes with respect to each other, as further described below.

4.2 Definition of the Routing Study Area

The Companies began the route selection process by establishing a routing study area surrounding the Companies' existing transmission line ROW between the Industrial Park Tap and the Bell Rock Substation. To ensure the evaluation considered a full range of alternatives and did not overlook a clearly superior route alternative, the routing study area was defined broadly to include land within the following boundaries as shown in Figure 4.1:

- Enbridge Natural Gas Pipeline Corridor to the north.
- U.S. Highway Route 6 to the south
- Bell Rock Substation to the west.
- Industrial Park Tap to the east.

In general, Fall River and the New Bedford region make up the more densely developed population centers in the routing study area, which also includes the municipalities of Acushnet, Dartmouth and Freetown. Much of the routing study area consists of state, municipal, and private open space interspersed with pockets of residential, commercial, industrial and agricultural lands.

4.3 Establishment of Route Selection Criteria

The Companies considered the corridor requirements to construct either an overhead line or an underground cable, both of which are dictated by standards including vertical and horizontal clearance codes, depths and setbacks from other active utilities, and final connection points such as a substation or switching station. An initial step in the Companies' analysis was to establish general criteria to identify potential overhead and underground routes. The Companies established the following general criteria:

1. **Maximize use of existing linear corridors.** The potential location of the proposed 115-kV transmission line along existing ROW (e.g., transmission line, highway, railroad, and pipeline corridors) where linear uses are already established was a primary routing consideration. Collocation along existing linear corridors minimizes conflicts with local, state and federal land use plans and policies; minimizes the need to acquire land rights; and follows corridors already encumbered by infrastructure, thereby decreasing environmental impacts. Utilizing existing transmission line ROW offers the benefit of an established network of access roads and lands already encumbered with utility easements. In addition, use of existing linear corridors minimizes the need to acquire additional land or land rights to construct a line, which could impact project cost and schedule.
2. **Maintain system operability/reliability**. Route alternatives, whether overhead or underground, must allow general accessibility for future operation, inspection, maintenance, and repair. The Companies accordingly sought routes that would minimize access restrictions.
3. **Minimize impacts to environmental resources**. The Companies sought to identify route alternatives that would minimize impacts to environmental resources such as wetlands, wildlife habitats, watercourses, conservation lands, historic sites, archaeological resources, and other designated resources.
4. **Minimize cost.** The Companies sought to develop route alternatives that would avoid costly remediation or construction requirements or, alternatively, that would provide some opportunity for securing cost reductions, e.g., by avoiding underground construction if possible to reduce construction costs.
5. **Limit construction constraints**. In evaluating alternative routes, preference was given to routes that would minimize constructability constraints. For example, highway crossings or working within other utility corridors (e.g., railroad corridors) can result in access restrictions, workspace constraints, safety concerns, traffic disruptions, and restrictive work hours.
6. **Minimize impacts to densely developed areas.** The placement of transmission facilities in densely developed areas typically creates additional complexity both during initial construction and when maintenance or replacement is required. The potential for construction and maintenance work-hour restrictions, need for additional ROW, temporary workspace and limited access availability are more prevalent in densely populated areas. Therefore, the Companies sought to identify route alternatives that would, to the extent practicable, minimize impacts to densely developed areas and the social/developed environment.

4.4 Potential Route Corridors

The Companies focused first on the use of existing utility and transportation corridors to identify potential routes that avoid the need to create a new ROW. The Companies conducted a macro-review of USGS topographic maps, Geographic Information System ("GIS") data and aerial imagery of the routing study area to identify existing linear corridors that could be used, individually or in combination, to construct the new line. This review identified numerous existing corridors within the routing study area, including those associated with electric transmission lines and municipal utilities, railroads, highways and roadways, and natural gas pipelines, that theoretically could be utilized to develop potential routes. The existing corridors identified in the routing study area are described below.

4.4.1 Electric Transmission Line Corridors

The existing transmission line corridors identified in the routing study area are described below and shown on Figure 4.2.

- **ROW 1:** This is an approximately 175-foot-wide transmission ROW located between the Tremont Substation and the Acushnet Substation. The ROW runs approximately 9.6 miles within the routing study area and passes through Acushnet and Rochester. The ROW contains two existing 115-kV overhead lines, Eversource Line 112 and Line 114. The portions of the ROW extending from the Wing Lane Substation to the Acushnet Substation contain overhead distribution lines in addition to the two existing 115-kV lines. Eversource controls this ROW in fee or easement.
- **ROW 2:** This is an approximately 100-foot-wide transmission ROW extending off of ROW 1 at the Wing Lane Substation. The ROW runs approximately 5.4 miles within the routing study area and passes through Acushnet and Fairhaven. The ROW contains overhead distribution lines and one existing 115-kV overhead line, Eversource Line 112. Eversource controls this ROW in fee or easement.
- **ROW 3:** This is an approximately 150-foot-wide transmission ROW extending off of ROW 1 just north of the Industrial Park Tap. The ROW runs approximately 2.9 miles within the routing study area through Acushnet and Mattapoisett to the Crystal Spring Substation. The ROW contains one existing 115-kV overhead line, Eversource Line 114. Eversource controls this ROW in fee or easement.
- **ROW 4:** This is an approximately 150- to 210-foot-wide transmission ROW extending from the Industrial Park Tap (intersection with ROW 1) to the Bell Rock Substation. The ROW runs approximately 12 miles within the routing study area and passes through Acushnet, New Bedford, Dartmouth and Fall River. From the Industrial Park Tap to the High Hill Switching Station (approximately 6.6 miles), the ROW contains one existing distribution line and one existing overhead 115-kV line, Eversource Line 112. From the High Hill Switching Station to the Bell Rock Substation, the ROW contains one existing 115-kV overhead line, the D21 Line, which transitions from Eversource to National Grid's service territory at the Dartmouth/Fall River municipal boundary. Eversource and National Grid control this ROW in fee or easement.
- **ROW 5:** This is an approximately 125- to 150-foot-wide transmission ROW (though portions vary to 250 feet) extending from the Bridgewater Substation to the Pottersville Substation. The ROW runs approximately 7.9 miles within the routing study area and passes through Dighton, Swansea, and Somerset. For approximately six miles, from Dighton to just north of Stevens Road in Swansea, four existing overhead 115-kV lines (National Grid's U6/V5 and T7/S8 Lines) are contained within the ROW; the U6 and V5 and T7 and S8 are double-circuited on their own set of structures. From

Stevens Road to just west of Hot and Cold Lane in Somerset (approximately 1.0 mile), four existing overhead 115-kV lines are contained within the ROW (National Grid's U6/V5 and T7/S8 Lines), the U6/V5 remains double-circuited and the T7 and S8 fluctuates between single and double-circuit configurations. West of Hot and Cold Lane to the Pottersville Substation (approximately 1.0 mile), the ROW contains six overhead 115-kV lines (National Grid's U6/V5, T7/S8, W4S and X3S Lines), four of which are double-circuited (U6/V5 and T7/S8). National Grid controls this ROW in fee or easement.

- **ROW 6**: This is an approximately 80- to 150-foot-wide transmission ROW extending from the Pottersville Substation to the Bell Rock Substation. The ROW runs approximately 3.4 miles within the routing study area and passes through Somerset and Fall River. The first 1.7 miles of the ROW between the Pottersville Substation and the Sykes Road Substation is approximately 80 feet wide and contains two 115-kV lines located on double-circuit lattice towers, National Grid's N12 and M13 Lines. The remaining 1.7 miles between the Sykes Road Substation and the Bell Rock Substation is approximately 150-feet wide and contains the N12 and M13 115-kV Lines located on separate H-frame structures. National Grid controls this ROW in fee or easement.
- **ROW 7:** This is an approximately 150-foot-wide ROW extending from the Bell Rock Substation south into Westport. The ROW runs approximately 4.5 miles within the routing study area and passes through Fall River and Westport. The ROW contains two existing overhead 115-kV lines, National Grid's L14 and M13 Lines. National Grid controls this ROW in fee or easement.
- **ROW 8:** This is an approximately 150-foot-wide transmission ROW extending from the High Hill Switching Station to the Fisher Road Substation. The ROW runs approximately 9.2 miles within the routing study area and passes through Dartmouth. The ROW contains two existing overhead 115-kV lines, Eversource Line 109 and Line 111, and one 34.5-kV distribution line. Eversource controls this ROW in fee or easement.
- **ROW 9:** This is an approximately 100-foot-wide distribution ROW extending from the Crystal Spring Substation to the Arsene Substation. The ROW runs approximately 4.1 miles within the routing study area and passes through Mattapoisett and Fairhaven. The ROW contains two existing overhead 13.4-kV distribution circuits on one set of wood monopole structures. Eversource controls this ROW in fee or easement.

4.4.2 Municipal Utility Corridors

One municipal utility corridor was identified in the routing study area, as shown on Figure 4.2 and described below:

- **ROW 10:** An approximately 80-foot-wide City of New Bedford water/sewer ROW extending approximately 8.2 miles through the Towns of Freetown and Dartmouth connecting a filtration plant at Little Quittacas Pond to the High Hill Reservoir.

4.4.3 Railroad Corridors

Several rail corridors run throughout the routing study area, as shown on Figure 4.3. The rail corridors are of mixed ownership consisting of either Massachusetts Department of Transportation ("MassDOT"), CSX, or Bay Colony. According to the Commonwealth of Massachusetts Railroad Ownership Map,[22] the majority

[22] Massachusetts Department of Transportation Rail Inventory. 2014. Available at https://geo-massdot.opendata.arcgis.com/datasets/rail-inventory. Accessed on May 26, 2021.

of the rail corridors in the routing study area provide freight service to the Fall River and New Bedford regions, while other rail corridors service commuters or will be upgraded to service commuters in the near future. The width of the existing rail corridors in the routing study area varies but is generally 40- to 80-feet wide.

4.4.4 Highway and Roadway Corridors

Four major limited access highway systems are located in the routing study area: Interstate Route 195 ("I-195"), State Route 24, State Route 79, and State Route 140, as shown on Figure 4.4. I-195 generally runs west to east and is located in the southern portion of the routing study area, in the vicinity of Industrial Park Tap. State Route 24 generally runs north to south in the western portion of the routing study area, in the vicinity of Bell Rock Substation. State Route 79 splits from State Route 24 in Fall River at the western limit of the routing study area. State Route 140 generally runs northwest to southeast, approximately three miles west of Industrial Park Tap.

Portions of several other principal and minor arterial roadways, including State Route 138, U.S. Highway Route 6, and State Route 28, are located in the routing study area.

4.4.5 Local Roadway Network

The local roadway network in the four communities of Acushnet, New Bedford, Dartmouth and Fall River was evaluated as potential route options for the installation of the new 115-kV line as either overhead or underground options. Due to the significant costs of constructing a new underground cable as compared to installing a new overhead line, the Companies' primary objective was to identify a potential overhead route that would align with local roadways to serve as an alternative to construction of a new overhead line within the existing electric transmission ROW.

The local roadway networks in Acushnet, New Bedford, and Dartmouth consist of paved roadways. The typical roadway ROW is generally 40 to 50 feet wide with an average traveled way of approximately 20 feet wide. The local roadway network in Fall River in the vicinity of the Bell Rock Substation, is primarily located within the Watuppa Reservation and the Southeastern Massachusetts Bioreserve. While some of these roadways are paved, the majority are unimproved gravel roads or woods/fire roads enclosed with a forested canopy. The typical roadway ROW is approximately 40-feet wide with an average traveled way of approximately 20 feet (maximum) with approximately six-foot shoulders on either side.

4.4.6 Natural Gas Pipeline Corridors

Several natural gas transmission pipelines are located within the routing study area, as shown on Figure 4.5. The pipelines in the routing study area are operated and owned by Spectra Energy Partners, an Enbridge company, and are part of the Algonquin Gas Transmission "G System" extending south from the mainline near Mendon, Massachusetts and into Providence, Rhode Island and Cape Cod. The width of the existing gas pipeline corridor varies but is generally 50- to 65-feet wide.

4.5 Identification and Screening of Potential Routes

The Companies applied the route selection criteria to identify a "Universe of Routes" that could potentially support the installation of a new electric transmission line between the Industrial Park Tap and the Bell Rock Substation. The Universe of Routes consisted of 24 different route options, as shown on Figure 4.6, that underwent initial screening. The Companies reviewed the potential natural and social/developed

environmental constraints and criteria related to engineering and construction feasibility to cull the number of routes down to a more manageable set of routes for more detailed analysis. During this process, a number of the initial route options were dismissed from further consideration due to the availability of clearly superior route options, or in consideration of the exorbitant length, environmental impacts, cost and/or reliability concerns of some route options.

By means of this initial screening process, the Companies determined that 17 of the 24 routes identified were not suitable for the installation and operation of a 115-kV transmission line due to significant concerns related to land acquisition requirements and associated cost. A number of the eliminated routes presented complications with either collocation along established transportation infrastructure or construction constraints and limitations. For example, route opportunities following existing natural gas pipeline corridors generally did not provide sufficient space for the installation of a new adjacent electric transmission line without obtaining new property rights. Co-location with a natural gas pipeline ROW can present safety concerns during construction and maintenance of a new transmission line, and these routes are generally avoided if a more feasible route is available. For this reason, route opportunities following existing pipeline corridors were eliminated from further consideration. In addition, route opportunities following portions of ROW 5 and ROW 6 through the towns of Somerset and Swansea, which are fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line were eliminated due to the lack of available space in the ROW to construct new transmission structures and an overhead line. Similarly, collocating a transmission line along a railroad corridor or highway corridor may be possible; however, the Project proponent must demonstrate that there is no feasible alternative to collocating with these facilities. Given the availability of other routing alternatives that do not utilize railroad and highway corridors, route opportunities following railroads and highways were eliminated from further consideration.

Overhead line installations along local roadways were also screened and dismissed from further consideration as a feasible option because the installation of a new overhead line along these corridors would require obtaining new property rights, encroaching upon open space and residential properties along the roadways, and triggering the release of conservation lands in Fall River via the Article 97 land disposition process through the Legislature of the Commonwealth.

A summary of routes eliminated during the screening process is provided in Table 4-1 below.

TABLE 4-1 ROUTES ELIMINATED FROM FURTHER CONSIDERATION

ROUTE	DESCRIPTION	DISTANCE (MILES)	EXPLANATION FOR ELIMINATION
2 (see Fig. 4.6, Detail Sheet 1)	Overhead along existing electric transmission (ROW 4), underground along limited access highway, and local roadway ROW.	14.7	• Article 97 legislative approval would be required for installation of an underground line w/in MA DCR Roads & Trails. • Rights/Agreements would be required from MassDOT to occupy the State Route 140 corridor, which are not likely to be acquired due to the availability of other viable alternatives.
5 (see Fig. 4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 1, 2, 3, 7, 9), underground along state and local roadway ROW.	25.8	• Rights/Agreements would be required to occupy the U.S. Highway Route 6 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • The 4.5 miles of ROW 7 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
6 (see Fig. 4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 2, 7) and limited access highway ROW.	19.3	• Rights/Agreements would be required from MassDOT to occupy the I-195 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • Unlikely to receive permission to locate in/along I-195 given the availability of other alternatives.
7 (see Fig. 4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 1, 5, 6) and gas pipeline ROW.	41.2	• Approximately 20 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas, this would require an act of the Massachusetts Legislature under Article 97. • Existing transmission corridor extends west and then north from Bell Rock Substation resulting in a long and circuitous route to Industrial Park Tap. • Approximately 3.4 miles of ROW 6 in Somerset and Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line. • Approximately 4.5 miles of ROW 5 in Swansea and Somerset is fully built-out and adjacent ROW is not feasible without significant property acquisition and building removals.
8 (see Fig. 4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 1, 6), railroad, and gas pipeline ROW.	33.7	• Approximately 15.4 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas, this would require an act of the Massachusetts Legislature under Article 97. • Easement rights would be required from rail owners to co-locate facilities along rail ROW. The existing railroad easement is not wide enough in all locations to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Existing transmission corridor extends west and then north from Bell Rock Substation resulting in a long and circuitous route to Industrial Park Tap. • Approximately 3.4 miles of ROW 6 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.

ROUTE	DESCRIPTION	DISTANCE (MILES)	EXPLANATION FOR ELIMINATION
9 (see Fig.4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 1, 6), limited access highway, and gas pipeline ROW.	34.1	• Approximately 17.3 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas this would require an act of the Massachusetts Legislature under Article 97. • Rights/Agreements would be required from MassDOT to occupy the State Route 24 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • Existing transmission corridor extends west and then north from Bell Rock Substation resulting in a long and circuitous route to Industrial Park Tap. • Approximately 3.4 miles of ROW 6 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
10 (see Fig. 4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 1, 6), local roadway, limited access highway, railroad, and gas pipeline ROW.	30.9	• Approximately 18.2 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas this would require an act of the Massachusetts Legislature under Article 97. • Rights/Agreements would be required from MassDOT to occupy the State Route 24 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • Easement rights would be required from rail owners to co-locate facilities along rail ROW. The existing railroad easement is not wide enough in all locations to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Existing transmission corridor extends west and then north from Bell Rock Substation resulting in a long and circuitous route to Industrial Park Tap. • Approximately 3.4 miles of ROW 6 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
11 (see Fig. 4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 2, 7), limited access highway, state and local roadway ROW	22	• Rights/Agreements would be required from MassDOT to occupy the I-195 and U.S. Highway Route 6 corridors, which are not likely to be acquired due to the availability of other viable alternatives. • The 4.5 miles of ROW 7 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
12 (see Fig. 4.6, Detail Sheet 2)	Overhead along existing electric transmission (ROWs 2, 7), limited access highway, railroad, and local road ROWs.	19.5	• Rights/Agreements would be required from MassDOT to occupy the I-195 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • Easement rights would be required from rail owners to co-locate facilities along rail ROW. The existing railroad easement is not wide enough in all locations to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • The 4.5 miles of ROW 7 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.

ROUTE	DESCRIPTION	DISTANCE (MILES)	EXPLANATION FOR ELIMINATION
13 (see Fig. 4.6, Detail Sheet 3)	Overhead along existing electric transmission (ROWs 4, 6), railroad, and gas pipeline ROW.	21.2	• Approximately 6.7 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas this would require an act of the Massachusetts Legislature under Article 97. • Easement rights would be required from rail owners to co-locate facilities along rail ROW. The existing railroad easement is not wide enough in all locations to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Approximately 3.4 miles of ROW 6 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
14 (see Fig. 4.6, Detail Sheet 3)	Overhead along existing electric transmission (ROWs 4, 6), limited access highway, railroad, and gas pipeline ROWs.	21.1	• Approximately 7.3 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas, this would require an act of the Massachusetts Legislature under Article 97. • Rights/Agreements would be required from MassDOT to occupy the State Route 24 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • Easement rights would be required from rail owners to co-locate facilities along rail ROW. The existing railroad easement is not wide enough in all locations to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Approximately 3.4 miles of ROW 6 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
15 (see Fig. 4.6, Detail Sheet 3)	Overhead along existing electric transmission (ROWs 4, 6), local roadway, limited access highway, railroad, and gas pipeline ROWs.	18.4	• Approximately 7.3 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas, this would require an act of the Massachusetts Legislature under Article 97. • Rights/Agreements would be required from MassDOT to occupy the State Route 24 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • Easement rights would be required from rail owners to co-locate facilities along rail ROW. The existing railroad easement is not wide enough in all locations to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Approximately 3.4 miles of ROW 6 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
16 (see Fig. 4.6, Detail Sheet 3)	Overhead along existing electric transmission (ROWs 4, 8, 7), limited access highway, state and local roadway, and gas pipeline ROW	19.7	• Approximately 5.8 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Rights/Agreements would be required from MassDOT to occupy the I-195 and U.S. Highway Route 6 corridors, which are not likely to be acquired due to the availability of other viable alternatives.

ROUTE	DESCRIPTION	DISTANCE (MILES)	EXPLANATION FOR ELIMINATION
			• The 4.5 miles of ROW 7 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
17 (see Fig. 4.6, Detail Sheet 3)	Overhead along existing electric transmission (ROWs 4, 8, 7), limited access highway, and gas pipeline ROW	19.3	• Approximately 3.6 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Rights would be required from MassDOT to occupy the I-195 corridor, which are not likely to be acquired due to the availability of other viable alternatives. • The 4.5 miles of ROW 7 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
18 (see Fig. 4.6, Detail Sheet 3)	Overhead along existing electric transmission (ROWs 4, 5, 6) and gas pipeline ROW	30.7	• Approximately 10.9 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas, this would require an act of the Massachusetts Legislature under Article 97. • Approximately 4.5 miles of ROW 5 in Swansea and Somerset is fully built-out and adjacent ROW is not feasible without significant property acquisition and building removals. • Existing transmission corridor extends west and then north from Bell Rock Substation resulting in a long and circuitous route to Industrial Park Tap. • Approximately 3.4 miles of ROW 6 in Fall River is fully built-out and would require rebuild and reconfiguration of the existing transmission lines in order to accommodate a new line.
19 (see Fig. 4.6, Detail Sheet 3)	Overhead along existing electric transmission (ROWs 1, 4), municipal utility (ROW 10), and gas pipeline ROW.	29.3	• Approximately 8.2 miles along gas pipeline ROW, portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. • Additional easement rights and/or land acquisition along municipal utility ROW. • Existing transmission corridor extends east from Bell Rock Substation, but leaves the existing ROW and heads north then east then south, resulting in a long and circuitous route to Industrial Park Tap.
24 (see Fig. 4.6, Detail Sheet 1)	Overhead along existing electric transmission (ROW 4) and gas pipeline ROW, underground along local roadway ROW.	14.4	• Article 97 legislative approval would be required for installation of an underground line within MA DCR Roads & Trails. • Approximately 1.7 miles along gas pipeline ROW portions of which are not wide enough to accommodate the installation of a new 115-kV transmission line without acquiring additional land rights. In certain areas, this would require an act of the Massachusetts Legislature under Article 97. • Underground crossing of the Acushnet River would require trenchless installation, which would trigger the need to acquire additional easements for the terrestrial workspace needed for a horizontal direction drill.

4.5.1 Identification of Candidate Routes

Following the initial route screening, the remaining seven route options were identified as potentially feasible routes from engineering, environmental and constructability perspectives. These seven "Candidate Routes" were advanced for more detailed analysis and ranking as described in Section 4.6. A summary of each Candidate Route is presented below and in Table 4-2. A map showing all seven Candidate Routes is presented in Figure 4.7. Detailed aerial panel maps are provided in Appendix 4-1.

- **Candidate Route 1** – Candidate Route 1 runs for 12.1 miles along existing transmission ROWs from Industrial Park Tap to the Bell Rock Substation. Candidate Route 1 consists of a predominantly overhead transmission line installation for approximately 12 miles and two short sections of underground cable installation (a total of approximately 600 feet) to avoid multiple overhead line crossings at the Industrial Park Tap and High Hill Switching Station. Candidate Route 1 is located on ROW 4, which varies in width from 150- to 210-feet wide.
- **Candidate Route 3** – Candidate Route 3 runs for 18.4 miles along existing transmission ROW and roadway ROWs. For 0.4 mile, the route would consist of an overhead installation located on ROW 1. At Mendall Road, the line would transition to an underground installation following Mendall Road, Perry Hill Road, Main Street, Lake Street, Peckham Road, Acushnet Avenue, Braley Road, Phillips Road, Chippaway Road, Bullock Road, Slab Ridge Road, Hathaway Road, Bent Rim Trail, Makepeace Road, Cedar Swamp Road, Copicut Road, Gated Fire Lane, Grinnell Path, Gated Fire Lane, and Bell Rock Road for a total distance of 18 miles.
- **Candidate Route 4** – Candidate Route 4 runs for 14.1 miles along existing transmission ROW and roadway ROWs. For 0.7 mile, the route would consist of an overhead installation located on ROW 2. At Hathaway Road, the line would transition to an underground installation following Hathaway Road, Wing Road, Main Street, Tarklin Hill Road, New Plainville Road, Old Plainville Road, Old Fall River Road, North Hixville Road, Yellow Hill Road, Blossom Road, and Bell Rock Road for a total distance of 13.4 miles.
- **Candidate Route 20** – Candidate Route 20 runs for 15.7 miles along existing transmission ROW and roadway ROWs. For 0.7 mile, the route would consist of an overhead installation on ROW 2. At Hathaway Road, the line would transition to an underground installation following Hathaway Road, Wing Road, Main Street, Tarklin Hill Road, New Plainville Road, Shawmut Avenue, High Hill Road, Pine Island Road, Flag Swamp Road, Quanapoag Road, Copicut Road, Gated Fire Lane, Grinnell Path, Gated Fire Lane, and Bell Rock Road for a total distance of 15 miles.
- **Candidate Route 21** – Candidate Route 21 runs for 15.1 miles along existing transmission ROW and roadway ROWs. For 6.5 miles, the route would consist of an overhead installation on ROW 4. At High Hill Road, the line would transition to an underground installation following High Hill Road, Bullock Road, Quanapoag Road, Copicut Road, Gated Fire Lane, Grinnell Path, Gated Fire Lane, and Bell Rock Road for a total distance of 8.6 miles.
- **Candidate Route 22** – Candidate Route 22 runs for 15.5 miles along existing transmission ROW and roadway ROWs. For 7.5 miles, the route would consist of an overhead installation on ROW 4. At Collins Corner Road, the line would transition to an underground installation following Collins Corner Road, Old Fall River Road, North Hixville Road, Yellow Hill Road, Blossom Road, and Bell Rock Road for a total distance of 8.0 miles.
- **Candidate Route 23** – Candidate Route 23 runs for 12.8 miles along existing transmission ROW and roadway ROWs. For 0.7 mile, the route would consist of an overhead installation on ROW 2. At Hathaway Road, the line would transition to an underground installation following Hathaway Road, Wing Road, Main Street, Tarklin Hill Road, New Plainville Road, Shawmut Avenue, and High Hill Road for a total distance of 6.6 miles. At the High Hill Switching Station, the underground cable would transition to an overhead installation in ROW 4 for 5.5 miles.

TABLE 4-2 CANDIDATE ROUTE SUMMARY

ROUTE NO.	ROUTE LENGTH	TOWNS	MAJOR WATERBODY CROSSINGS	LANDMARKS AND MAJOR CONSERVATION AREAS
1 (see Fig. 4.6, Detail Sheet 2)	12.0 miles (OH) ~600 feet (UG)	Acushnet, New Bedford, Dartmouth, Fall River	Acushnet River, Copicut Reservoir	Wheldon Woods Conservation Area, Acushnet Cedar Swamp State Reservation, Southeastern Massachusetts Bioreserve, Watuppa Reservation
3 (see Fig. 4.6, Detail Sheet 1)	18.4 miles 0.4 (OH) 18.0 (UG)	Acushnet, New Bedford, Freetown, Fall River	New Bedford Reservoir	Freetown/ Fall River State Forest, Southeastern Massachusetts Bioreserve, Watuppa Reservation
4 (see Fig. 4.6, Detail Sheet 1)	14.1 miles 0.7 (OH) 13.4 (UG)	Acushnet, New Bedford, Dartmouth, Fall River	Acushnet River	Copicut Woods, Southeastern Massachusetts Bioreserve, Watuppa Reservation
20 (see Fig. 4.6, Detail Sheet 1)	15.7 miles 0.7 (OH) 14.9 (UG)	Acushnet, New Bedford, Dartmouth, Freetown, Fall River	Acushnet River, Turner Pond	Acushnet Cedar Swamp State Reservation, Southeastern Massachusetts Bioreserve, Freetown Fall River State Forest, Watuppa Reservation
21 (see Fig. 4.6, Detail Sheet 1)	15.1 miles 6.5 (OH) 8.6 (UG)	Acushnet, New Bedford, Dartmouth, Freetown, Fall River	Acushnet River	Wheldon Woods Conservation Area, Acushnet Cedar Swamp State Reservation, Southeastern Massachusetts Bioreserve, Freetown Fall River State Forest, Watuppa Reservation
22 (see Fig. 4.6, Detail Sheet 1)	15.5 miles 7.5 (OH) 8.0 (UG)	Acushnet, New Bedford, Dartmouth, Fall River	Acushnet River	Acushnet Cedar Swamp State Reservation, Southeastern Massachusetts Bioreserve, Copicut Woods, Watuppa Reservation
23 (see Fig. 4.6, Detail Sheet 1)	12.8 miles 6.2 (OH) 6.6 (UG)	Acushnet, New Bedford, Dartmouth, Fall River	Acushnet River, Turner Pond, Copicut Reservoir	Acushnet Cedar Swamp State Reservation, Southeastern Massachusetts Bioreserve, Watuppa Reservation

Notes: OH = Overhead; UG = Underground.

4.6 Candidate Route Evaluation and Scoring

The Companies used a scoring and weighting system to conduct a comparative analysis of the Candidate Routes. The purpose of this system was to synthesize multiple evaluation criteria into a single numerical score, thus facilitating a ranking of the Candidate Routes. The scoring analysis includes 15 criteria that compare the relative levels of potential natural environmental impacts, social/developed environmental impacts and constructability constraints along each of the Candidate Routes. The Companies selected criteria that were applicable to both overhead and underground routing configurations. Separately, the Companies developed cost and reliability comparisons as described in Sections 4.6.3 and 4.6.4, respectively.

4.6.1 Scoring and Weighting Methodology

The Companies identified 15 criteria in three categories to be used in the analysis of Candidate Routes. A detailed description of each criterion is provided below. The Companies then assigned each criterion a weight ranging from **1** to **3**, with **1** being the lowest weight and **3** being the highest weight that could be applied to a particular criterion. Using a system of weights allowed the scoring to reflect the Companies' judgment as to the relative importance of the criteria with respect to overhead and underground transmission line permitting, design and construction. Factors considered in determining the appropriate weighting for a resource included the extent of the regulatory protections for that resource, potential for impact to that resource during construction, cost implications, schedule implications, and anticipated concerns of the community based on similar projects undertaken by the Companies. The 15 route scoring criteria and their respective weights are provided in Table 4-3.

The Companies used a "ratio" scoring system to compare the Candidate Routes on each of the 15 criteria. To generate a ratio score for each criterion, the raw score for each route is divided by the highest raw score among all the Candidate Routes. For example, if Route X has 10 acres of tree removal, Route Y has five acres, and Route Z has two acres, Route X would score 1.0, Route Y would score 0.5, and Route Z would score 0.2. In this scoring system, a lower score indicates a lower potential impact.

To obtain a weighted score for each criterion, the ratio score was multiplied by the weight for that criterion. The criteria scores for each Candidate Route were then added together to obtain a single numerical score. In all, this process resulted in weighted and unweighted scores for each Candidate Route. Those routes with a lower weighted score were considered superior routes to those with a higher weighted score suggesting greater potential natural and social environmental impacts.

TABLE 4-3 ENVIRONMENTAL SCORING CRITERIA AND WEIGHTING

	CRITERION	DESCRIPTION	WEIGHT*	EXPLANATION OF WEIGHT
Natural Environment	MA DCR Conservation (Article 97) Land	Length of route in miles requiring Article 97 approval	3	Requires an Act of the Commonwealth of Massachusetts Legislature, which introduces complexity and uncertainty into the Companies' ability to secure necessary property rights.
	Wetlands	Acres within 25 feet of ROW	1	Minimization and mitigation measures can be implemented to reduce impacts
	Outstanding Resource Waters / Areas of Critical Environmental Concern/ Chapter 91 Jurisdictional Crossings	Number of crossings	2	Higher levels of regulatory review, elevated levels of protection and mitigation requirements. Western portions of routing study area are located within the watersheds of the North Watuppa Reservoir and Copicut Reservoir.
	Rare Species Habitat (Priority Habitat)	Acres within ROW	2	Rare species habitat was given a medium weight as these areas require special attention due to the high level of complexity of regulations and high value placed on protection of rare species and mitigation.
	Tree Clearing Requirements	Acres of forested land within ROW	3	Tree removal in forested land was given a higher weight as removal of forested area has the potential to contribute to visual impacts, conversion of wetland types, and loss of specific habitat types.
Social / Developed Environment	Commercial Buildings	Number directly abutting ROW	2	Commercial use buildings are given a medium weight due to temporary construction business operation impacts and stakeholder concerns.
	Residences and Dwellings	Number directly abutting ROW	3	Though most impacts would be temporary, residential land use are given a high weight due to construction disturbances, visual impact and stakeholder concerns.
	Sensitive Receptors	Number directly abutting ROW	3	Sensitive receptors are given a high weight due to temporary disruption and stakeholder concerns.
	Potential Traffic Congestion	Length within roadway ROW	3	Though most impacts would be temporary, potential for traffic congestion is given a high weight due to construction disturbances and stakeholder concerns.
	Historic and Archaeologic Resources	Number directly abutting ROW	2	Efforts will be undertaken to avoid or protect historic and archaeological resources. However, additional costs could be incurred associated with redesign and/or avoidance and protection efforts associated with these resources.
	Potential Encounters w/Contamination	Number within ROW	1	Although impacts can be mitigated, this criterion results in additional liability and costs to handle and manage contaminated groundwater and soil, soil disposal, and extra workspace requirements.
Constructability	Complex Crossings	Number of trenchless crossings, overhead crossings of other transmission line, and railroad crossings within ROW	2	Weight applied due to additional complexity and cost of these crossings associated with design and construction requirements.

	CRITERION	DESCRIPTION	WEIGHT*	EXPLANATION OF WEIGHT
	Utility Congestion	Length of significant utility congestion, either overhead or underground, within ROW	2	Potential relocation of existing underground utilities. Requirement for land acquisition and/or reconfiguration of existing transmission line structures.
	Substantial Road Improvements	Length in miles that each route would be located within or require access from unimproved, rough roads to facilitate construction of the Project	3	Extensive road improvements can affect project impacts, schedule and costs. Necessary upgrades to unimproved municipal roads require approval from the local DPW and on occasion from the MA DCR.
	Hard Angles (>30 degrees)	Number within ROW	1	Additional costs associated with design requirements, material costs, and work area requirements.

Note: *Weights assigned to each criterion were based on the scale of the severity of the potential impact/constraint: 1 - 3 (1 = Best, 3 = Worst)
1 = Minimal Constraint/Impact
2 = Moderate Constraint/Impact
3 = Significant Constraint/Impact

Natural Environment Criteria

The potential impact on the surrounding natural environment was considered, as well as the ability of the selected alternative to meet environmental laws and regulations. The feasibility of avoiding or minimizing adverse impacts to natural environmental resources was analyzed. The five natural environment criteria included in the scoring analysis include:

- Massachusetts Department of Conservation Recreation ("MA DCR") (Article 97) Conservation Lands.
- Wetland Resource Areas including Bordering Vegetated Wetlands.
- Outstanding Resource Waters ("ORWs")/Areas of Critical Environmental Concern ("ACEC")/Massachusetts Department of Environmental Protection ("MassDEP") Chapter 91 Jurisdictional Waterway Crossings.
- State-listed Rare Species Habitat (Priority Habitat).
- Tree clearing requirements to meet clearance codes.

Natural resource mapping of the Candidate Routes is provided in Appendix 4-1.

MA DCR (Article 97) Land

Conservation lands subject to Article 97 could be affected by the construction of overhead and underground transmission lines. Scores for this criterion were developed by reviewing the MassGIS MA DCR's Roads and Trails data[23] to determine the length of each route (in miles) located along unimproved MA DCR roads and trails or along improved MA DCR roads subject to a Conservation Restriction where a land acquisition and Article 97 approval would be required. Land subject to Article 97 would require an Act of the Massachusetts Legislature, which introduces complexity and uncertainty into the Companies' ability to secure necessary property rights. This criterion was assigned a weight of **3**.

Wetland Resource Areas

Project construction could directly impact wetland resource areas located along a route either temporarily or permanently. Scores for this criterion were developed by reviewing the MassGIS MassDEP Wetlands (2005) data to determine the number of wetland acres within 25 feet of each Candidate Route ROW.[24, 25] This criterion was assigned a weight of **1**.

ORW / ACECs / MassDEP Chapter 91 Jurisdictional Crossings

Project construction could directly impact ORW, ACECs, and/or resources protected under the Massachusetts Public Waterfront Act, Chapter 91, which is the primary tool for protecting and promoting public use and interests in tidelands and other waterways.[26] Scores for this criterion were based on the

[23] Massachusetts Geographic Information System (MassGIS). June 2015. Department of Conservation and Recreation Roads and Trails. Available at https://docs.digital.mass.gov/dataset/massgis-data-department-conservation-and-recreation-roads-and-trails. Accessed on May 26, 2021.
[24] MassGIS. MassDEP Wetlands 2005 Data layer. December 2017. Available at https://docs.digital.mass.gov/dataset/massgis-data-massdep-wetlands-2005. Accessed on May 26, 2021.
[25] This evaluation included biological wetland resource areas only and did not account for acreage of wetland buffer zone or Riverfront Area.
[26] Chapter 91, The Massachusetts Public Waterfront Act. Guide. 2021. Available at https://www.mass.gov/guides/chapter-91-the-massachusetts-public-waterfront-act. Accessed on May 26, 2021.

number of crossings of surface waterbody resources that are listed in the Commonwealth of Massachusetts Surface Water Quality Standards as ORW (314 Code of Massachusetts Regulations ["CMR"] 4.00) and the number of crossings Certified Vernal Pools[27] and ACECs based on MassGIS data layers.[28,29] The evaluation of Chapter 91 Jurisdictional crossings involved reviewing the MassGIS Tidelands Jurisdiction (G.L. c. 91) data to determine the number of jurisdictional crossings along each Candidate Route ROW.[30] Areas that may be subject to Chapter 91 jurisdiction include Flowed Tidelands, Filled Tidelands, Great Ponds and Non-Tidal Rivers and Streams. Additionally, public drinking water supplies were reviewed to determine whether they constituted ORW. This criterion was assigned a weight of **2**.

Rare Species Habitat (Priority Habitat)

Project construction could directly impact areas protected as habitat for state-listed rare species. This criterion was based on a review of the MassGIS Natural Heritage and Endangered Species Program ("NHESP") Priority Habitats of Rare Species data to determine the acres of priority habitat within each Candidate Route ROW.[31] This criterion was assigned a weight of **2**.

Tree Clearing

To accommodate the construction, and to maintain the reliability and safe operation of overhead transmission lines, tree clearing is often required to meet clearance requirements. In order to evaluate tree clearing needs for each Candidate Route, a ROW corridor was established by: 1) utilizing the limits of the existing overhead transmission line corridors held by the Companies; or 2) by establishing a typical ROW corridor width for underground cable installation. The typical corridor for underground cable installation was assumed to be the width of the existing roadway travel surface. Forested upland and forested wetland land uses located within the limits of these established ROWs were assumed to require tree clearing for each Candidate Route. This criterion was evaluated using the MassGIS Land Use data to identify the total acreage of forested land within each Candidate Route ROW.[32] This criterion was assigned a weight of **3**.

Social/ Developed Environment Criteria

The potential impact on landowners, abutters, customers and local community interests was taken into account by considering the potential impacts on landowners and stakeholders. The feasibility of avoiding and/or minimizing adverse impacts to social resources was analyzed. The six Social/Developed Environment Criteria included in the scoring analysis include:

- Residences and Dwellings
- Commercial Buildings
- Sensitive Receptors (places where the public congregates, etc.)
- Potential for Traffic Congestion
- Historic and Archaeologic Resources
- Potential to Encounter Subsurface Contamination

[27] Certified vernal pools are classified as Class B Outstanding Resource Water per 314 CMR 4.00.
[28] MassGIS. NHESP Certified Vernal Pools. Updated Continually.
[29] MassGIS. Areas of Critical Environmental Concern. April 2009.
[30] MassGIS. Tidelands Jurisdiction (M.G.L. c.91) Data layers. March 2011.
[31] MassGIS. NHESP Priority Habitats of Rare Species. August 2017.
[32] MassGIS. Land Use. May 2019.

Land uses and cultural resources mapping of the Candidate Routes is provided in Appendix 4-1.

Residences and Dwellings

Residents along a route could be subject to temporary traffic disruption, street closings, construction noise, dust, and/or other temporary impacts due to Project construction, as well as the potential for visual impacts from the permanent removal of trees along certain routes. The routes analyzed pass through areas with varying degrees of residential land uses (high, medium, low and very low density and multi-family residential). Residences were counted based on aerial photographic interpretation and Google street imagery to determine the number of homes directly abutting each Candidate Route ROW. This criterion was assigned a weight of **3**.

Commercial Buildings

Businesses along a route could be subject to temporary traffic disruption, street closings, construction noise, dust, and/or other temporary construction impacts, as well as the potential for visual impacts from the permanent removal of trees and the placement of structures along certain routes. The number of commercial buildings was counted based on aerial photographic interpretation and Google street-imagery to determine the number of commercial buildings directly abutting each Candidate Route ROW. This criterion was assigned a weight of **2**.

Sensitive Receptors

Sensitive receptors are defined as public facilities including hospitals, elder care facilities, public and private schools, cemeteries, licensed daycares, district courts, nursing homes, police stations, fire stations, and places of worship. Sensitive receptors could be subject to temporary traffic disruption, street closings, construction noise, and/or other temporary impacts due to Project construction. The number of sensitive receptors directly abutting each route was determined based on MassGIS Massachusetts Schools data,[33] USGS Geographic Names Information System ("GNIS"),[34] and the Massachusetts Department of Early Education and Care location data.[35] This criterion was assigned a weight of **3**.

Potential for Traffic Congestion

The installation of a new transmission line within public roadways could result in temporary increased traffic density and congestion, traffic disruption, street closings, construction noise, and/or other temporary impacts due to Project construction. This criterion was evaluated by determining the length (in miles) that each route would be installed within a public roadway ROW. This criterion was assigned a weight of **3**.

Historic and Archaeologic Resources

The PAL conducted a desktop analysis to identify inventoried historic properties (including architectural sites, historic architectural resources, and historic districts and/or areas) that potentially could be affected by construction impacts due to earth movement, traffic disruptions, the permanent removal of trees and the placement of transmission facilities in or near cultural resources. Inventoried historic architectural resources were assessed using MHC data from the Massachusetts Cultural Resources Information System

[33] MassGIS. Massachusetts Schools. November 2020.
[34] USGS. Geographic Names Information System. May 2021.
[35] MA Department of Early Education and Care online directory of licensed child care programs available at https://eecweb.eec.state.ma.us/ChildCareSearch/EarlyEduMap.aspx. Accessed on June 4, 2021.

("MACRIS"),[36] and involved a review of inventoried resources in proximity to each Candidate Route. The number of all previously identified historic properties directly abutting each Candidate Route ROW was counted based on the number of buildings, local historic districts, and National Register of Historic Places ("NRHP")-listed individual buildings and districts included in the Inventory of Historic and Archaeological Assets of the Commonwealth or listed in the State and National Registers of Historic Places. Archaeological sites were also assessed using MACRIS and involved a review of inventoried sites within proximity to each Candidate Route. This criterion was assigned a weight of **2**.

Potential to Encounter Subsurface Contamination

The presence of subsurface contamination adds complexities to Project construction. Underground excavation and/or other construction activities may expose contaminated soil that can affect worker safety and require special soil management procedures and disposal requirements under federal and state hazardous material and/ or other regulations. This adds complexities and costs and may significantly affect schedule. The potential to encounter subsurface contamination was assessed based on the number of MassDEP Bureau of Waste Site Cleanup Massachusetts Contingency Plan sites within the Candidate Route ROW, including Active Tier I and Tier II sites, Activity Use Limitation sites closed with ongoing maintenance conditions, Utility Release Abatement Measure sites, and those sites with a Class C Response Action Outcome or Temporary Solution Statement. This criterion was evaluated using the MassGIS MassDEP Tier Classified Oil and/or Hazardous Material Sites data layer, the MassDEP Oil and/or Hazardous Material Sites with Activity Use Limitations, and the Massachusetts Energy and Environmental Affairs Data Portal Search for Waste Site and Reportable Releases to determine the number of sites within the ROW.[37, 38, 39] This criterion was assigned a weight of **1**.

Constructability

The potential physical constraints and field conditions along a route alternative can significantly affect construction of the Project. For example, road and highway crossings, large watercourse crossings, and work within other utility corridors can result in access restrictions, working space constraints, safety concerns, traffic disruptions, and restrictive work hours.

Engineering and construction feasibility play a key role in determining whether or not an alternative route is feasible and if the facilities can be installed safely and meet standard industry practices for operability and reliability. The four constructability criteria included in the scoring analysis include:

- Complex Crossings (physical barriers to be crossed aerially or underground).
- Congestion and Space Constraints Due to Existing Utility Infrastructure.
- Substantial Road Improvements (those that would require heavy repairs to support the construction of a new 115-kV line or cable).
- Hard Angles (>30 degrees) – (although transmission lines may be considered by some to be flexible there is inherent rigidity in the stringing overhead conductors or installing underground cable).

[36] MassGIS. MHC Historic Inventory. Updated Continually.
[37] MassGIS MassDEP Tier Classified Oil and/or Hazardous Material Sites (MGL c. 21E). December 2020.
[38] MassDEP Oil and/or Hazardous Material Sites with Activity and Use Limitations (AUL) Data layer. December 2020.
[39] Massachusetts Energy & Environmental Affairs Data Portal. Search for Waste Site & Reportable Releases. Available at https://eeaonline.eea.state.ma.us/portal#!/search/wastesite. Accessed on June 9, 2021.

Complex Crossings

All Candidate Routes require the crossing of certain features (e.g., railroad ROWs, highways, other overhead transmission lines) that require additional consideration and effort to design, permit and/or construct. The category of complex crossings includes trenchless crossings (e.g., Horizontal Directional Drill, jack and bore, micro-tunneling), crossings of existing, energized overhead transmission lines and railroad crossings. Such crossings are generally more complex and require logistical coordination, additional expense (design and material) and may have schedule implications due to longer permitting or easement approval timelines and/or longer construction durations. In comparison, a more conventional crossing or installation, such as construction of an overhead line and supporting structures within an existing overhead transmission ROW or the installation an underground duct bank and manhole system within a non-congested roadway system, generally do not pose the same logistics, risks, construction durations and costs as a non-conventional, complex crossing(s). This complex crossing criterion involved a count of the number of non-conventional, complex crossings within the ROW based on: (1) a preliminary review of where trenchless installations would be required along the underground route; (2) review of the MassGIS trains data layer; and (3) aerial photographic interpretation.[40] This criterion was assigned a weight of **2**.

Congestion Due to Existing Utility Infrastructure

The number of existing utilities located along and within a Candidate Route ROW can affect the available space above and below grade to physically construct transmission lines. Overhead and underground electric facilities (both transmission and distribution), underground pipelines, municipal water, sewer, and gas facilities, and features such as manholes and catch basins can significantly constrain available space. Such constraints complicate the construction process, and increase construction duration, traffic disruption, and costs. The utility density along Candidate Routes was assessed using aerial photographic interpretation, available subsurface utility records, known facility locations obtained from the municipalities traversed by the Candidate Routes, and existing ROW configuration mapping provided by the Companies. The length of significant utility congestion was evaluated for each route. Congestion was determined to be significant if the Companies anticipated that existing utilities would need to be rebuilt and/or reconfigured to accommodate the installation of a new transmission line, or if the presence of existing utilities would appreciably complicate the construction process. Generally, the areas of significant utility congestion are located in the more densely populated area of the routing study area including Somerset, Swansea, Fall River, New Bedford, and Acushnet. This is expected due to the amount of heavy commercial and industrial uses in these areas. This criterion was assigned a weight of **2**.

Substantial Road Improvements

Working in remote locations of the Study Area requires access along unimproved roads along all Candidate Routes. These roadways require additional consideration and coordination with jurisdictional agencies to facilitate the type of substantial improvements required for access, construction, and operation and maintenance activities. The mileage estimate for the substantial road improvements category was based upon the distance in mileage that each route would be located within or require access from unimproved, rough roads to facilitate construction of the Project. These roads are primarily in the City of Fall River Watuppa Reservation on the western portion of the Study Area. The mileage estimation was based upon aerial photographic interpretation and field reconnaissance efforts. The unimproved, rough roads that are public roads would require heavy repairs to support the construction of a new 115-kV line or cable. The Companies would need to coordinate with the affected municipalities, and in some instances, the Massachusetts Department of Conservation and Recreation, to obtain approval to make the road repairs.

[40] MassGIS Trains. April 2015.

Also included in this category, is a mileage estimation of new roads that would need to be constructed within the existing transmission line ROW to facilitate construction of the Project within the existing transmission line corridor. This criterion was assigned a wight of a **3**.

Hard Angles (>30 degrees)

For above-ground transmission lines, sharp angles may require specialized structures and additional material and design costs. For underground cables, sharp bends may also increase construction difficulty and the risk of cable damage during installation and operation; sharp turns also necessitate installation of additional manholes to minimize side wall pressure on the cables. Consistent with other siting applications submitted by the Companies, this criterion was evaluated in ArcGIS to determine the number of bends greater than 30 degrees along both the overhead and underground portions of each Candidate Route ROW. For overhead transmission routes, the ROW centerline was reviewed; for underground transmission routes the center of each road was reviewed. This criterion was assigned a weight of **1**.

4.6.2 Numerical Scoring of Candidate Routes

Table 4-4 presents an overview of all raw data, total ratio scores and total weighted scores for the specific criteria evaluated along each Candidate Route. Overall, Candidate Route 1 has the lowest weighted score (10.82) and would result in the lowest potential for impact of all the Candidate Routes evaluated. Candidate Route 1 had the lowest weighted score for the residences, potential for traffic congestion, hard angles, and substantial road improvements criterion. Candidate Route 22 ranked second best in terms of potential impacts, with a weighted score of 11.67, followed by Candidate Route 21, with a weighted score of 13.95.

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TABLE 4-4 CANDIDATE ROUTE SCORING EVALUATION MATRIX

Candidate Route	Residences (No. directly abutting ROW)[1]	Commercial (No. of commercial buildings directly abutting ROW)[1]	Sensitive Receptors abutting ROW[1,2]	DCR Conservation Land (Length in miles Requiring Article 97 Approval)[3]	Historic & Archaeologic Resources (Known Sites) (No. directly abutting ROW)[1]	Wetlands (Acres within 25 ft buffer)	ORW, ACEC, & Chapter 91 Jurisdictional Crossings (No. within ROW)	Rare Species Habitat (Acres Priority Habitat within ROW)	Tree Clearing (Acres of forested land within ROW)	Potential for Subsurface Contamination (No. of sites within ROW	Potential Traffic Congestion Impacts (Mileage in roadway ROW)	Complex Crossings (trenchless technology, overhead transmission line crossings, and railroad crossings)	Congestion with Existing Utility Infrastructure (Length of Significant Utility Congestion within ROW)	Hard Angles (>30 degrees) (No. within ROW)	Substantial Road Improvements Required (miles)[4]	Total Criteria Score	
Route 1 - *ISO Route*	52.0	6.0	0.0	0.0	27.0	47.7	1.0	106.0	45.0	0.0	0.0	3.0	0.0	3.0	2.8		
Ratio Score	0.10	0.09	0.00	0.00	0.23	1.00	0.50	1.00	1.00	0.00	0.00	0.60	0.00	0.12	0.53	5.16	Ratio Score
Weight	3	2	3	3	2	1	2	2	3	1	3	2	2	1	3		
Weighted Score	0.29	0.17	0.00	0.00	0.45	1.00	1.00	2.00	3.00	0.00	0.00	1.20	0.00	0.12	1.58	10.82	Weighted Score
Route 3 - *Central Underground Route Variation*	529.0	18.0	10.0	5.2	61.0	3.8	0.0	21.8	8.9	0.0	18.0	1.0	0.8	25.0	4.3		
Ratio Score	1.00	0.26	0.71	0.83	0.51	0.08	0.00	0.21	0.20	0.00	1.00	0.20	0.55	1.00	0.80	7.35	Ratio Score
Weight	3	2	3	3	2	1	2	2	3	1	3	2	2	1	3		
Weighted Score	3.00	0.51	2.14	2.50	1.03	0.08	0.00	0.41	0.59	0.00	3.00	0.40	1.10	1.00	2.39	18.15	Weighted Score
Route 4 - *Southern Underground*	419.0	70.0	14.0	2.7	119.0	5.9	1.0	35.7	5.7	1.0	13.4	3.0	1.5	7.0	3.9		
Notes/Details																	
Ratio Score	0.79	1.00	1.00	0.42	1.00	0.12	0.50	0.34	0.13	1.00	0.74	0.60	1.00	0.28	0.72	9.65	Ratio Score
Weight	3	2	3	3	2	1	2	2	3	1	3	2	2	1	3		
Weighted Score	2.38	2.00	3.00	1.27	2.00	0.12	1.00	0.67	0.38	1.00	2.23	1.20	2.00	0.28	2.16	21.70	Weighted Score
Route 20 - North/South Underground Crossover	396.0	65.0	12.0	6.3	107.0	6.7	2.0	37.6	9.8	1.0	14.9	4.0	1.5	18.0	5.4		
Notes/Details																	
Ratio Score	0.75	0.93	0.86	1.00	0.90	0.14	1.00	0.35	0.22	1.00	0.83	0.80	1.00	0.72	1.00	11.49	Ratio Score
Weight	3	2	3	3	2	1	2	2	3	1	3	2	2	1	3		
Weighted Score	2.25	1.86	2.57	3.00	1.80	0.14	2.00	0.71	0.65	1.00	2.48	1.60	2.00	0.72	3.00	25.78	Weighted Score
Route 21 - Hybrid Route 1	108.0	9.0	0.0	6.3	25.0	35.8	1.0	38.7	21.7	0.0	8.5	2.0	0.0	13.0	5.4		
Notes/Details																	
Ratio Score	0.20	0.13	0.00	1.00	0.21	0.75	0.50	0.36	0.48	0.00	0.47	0.40	0.00	0.52	1.00	6.03	Ratio Score
Weight	3	2	3	3	2	1	2	2	3	1	3	2	2	1	3		
Weighted Score	0.61	0.26	0.00	3.00	0.42	0.75	1.00	0.73	1.45	0.00	1.42	0.80	0.00	0.52	3.00	13.95	Weighted Score
Route 22 - Hybrid Route 2	178.0	6.0	3.0	2.7	36.0	42.4	0.0	40.1	19.9	0.0	8.0	3.0	0.0	7.0	3.9		
Notes/Details																	
Ratio Score	0.34	0.09	0.21	0.43	0.30	0.89	0.00	0.38	0.44	0.00	0.44	0.60	0.00	0.28	0.72	5.13	Ratio Score
Weight	3	2	3	3	2	1	2	2	3	1	3	2	2	1	3		
Weighted Score	1.01	0.17	0.64	1.30	0.61	0.89	0.00	0.76	1.32	0.00	1.33	1.20	0.00	0.28	2.16	11.67	Weighted Score
Route 23 - Hybrid Route 3	340.0	64.0	11.0	0.0	99.0	18.7	2.0	104.9	33.3	1.0	6.6	5.0	1.5	8.0	2.9		

Candidate Route	Residences (No. directly abutting ROW)[1]	Commercial (No. of commercial buildings directly abutting ROW)[1]	Sensitive Receptors abutting ROW[1,2]	DCR Conservation Land (Length in miles Requiring Article 97 Approval)[3]	Historic & Archaeologic Resources (Known Sites) (No. directly abutting ROW)[1]	Wetlands (Acres within 25 ft buffer)	ORW, ACEC, & Chapter 91 Jurisdictional Crossings (No. within ROW)	Rare Species Habitat (Acres Priority Habitat within ROW)	Tree Clearing (Acres of forested land within ROW)	Potential for Subsurface Contamination (No. of sites within ROW	Potential Traffic Congestion Impacts (Mileage in roadway ROW)	Complex Crossings (trenchless technology, overhead transmission line crossings, and railroad crossings)	Congestion with Existing Utility Infrastructure (Length of Significant Utility Congestion within ROW)	Hard Angles (>30 degrees) (No. within ROW)	Substantial Road Improvements Required (miles)[4]	Total Criteria Score	
Notes/Details																	
Ratio Score	0.64	0.91	0.79	0.00	0.83	0.39	1.00	0.99	0.74	1.00	0.37	1.00	1.00	0.32	0.54	10.52	Ratio Score
Weight	3	2	3	3	2	1	2	2	3	1	3	2	2	1	3		
Weighted Score	1.93	1.83	2.36	0.00	1.66	0.39	2.00	1.98	2.22	1.00	1.10	2.00	2.00	0.32	1.62	22.41	Weighted Score

1 This category includes resources identified within 150 feet of the edge of ROW.
2 This category includes public and private schools, licensed daycare facilities (center and home based), hospitals, police stations, fire stations, elder care facilities, places of worship, cemeteries, and district courts.
3 This category includes length of route along unimproved DCR roads and trails and along improved DCR roads subject to a Conservation Restriction.
4 This category identifies needs for extensive road improvements or development of new roads.

4.6.3 Candidate Route Evaluation – Estimated Costs

Table 4-5 presents cost estimates for the construction of a new 115-kV transmission line along each of the Candidate Routes. The cost estimate for Candidate Route 1 (the proposed route) is considered a -25%/+25% estimate and represents the sum of National Grid's and Eversource's transmission line cost estimates for the Project. It does not include any costs associated with work at the substations.

Cost estimates for the other Candidate Routes are conceptual (-50%/+200%) and are based on cost-per-mile estimates of $3.65 million/mile for overhead construction and $20 million/mile for underground construction. Additional factors that could increase these conceptual estimates include: (1) the need to rebuild or reconfigure existing transmission lines; (2) line clearance requirements that could result in the need for property acquisition and additional easements, and forestry practices; and (3) evaluation of the underground cable system to meet the required line ratings. In addition, there are many other factors that can affect the actual cost of a transmission line project, including the presence of contaminated soils and the potential for work hour restrictions. For an underground line, subsurface conditions and requirements for additional workspace for trenchless installations could also significantly affect the cost of the Project. Nonetheless, the estimates provided below provided an objective basis for comparing the potential cost differentials among the various routes.

TABLE 4-5 CONCEPTUAL SCREENING ESTIMATED COSTS ($ MILLIONS)

ROUTE	LENGTH	COST PER SEGMENT	TOTAL ESTIMATED COST
1 (see Fig. 4.6, Detail Sheet 2)	12.1 miles 12.0 (OH) 600 feet (UG)	NA	$50.5M
3 (see Fig. 4.6, Detail Sheet 1)	18.4 miles 0.4 (OH) 18.0 (UG)	$1.46M OH $360M UG	$361.46M
4 (see Fig. 4.6, Detail Sheet 1)	14.1 miles 0.7 (OH) 13.4 (UG)	$2.56M OH $268M UG	$270.56M
20 (see Fig. 4.6, Detail Sheet 1)	15.7 miles 0.7 (OH) 15.0 (UG)	$2.56M OH $300M UG	$302.56M
21 (see Fig. 4.6, Detail Sheet 1)	15.1 miles 6.5 (OH) 8.6 (UG)	$23.73M OH $172M UG	$195.73M
22 (see Fig. 4.6, Detail Sheet 1)	15.5 miles 7.5 (OH) 8.0 (UG)	$27.38M OH $160M UG	$187.38M
23 (see Fig. 4.6, Detail Sheet 1)	12.8 miles 6.2 (OH) 6.6 (UG)	$22.63M OH $132M UG	$154.63M

As shown in Table 4-5 above, Candidate Route 1 is significantly less expensive than any of the other identified Candidate Routes, each of which requires at least six miles of underground cable installation. Candidate Route 23, which is the next least expensive route, is more than three times the cost of Candidate Route 1.

4.6.4 Candidate Route Evaluation – Reliability

The Companies also considered the reliability of each Candidate Route. While an underground line may be less susceptible to weather-induced outages, an overhead line takes much less time to inspect and repair in the event of an outage (days rather than weeks). However, overhead and underground transmission technologies are both inherently reliable and would be constructed to be robust systems that meet current codes and standards. As a result, the Companies consider the reliability of the Candidate Routes to be comparable.

4.7 Selection of Preferred Route

The Companies conducted a detailed weighing and scoring assessment of seven Candidate Routes. Based on an evaluation using the 15 criteria described in Table 4-3, Candidate Route 1 was found to have the lowest potential for environmental impact. It is also by far the least expensive of the Candidate Routes to construct due to its short length and almost entirely overhead construction. Finally, its reliability is comparable to that of the other Candidate Routes. Consequently, the Companies determine that Candidate Route 1 is clearly superior to the remaining options and selected it as their Proposed Route (see Figure 4.8).

The Companies also considered whether presenting a Noticed Alternative Route was warranted in this case given the clear superiority of the Preferred Route from a cost perspective. Candidate Routes 3 and 4 offer the most geographic diversity from the Preferred Route and consist of a hybrid combination of overhead and underground construction. However, Candidate Routes 3 and 4 were not considered to be feasible Noticed Alternative Routes because these routes would involve underground construction of 18 miles and 13.4 miles, respectively, resulting in significant additional costs relative to the Preferred Route to install a new system of underground duct banks, manholes, transition stations and relocation of existing subsurface utilities and service connections. Similarly, Candidate Routes 20, 21, 22 and 23 scored worse, were significantly more expensive than the Preferred Route, and did not present any advantages or benefits as compared with the Preferred Route. As a result of this analysis, and the clear superiority of the Preferred Route, the Companies determined that specifying a Noticed Alternative Route had the potential to raise concern unnecessarily among certain abutters where the Companies had no intention of constructing the Project along such a substantially inferior route. Thus, the Companies determined that designating a Noticed Alternative Route was not warranted under these circumstances.

4.8 Conclusion

The Companies' process for selecting a Preferred Route for the proposed 115-kV transmission line addresses the Siting Board's standards applicable to jurisdictional energy facilities in an objective and comprehensive fashion. The Companies approached the process by identifying an initial universe of potential route corridors within a broad routing study area to fulfill a review of route options with geographic diversity, and to ensure that no feasible or clearly superior routes would be overlooked. These corridors were then combined to produce 24 potential routes for the transmission line. The 24 routes were analyzed and assessed against initial threshold criteria, resulting in the selection of the seven potentially feasible candidate route alternatives for further evaluation. Finally, the Companies performed a detailed evaluation of the environmental impacts, reliability and cost of the seven routes to determine the best option.

The Preferred Route (Candidate Route 1) is proposed within the existing Eversource and National Grid ROW, where established overhead transmission line corridors have existed for decades between the Industrial Park Tap and the Bell Rock Substation. These ROWs are controlled by the Companies either in fee or easement and contain sufficient width to construct a new overhead transmission line adjacent to the

existing overhead transmission lines. The Preferred Route is superior in terms of potential environmental impact and cost.

The other Candidate Routes consisted of a combination of route segments transitioning from overhead to underground transmission and contained a number of significant challenges. Notably, all of the Candidate Routes contain a substantial length of underground construction resulting in a substantial cost premium and disruption to the communities traversed by the alternatives. Additionally, Candidate Routes 3, 4, 20, 21 and 22 would require the need to receive approval from the Commonwealth of Massachusetts Legislature under the Article 97 provisions, and then to receive approval from the MA DCR for the release of lands currently held for conservation purposes. Easements and the Article 97 process are difficult, and could extend for a period of years, resulting in a delay to placing the new 115-kV transmission line into service. In light of the clear superiority of the Preferred Route, particularly with respect to cost, the Company determined that designating a Noticed Alternative Route is not warranted in this case.

A more detailed examination of the Preferred Route is presented in Section 5 of this Analysis.

5.0 DETAILED ANALYSIS OF PREFERRED ROUTE

5.1 Introduction

This section provides a detailed analysis of the potential environmental impacts and mitigation associated with the Preferred Route. A series of social/developed and natural environmental criteria are evaluated including: land use, protected land and open space, historical/archaeological sites, tree removal, wetlands and water crossings, rare species habitat, public water supplies, visual, noise, traffic, and EMF.

Potential impacts associated with each of these criteria are described, including both construction-related (temporary) impacts and siting and operation-related (permanent) impacts. Examples of potential temporary construction-related impacts include traffic impacts, temporary use of areas to stage construction equipment and supplies (such as construction mats), and short-term construction noise associated with the operation of heavy equipment. Examples of permanent impacts include fill, vegetation removal, operational noise and visual impacts.

Section 5.2 provides a description of the Preferred Route and the associated ancillary facility improvements at the Tremont, Acushnet, and Bell Rock substations. Related maps and figures are found in Volume II of this Analysis. Section 5.3 provides an overview of the Companies' construction and maintenance plans. To supplement this section, the Companies' environmental guidance and best practices documents are presented in Appendices 5-1 (Eversource) and 5-2 (National Grid).

Section 5.4 describes the social/developed and natural environmental impacts resulting from the Project and discusses proposed appropriate mitigation. Section 5.5 presents the costs of the proposed facilities. Finally, Section 5.6 summarizes the analysis based upon a full consideration of cost and environmental impact factors.

5.2 Description of Preferred Route

5.2.1 Preferred Route

The proposed transmission line (to be known as the 114 Line) will be constructed within an existing ROW held by the Companies and used for transmission purposes. The Preferred Route of the proposed 115-kV transmission line is illustrated on Figure 5.1, typical ROW cross-sections are included in Figure 5.2, and typical transmission structure details are included in Figure 5.3.

The existing transmission ROW varies from 150- to 210-feet wide. From the Industrial Park Tap in Acushnet west to the Industrial Park Substation in New Bedford (approximately 4.2 miles), there is one existing 115-kV transmission line located on single-circuit H-frame structures and co-located with an existing distribution line. This section of ROW is approximately 210-feet wide. The existing 115-kV transmission line continues west from the Industrial Park Substation to the High Hill Switching Station in Dartmouth (approximately 2.4 miles) also on single-circuit H-frame structures and co-located with an existing distribution line. The ROW from Industrial Park Substation west to High Hill is approximately 150 feet wide. From the High Hill Switching Station west to the Bell Rock Substation in Fall River (approximately 5.4 miles), the existing 115-kV transmission line is located on single-circuit H-frame structures within an approximately 150-foot-wide ROW, and transitions from Eversource territory to National Grid territory at the Dartmouth/Fall River municipal border.

The new transmission line will generally be constructed on self-weathering or galvanized steel H-frame and monopole structures directly embedded into the ground. Structures located at angle points, dead-end structures and certain other locations within the ROW will be self-supported steel structures erected on concrete caisson foundations. Select dead-end and angle structures will consist of steel triple-pole structures requiring reinforced concrete foundations to support heavy loads.

The new transmission line is to be constructed predominantly overhead; however, it does involve the construction of two short sections of underground cable (a total of approximately 600 linear feet) to be installed to avoid multiple overhead line crossings at the Eversource Industrial Park Tap and at the Eversource High Hill Switching Station. There will be no changes to the existing 115-kV transmission lines or structures located within the existing ROW. Plan and profile drawings of the underground sections are included in Figure 5.2, sheets 15-19.

5.2.2 Ancillary Facilities

This Section discusses the modifications at the Tremont, Acushnet and Bell Rock Substations that will be constructed as part of the Project. The location of the Tremont, Acushnet and Bell Rock Substations are shown on Figure 5.5, with more detail shown in Figures 5.5.1 through 5.5.3, respectively.

The existing 115-kV Tremont Substation is located on approximately 2.1 acres of Eversource fee-owned property off of North Carver Road in Wareham. The Tremont Substation is set back approximately 15 feet west of North Carver Road and is bordered by overhead transmission ROW to the east, company owned land and road ROW (Doty Street) to the south/west, and company owned land/overhead transmission ROW to the east and north.

The existing 115-kV Acushnet Substation is located on approximately 13.75 acres of Eversource fee-owned property off of Beech Street in Acushnet. The Acushnet Substation is set back approximately 65 feet north of Beech Street and is bordered by the Acushnet River to the west, overhead transmission ROW to the north, Acushnet River Preserve to the east, and Beech Street to the south.

The existing National Grid 115-kV Bell Rock Substation is located on a 2.75-acre easement on land owned by the City of Fall River, and Eversource's substation easement granted by the City is approximately 1.06 acres for a total of approximately 3.81 acres.[41] The Bell Rock Substation is set back approximately 60 feet east of Bell Rock Road and is bordered by overhead transmission ROWs to the south, west, and east. To the north, the substation is bordered by conservation land held by the City of Fall River Water Department.

Protection and Control Upgrades

To accommodate installation of a new 115-kV overhead transmission line along the Preferred Route, the following upgrades to the protection and control schemes at Bell Rock, Tremont, and Acushnet Substations would be required:

- Replace existing relays in existing panels or install new relay panels in the control enclosures.
- Install new conduit/cable trench and control cable from yard equipment to the control enclosures.
- Modify the telecommunication architecture to accommodate new relay systems.

[41] Easements were granted by the City of Fall River to: (1) Montaup Electric Company, Deed Book 734, Page 461, dated June, 9, 1960; and (2) New Bedford Gas and Edison Light Company, Deed Book 1073, Page 283, dated April 24, 1973.

- Program new relays to operate as a three-terminal line between Bell Rock, Tremont, and Acushnet Substations.
- Test and commission new relay and communication equipment.

All work necessary to accommodate the protection and control upgrades will occur within the existing fenced-in substation yards utilizing existing access driveways.

Bell Rock Substation

Protection and telecommunications changes, including installation of a 115-kV line trap and tuner, will be implemented and commissioned to complete the termination for the New Line. No fence line expansion or removal of existing equipment is required to accommodate these necessary improvements. [42]

5.2.3 Route Maps

Route maps are presented in a separately bound volume to support the assessment of the Preferred Route. A Land Use Map overlay and an Environmental Resources Map overlay were created. Locus maps are provided for the Preferred Route as Figure 5.1. An area of 300 feet measured from the edges of the ROWs is defined as the "Study Area Buffer." For the assessment of social/developed and natural environmental criteria, some resources were evaluated within the ROW and some were evaluated within the Study Area Buffer (see Figures 5.6 and 5.7). The Route maps are provided in 11- by 17-inch format bound together as a separate volume (Volume II) for this Environmental Analysis.

Land Use Maps

The Land Use Maps (Figure 5.6) illustrate land uses within the Study Area Buffer of the ROWs for the Preferred Route. Land uses located within the Study Area Buffer include: residential, agricultural, open land, forest, non-forested wetland, grassland, industrial, ROW, water, recreation, and other, as described in Section 5.4.1. The land use information was obtained from the MassGIS website. The land use mapping from MassGIS is based on 2016 aerial photography. The land use mapping illustrates existing physical conditions identified by aerial photographs rather than zoning districts. A discussion of applicable zoning information and districts as they pertain to land use is provided for the Preferred Route in the sections below.

Environmental Resources Maps

The Environmental Resources Maps (Figure 5.7) illustrate the social/developed and natural environment resources within the Study Area Buffer of the ROWs for the Preferred Route. Environmental resources include: open space/recreational land, historic/archaeological sites, wetlands and water crossings, certified vernal pools, rare species habitat, ORWs, and ACECs. Environmental resources are described in detail in Section 5.4.

[42] The work at Bell Rock Substation described herein is the work that is necessary to accommodate the new 115-kV transmission line. There is additional work currently being done at the Bell Rock Substation (EEA No. 15941) that is being performed to address separate needs on National Grid's system that are independent of the needs being addressed by this Project; thus, the additional work at the station is not ancillary to the Project and is not described further in this Analysis.

5.3 Construction Methods

The Companies have long established policies and procedures for minimizing construction related disturbances throughout all phases of construction. The Companies and their respective contractors will follow these procedures for construction of the Project. These policies and procedures include: (1) Eversource's Construction & Maintenance Environmental Requirements: Best Management Practices Manual for Massachusetts and Connecticut ("BMP Manual") (provided as Appendix 5-1); and (2) National Grid's ROW Access, Maintenance and Construction Best Management Practices ("EG-303NE") (provided as Appendix 5-2).

This Section describes the general construction methods anticipated for the Project for both overhead and underground construction.

5.3.1 Overhead Transmission Line Construction Sequence

Conventional overhead electric transmission line construction techniques will be used to construct the new transmission line. The work will be completed in a progression of activities that will generally proceed as follows:

1. Survey and removal of vegetation and ROW mowing in advance of construction.
2. Installation of Best Management Practices ("BMPs") (e.g., erosion and sediment controls).
3. Construction of access roads and access road improvements.
4. Construction of work pads and staging areas.
5. Installation of foundations and structures.
6. Installation of conductor, OPGW, and shield wire.
7. Restoration and stabilization of the ROW.

Each stage of construction is further described below.

Tree Clearing, ROW Mowing and Removal of Vegetation in Advance of Construction

Mowing of the ROW or other vegetation management is required prior to the start of construction to provide access to the proposed structure locations, to facilitate safe vehicular and equipment passage, and to provide safe work sites for personnel. Along the National Grid ROW, tree clearing and pruning is required to maintain required clearances between vegetation and the transmission line structures and conductors for reliable operation of the transmission facilities. Herbicides will not be used during construction.

Prior to tree clearing and mowing, the boundaries of wetlands will be clearly marked to prevent unauthorized vehicular encroachment into wetland areas. For areas of tree clearing on the National Grid ROW, appropriate forestry techniques will be implemented within wetlands to minimize ground disturbance. Other sensitive resources, such as cultural resource features and NHESP state-listed plant species, will be flagged and encompassed with protective fencing prior to removal of vegetation on the ROW. Temporary construction mats will be used to gain access to and across wetlands, to minimize wetland disturbance, and to provide stable platforms for safe equipment operation.

Tree clearing will involve cutting and removal of all tall growing woody species within the ROW limits of work. Tree clearing, totaling approximately 27.5 acres, is proposed within approximately 4.2 miles of the

existing National Grid ROW in Fall River for a width of approximately 60 feet along the southern edge of the existing ROW from the Dartmouth/ Fall River municipal line westerly to the Bell Rock Substation. There are no residential dwellings directly abutting the ROW where tree clearing activities will occur. No tree clearing or vegetation removal is to occur outside of existing utility easements or established access roads, with the exception of potential danger or hazard tree removal. Tree clearing will be accomplished mechanically or by hand.

Brush, limbs, and cleared trees will be chipped and removed from the site or applied to upland areas as an erosion control measure, where allowable. Temporary laydown areas will be established along the ROW to serve as locations to load timber, to temporarily stage a wood-chipper, and to park tree clearing vehicles and equipment. Generally, trees to be removed will be cut close to the ground, leaving the stumps and roots in place, which will reduce soil disturbance and erosion. In locations where grading is required for access road improvements, work pads and at structure sites, stumps will be removed. In certain environmentally sensitive areas such as wetlands, it may be necessary and desirable to leave felled trees and/or snags and allow them to decompose in place and provide valuable wildlife habitat rather than to disturb soft organic substrates while removing them. Where appropriate, enhancements will be proposed as mitigation for important wildlife features that may be lost as a result of tree removal and construction activities. Potential enhancement activities may include seeding, planting of native shrub species, and provision of snags, woody debris, and stone piles to create wildlife cover.

Mowing will occur in advance of construction within the Project limit of disturbance. Mowing will be used to reestablish access routes, prepare work pad and structure sites within the ROW. Mowing will be completed by mechanical means. Small trees and shrubs within the ROW limits of disturbance for National Grid will be mowed as necessary with the intent of preserving root systems to the extent practical. Where the ROW crosses streams and brooks, any necessary vegetation mowing along the stream bank will be minimized to the extent practicable to reduce disturbance of bank soils and the potential for construction-related erosion. Wood chips may be applied to the ground in certain upland areas to serve as a means for erosion and sediment control.

Any trees just outside the ROW edge that may pose a hazard to the New Line will be assessed and to ensure reliability, these “hazard trees” may have to be pruned or, if the property owner provides permission, removed. The Project team will work with individual property owners to address their concerns.

Installation of Best Management Practices (Erosion and Sediment Controls)

Following vegetation removal activities, erosion and sediment control devices such as straw bales, straw wattles, siltation fencing, compost socks, and/or chip bales will be installed in accordance with the Companies’ BMP Manuals, and with approved plans and permit requirements. Installation of the erosion and sediment controls may also occur concurrently with work pads, pulling pads and/or access road construction. The installation of these sediment control devices will be supervised by the Companies’ contractors and will be reviewed by the Companies’ respective Construction Supervisors and/or designated environmental monitors. Erosion and sediment controls will be installed between the work site and environmentally sensitive areas such as wetlands, streams, drainage courses, roads and adjacent properties when work activities will disturb soil and result in the potential for soil erosion and sedimentation. The devices will function to mitigate construction-related soil erosion and sedimentation and will also serve as a physical boundary to delineate resource areas and to contain construction activities within approved areas.

Construction of Access Roads and Access Road Improvements

Access roads are required along the ROW to provide the ability to construct, inspect, and maintain the existing transmission line facilities. One of the objectives of the Project is to keep construction equipment

on the existing ROW to the maximum extent practicable when moving from structure location to structure location. The Companies are planning to use the existing network of access roads to the greatest extent practicable. In some areas, new road spurs are necessary to gain access to the new structure locations from the existing and established ROW access roads. Typical access roads vary in width from 16 to 20 feet wide to accommodate the vehicles and equipment needed for construction on the transmission lines. These roads will be located to avoid or minimize disturbance to wetland resources to the extent feasible, to follow the existing contours of the land as closely as possible, and where practicable, avoid severe slopes. In addition, access roads will be constructed to avoid significantly altering existing drainage patterns. A total of approximately 2,300 linear feet of new access road spurs will be installed to facilitate construction, operation, and maintenance of the Project.

Access roads will be constructed of gravel, timber construction mats or a combination thereof depending on site specific conditions, related grading work, and whether they are temporary or permanent. Existing access is visible on the aerial photography-based map set in Figure 5.7.

Along the ROW, the existing access roads may require improvements in certain locations to facilitate construction. For example, clean gravel or trap rock may be used to stabilize and level the roads for construction vehicles, and stabilized construction entrances may need to be refreshed where the ROW crosses public roadways. Any access road improvements and/or maintenance will be carried out in compliance with the conditions and approvals of the appropriate federal, state, and local regulatory agencies. Dust suppression measures, such as the use of water trucks to spray road surfaces, will be implemented as required to minimize fugitive dust from construction vehicle travel along the ROW. Crushed stone aprons/tracking pads will be used at all access road entrances to public roadways as needed to minimize the migration of soils off-site from construction equipment.

Access across wetlands and streams, where upland access is not available, will be accomplished by the temporary placement of construction mats (timber or equivalent). The use of construction mats allows for heavy equipment access within wetland areas, minimizes the need to remove vegetation beneath the access way, and helps to reduce the degree of soil disturbance, soil compaction, and rutting in soft wetland soils. Construction mats most often used by the Companies are wooden timbers bolted together typically into 4-foot by 16-foot sections, wooden lattice mats, or composite mats. Typically, construction mats may be installed on top of the existing vegetation; however, in some instances cutting or mowing woody vegetation may be required. Such temporary construction mat access roads will be removed following completion of construction, and areas will be restored to reestablish pre-existing topography and hydrology as necessary.

Construction of Work Pads, Pulling Pads and Staging/Laydown Areas

Work pads will be constructed to provide a safe and level work area for construction equipment to undertake foundation work and structure assembly. Mowing of low growing woody vegetation and brush and minor grading may be necessary to create a work pad of approximately 100-feet by 100-feet to 100-feet by 150-feet at each proposed structure location. The work pads may be slightly smaller or larger depending on terrain, equipment, and overall site conditions at each structure location. Upland work pads will be constructed by grading and/or adding gravel or crushed stone to provide a stabilized work surface. Once construction is complete, upland work pads (except those located in floodplain and Riverfront Area) will remain in place. In wetlands, these work pads will be constructed with temporary construction mats and will be removed after the completion of construction activities.

Construction of temporary wire stringing and pulling sites will be required to provide a level workspace for equipment and personnel or to establish remote wire stringing set-up sites at angle points in the transmission line and at dead-end structures.

A combination of temporary storage areas, staging areas, and laydown areas will be needed to support construction. Areas for material staging will be required at locations in the vicinity of the Project. Although these areas do not necessarily have to be adjacent to the Project, the closer these areas are to the Project, the less likely the disturbance of the public. The Companies and/or their designated contractor(s) will be responsible for selecting these sites and making arrangements with property owners for use of the land during construction. Selected staging areas and contractor laydown areas will typically be previously developed properties, where environmental resources can be avoided.

Installation of Foundations and Structures

The proposed transmission line structures include a combination of structure types including steel H-frame and monopole structures. Excavation for direct embedment structures will be performed using a soil auger or standard excavation equipment depending on field conditions. Excavations will range from approximately 10- to 20-feet in depth, with diameters typically between five-and-a-half and eight feet. A steel casing will be placed vertically into the hole and backfilled. The poles will be field assembled and inserted by cranes into the embedded steel casings. The annular space between the pole and the steel casing will then be backfilled with crushed stone.

Concrete foundations for steel structures will typically be drilled piers (also known as drilled caissons), 10-feet in diameter and 15- to 30-feet in depth, depending on the height and load conditions for the structure. Caissons will be constructed by drilling a vertical shaft, installing a steel reinforcing cage, placing steel anchor bolts, pouring concrete, and backfilling as needed. Structures will be lifted by a crane and placed onto the anchor bolts.

Excavated material will be temporarily stockpiled next to the excavation; however, this material will not be placed directly into wetland resource areas. If a stockpile is in close proximity to wetlands, the excavated material will be enclosed by staked straw bales or other sediment controls. Additional controls, such as watertight spin off boxes or geotextile filter fabric, may be used for saturated stockpile management in work areas in wetlands (e.g., construction mat platforms) where sediment-laden runoff would pose an issue for the surrounding wetland. Excess excavated soil will be spread over upland areas outside of any applicable wetland buffer zones or other wetland resource areas or removed from the site in accordance with the Companies' policies and procedures.

Dewatering may be required during the foundation installation. Groundwater pumped from an excavation would be discharged to an upland area if there is adequate vegetation to function as a filter medium. Where conditions are not adequate for infiltration, the dewatering waters would be pumped into a sediment filter bag within a straw bale/silt fence corral (basin) located within an upland. The basin and all accumulated sediment would be removed following dewatering operations and the area would be restored, as needed.

Rock that is encountered during foundation excavation will generally be removed by means of drilling with rock coring augers rather than a standard soil auger. This method allows the same drill rig to be used and maintains a constant diameter hole. However, in some cases, rock hammering and excavation may be used to break up the rock. No blasting is currently anticipated for the Project.

Installation of Conductor, Optical Ground Wire, and Shield Wire

Following the construction of transmission line structures, insulators will be installed on the structures. The insulators isolate the energized power conductors from the structure. OPGW, shield wire, and power conductors will then be installed using stringing blocks and wire stringing equipment. The wire stringing equipment is used to pull the conductors from a wire reel on the ground through stringing blocks attached to the structures to achieve the desired sag and tension condition. During the stringing operation, temporary

guard structures or boom trucks will be placed at road and highway crossings and at crossings of existing utility lines. These guard structures are used to ensure public safety and uninterrupted operation of other utilities by keeping the wire away from other utility wires and clear of the traveled way at these crossing locations.

Helicopter work is not anticipated at this time but may be considered depending on the work methods proposed by the construction vendors. In the event that helicopters are used, the Companies would develop project-specific health and safety plans and project hazard analyses in coordination with their contractor(s). The Companies would notify municipal officials, fire and police departments, and affected landowners in advance of any helicopter work.

Restoration and Stabilization of the ROW

Restoration efforts, including removal of construction debris, final grading, stabilization of disturbed soil, and installation of permanent sediment control devices (water bar/diversion channel/rock ford), will be completed following construction. All disturbed areas around structure work pads and other graded locations that are not stabilized with a gravel surface will be seeded with an appropriate seed mixture and mulch or an erosion control blanket to stabilize the soils in accordance with applicable regulations. Temporary sediment control devices will be removed following the stabilization of disturbed areas. Existing stone walls and fences will be restored, in accordance with property owner agreements and applicable local ordinances. Where authorized by property owners, permanent gates and access roadblocks will be installed at key locations to restrict access onto the ROW by unauthorized persons or vehicles. Regulated environmental resource areas that are temporarily or permanently disturbed by construction will be restored or replicated in accordance with applicable permit conditions.

5.3.2 Underground Transmission Line Construction Sequence

The two underground line segments (one approximately 160-foot segment at the Eversource Industrial Park Tap and one approximately 440-foot segment at the Eversource High Hill Switching Station) will involve the installation of overhead-to-underground transition structures and underground duct banks within the existing Eversource ROW. Construction of the two underground spans will be completed via open cut trenching methods. Open cut trenching involves excavating/removing the surface material to install the duct bank(s). This will result in soil and rock excavation and removal within the ROW. Pre-assembled polyvinyl chloride ("PVC") conduit will be placed in the trench and encased in thermal concrete to form a duct bank. Plan and profile drawings for the underground segments are included in Figure 5.2, sheets 15-19.

The following list provides a summary overview of the phases of construction associated with the installation of a new underground cable:

1. Implementation of BMPs, including soil erosion and sediment controls.
2. Trenching and duct bank installation.
3. Cable pulling.
4. Testing and commissioning.
5. Final restoration.

Installation of BMPs, including erosion and sediment controls, will be the same as that described for the overhead transmission line construction sequence above. Further details regarding the other underground phases of construction are described below.

Trenching and Duct Bank Installation

The primary method for underground duct bank construction is open-cut trenching. For installation of the underground transmission line spans, a sufficient trench width will be marked, Dig Safe will be contacted, and the location of the existing utilities will be marked. Earth removal will commence and a trench will be excavated by backhoe, or similar equipment, to the required depth. Any rock encountered during excavation will be removed by mechanical means and brought to an off-site facility for recycling, re-use or disposal. Once excavated, the trench will be sheeted and shored as required by soil conditions, OSHA safety rules, and local and state regulations. Shoring is designed to permit passage of construction vehicles adjacent to the trench and will allow for the trench to be covered with a steel plate to allow construction vehicles access over the trench, as necessary, during construction.

Once a portion of the trench is prepared, conduit sections will either be assembled inside the trench or pre-assembled at the ground surface and then lowered into the trench. The area around the conduits will be temporarily formed and then filled with high-strength thermal concrete (3,000 pounds per square inch) that creates a barrier around the conduits. After the concrete is placed in the trench, it will be backfilled with fluidized thermal backfill, thermally approved backfill (sand, soil, etc.) or native soil depending on local conditions. Figure 5.4 below shows the typical underground duct bank configuration.

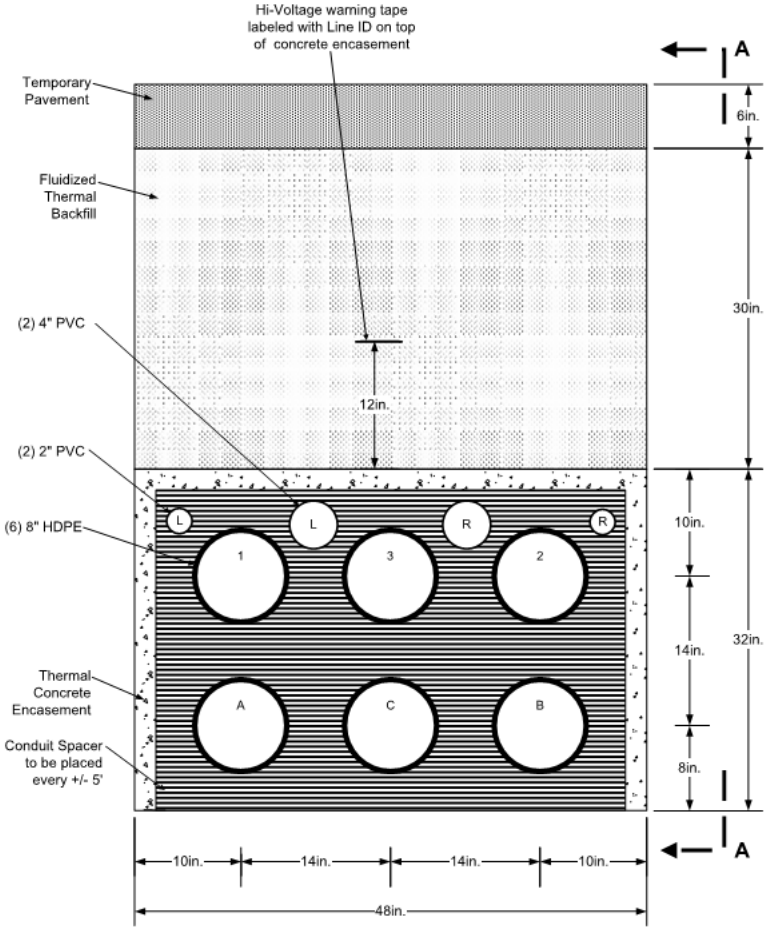

FIGURE 5-4 TYPICAL DUCT BANK CONFIGURATION

Cable Pulling

Prior to the installation of cable in the ducts, each conduit will be tested by pulling a mandrel (a close-fitting cylinder designed to confirm a conduit's shape and size) and cleaned via a swab through each of the ducts. When the swab and mandrel have been pulled successfully per the Companies' approval, the conduit is ready for cable installation.

Six power cables will be installed between the riser structures. To install each cable section, a cable reel will be set up at the "pull-in" riser and a cable puller will be set up at the "pull-out" riser. Following the initial pulling of the mandrel and pulling line through each duct, a hydraulic cable pulling winch and tensioner will be used to individually pull cable from the pull-in to the pull-out locations. This process will be repeated until all cables have been installed. Other accessory cables such as the grounding cable and communication cables will also be pulled into the duct bank.

Once the complete cable system is installed, it will be field-tested. At the completion of successful testing, the line will be energized.

Final Restoration

Following installation, areas disturbed by the work will be restored to match the existing topography and ground cover. Vegetated areas will be restored providing a minimum of 3 inches of suitable topsoil, grass seed, lime, starter fertilizer and mulch.

5.3.3 Construction Work Hours

Typical construction work hours are proposed to be from 7:00 a.m. to 5:00 p.m. Monday through Friday and from 9:00 a.m. to 5:00 p.m. on Saturdays, when daylight and weather conditions allow. Some work tasks such as concrete pours and transmission line stringing, once started, must be continued through to completion and may go beyond normal work hours. In addition, the nature of transmission line construction requires line outages for certain procedures such as transmission line connections, equipment cutovers, or stringing under or over other transmission lines. These outages are dictated by the system operator, ISO-NE, and can be very limited based on regional system load and weather conditions. Work requiring scheduled outages and crossings of certain transportation and utility corridors may need to be performed on a limited basis outside of normal work hours, including on Sundays and holidays.

5.3.4 Environmental Compliance and Monitoring

The Companies will develop and maintain a Stormwater Pollution Prevention Plan ("SWPPP") and Soil Erosion and Sediment Control Plan for each part of the Project for which they are responsible. The SWPPP will identify controls to be implemented to avoid and minimize the potential for erosion and sedimentation from soil disturbance during construction. The SWPPP will include a construction personnel contact list, a description of the proposed work, stormwater controls and spill prevention measures, and inspection practices to be implemented for the management of construction-related storm water discharges from the Project. The SWPPP will be adhered to by the contractors during all phases of Project construction in accordance with the general conditions prescribed in the Project's U.S. Environmental Protection Agency Stormwater Construction General Permit.

The Companies will retain the services of environmental compliance monitors. The primary responsibility of the monitors will be to observe civil construction activities, including the installation and maintenance

of soil erosion and sediment control BMPs, on a routine basis to ensure compliance with all federal, state, and local permit commitments. The environmental monitors will be experienced in soil erosion control techniques and will have an understanding of wetland resources to be protected.

In addition, the Companies will require that their construction contractors designate a construction supervisor or equivalent to be responsible for coordinating with the environmental monitor and for regular inspections and compliance with permit requirements. This person or persons will be responsible for providing appropriate training and direction to the other members of the construction crew regarding work methods as they relate to permit compliance and construction mitigation commitments. Additionally, construction personnel will undergo pre-construction training on appropriate environmental protection and compliance obligations prior to the start of construction of the Project. Training topics will include environmental, stormwater management, cultural resources, and safety considerations. Daily tailboard meetings will occur including a review of the day's environmental requirements and considerations. Regular construction progress meetings will be held to reinforce contractor awareness of these mitigation measures and as new crew members join the work force.

As necessary, deficiencies of erosion control measures and other permit compliance matters will be immediately brought to the attention of the Site Contractor's construction supervisor for implementation of corrective measures.

A copy of the Final Decision issued by the Siting Board, and copies of all other permits and approvals, will be provided to and reviewed by the Companies' project managers and construction supervisors in advance of construction. These documents will also be provided to the contractor's project manager and construction supervisor prior to construction. Contractors are required, through their contracts with the Companies, to understand and comply with Siting Board and/or Department Orders and conditions or requirements for any other applicable Project permits and approvals. The Companies also require contractors to keep copies of these documents on site and available to all personnel during construction. These documents and applicable conditions will also be reviewed during the construction kick-off meeting in the field between Companies' representatives and contractor personnel.

In addition to the measures discussed above, the applicable conditions and provisions of the Final Order and other permits and approvals will be reviewed during project meetings and will be discussed as needed during tailboard meetings, where construction personnel are briefed by their construction supervisor on the upcoming day's work and at that time will be reminded of any related specific compliance conditions.

5.3.5 Safety and Public Health Considerations

The Project will be designed, built, and maintained so that the health and safety of the public are protected. This will be accomplished through adherence to all federal, state and local regulations and industry standards and guidelines established for protection of the public. Specifically, the Project will be designed, built, and maintained in accordance with the National Electrical Safety Code and other applicable electrical safety codes. The facilities will be designed in accordance with sound engineering practices using established design codes and guides published by, among others, the Institute of Electrical and Electronic Engineers, the American Society of Civil Engineers, the American Concrete Institute, and the American National Standards Institute.

Practices that will be used to protect the public during construction will include, but not be limited to, contractor safety training, establishing traffic control plans for construction traffic to maintain safe driving conditions, restricting public access to work areas, and using temporary guard structures at road and electric line crossings to prevent accidental contact with the conductor during installation.

Following construction, all transmission structures will be clearly marked with warning signs to alert the public to potential hazards if climbed. Trespassing on the ROW will be inhibited by the installation of gates and/or barriers at entrances from public roads where approved by owners of properties upon which easements are located.

5.4 Environmental Analysis of the Preferred Route

This section describes the existing conditions along the Preferred Route, presents an analysis of potential impacts to specific resources as a result of Project construction, and describes the measures the Companies propose to undertake to avoid, minimize, and mitigate such impacts. The discussion of Station Work associated with the Project includes only those portions that are ancillary to the New 114 Line. Therefore, the separate impacts associated with the ongoing rebuild of the Bell Rock Substation are not discussed herein.

Categories of potential impacts considered include land use, protected lands and open space, historic and archaeological resources, tree clearing and removal, wetlands and water resources, rare species habitat, magnetic fields, noise and visual, traffic, and electric and magnetic fields. Data on natural and human environmental resources were compiled for the Preferred Route using information such as the most recently available MassGIS data and mapping. In addition to this information, comprehensive field constructability reviews conducted during the planning and design phase of the Preferred Route is also provided where applicable in the sections that follow.

5.4.1 Land Use

Land use within and along the Preferred Route were assessed using MassGIS 2016 Land Use data.[43] Land use was tabulated in acres within approximately 300 feet of the edge of the ROW ("Study Area"). As listed in Table 5-1 and shown on Figure 5.6, land uses adjacent to the Preferred Route are primarily comprised of forests, forested and non-forested wetland, ROW, and single-family residential interspersed with areas of pasture/hay, multi-family residential grassland and developed open space. The Companies also reviewed local master plans and open space plans for the four communities where portions of the Preferred Route will pass in order to determine if the Project was in compliance with local planning initiatives (refer to Table 5-2). The Master Plans for the affected jurisdictions address utilities and infrastructure in that the focus of the plans center on land use and infrastructure-type or development projects; however, they do not explicitly address transmission line utilities.

TABLE 5-1 LAND USES WITHIN THE PREFERRED ROUTE ROW AND STUDY AREA

LAND USE TYPE	PREFERRED ROUTE (ACRES)	
	ROW	Study Area
Aquatic Bed	0.0	0.4
Bare Land	2.1	3.2
Cultivated Land	0.3	1.6
Deciduous Forest	17.6	202.8

[43] MassGIS. May 2019. Land Use. Retrieved May 26, 2021 from https://docs.digital.mass.gov/dataset/massgis-data-2016-land-coverland-use.

LAND USE TYPE	PREFERRED ROUTE (ACRES)	
	ROW	Study Area
Developed Open Space	13.1	50.3
Evergreen Forest	27.4	414.5
Forested Wetland	9.5	192.5
Grassland	123.5	148.7
Industrial	1.3	17.7
Non-forested Wetland	43.8	48.7
Other Impervious	3.5	7.1
Pasture/Hay	5.5	18.5
Residential – Multi-Family	0.0	1.1
Residential – Single Family	0.3	9.0
Right-of-way	2.7	14.6
Scrub/Shrub	1.1	5.1
Open Water	1.1	13.1

TABLE 5-2 COMMUNITY PRESERVATION AND MASTER PLANS

COMMUNITY	PLAN OR GUIDELINE REFERENCE
Town of Acushnet	Master Plan 2008
City of New Bedford	Master Plan New Bedford 2020 (2010)
Town of Dartmouth	Master Plan 2007
City of Fall River	Master Plan 2009-2030

Preferred Route

Approximately nine acres of the Preferred Route Study Area are classified as residential-single family development. Along the Preferred Route, residential-single family development occurs primarily at existing roadway crossings such as Middle Road and Main Street in Acushnet; Phillips Road in New Bedford; and High Hill Road in Dartmouth. Residential-multifamily comprises approximately 1.1 acres of the Preferred Route Study Area and is predominantly located off Phillips Road in New Bedford.

Industrial development comprises approximately 17.7 acres of the Preferred Route Study Area and primarily consists of the Greater New Bedford Industrial Park in New Bedford, which is located between Flaherty Drive and Duchaine Boulevard. No commercial development occurs within the Preferred Route Study Area. Right-of-way land use (14.6 acres) includes transportation corridors such as Main Street, Middle Road, State Route 140 (Alfred M. Bessette Memorial Highway), Route 18 (Acushnet Avenue), Phillips Avenue, Duchaine Boulevard, Flaherty Drive, High Hill Road, Flag Swamp Road, Collins Corner Road, Quanapoag Road, and Copicut Road. The Preferred Route ROW also crosses a New Bedford Water Board water supply ROW in the town of Dartmouth, as well as an existing Algonquin Gas Transmission Pipeline ROW in the City of Fall River. A solar farm is located within the Study Area in New Bedford, west of the New Bedford Industrial Park.

Sensitive receptor land uses are defined as public facilities including hospitals, elder care facilities and nursing homes, public and private schools, cemeteries, licensed daycares, district courts, police stations, fire stations and places of worship. Identification of sensitive receptors is based on the USGS GNIS[44] database as well as aerial photographic interpretation of available orthophotography along the route. No sensitive receptors were identified within the Preferred Route ROW. Two sensitive receptors, the New Bedford Fire Department Station 5 and Clifford Chapel, are located within the Preferred Route Study Area.

The Companies also reviewed local zoning districts. Table 5-3 identifies, by municipality, the zoning districts through which the Preferred Route passes.

TABLE 5-3 ZONING DISTRICTS WITHIN THE PREFERRED ROUTE STUDY AREA

MUNICIPALITY	RESIDENTIAL (ACRES)	COMMERCIAL (ACRES)	INDUSTRIAL (ACRES)	OTHER (ACRES)
Fall River[1,2,3]	235.2	0.0	0.0	7.5 (Road ROW) 146.1 (Water Resource District), 29.35 (Road ROW), 10.7 (Water)
Dartmouth[4,5]	131.4	0.0	100.1	2.8 (Road ROW)
New Bedford[6,7]	49.9	0.0	87.5	29.4 (Road ROW)
Acushnet[8]	340.4	0.0	0.0	7.7 (Road ROW)

[1]City of Fall River. 2018. City of Fall River, MA-GIS. Retrieved June 2, 2021 from http://host.cdmsmithgis.com/fallriverma/.

[2]City of Fall River. 2013. Zoning Map of the City of Fall River. Fall River Zoning Ordinance 2013 Revision Map. Retrieved June 2, 2021 from https://files.masscec.com/Zoning%20Ordinance%202013%20RevisionMAP.pdf

[3]The entirety of the Preferred Route within the City of Fall River is located in the Watershed and Water Supply Protection Overlay District.

[4]Town of Dartmouth. 2021. Town of Dartmouth MA GIS Mapping. Retrieved June 2, 2021 from https://dartmouthma.mapgeo.io/datasets/properties?abuttersDistance=100&latlng=41.585364%2C-70.995987&panel=themes&themes=%5B%22zoning%22%5D&zoom=12.

[5]Town of Dartmouth. 2018. Dartmouth Zoning Map. Retrieved June 2, 2021 from https://www.town.dartmouth.ma.us/sites/g/files/vyhlif466/f/uploads/dartmouth_zoning_official_map_24_x_51_october_16_2018_update_04012019.pdf

[6]City of New Bedford. 2015. City of New Bedford Zoning Map. Retrieved June 2, 2021 from http://s3.amazonaws.com/newbedford-ma/wp-content/uploads/20191219193019/Zoning_2015.pdf

[7]City of New Bedford. 2021. City of New Bedford Parcel Information - GIS. Retrieved June 2, 2021 from https://newbedford.maps.arcgis.com/apps/webappviewer/index.html?id=9d8fc84c8d04473a93bfd19f708745c7

[8]Town of Acushnet. 2015. Zoning Map-Town of Acushnet, MA. Retrieved June 2, 2021 from https://www.acushnet.ma.us/sites/g/files/vyhlif2721/f/file/file/acushnet_town_zoning_map_0.pdf

The majority of the land located within the Study Area is zoned as residential. There are 128 residences located within the Study Area.[45]

Substation Improvements

The improvements to the Tremont, Acushnet and Bell Rock Substations related to the installation of the 115-kV transmission line will take place on land currently held in fee or easement by the Companies for existing utility purposes.

[44] United States Geological Survey (USGS). 2021. Geographic Names Information Systems (GNIS)-USGS National Map Downloadable Data Collection. Retrieved June 4, 2021 from https://www.usgs.gov/core-science-systems/ngp/board-on-geographic-names/download-gnis-data.

[45] Residences were counted based on aerial photographic interpretation and Google street imagery to determine the number of homes with the Study Area.

Avoidance, Minimization, and Mitigation

The Preferred Route is located entirely within an existing transmission line ROW corridor held in fee or easement by the Companies. Installation of a new 115-kV transmission line within the Preferred Route ROW will be consistent with the surrounding utility infrastructure. Construction will result in the permanent alteration of land within the Companies' existing transmission line easement as a result of tree clearing, structure installation and access road improvements/installation. Once operational, the Project infrastructure is not anticipated to interfere with any residential, business or other public facilities. Normal operation at all facilities will continue and existing land uses will be allowed to continue following construction.

To minimize land use impacts, the Companies are proposing to locate the Project within an existing overhead transmission ROW, parallel to existing 115-kV transmission lines. There are no anticipated permanent changes to abutting land uses associated with construction of the Project along the Preferred Route and no additional easements or property acquisitions are necessary. A construction communication plan will be developed for the Project that will provide outreach during construction and will provide a consistent point of contact for the public. Recognizing the varying needs of its stakeholders, the Companies are developing various communication methods to inform stakeholders of construction activities, including as needed: work area signage; advance notification of scheduled construction; personal contact with residents, community groups and businesses; and regular e-mail updates to residents (upon request) and local officials that will include information on upcoming construction activity. As discussed in further detail in the Sections that follow, the Companies will mitigate temporary impacts related to noise (Section 5.4.9) and traffic and transportation (Section 5.4.10). With the implementation of these measures, the anticipated impacts of the Project on land use will be minimized. To further mitigate environmental impacts to land uses, the Companies will be developing, among other mitigation documents, a Compensatory Wetland Mitigation Plan to be filed with the USACE - New England District, and a Conservation and Management Plan to be filed with the NHESP. The Companies are also in the preliminary phases of discussions with the MassDEP, the Acushnet, New Bedford, Dartmouth, and Fall River conservation commissions, and the Superintendent of the Watuppa Reservation to develop appropriate mitigation packages.

5.4.2 Protected Lands, Open Space and Recreation

This section describes open space and recreation properties located within the Study Area of the Preferred Route. Protected open space and recreation land uses were identified using the MassGIS Protected and Recreational Open Space data layer.[46] The primary purposes of these protected lands include recreation, conservation, habitat protection, water supply protection, and cultural/historical significance. Many of these areas provide year-round recreational opportunities such as hiking and nature study, and seasonal activities such as fishing. Protected lands and open space are depicted on Figure 5.7.

For this analysis, the Companies also evaluated ACECs, which are identified as environmentally significant places in Massachusetts that receive special recognition because of the quality, uniqueness, and significance of their natural and cultural resources.[47] No ACECs are located within proximity of the Preferred Route.

[46] MassGIS. 2020. MassGIS Data: Protected and Recreational Open Space. Retrieved May 26, 2021 from https:// https://docs.digital.mass.gov/dataset/massgis-data-protected-and-recreational-openspace.

[47] MassGIS. 2009. MassGIS Data: Areas of Critical Environmental Concern. Retrieved May 26, 2021 from https://docs.digital.mass.gov/dataset/massgis-data-areas-critical-environmental-concern.

Preferred Route

As identified in Table 5-4, 14 state, private, and municipally owned open space lands are located within the Preferred Route Study Area, consisting of a total of approximately 537 acres.

TABLE 5-4 OPEN SPACE WITHIN THE PREFERRED ROUTE STUDY AREA

SITE NAME	OWNER	LOCATION	PRIMARY PURPOSE
Keith's Tree Farm Conservation Restriction	Private Owner	Acushnet	Conservation
Acushnet River Valley Conservation Area	Fairhaven-Acushnet Land Preservation Trust	Acushnet	Conservation
Wheldon Woods Conservation Area	Fairhaven-Acushnet Land Preservation Trust	Acushnet	Conservation
Acushnet River Valley Golf Course	Town of Acushnet	Acushnet	Recreation
Clough Conservation Restriction	City of New Bedford	New Bedford	Conservation
Acushnet Cedar Swamp State Reservation	Division of State Parks and Recreation	New Bedford	Recreation and Conservation
High Hill Reservoir (Water Supply Conduit ROW)	City of New Bedford	Dartmouth	Water Supply
Town of Dartmouth Conservation Commission	Town of Dartmouth	Dartmouth	Conservation
Southeastern Massachusetts Bioreserve	City of Fall River	Fall River	Conservation
Copicut Reservoir	City of Fall River	Fall River	Water Supply
Southeastern Massachusetts Bioreserve	Division of State Park and Recreation/Department of Fish and Game	Fall River	Recreation and Conservation
Copicut Wildlife Management Area	Department of Fish and Game	Fall River	Conservation
Copicut Wildlife Conservation Easement	Private Owner	Fall River	Conservation
Watuppa Reservation	City of Fall River	Fall River	Water Supply

The largest protected open space area within the Study Area is the Southeastern Massachusetts Bioreserve ("Bioreserve"). The Bioreserve is protected open space and includes Freetown-Fall River State Forest. A number of trails within the Bioreserve cross the existing transmission line ROW. The Bioreserve is jointly managed by the City of Fall River Water Division, the MA DCR, the Massachusetts Division of Fisheries and Wildlife, and the Trustees of Reservations.

The Acushnet Cedar Swamp State Reservation in Dartmouth and New Bedford is protected open space owned by the Commonwealth of Massachusetts and managed by the MA DCR. The Preferred Route also crosses a private Christmas tree farm and the Wheldon Woods Conservation Area.

Three open space lands within the Study Area of the Preferred Route are used for water supply protection purposes. These areas include: (1) a New Bedford Water Board water supply ROW in Dartmouth which connects a filtration plant at Little Quittacas Pond to the High Hill Reservoir; (2) the Copicut Reservoir, which is part of the Watuppa Reservation, located in Fall River; and (3) a parcel of land associated with the Watuppa Reservation in Fall River. The Copicut Reservoir is designated as a secondary public water supply for the City of Fall River.

Based on the design information evaluated for the Preferred Route ROW, approximately 27.5 acres of tree clearing would be required within National Grid's existing transmission line easements where the

underlying land use is designated as protected open space or recreational lands. National Grid holds easements that grant rights for the construction and maintenance of towers, poles, wires and other structures for the transmission of electric power in these locations.

Substation Improvements

The improvements to the Tremont, Acushnet and Bell Rock Substations related to the installation of the 115-kV transmission line will take place on privately held land (in fee or easement) currently serving existing utility purposes. Work at the existing substations will be confined entirely to the privately held parcels, and as such, no changes to protected open space and recreational lands are anticipated associated with the Project.

Avoidance, Minimization, and Mitigation

As summarized in Table 5-5, the Preferred Route crosses open space and protected lands. The Preferred Route Study Area is comprised of approximately 537 acres (47 percent) of open land.

Potential temporary impacts to open space and recreational lands along the route could occur during the improvements of access roads, use of heavy machinery on access roads, and the temporary use of equipment on work pads and construction mats. The Preferred Route is located within an existing transmission line ROW corridor held in fee or easement by the Companies. Installation of a new 115-kV transmission line along the Preferred Route will be consistent with the surrounding utility infrastructure and is not anticipated to interfere with any long-term existing or future land uses. Temporary disturbances may occur within designated open spaces such as the Bioreserve and portions of the Watuppa Reservation where passive and active public recreational uses do occur. Normal operation at all facilities will continue and existing land uses will be allowed to continue following construction.

TABLE 5-5 OPEN SPACE WITHIN THE PREFERRED ROUTE

STUDY BUFFER	UNITS	PREFERRED ROUTE
Open Space Properties (Study Area)	Number	14
Open Space Land (Study Area)	Acres	537.4
Total Lands in Study Area	Acres	1,149
Open Space Land (Study Area)	Percentage	47%
Open Space Land (ROW)	Acres	115.7

To minimize impacts to adjacent open spaces, the Companies are locating the Preferred Route within an existing transmission line ROW. The Companies will provide notification of the intended construction plan and schedule to any affected abutters so that the effect of any temporary disruptions may be minimized. To mitigate temporary construction-phase disturbances to public open spaces, specifically existing trail systems, the Companies will coordinate with the affected stakeholders and will develop an outreach plan to include safety signage and temporary detours around active construction zones. Some wildlife habitat functions associated with forested areas will be permanently altered as a result of tree clearing; however, they will be replaced by the increasingly scarce scrub-shrub habitat. Post-construction stabilization and restoration of the ROW will also facilitate natural revegetation on the ROW and reestablish available wildlife habitats on the ROW. With the implementation of these measures, the anticipated impacts of the Project on protected, open space, and recreational lands will be minimized.

5.4.3 Historic and Archaeologic Resources

This section describes archaeological sites and historic architectural properties present in the vicinity of the Preferred Route. Historic and Archaeologic Resources include, but are not limited to, buried archaeological sites, standing historic structures, or thematically related groups of buildings, structures or properties (usually organized as historic "districts" or "areas").

The Companies contracted PAL to identify known historic and archaeologic resources. PAL conducted a search of the Massachusetts Historical Commission's ("MHC") *Inventory of the Historic and Archeological Assets of the Commonwealth* ("MHC Inventory"), which includes resources that are listed in the NRHP or are eligible for listing. To be considered significant and eligible for listing in the NRHP, a resource must exhibit physical integrity, contribute to our understanding of American history, architecture, archaeology, technology, and/or culture and demonstrate at least one of the following four criteria:

- Association with important historic events.
- Association with important persons.
- Distinctive design or physical characteristics.
- Potential to provide important new information about the pre-contact, contact, or historic periods of history.

PAL established a study area from the center of the route out to a 0.5-mile-radius to account for all known archaeological sites and a 150-foot-radius to account for historic architectural properties. The location of archaeological resources is sensitive and protected information per G.L. c. 9, § 26A.

Preferred Route

Twenty-seven archaeological sites and 15 historic architectural properties have been previously recorded within the cultural resources study area for the Preferred Route. PAL conducted an intensive (locational) archaeological survey of the Preferred Route in 2018 and identified 18 new archaeological sites, for a total of 45 archaeological sites within its study area. In 2021, PAL conducted archaeological site examination investigations of nine sites to determine their eligibility for listing in the NRHP and plans to submit a report to the MHC on the findings in the 1st quarter of 2022. PAL also conducted an historic architectural property reconnaissance survey in 2018 and recommended that the Preferred Route would not affect any historic properties.

Substation Improvements

One archaeological site and no historic architectural properties have been previously recorded within the study areas around each of the three substations. No known historic or archaeologic resources are located immediately adjacent to the substations. The footprints of each substation have been previously affected by extensive ground disturbance activities conducted during the construction of each of the substations. The improvements to the Tremont, Acushnet and Bell Rock Substations related to the installation of the 115-kV transmission line will take place within existing disturbed substation facilities on land currently held in fee or easement by the Companies for existing utility purposes.

Avoidance, Minimization, and Mitigation

The Preferred Route is located within established transmission line ROW. Based on the results of the PAL architectural survey report, the installation of the overhead transmission line and related tree clearing along the Preferred Route will not result in any impacts to the existing view shed from abutting above-ground

resources. Construction within the ROW has the potential to impact archaeological sites depending on the depth and extent of planned ground disturbance in relation to archaeological resources.

The Project will be subject to review under Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations Part 800, "Section 106") and will require a permit from the USACE. The Project will also be subject to review by the MHC under G.L. c. 9 §§ 26–27C. The Companies will coordinate with the USACE and MHC to avoid and/or minimize adverse effects to any NRHP-eligible or -listed cultural resources. As part of the USACE Section 404 permit review, and pursuant to Section 106, the USACE will also consult with federally recognized Native American Indian Tribes that express an interest in the cultural resources that may be affected by those portions of the Project.

The Companies will continue to coordinate with PAL in consultation with MHC and the USACE to identify historic, archaeologic or cultural resources prior to construction and to avoid, minimize or mitigate impacts to significant resources. Any protection or avoidance measures required to avoid or minimize impacts to significant resources will be outlined in an Avoidance and Protection Plan and procedures to handle unanticipated discoveries during construction will also be specified as part of a Post Review Discoveries Plan.

5.4.4 Tree Clearing and Removal

This section identifies the impact of tree removal that would result from construction of the Project along the Preferred Route. Tree removal will be required within the National Grid ROW in Fall River to expand the cleared ROW width approximately 60 feet to the south side of the ROW.

In addition, tall growing trees just outside the maintained ROW edges will be assessed for their potential to damage the transmission lines. A danger tree is a tree located either on or off the ROW, which may contact electric lines if it failed or were cut. Hazard trees are danger trees that are structurally weak, broken, damaged, decaying or infested and that could contact the structures or conductors (or violate the conductor clearance zones) if they were to fail and fall towards the ROW. The identification of danger or hazard trees will take place closer to the start of construction. The composition of the mixed deciduous and coniferous forested habitats within the ROW include oak (*Quercus* spp), Eastern white pine (*Pinus strobus*) upland forest, mixed upland deciduous/coniferous forest, and forested wetlands.

The analysis of proposed tree removal has been conducted based on field work, Project design, and MEPA submittal requirements. Table 5-6 identifies the potential tree clearing requirements for the Preferred Route based on this analysis.

Proposed tree removal will result in permanent conversion of forested uplands to shrub lands or grasslands and forested wetlands to scrub-shrub or emergent wetlands. This habitat change can provide a benefit to wildlife by providing field and thicket habitat that was once common but has been depleted due to suburban sprawl and development and reforestation of abandoned agricultural areas. The changes will not substantially reduce the capacity of the area to provide important wildlife habitat functions consistent with current conditions.

TABLE 5-6 POTENTIAL TREE CLEARING & REMOVAL FOR THE PREFERRED ROUTE

TREE REMOVAL	PREFERRED ROUTE (ACRES)
Forested Uplands	25.30
Forested Wetlands	2.17
Total for Tree Clearing and Removal	27.47

Preferred Route

The Preferred Route is approximately 12.1 miles of overhead transmission line and follows an existing ROW where the vegetation is generally maintained as scrub-shrub pursuant to the Companies' existing vegetation management practices.

Substation Improvements

No additional tree clearing is required at the Tremont, Acushnet, or Bell Rock substations in connection with the Project.

Avoidance, Minimization, and Mitigation

All tree clearing and vegetation removal is to occur within the boundaries of the existing ROW. This analysis indicates that impacts to forested areas within the ROW of the Preferred Route would include approximately 25.3 acres of upland clearing and 2.17 acres of wetland clearing. Off-ROW tree removal for access road, line stringing sites, and staging areas might involve additional acres of forested land. While the Preferred Route follows existing, regularly maintained ROWs, the installation of a new transmission line will require tree removal in select areas where the existing ROW is not fully cleared and where off ROW access may be required.

The Companies have long followed established plans and procedures for applying an Integrated Vegetation Management approach to manage vegetation within existing utility corridors in accordance with transmission line clearance standards. The vegetation maintenance cycle follows an approximately five-year timeline and encourages the growth of low-growing shrubs and other vegetation which provide a degree of natural vegetation control. Vegetation management is necessary to ensure the reliable and safe delivery of electric services to the Companies' customers. This is accomplished by allowing for the proper clearance between vegetation and electrical conductors. Once Project construction is complete, vegetation maintenance will continue to occur in this area and along the remainder of the transmission line ROW in accordance with the Companies' respective Vegetation Management Plans ("VMPs") (National Grid's 2014-2018 VMP; Eversource's 2018-2022 VMP for Central, Eastern, and Southeastern Massachusetts). The Companies' VMPs are prepared in compliance with the Massachusetts ROWs Management regulations (333 CMR 11.00), which are administered by the Massachusetts Department of Agricultural Resources.

In forested wetlands where tree removal is required, and where possible, dead standing snags and slash piles will be left in place to provide for wildlife habitat features. As feasible, trees may be topped to offer wildlife habitat benefits. Low scrub-shrub wetland plant communities will be left intact with the exception of access routes where temporary constructing matting is proposed. If required or otherwise determined to be necessary, a mitigation plan using native plant species may be implemented to supplement the re-establishment of vegetation along the affected northern edge of the Copicut Reservoir in Fall River.

Temporary impacts to wildlife would be anticipated in association with the clearing of forested areas along the Preferred Route. However, large blocks of intact woodland will remain. Larger, more mobile species such as large mammals (white-tailed deer) are expected to temporarily relocate from construction areas but are unlikely to be permanently impacted by the displacement. Small mammals such as gray squirrels (Sciurus carolinensis), woodchucks (Marmota monax), and possibly a few furbearers (skunks and raccoons), as well as herpetofauna are also likely to be temporarily displaced; however, upon the recovery of the habitat, the increased availability of maintained, early seral stage habitat will enhance habitat diversity for herptiles and other cold-blooded fauna (insects and other invertebrates). Depending upon the time of year, some avifauna may also be temporarily displaced, possibly affecting breeding and nesting

activities; however, these species are likely to return after construction and in subsequent years. With the implementation of the measures discussed above, tree removal impacts from the Project will be minimized.

5.4.5 Wetlands, Water Resources and Vernal Pools

This section identifies the wetlands, water crossings, and vernal pools associated with the Preferred Route. The assessment of wetlands and watercourses within the ROW of the Preferred Route is based on field work, Project design, and MEPA submittal requirements. The vernal pool assessment, and identification of wetlands, water crossings, and vernal pools located outside of the existing electric transmission ROW easement is based on the following digital data layers:

- MassDEP Wetland Data[48]
- USGS National Hydrography ("NHD") Data[49]
- MassGIS NHESP Certified Vernal Pool ("CVP") Maps[50]

Table 5-7 below summarizes the wetlands, watercourses, and vernal pools identified along the Preferred Route which are also depicted on Figure 5-7.

TABLE 5-7 WETLANDS, WATERCOURSES, AND VERNAL POOLS WITHIN THE PREFERRED ROUTE

RESOURCE	UNITS	PREFERRED ROUTE	
		ROW[1]	Study Area[2]
Wetlands	Acres	81.14	184
	Number	71	123
Streams (Perennial)	Number	8	19
Streams (Intermittent)	Number	10	2
Certified Vernal Pools	Number	0	5

[1] Based on field delineated data of the Companies overhead transmission line ROW.
[2] Based on most recently available GIS datasets (MassDEP Wetlands and NHD Data).

Preferred Route

Approximately 81 acres of wetlands were identified within the ROW of the Preferred Route. The wetlands are found in pockets along the National Grid portion of the Route in Fall River and within more extensive complexes along the Eversource portion of the route from the Fall River/ Dartmouth town line heading east to Acushnet. Approximately 184 acres of wetlands were found within the Study Area of the Preferred Route. The Preferred Route crosses eight perennial streams and 10 intermittent streams. Named perennial streams crossed by the Preferred Route include the Acushnet River, the Shingle Island River, and the Copicut River.

[48] Massachusetts Department of Environmental Protection (MassDEP). 2005. MADEP Wetland Data. Retrieved May 26, 2021 from https://docs.digital.mass.gov/dataset/massgis-data-massdep-wetlands-original-112000.
[49] United States Geological Survey. 2016. National Hydrography Dataset (NHD) Viewer. Retrieved May 26, 2021 from https://nhd.usgs.gov/ NHD_High_Resolution.html.
[50] Natural Heritage and Endangered Species Program. Updated Continually. MassGIS Data – Certified Vernal Pools. Retrieved May 26, 2021 from https://www.mass.gov/info-details/massgis-data-nhesp-certified-vernal-pools#downloads-.

Based on a review of MassGIS NHESP vernal pool data layers, no CVPs are located within the Preferred Route ROW; five CVPs were identified within the Study Area.

Substation Improvements

The Substation improvements related to the Preferred Route would not result in any additional wetland disturbance.

Avoidance, Minimization, Mitigation

An analysis of wetlands along the Preferred Route ROW has been conducted based on field work, Project plans, and MEPA submittal requirements. Based on preliminary design, construction of the Project along the Preferred Route alignment will result in approximately 7.1 acres of temporary, 1.7 acres of secondary, and 0.02 acre of permanent impact to wetlands, respectively.

Throughout the planning and design process for the new transmission line, wetland and watercourse impacts have been minimized to the greatest extent practicable by utilizing existing transmission line corridors and existing access roads. However, given the scale and landscape setting of the Project, certain wetland impacts associated with the development of the new transmission line cannot be avoided. Construction will result in temporary, permanent, and secondary impacts to wetland resources. Secondary impacts generally involve the conversion of forested wetland habitat to scrub-shrub or emergent wetland habitat, whereby the cover type changes but there is no net loss of wetlands. Impacts associated with construction of the Project include vegetation removal, excavation for pole structures, work pads and access road construction.

To reduce the impacts associated with the construction and operation of the Project, the Companies incorporated design measures to minimize impacts. These measures, which include using an existing ROW, utilizing existing access roads, and avoiding the placement and construction of structures and access roads in wetlands and watercourses where possible, have resulted in the avoidance and minimization of impacts to wetlands, watercourses, and vernal pools to the greatest extent practicable.

The Companies are currently in the preliminary phases of discussions with the USACE, MassDEP, NHESP, the Acushnet, New Bedford, Dartmouth, and Fall River conservation commissions, and the Superintendent of the Watuppa Reservation to develop an appropriate mitigation package so there is no net loss of wetland functions and values as a result of the Project. Examples of possible wetland mitigation strategies include wetland restoration, targeted property acquisition for land preservation and participation in the USACE Massachusetts in-lieu fee program.

Additionally, temporary, construction-related wetland impacts along the ROW will be mitigated in situ by restoring the affected areas to pre-existing conditions following construction. Such restoration activities include removing construction mats, re-grading the area to restore pre-construction grades and contours and address any rutting, removal of all construction debris and restoring wetlands to include natural revegetation. With the implementation of these measures, wetlands and watercourse impacts from the Project will be minimized.

5.4.6 Rare Species Habitat

This section describes the rare species habitats found within the ROWs of the Preferred Route. Rare species habitat within the ROWs was identified using the MassGIS NHESP Priority Habitats of Rare Species[51] data layer and is depicted on Figure 5.7. During the regulatory review process, NHESP staff will review a proposed action to determine whether the project, as proposed, will impact state-listed species and their habitats. If it is determined that a proposed action will result in a "take" and cannot be revised to avoid a "take," then the proponent must file for the issuance of a Conservation and Management Permit ("CMP") and the proposed action must meet the performance standards for the CMP.

Preferred Route

Approximately 142 acres of rare species priority habitat were identified within the Preferred Route ROW based upon a desktop analysis using MassGIS Priority Habitats of Rare Species data layers. This total represents 56 percent of the land area within the Preferred Route ROW.

Substation Improvements

Work at the Bell Rock Substation would take place within a previously disturbed and developed substation site. As such, no additional rare species impacts are anticipated from work at the Bell Rock Substation as part of the Project. The Tremont and Acushnet Substations are not located within any identified rare species habitats.

Avoidance, Minimization, and Mitigation

Based on the field work, Project design, and MEPA submittal requirements that have been analyzed to date, approximately 27.5 acres of rare species priority habitat within the ROW would need to be cleared of trees. This estimate includes approximately 25.3 acres of upland clearing and 2.17 acres of wetland clearing.

The Companies will work with NHESP staff through the Massachusetts Endangered Species Act ("MESA") review process to identify appropriate Protection Plans for each state-listed rare species that may be affected by the Project. These Protection Plans will focus on minimizing direct mortality of state-listed species that may be present with the ROW during construction. Minimization measures could include time of year restrictions for construction, use of temporary exclusion barriers, and wildlife clearing surveys conducted daily by qualified biologists in advance of construction. The NHESP filed a comment letter on December 21, 2018 with the Secretary of the Executive Office of Energy and Environmental Affairs responding to the Expanded ENF filed for the Project, indicating that its review of the AFRRP pursuant to the MESA remains ongoing. The NHESP stated that "the AFRRP, as proposed will likely result in a Take of a state-listed species of turtle and may also result in a Take of one state-listed species of grass and one state-listed species of flax." The Companies expect to continue consultations with the NHESP to discuss feasible ways to avoid, minimize and mitigate, and to develop a Conservation and Management Plan for issuance of a CMP by the NHESP. Mitigation options under a CMP may include, but are not limited to, tracking and protection, funding of programs that directly benefit the affected species, onsite and/or offsite habitat protection. Tracking and protection would include a GPS-based real-time monitoring program identifying species locations. Offsite habitat protection typically requires the acquisition of land, under fee ownership or conservation restriction, for permanent habitat conservation. Other mitigation options include financial contribution toward land acquisition, conservation research funding, habitat management, or other

[51] Natural Heritage and Endangered Species Program. 2021. MassGIS Data – NHESP Priority Habitats of Rare Species. Retrieved August 24, 2021 from: https://www.mass.gov/info-details/massgis-data-nhesp-priority-habitats-of-rare-species.

programs that directly benefit the affected species. With the implementation of these measures, impacts to rare species and their habitats as a result of the Project will be minimized.

5.4.7 Public Water Supplies

Public water supplies can be sourced from either groundwater aquifers or surface waters. In Massachusetts, the MassDEP has established a category of waterbodies known as ORWs. ORWs are designated in the Massachusetts Surface Water Quality Standards Regulations (314 CMR 4.00) and include high quality waters with socioeconomic, recreational, ecological and/or aesthetic values. Class A Public Water Supplies and their tributaries and NHESP CVPs are ORWs. Other waters can be specifically designated by the MassDEP as ORWs.

To identify public water supply areas within the Study Buffer of the Preferred Route a desktop analysis was performed using the following datalayers:

- MassGIS Outstanding Resource Waters Datalayer[52]
- MassGIS Aquifers Datalayer[53]
- MassGIS Wellhead Protection Areas Datalayer[54]

Preferred Route

The Preferred Route traverses wetlands that are designated as tributaries to the Class A Public Water Supplies of the North Watuppa Pond and the Copicut Reservoir and therefore are classified as ORW. The Copicut Reservoir is located in the City of Fall River. The Preferred Route also traverses open water areas along the northern boundary of Copicut Reservoir. North Watuppa Pond is located 2,000 feet west of the Preferred Route ROW and is not traversed directly by the Preferred Route. The Preferred Route also crosses the Long Pond/Assawompset Pond/Pocksha Pond ORW polygon; however, the surface waters of these resources are located over three miles to the north of the Preferred Route.

Approximately 189.3 acres of the Copicut Reservoir ORW are located within the ROW of the Preferred Route and approximately 86.2 acres of the North Watuppa Pond ORW are located within the Preferred Route ROW. In addition, there are approximately 16.8 acres of high-yield aquifers and approximately 157.2 acres of medium-yield aquifers located within the ROW.

No wellhead protection areas are located within the Study Buffer of the Preferred Route.

Substation Improvements

Work at the Bell Rock Substation associated with the Preferred Route would take place within a previously disturbed and developed substation site. As such, no public water supply impacts are anticipated from work at the Bell Rock Substation.

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[52] MassGIS. 2010. MassGIS Data: Outstanding Resource Waters. Retrieved May 26, 2021 from https://www.mass.gov/info-details/massgis-data-outstanding-resource-waters.
[53] MassGIS. 2007. MassGIS Data: Aquifers. Retrieved May 26, 2021 from https://www.mass.gov/info-details/massgis-data-aquifers.
[54] MassGIS. April 2021: MassGIS Data: MassDEP Wellhead Protection Area (Zone II, Zone I, IWPA). Retrieved June 7, 2021 from https://docs.digital.mass.gov/dataset/massgis-data-massdep-wellhead-protection-areas-zone-ii-zone-i-iwpa.

The northeastern portion of the Tremont Substation site is associated with a medium yield aquifer. The Acushnet Substation is located in the vicinity of medium and high yield aquifers located approximately 50 feet northwest of the existing Substation site. No impacts to public water supplies are anticipated.

Avoidance, Minimization, and Mitigation

Construction of the Project is anticipated to result in unavoidable temporary impacts to vegetated wetland resources within the Copicut Reservoir and North Watuppa Pond watersheds. Temporary wetland impacts within 400 feet of the Copicut Reservoir are also unavoidable due to the proximity of the Preferred Route ROW to the northern end of the reservoir.

Proposed structures and work areas for the Project have been sited and will be constructed to avoid permanent impacts to ORW. In locations where ORW cannot be avoided, the work activities will consist of the placement of temporary construction mats for access routes or temporary work space. The use of sediment and erosion controls will be implemented to minimize sediment migration outside of the limits of disturbance. The temporary construction matting will be removed immediately after the construction activities are complete. Any required restoration or stabilization, after the mat removal, will be completed as the equipment and vehicles de-mobilize from the ROW.

All tree clearing and vegetation removal will be done mechanically or by hand. The Project will comply with the National Pollutant Discharge Elimination System Construction General Permit and SWPPP requirements, requirements of the Section 401 Water Quality Certification, MA Wetlands Protection Act and implementing regulations, and other restrictions as may be applied by the local conservation commissions in accordance with the Wetlands Protection Act.

Appropriate sediment and erosion control, spill prevention, and response measures will be implemented, and these controls will be closely monitored and managed. The Companies will require their contractors to adhere to BMPs regarding the storage and handling of oil and potentially hazardous materials during the Project. Equipment used for the construction of the Line will be properly maintained and operated to reduce the chances of spill occurrences of petroleum products. Refueling equipment will be required to carry spill containment and prevention devices (e.g., drip pans, absorbent pads).

Further, the Companies will require its contractors to adhere to a standard emergency response plan or a Project-specific spill prevention, containment, response, and reporting plan. Equipment, other than equipment that is not readily mobile, will not be refueled or maintained within 100 feet of any wetland or waterbody. In addition, equipment/material storage will not be permitted within 100 feet of any wetland or waterbody. Contractor staging areas and contractor yards typically will be located at existing developed areas (e.g., parking lots, existing yards) where the storage of construction materials and equipment, including fuels and lubricants, will not conflict with protection of public water supplies or wetland resources.

Following construction, the normal operation and maintenance of the transmission line facilities will have no impact on public water supply resources. Vegetation management within sensitive areas, including public water supply areas, will follow the same procedures as are currently used on the ROW and described the Companies' VMPs. No herbicides will be applied within ORW.

The Companies are currently in the preliminary phases of coordinating with the MassDEP and will incorporate design recommendations and mitigation measures, as set forth in permitting conditions, to protect the surface water resources. The National Grid has also participated in meetings with the Superintendent of the Watuppa Reservation and will continue this collaboration to identify and implement

the appropriate mitigation measures to address potential impacts to ORW. With the implementation of the measures discussed above, the potential impacts of the Project to public water supplies will be minimized.

5.4.8 Visual Impact Assessment

This section describes the potential visual impacts from the Project.

Preferred Route

The Companies engaged POWER Engineers, Inc. to assess the potential for visual impacts from construction of the Project. As can be seen in Figures 5.6 and 5.7, most of the route traverses undeveloped or densely forested areas (e.g., the Southeast Massachusetts Bioreserve) where structures are visible only from road crossings and occasional commercial or residential uses directly adjacent to the ROW. However, five key observation points were identified where there is a potential for greater visibility and/or sensitivity to views of new structures. From west to east, these locations include:

- Quanapoag Road, Fall River – Road crossing near the Copicut Reservoir.
- Pine Island Road, Dartmouth – Represents views from residences located on and adjacent to Collins Corner Road, Flag Swamp Road, Pine Island Road, and High Hill Road.
- Heritage Drive, New Bedford – Represents views from residential areas along Heritage Drive and Birchwood Drive.
- Heritage Road Lane and Wildrose Lane, Acushnet – Represent more open views around Acushnet, where fields or cultivated areas provide a view of the ROW from a greater distance.

Visual renderings were prepared from these observation points. Figure 5.8 depicts existing and simulated future conditions at these representative locations along the Preferred Route.

The existing 115-kV transmission lines are presently visible from all five observation points. Contrasts with existing views are strongest in locations where monopole structures are introduced within the corridor presently occupied by existing H-frame structures (see Viewpoints 3, 4 and 5). The contrast is expressed primarily by the difference in configuration between the monopoles and the H-frame structures. The color and texture would be similar, and only limited vegetation clearing would be required in this area to accommodate the installation of the monopole structures. In the more open views within the Town of Acushnet (Viewpoints 1 and 2), the primary effect is the introduction of additional H-frames, similar in height to those that already exist, within the corridor.

Overall, the potential for visual impact along the Preferred Route has been minimized through use of an existing transmission line ROW located primarily in undeveloped and forested areas with relatively few residential or commercial abutters. The Companies will work on a case-by-case basis with any abutting landowners that express concern about the change in views to determine whether measures such as landscaping or fencing could further mitigate impacts.

Substation Improvements

The Tremont, Acushnet, and Bell Rock Substations are existing facilities with existing structures. The Substation sites are located in areas of other utility uses including multiple existing transmission lines. Work at the existing Tremont and Acushnet Substations will consist of limited underground conduit installation and/or be contained within the existing station control buildings. Work at the Bell Rock Substation associated with the Project will consist of the installation of a wave trap and its structure, a

disconnect switch, and one line tuner, all of which will be shorter than the existing structures. Therefore, the substation improvements are not anticipated to have an adverse visual impact.

Avoidance, Minimization, and Mitigation

Impacts from the Project will be minimized due to the limited need for clearing in locations near sensitive viewers and the location of the Project within an already well-developed transmission ROW. The Companies will work with those abutting landowners that experience a material change in view as a result of construction to determine reasonable and practical screening that could be provided on their properties. Screening options may be in "soft" form (e.g., vegetation) or "hard" form (e.g., fencing), or a combination of the two. With the implementation of these measures, the visual impacts of the Project will be minimized.

5.4.9 Noise

The noise impacts associated with the proposed transmission line are limited to temporary construction noise impacts. The potential for noise impacts from project construction is a function of the specific receptors along the route as well as the equipment and proposed hours of operation. Construction is anticipated to occur during typical work hours, though in specific instances, at some locations, or at the request of a municipality or state agency, the Companies may seek municipal approval to work at night. The noise ordinances applicable to the municipalities that the planned construction will affect are shown in Table 5-8.

In general, the sound levels from construction activity will be dominated by the loudest piece of equipment operating at the time (see Tables 5-9 and 5-10). Therefore, at any given point along the work area, the loudest piece of equipment will be the most representative of the expected sound levels in the area.

TABLE 5-8 MUNICIPAL NOISE ORDINANCE SUMMARY

Municipality Code	Allowed Construction Hours		Exceptions/Decibel Limits
	Weekday	Weekend	
City of Fall River Municipal Code, Chapter 46: Offenses, Section 7 (46-7)	7 a.m. – 10 p.m.	8 a.m. – 10 p.m. (Sundays)	No prescribed decibel level limits in bylaw. However, the following noises are prohibited outside of the allowed construction hours: "those caused by trucks, the loading or unloading of trucks, all types of mechanical devices, including lawn mowers, and animals and birds."
Town of Acushnet	Not specified	Not specified	No prescribed decibel level limits in bylaw.
City of New Bedford Code of Ordinances, Chapter 17: Offenses and Miscellaneous Provisions, Section 15 – Noise (17-15)	7 a.m. – 10 p.m.	7 a.m. - 10 p.m.	No prescribed decibel level limits in bylaw. However, the following noises are prohibited outside of the allowed commercial establishment hours: "All noises at commercial establishments located in principally residential neighborhoods that menace the health, interrupt or disturb sleep of residents"…"shall include the loading or unloading of motor vehicles, those sounds emitted by all types of mechanical devices, including motor vehicles, and those by animals and birds."
Town of Dartmouth Chapter 250: Noise, Article II: Noise Control, Section 3: Noise Prohibition (250-3)	7 a.m. – 8 p.m.	Construction activities could be allowed beyond designated hours if it is in the best interest of public safety or welfare.	No prescribed decibel level limits in bylaw. However, the following noises are prohibited outside of the allowed construction hours: "The operation of tools and equipment used in Construction or Demolition is allowed between the hours of 7:00 a.m. and 8:00 p.m. on weekdays and

Municipality Code	Allowed Construction Hours		Exceptions/Decibel Limits
	Weekday	Weekend	
			is not restricted within those hours by the one-hundred-fifty-foot standard set forth in § 250-3A(3). Said activity shall also be allowed beyond these hours if it is determined to be in the interest of public safety or welfare, and upon the issuance of and pursuant to a permit from the Building Department, which permit may be renewed for one or more periods of not exceeding one week each."

Preferred Route

The Preferred Route utilizes an established ROW from Industrial Park Tap to the Bell Rock Substation. Construction of the new 115-kV transmission line will include various types of equipment during the construction sequence. Table 5-9 identifies the types of equipment to be used for each phase of the construction sequence and provides a range of typical sound levels from the equipment. The typical sound levels are provided at a distance of 50 feet from the source and have also been extrapolated for noise levels at 100, 200, and 300 feet. The estimated noise levels range from 80 dBA to 98 dBA at a distance of 50 feet from the construction activity. The closest residence along the Preferred Route is approximately 100 feet away from the proposed transmission line. Typical sound levels of construction noise experienced at any given residence will be intermittent and will occur throughout Project construction.

TABLE 5-9 TYPICAL CONSTRUCTION SOUND LEVELS ALONG THE PREFERRED ROUTE

Description of Activity	Types of Equipment	Typical Sound Levels at 50 Feet (dBA)	Estimated Sound Levels (dBA) at Various Distances from Noise Sources		
			100 Feet	200 Feet	300 Feet
Vegetation Removal and ROW Mowing	• Grapple trucks • Bulldozers • Track-mounted mowers • Motorized tree shears • Log forwarders • Chippers, Chain saws • Box trailers	84 to 98	78 to 92	72 to 86	69 to 83
Erosion/Sediment Controls and Access Road Improvements and Maintenance	• Dump trucks • Bulldozers, excavators, backhoes • Graders, Forwarders • 10-wheel trucks with grapples, Cranes	80 to 93	74 to 87	68 to 81	65 to 78
Removal and Disposal of Existing Transmission Line Components	• Cranes • Flatbed trucks • Pullers with take-up reel • Excavators	80 to 90	74 to 84	68 to 78	65 to 75
Installation of Foundations and Structures	• Backhoes and excavators • Rock drills mounted on excavators • Cluster drills with truck mounted compressors • Concrete trucks • Cranes	80 to 90	74 to 84	68 to 78	65 to 75

Description of Activity	Types of Equipment	Typical Sound Levels at 50 Feet (dBA)	Estimated Sound Levels (dBA) at Various Distances from Noise Sources		
			100 Feet	200 Feet	300 Feet
	• Aerial lift equipment • Tractor trailers				
Conductor and Shield Wire Installation	• Puller-tensioners • Conductor reel stands • Cranes • Bucket trucks • Flatbed trucks	80 to 93	74 to 87	68 to 81	65 to 78
Restoration of the ROW	• Bulldozers, Excavators • Tractor-mounted York rakes • Straw blowers • Hydro-seeders	80 to 90	74 to 84	68 to 78	65 to 75

Substation Improvements

Typical construction noise at each substation (Tremont, Acushnet and Bell Rock) will include noise from equipment during the installation of equipment and protection upgrades, foundations and structures. The noise impacts to the nearest residences heavily depend on the distance from the residences to each respective substation. Improvements to the Tremont and Acushnet Substations will take place primarily within the existing control building enclosures of the Substations and therefore are not anticipated to significantly affect existing ambient noise levels.

Tremont Substation is surrounded by utility corridors, commercial, and transportation uses (I-495). The nearest residential home is located approximately 420 feet away from the Tremont Substation; therefore, construction generated noise could slightly affect existing ambient noise at the nearest residence.

Acushnet Substation is surrounded primarily by forest, utility corridors and grassland. The nearest residential home is located approximately 190 feet southeast of the Acushnet Substation; therefore, construction generated noise could slightly affect existing ambient noise at the nearest residence.

Bell Rock Substation is surrounded primarily by forest and utility corridors. The nearest residential home is located approximately 0.5 mile away from the Bell Rock Substation; therefore, construction noise is not anticipated to significantly affect existing ambient sound levels at the nearest residence.

Table 5-10 provides an estimate of the sound levels at the nearest residence to each of the substations.

TABLE 5-10 TYPICAL SUBSTATION CONSTRUCTION SOUND LEVELS

Description of Activity	Types of Equipment	Typical Sound Levels at 50 Feet (dBA)	Estimated Sound Levels at Closest Residence (dBA)		
			Bell Rock Substation (0.5 mile)	Acushnet Substation (0.04 mile)	Tremont Substation (0.08 mile)
Installation of Foundations and Structures	• Backhoes and excavators • Rock drills mounted on excavators • Cluster drills with truck mounted compressors • Concrete trucks	80 to 90	47 to 57	68 to 78	65 to 75

Description of Activity	Types of Equipment	Typical Sound Levels at 50 Feet (dBA)	Estimated Sound Levels at Closest Residence (dBA)		
			Bell Rock Substation (0.5 mile)	Acushnet Substation (0.04 mile)	Tremont Substation (0.08 mile)
	• Cranes • Aerial lift equipment • Tractor trailers				

Avoidance, Minimization, and Mitigation

To the extent practicable, the Companies will comply with the noise ordinances in the municipalities within which the Project is proposed. In some instances, and as dictated by MassDOT or the local authority, construction may be required to be performed at night to minimize daytime impacts to commuters and abutters. Some work tasks, once started, may require continuous operation until completion. Work requiring scheduled outages and work that requires continuous operation until completion may need to be performed on a limited basis outside of normal work hours, including Sundays and holidays.

Temporary noise impacts from construction equipment will be mitigated by maintaining equipment in good working condition and by use of appropriate mufflers. Noise sources that may operate continually during the day, such as generators or air compressors, will be located away from populated areas to the extent possible. The Companies and its contractors will also comply with state law (G.L. c. 90, § 161A) and MassDEP regulations (310 CMR 7.11(1)(b)), which limit vehicle idling to no more than five minutes, to the greatest extent feasible based upon the construction task, type of equipment/vehicle and weather conditions. There are exceptions for vehicles being serviced, vehicles making deliveries that need to keep their engines running and vehicles that need to run their engines to operate accessories. With the implementation of these measures, noise impacts associated with the Project will be minimized.

5.4.10 Traffic and Transportation

This section evaluates the potential for traffic impacts along the Preferred Route. Potential traffic impacts were evaluated using the MassGIS data layer for MassDOT Roads (2018). Roadways are identified by six functional classification system categories developed by MassDOT as shown in Table 5-11 below.

TABLE 5-11 ROADWAYS AFFECTED BY OVERHEAD LINE INSTALLATION

Functional Classification System Category (MassDOT)	Preferred Route
Road Crossings: Minor Street or Road (Class 5 & 6)	14
Road Crossings: Major Road Arterials/Collectors & Other Numbered Routes (Class 3 & 4)	3
Road Crossings: Limited Access Highway (Class 1)	2
Subtotal	19
Railroad Crossings (active)	1

Preferred Route

Construction of the Project along the Preferred Route would not result in a significant increase in traffic or material impacts to existing traffic patterns. During construction, the main impacts would occur when stringing transmission conductors over road crossings and at ROW construction access locations. At the

ROW access locations, construction equipment and personnel will enter and exit the ROW from public roads and temporarily increase traffic. Since the various construction tasks will occur at different times and locations, traffic at these entry roadways will be intermittent. Generally, the larger construction equipment will enter the ROW once while working in a specific area. Smaller vehicles such as pickup trucks carrying construction workers will access the ROW daily.

Additional impacts, including lane closures or temporary traffic stops, are anticipated when the new transmission lines need to be strung over public roadways. At such times, trucks may be set up in travel lanes, shoulders, or medians to install temporary guard structures to support the lines as they are attached to the permanent transmission line structures. Traffic will be stopped for a short period of time to allow a rope to be manually pulled across the roadway. Conductor will then be attached to this rope and pulled above the roadway onto the temporary guard structures; traffic typically will be able to flow while the conductors are attached to the structures. Line stringing will be required across 19 roadway crossings and one railroad crossing along the Preferred Route. Permits from MassDOT will be required for this work at state highway crossings.

Along local roadways, the Companies will coordinate with the municipalities on requirements for work hours, signage, and police details. The Project will not have any permanent traffic impacts. Post-construction traffic impacts will be limited to those associated with occasional ROW and transmission line maintenance activities.

Substation Improvements

Construction traffic impacts related to the Tremont, Acushnet, and Bell Rock Substation improvements are not expected to disrupt existing traffic patterns or significantly increase existing traffic levels on any public roadways. Traffic associated with the substation work will include intermittent material deliveries and the arrival and departure of construction personnel.

Avoidance, Minimization, and Mitigation

Traffic impacts associated with the Project would be temporary in nature and confined to the amount of time necessary for construction. The Companies will carefully coordinate construction to minimize impacts to adjacent residences and businesses and others relying on neighboring transportation corridors. Prior to beginning construction, the Companies will work closely with the municipalities and MassDOT to develop construction Traffic Management Plans to illustrate construction-phase traffic controls and to minimize the impacts of construction on the traveling public. Implementation of a well-designed Traffic Management Plan will reduce the potential for traffic disruptions and inconvenience to drivers. With the implementation of these measures, the temporary traffic disruptions anticipated from the Project will be minimized.

5.4.11 Electric and Magnetic Fields

The Companies' consultant, Exponent, assessed EMF associated with the existing and proposed transmission and distribution lines along the Preferred Route of the Project, at average and peak loading conditions. Along portions of the ROW, the Project will parallel existing 115-kV transmission lines (Lines 111, 112 and D21), as well as 13.2-kV distribution lines (Lines 106 and 107).

Exponent modeled the EMF levels for six cross-sections of the ROW along the Preferred Route (five in Eversource's portion of the ROW and one in National Grid's) under existing and proposed configurations to characterize the Project-related changes to EMF levels. Results of the modeling effort show that changes in the ROW-edge EMF levels as a result of the Project are calculated to be small and that the Project

generally reduces magnetic field levels along the Project ROW. The report and technical appendices provided in Appendix 5-3 describe the modeling methods and results, which are discussed further below.

Electric Fields

There will be changes in the electric fields along the Project ROW; however, those changes will be small because the voltage of the Project is the same as that of the existing transmission lines in the ROW. The following tables summarize electric field levels for all cross-sections along the ROW for both existing and proposed conditions.[55]

TABLE 5-12 ELECTRIC-FIELD LEVELS (KV/M) FOR OVERHEAD SECTIONS AT AVERAGE CONDUCTOR HEIGHT

Segment Number	Configuration	100 feet beyond – ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-1	Existing	<0.1	0.1	1.0	0.2	<0.1
	Proposed	<0.1	0.1	1.8	0.2	<0.1
XS-2	Existing	<0.1	0.1	1.0	0.5	<0.1
	Proposed	<0.1	0.1	1.0	0.5	<0.1
XS-3	Existing	<0.1	0.1	1.0	0.5	<0.1
	Proposed	<0.1	0.1	1.1	0.5	<0.1
XS-4	Existing	<0.1	<0.1	1.0	0.5	<0.1
	Proposed	<0.1	0.1	1.2	0.5	<0.1
XS-5	Existing	<0.1	0.1	1.1	0.6	<0.1
	Proposed	<0.1	0.6	1.8	0.6	<0.1
XS-6	Existing	<0.1	0.1	1.4	0.6	<0.1
	Proposed	<0.1	0.5	1.9	0.6	<0.1

As shown in Table 5-12, with the exception of electric fields on the south edge of the ROW at XS-5 and XS-6, the electric field level is calculated to change by less than 0.1 kV/m on either ROW edge. The highest calculated electric field on the ROW at average conductor heights increases from approximately 1.4 kV/m in the existing configuration to approximately 1.9 kV/m in the proposed configuration (XS-6).

Magnetic Fields

Overall, magnetic field levels were calculated to generally decrease as a result of the Project. Calculated magnetic field levels for overhead sections at average loading are provided below in Table 5-13.

TABLE 5-13 MAGNETIC-FIELD LEVELS (MG) FOR OVERHEAD SECTIONS AT AVERAGE LOADING

Segment Number	Configuration	100 feet beyond – ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-1	Existing	1.6	13	46	7.0	1.4
	Proposed	0.9	9.0	65	1.1	0.2
XS-2	Existing	1.8	14	46	15	2.1
	Proposed	1.9	15	46	7.9	1.6

[55] In the limited segments of the Project to be installed in underground duct banks, there will be no above-ground electric fields.

Segment Number	Configuration	100 feet beyond – ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-3	Existing	0.9	14	68	21	2.4
	Proposed	1.7	13	37	13	1.9
XS-4	Existing	1.0	3.6	71	20	2.3
	Proposed	1.8	10	48	12	1.7
XS-5	Existing	2.0	7.1	103	35	4.1
	Proposed	1.0	15	89	24	1.9
XS-6	Existing	2.0	7.6	135	36	4.0
	Proposed	0.6	12	110	24	2.1

As shown above in Table 5-13, the ROW-edge magnetic field levels are calculated to decrease in all sections of the northern ROW edge and decrease or change by less than one milligauss ("mG") in three of the six cross section locations on the southern edge of the ROW. The largest ROW-edge increase in magnetic-field levels would occur on the south side of XS-5 where the new Line 114 is constructed nearest to the ROW edge. In these locations, the magnetic-field level at the edge of the ROW is calculated to increase from approximately 7.1 mG to 15 mG as a result of the Project. The highest existing magnetic-field level at the ROW edge (northern edge of XS-6) is 36 mG and is calculated to decrease to 24 mG as a result of the Project.

The Project also includes two relatively short segments of underground line construction. These underground configurations, labeled as UG-1 and UG-2 in Exponent's analysis, are proposed to be constructed on the ROW, more than 60 feet from the nearest ROW edge and hundreds of feet from the nearest structure or residence. For UG-1 (which represents the majority of the underground portions of the Project), the maximum calculated magnetic field level, immediately above the duct bank is 7.6 mG, decreasing to 1 mG or less at 50 feet and beyond. For UG-2 (which represents the small area of the Project where the underground duct bank approaches the riser pole), magnetic fields are higher (173 mG on the ROW immediately above the duct bank), but they decrease rapidly with distance (to 33 mG or less at 50 feet and 9.6 mG or less at 100 feet). The closest residence to UG-2 is located approximately 180 feet from the duct bank; therefore, magnetic field levels at the nearest residence would be negligible.

Conclusion

The highest ROW-edge electric field and magnetic field levels after construction (0.6 kV/m and 24 mG, respectively) are calculated to be the same as or lower than existing electric field and magnetic field levels (0.6 kV/m and 36 mG, respectively). In all cases, the calculated electric and magnetic fields were compared to health-based international standards and guidelines developed by the International Commission on Non-Ionizing Radiation Protection and the International Committee for Electromagnetic Safety and were found to be far below these standards.

Consistent with Siting Board precedent, the Companies have proposed construction of the Project with several features designed to reduce magnetic field levels. For example, the Companies are proposing to, wherever possible, place the new Line 114 near the center of the ROW. In addition, the phasing of the conductors has been selected to reduce magnetic field levels at the ROW edge and the conductor heights exceed National Electrical Safety Code standards. Please refer to Appendix 5-3 and Appendix 5-4 for additional detail.

5.4.12 Environmental Justice Considerations

To promote a more robust transmission system and to properly plan for and address the Commonwealth's energy needs in a timely way, the Companies are developing and implementing this Project consistent with the Commonwealth's environmental and resource use laws and policies, including enhanced outreach to EJ populations. The Companies have taken proactive steps to promote community involvement during the planning of the Project.

As part of the stakeholder outreach plan, the Companies have promoted and will continue to promote public involvement by the EJ populations located within one mile of the Project through the use and dissemination of multi-lingual Project fact sheets, website content, meeting invitations and translation services for future presentations in English, Spanish, and Portuguese (both in writing and in-person). Based on review of the Massachusetts Environmental Justice Populations Mapping Tool, there are EJ populations located within one mile of the Project. The EJ populations within one mile of the Project in the municipalities of Acushnet and New Bedford are mapped based on minority and/or income criteria as generated by the Massachusetts Environmental Justice Populations Mapping Tool. Figure 5.9 depicts the EJ populations in the vicinity of the Preferred Route.

As described above, any potential impacts associated with the Project are anticipated to be minimal and predominantly limited to temporary impacts associated with construction activities for both EJ and non-EJ populations. There will be no disparate impacts to EJ populations because of the Project. For unavoidable impacts during construction, mitigation measures have been identified.

Additionally, the Companies will be implementing other measures to avoid, minimize, and mitigate potential environmental impacts throughout the entire Project alignment, including where it crosses through or is within 1 mile of mapped EJ populations. These include, but are not limited to, use of construction matting in wetlands to reduce soil disturbance and protect water quality, as well as implementation of the SWPPP to avoid impacts to receiving waters from sediment laden stormwater runoff or from spills or other inadvertent releases of fuels, oils, or other hazardous materials used in equipment or as incidental use during construction. The SWPPP also has provisions for general housekeeping to manage and regularly remove construction-related trash and debris from work areas and dispose of such items at an appropriate receiving facility. This will help maintain a clean work site and avoid the potential for windblown trash and other debris to escape the ROW.

While it is believed that the Project is not reasonably likely to negatively affect EJ populations, the Companies will continue outreach to EJ community members during the permitting and development phases of the Project to support participation by the EJ community.

5.4.13 Conclusion – Environmental Impacts

The preceding sections have reviewed the environmental impacts associated with the Project along the Preferred Route, including those related to land use, protected land and open space, historical/archeological sites, tree removal, wetlands and water crossings, rare species habitat, public water supplies, visual, noise, traffic, and EMF. In addition, these sections have addressed the potential for impacts to EJ populations as identified via the Massachusetts Environmental Justice Populations Mapping Tool.

The Preferred Route is aligned along existing transmission line ROW that is operated and managed by the Companies. Impacts would be minimized as feasible, use of BMPs would be implemented, compliance with federal, state, and local rules and regulations would be followed, and mitigation will be provided to the extent practicable for impacts that cannot be avoided.

5.5 Project Cost

The total estimated cost for the Project is $52.7M (2021 dollars) and is presented at the -25%/+25% estimate level. This includes $13.9 million for construction of National Grid's portion of the New Line, $36.6 million for construction of Eversource's portion of the New Line and $2.2 million for the Substation Work at the three substations identified herein.

5.6 Conclusion

The Project will provide for a reliable and resilient energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. Based upon the above, the potential environmental impacts associated with the proposed Project will be avoided, minimized, and mitigated to the maximum extent possible in compliance with federal, state and local rules and regulations. The Companies therefore conclude that, consistent with the Siting Board's statutory mandate, the construction of the Project along the Preferred Route properly minimizes environmental impacts and achieves an appropriate balance among conflicting environmental concerns, as well as among environmental impacts, cost, and reliability.

6.0 CONSISTENCY WITH THE CURRENT HEALTH, ENVIRONMENTAL PROTECTION, AND RESOURCE USE AND DEVELOPMENT POLICIES OF THE COMMONWEALTH

6.1 Introduction

Pursuant to G.L. c. 164, § 69J, the Siting Board shall approve a petition to construct a facility if, *inter alia*, the Siting Board determines that "plans for expansion and construction of the applicant's new facilities are consistent with current health, environmental protection, and resource use and development polices as adopted by the commonwealth." As discussed below and in more detail throughout the Analysis, the Project not only satisfies the requirements of this statute, but is also fully consistent with other important state energy policies as articulated in the Electric Utility Restructuring Act of 1997 (the "Restructuring Act"), the Green Communities Act (c. 169 of the Acts of 2008), the Global Warming Solutions Act (c. 298 of the Acts of 2008), the Energy Diversity Act (c. 188 of the Acts of 2016), the Clean Energy Act (c. 227 of the Acts of 2018) and the Next Generation Climate Policy Act (c. 8 of the Acts of 2021).

6.2 Health Policies

The Restructuring Act provides that reliable electric service is of "utmost importance to the safety, health and welfare of the Commonwealth's citizens and economy…" See Restructuring Act § 1(h). The Legislature has expressly determined that an adequate and reliable supply of energy is critical to the state's citizens and economy. The Project will be fully consistent with this policy. As discussed in the Analysis, the Project will enhance the reliability of the interconnected electric transmission system in SEMA-RI, enabling the Companies to continue to ensure the availability of sufficient and reliable electric service to the citizens and businesses of the Commonwealth and the region.

The Companies will design, build, and maintain the facilities for the Project so that the health and safety of the public are protected. This will be accomplished through adherence to all applicable federal, state, and local regulations, and industry standards and guidelines established for protection of the public. As discussed in Section 5 of the Analysis, all design, construction and operation activities will be in accordance with applicable governmental and industry standards such as the Massachusetts Code for the Installation and Maintenance of Electric Transmission Lines (220 C.M.R. §§ 125.00 *et seq*.), as well as the National Electrical Safety Code and Occupational Safety and Health Administration ("OSHA") regulations and will have no adverse health effects. The facilities will be designed in accordance with sound engineering practices using established design codes and guides published by, among others, the Department, the Institute of Electrical and Electronic Engineers, the American Society of Civil Engineers, the American Concrete Institute, and the American National Standards Institute. Following construction of the facilities, all transmission structures and substation facilities will be clearly marked with warning signs to alert the public to potential hazards.

In sum, because the Project will be consistent with, and promote, the Commonwealth's energy polices as outlined in the Restructuring Act, it will also be consistent with its health policies.

6.3 Environmental Protection Policies

The Project is consistent with the Commonwealth's environmental protection policies as set forth in Chapter 164 of the General Laws and with other state and local environmental policies as described below.

6.3.1 The Restructuring Act

The Restructuring Act provides that the Companies must demonstrate that the Project minimizes environmental impacts consistent with the minimization of costs associated with mitigation, control, and reduction of the environmental impacts of the Project. Accordingly, an assessment of all impacts of a proposed facility is necessary to determine whether an appropriate balance is achieved both among conflicting environmental concerns as well as among environmental impacts, cost and reliability.

A facility that achieves the appropriate balance thereby meets the Chapter 164 requirement to minimize environmental impacts at the lowest possible cost. To determine if a petitioner has achieved the proper balance among environmental impacts, cost, and reliability, the Siting Board first determines if the petitioner has provided sufficient information regarding environmental impacts and potential mitigation measures in order to make such a determination. The Siting Board then determines whether environmental impacts are minimized. Similarly, the Siting Board evaluates whether the petitioner has provided sufficient cost information in order to determine if the appropriate balance among environmental impacts, cost, and reliability has been achieved.

In Sections 3, 4, and 5 of this Analysis, the Companies have demonstrated that they compared alternative projects and routes and proposed specific plans to mitigate environmental impacts associated with the construction, operation, and maintenance of the proposed transmission line, consistent with cost minimization. As such, the Project is consistent with the environmental policies of the Commonwealth as set forth in the Restructuring Act.

6.3.2 State and Local Environmental Policies

The Companies will obtain all environmental approvals and permits required by federal, state and local agencies and will construct and operate the Project to fully comply with applicable federal, state and municipal regulations and environmental policies. Thus, the Project will contribute to a reliable, low cost, diverse energy supply for the Commonwealth while avoiding, minimizing and mitigating environmental impacts to the maximum extent practicable. Table 6-1, below, identifies the anticipated permits, reviews, and approvals required for the Project (in addition to the Siting Board's review). By meeting the requirements for acquiring each of these federal, state, and local permits, the Project will be in compliance with applicable state and local environmental policies.

TABLE 6-1 ANTICIPATED MAJOR FEDERAL, STATE AND LOCAL PERMIT/CONSULTATION REQUIREMENTS FOR THE PROJECT

AGENCY/ REGULATORY AUTHORITY	PERMIT AND/OR PURPOSE OF APPROVAL	REQUIRED?	COMMENTS
Federal			
USACE	Section 404 of Clean Water Act for discharge or dredge of fill material into waters of the United States; National Historic Preservation Act Section106 Consultation	Yes	To be filed upon completion of engineering permit design plan set.
United States Fish and Wildlife Service ("USFWS") / United States Marine Fisheries	Section 7 Endangered Species Act Consultation	Yes	The USFWS Endangered Species Consultation Procedure Information for Planning and Conservation was completed in July 2018.

AGENCY/ REGULATORY AUTHORITY	PERMIT AND/OR PURPOSE OF APPROVAL	REQUIRED?	COMMENTS
United States Environmental Protection Agency	National pollutant Discharge Elimination System Construction Stormwater General Permit	Yes	To be filed minimum 14 days prior to start of construction.
Federal Aviation Administration ("FAA")	Section 77.9 of FAA document 49 Code of Federal Regulations Part 77 Safe, Efficient Use and Preservation of the Navigable Airspace	Yes	90-day notification to be provided to FAA.
State			
Massachusetts Department of Public Utilities	M.G.L. c. 164, § 72, approval to construct ("Section 72 Petition")[1]	Yes	Construct and use a line for the transmission of electricity.
Executive Office of Energy & Environmental Affairs	Massachusetts Environmental Policy Act ("MEPA")	Yes	The Preferred Route exceeds MEPA EENF review thresholds relating to state-listed rare species and wetlands. The EENF was filed on November 15, 2018, and ENF decision received on December 28, 2018. The SEIR will be filed upon completion of the engineering permit design plan set.
Massachusetts Department of Environmental Protection ("MassDEP")	Individual Section 401 Water Quality Certification	Yes	To be filed upon completion of engineering permit design plan set.
Massachusetts Historical Commission ("MHC")	State Register Review / Adverse Effect Determination	Yes	Project Notification Form was filed on April 5, 2018. Coordination with MHC is ongoing.
MA Natural Heritage and Endangered Species Program ("NHESP")	MESA Review. Determination of Take or No-take	Yes	MESA Project Review Checklist was filed on November 15, 2018. Coordination with NHESP is ongoing.
Massachusetts Department of Conservation and Recreation ("MA DCR")	Construction and Access Permit	TBD	To be filed upon completion of engineering permit design plan set.
Massachusetts Department of Transportation ("MassDOT")	State and Interstate Highway Right-of-Way Encroachment Permit and Crossing Permit	Yes	To be filed upon completion of engineering permit design plan set.
Local			

AGENCY/ REGULATORY AUTHORITY	PERMIT AND/OR PURPOSE OF APPROVAL	REQUIRED?	COMMENTS
Conservation Commissions	Wetlands Protection Act & Wetland Bylaws Order of Conditions	Yes	Activities in jurisdictional areas in Acushnet, New Bedford, Dartmouth and Fall River will require Orders of Conditions. To be filed upon completion of engineering permit design plan set.
Boards of Selectman	Street Crossing Permits	Yes	Public road crossings in Acushnet, New Bedford, Dartmouth and Fall River will require Street Franchise Permits. To be filed upon completion of engineering permit design plan set.
Zoning and Planning Boards	Stormwater Management & Earth Removal Permits	TBD	To be determined based on final engineering design.

Notes:
[1]The Companies have filed a motion with the Siting Board pursuant to G.L. c. 25, § 4, seeking the consolidation of the review of this Petition with the Section 72 Petition being filed contemporaneously with the Department.

6.3.3 Green Communities Act

The Green Communities Act is a comprehensive, multi-faceted energy reform bill that encourages energy and building efficiency, promotes renewable energy, creates green communities, implements elements of the Regional Greenhouse Gas Initiative, and provides market incentives and funding for various types of energy generation. The Green Communities Act (as amended and supplemented by St. 2012, c. 209, An Act Relative to Competitively Priced Electricity) can be expected to result in greater renewable supplies and substantial new conservation initiatives in future years. The improvements to the transmission system in the SEMA-RI area will strengthen and improve the reliability of the regional transmission system in the SEMA-RI area. While the primary Project purpose is improved reliability consistent with ISO-NE requirements, the more robust system will enable a stronger, more efficient and flexible operation of the grid as contemplated by the Green Communities Act, thereby facilitating the interconnection of more renewable energy. With respect to offshore wind in particular, the Project adds a new 115-kV path, which strengthens the area transmission network in close proximity to multiple proposed offshore wind interconnections. This strengthened transmission network provides increased opportunity for offshore wind to interconnect to the transmission system under a wider range of system conditions. The Project, therefore, is consistent with the Green Communities Act.

6.3.4 Global Warming Solutions Act

The Global Warming Solutions Act ("GWSA") establishes aggressive greenhouse gas ("GHG") emissions reduction targets of 25 percent from 1990 levels by 2020 and 80 percent from 1990 levels by 2050. Pursuant to the GWSA, the Secretary of Energy and Environmental Affairs issued the Clean Energy & Climate Plan for 2020 in December 2010 and updated the plan in December 2015. Among other provisions, the GWSA obligates administrative agencies such as the Siting Board, in considering and issuing permits, to consider reasonably foreseeable climate change impacts (e.g., additional GHG emissions) and related effects (e.g., sea level rise). More recently, in April 2020, the Secretary of Energy and Environmental Affairs established a 2050 statewide emissions limit of net zero GHG emissions (and in no event greater than 85% below 1990

levels). The proposed improvements to the transmission system in the SEMA-RI area will have no adverse climate change impacts or negative effects on sea levels.

As previously stated, the improvements to the transmission system in the SEMA-RI area will strengthen and improve the reliability of the regional transmission system. While the primary Project purpose is improved reliability consistent with ISO-NE requirements, the more robust system will be better able to accommodate future renewable energy projects at the large scale that will likely be necessary to achieve the GWSA's very ambitious 2050 GHG reductions (85% from 1990 levels). Consequently, the Project is consistent with the GWSA.

6.3.5 Energy Diversity Act

On August 8, 2016, Governor Charles Baker signed into law An Act to Promote Energy Diversity (the "Energy Diversity Act"). St. 2016, c. 188. The Energy Diversity Act is a multi-faceted energy bill that, among other things, facilitates the procurement and integration of renewable energy generation resources, including new offshore wind energy generation, firm service hydroelectric generation and new Class I RPS eligible resources. St. 2016, c. 188, § 12. The Project will improve the reliability of the transmission system in SEMA-RI and thereby create a more robust transmission system that is better able to accommodate various energy resources, including offshore wind, that may come online in the future as a result of the Energy Diversity Act. Accordingly, the Project is consistent with the Energy Diversity Act.

6.3.6 Clean Energy Act

On August 9, 2018, Governor Baker signed into law An Act to Advance Clean Energy (the "Clean Energy Act"). St. 2018, c. 227. The Clean Energy Act, among other provisions, amends the Energy Diversity Act to further encourage energy storage efforts. St. 2018, c. 227, § 20. The Clean Energy Act also requires the Department of Energy Resources to investigate the potential for additional clean energy solicitations. St. 2018, c. 227, § 21. As noted above, the Project will improve the reliability of the transmission system in the SEMA-RI area, which will, in turn, enhance the Companies' ability to accommodate new energy storage units as well as various other clean energy resources such as solar and on-shore and offshore wind in line with the Clean Energy Act. Accordingly, the Project is consistent with the Clean Energy Act.

6.4 Next-Gen Climate Policy Act

On March 26, 2021, Governor Baker signed Chapter 8 of the Acts of 2021, "An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy" (the "Climate Act"). The Climate Act codified the Baker Administration's commitment to net-zero emissions by 2050 and that in no event shall the level of emissions in 2050 be higher than a level 85% below 1990 levels. The Climate Act advances and extends the goals of the GWSA by, inter alia, establishing new interim goals for emissions reductions and authorizing a voluntary energy efficient building code for municipalities. The interim goals include that by 2030, emissions must be 50% lower than they were in Massachusetts in 1990, and by 2040, they must be 75% lower. In addition, the Climate Act allows the Commonwealth to procure an additional 2,400 megawatts of offshore wind energy by 2027.

The Climate Act also contains several provisions that enhance and codify the Commonwealth's EJ policies. Specifically, the Climate Act authorizes the Secretary of Energy and Environmental Affairs to require project proponents to improve the opportunities for meaningful participation by persons in EJ populations within proximity to proposed projects, regardless of whether a given project triggers the need for an ENF pursuant to MEPA. The Project traverses EJ neighborhoods in the communities of Acushnet and New

Bedford. To facilitate the meaningful participation of residents of the proximate EJ communities, the Companies have provided notifications of the Project and Project open houses in English, Spanish and Portuguese. Moreover, the Companies' environmental analysis is designed to minimize the Project's impacts to all populations, including EJ populations. The Companies have undertaken, and will continue to undertake, an extensive community outreach effort to facilitate the meaningful opportunity to participate by all. As such, the Project is consistent with the Commonwealth's EJ policies as codified in the Climate Act.

6.5 Resource Use and Development Policies

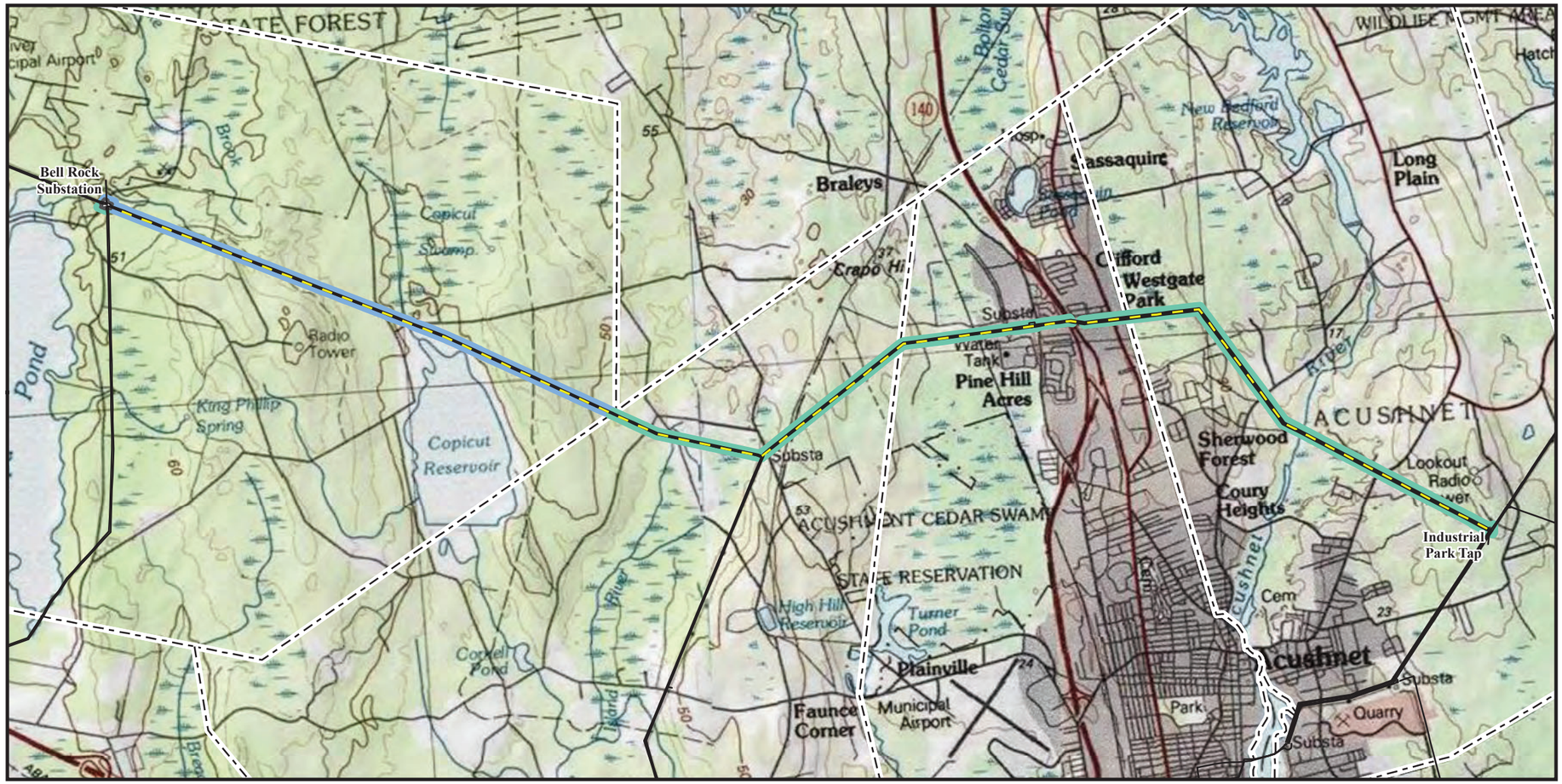
The Project, which will contribute to the long-term maintenance and reliability of the electric transmission system in the SEMA-RI area, will be constructed and operated in compliance with Massachusetts's policies regarding resource use and development. For example, in 2007, the Energy and Environmental Affairs' Smart Growth/Smart Energy policy established the Commonwealth's Sustainable Development Principles, including: (1) supporting the revitalization of city centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources and integrates uses; (2) encouraging remediation and reuse of existing sites, structures and infrastructure rather than new construction in undeveloped areas; and (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes. As described more fully in Section 5 of this Analysis, the Project will support these principles because, among other reasons, the Project will be located within an existing electric transmission ROW, consistent with the reuse of existing sites.

Accordingly, the Project complies with, and furthers, the Commonwealth's policies regarding resource use and development.

Acushnet to Fall River Reliability Project

Acushnet, New Bedford, Dartmouth, and Fall River, Massachusetts

Volume II - Figures



Eversource ROW

National Grid ROW

1 " = 1 miles

Prepared For:

New England Power Company
d/b/a National Grid
40 Sylvan Road
Waltham, MA 02451

NSTAR Electric Company
d/b/a Eversource
247 Station Drive
Westwood, MA 02090

Compiled By:

POWER Engineers, Inc
2 Hampshire Street, Suite 301
Foxborough, MA 02035

December 2021

This document has been reviewed for Critical Energy Infrastructure Information (CEII), December 2021)

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Town of Lakeville

Town of Freetown

Town of Acushnet

Town of Rochester

Town of Wareham

Town of Marion

City of Fall River

City of New Bedford

Town of Dartmouth

Town of Mattapoisett

Tremont Substation

Bell Rock Substation

Industrial Park Substation

High Hill Switching Station

Industrial Park Tap

Acushnet Substation

Project Vicinity



Legend

- Preferred Route
- Existing 114 Line
- Other Existing Transmission Line
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 1.1: USGS Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

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EVERSOURCE nationalgrid

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Date: 12/6/2021

Author: TDH

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Project Vicinity



Legend

- Preferred Route
- Existing 114 Line
- Other Existing Transmission Line
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 1.2: Aerial Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

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Date: 12/6/2021

Author: TDH

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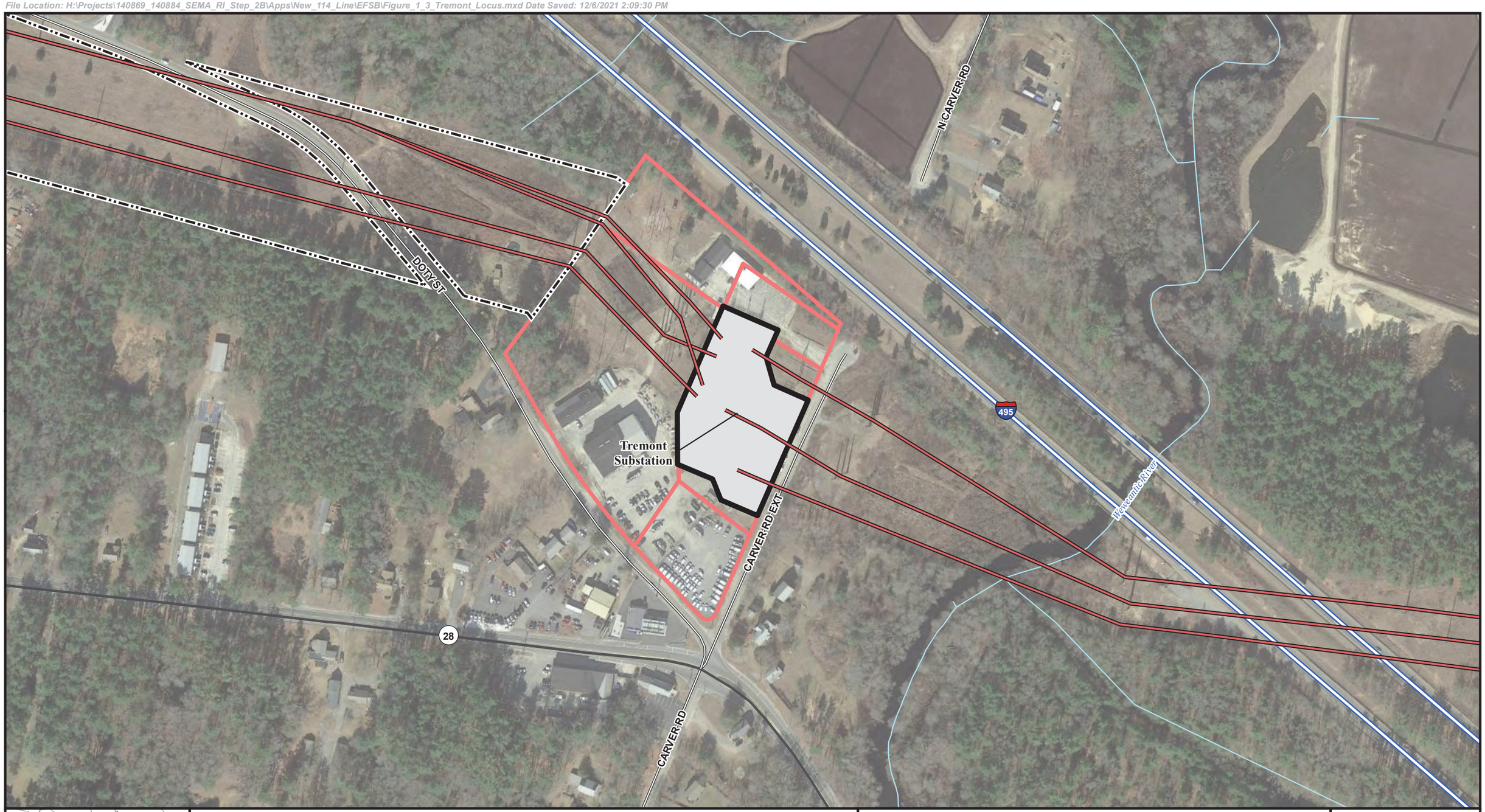



Legend

- Existing Transmission Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Interstate Highway
- State Highway
- Local Road
- Perennial Stream (NHD)

N

1 inch = 200 feet

0 100 200

Feet

**Indicates Layers Set to Transparency*

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 1.3 : Tremont Substation Aerial Locus Map

Commonwealth of Massachusetts
Town of Wareham

Date: 12/6/2021

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Imagery Source: Google Earth

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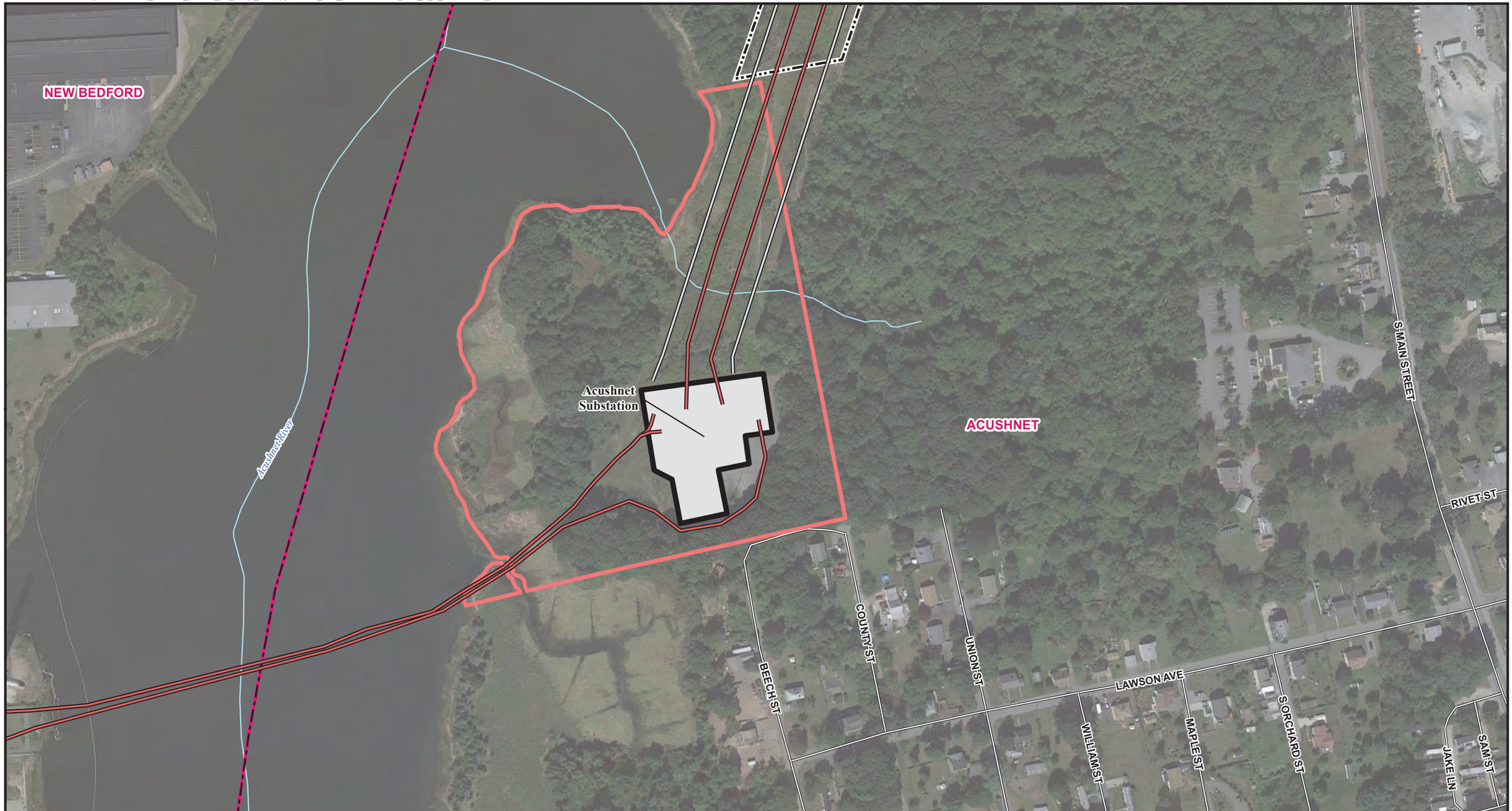



Legend

- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- Perennial Stream (NHD)

N

1 inch = 200 feet

0 100 200

Feet

**Indicates Layers Set to Transparency*

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 1.4 : Acushnet Substation Aerial Locus Map

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

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Imagery Source: Google Earth

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Legend

- Existing Transmission Line
- Existing Station
- Existing Right of Way
- National Grid Owned Land
- Local Road
- Perennial Stream (NHD)

N

1 inch = 200 feet

0 100 200

Feet

**Indicates Layers Set to Transparency*

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 1.5 : Bell Rock Substation Aerial Locus Map

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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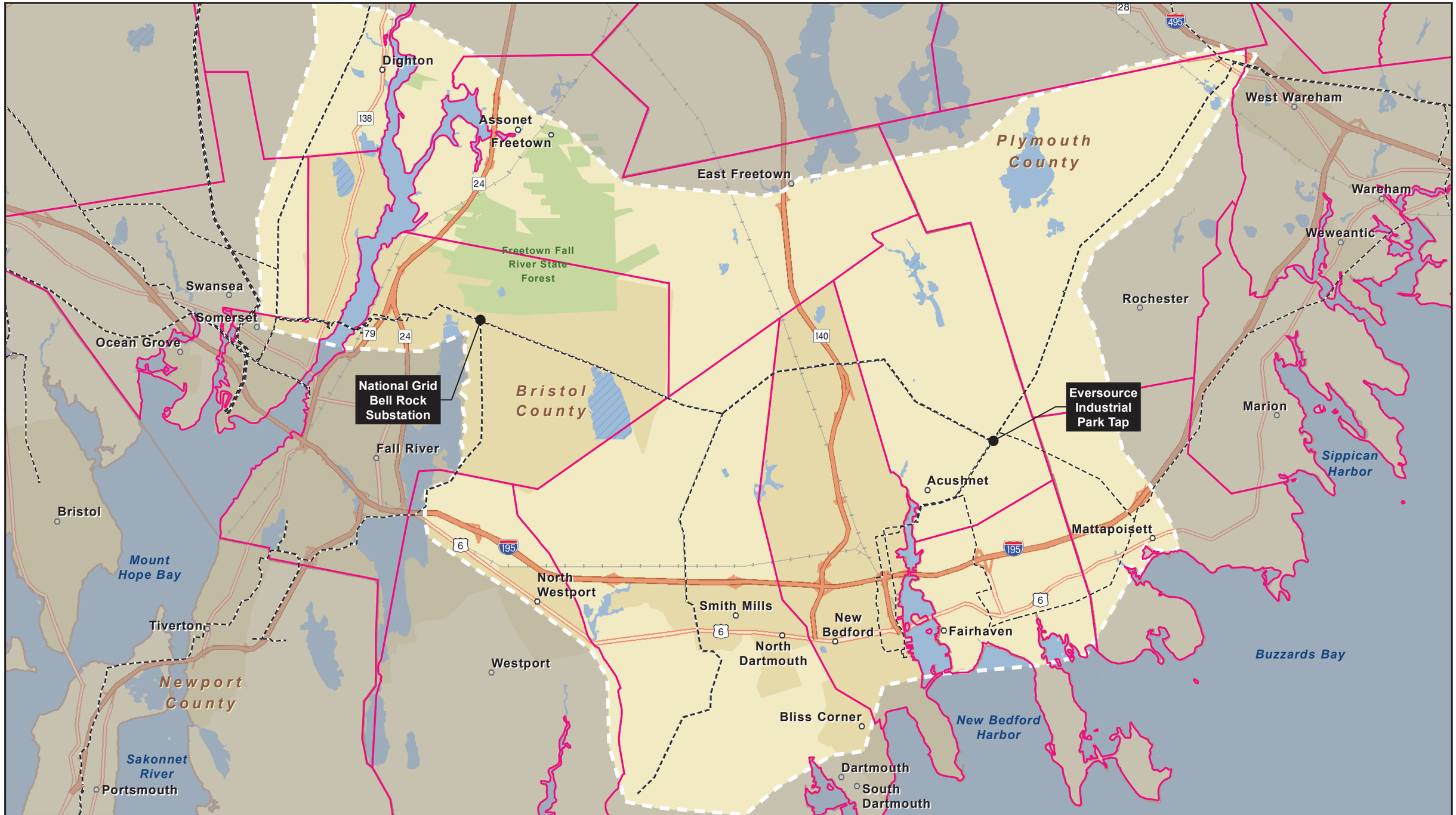

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Miles

Legend

- Existing Transmission Line
- Town Boundary
- Routing Study

Acushnet to Fall River Reliability Project

Figure 4.1: Routing Study Area

Commonwealth of Massachusetts

12/6/2021

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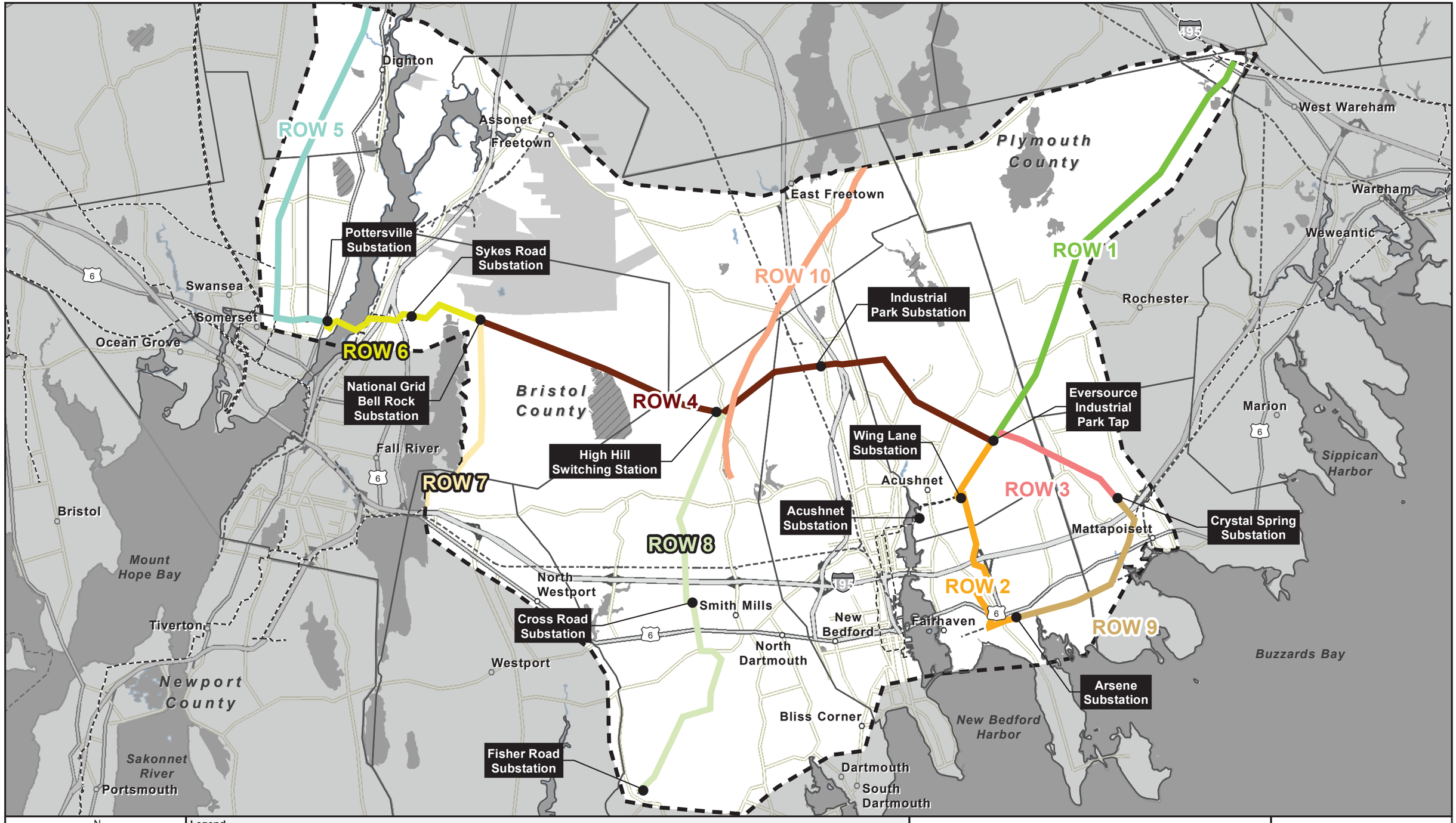

Acushnet to Fall River Reliability Project

Figure 4.2: Utility Corridors

Commonwealth of Massachusetts

12/6/2021

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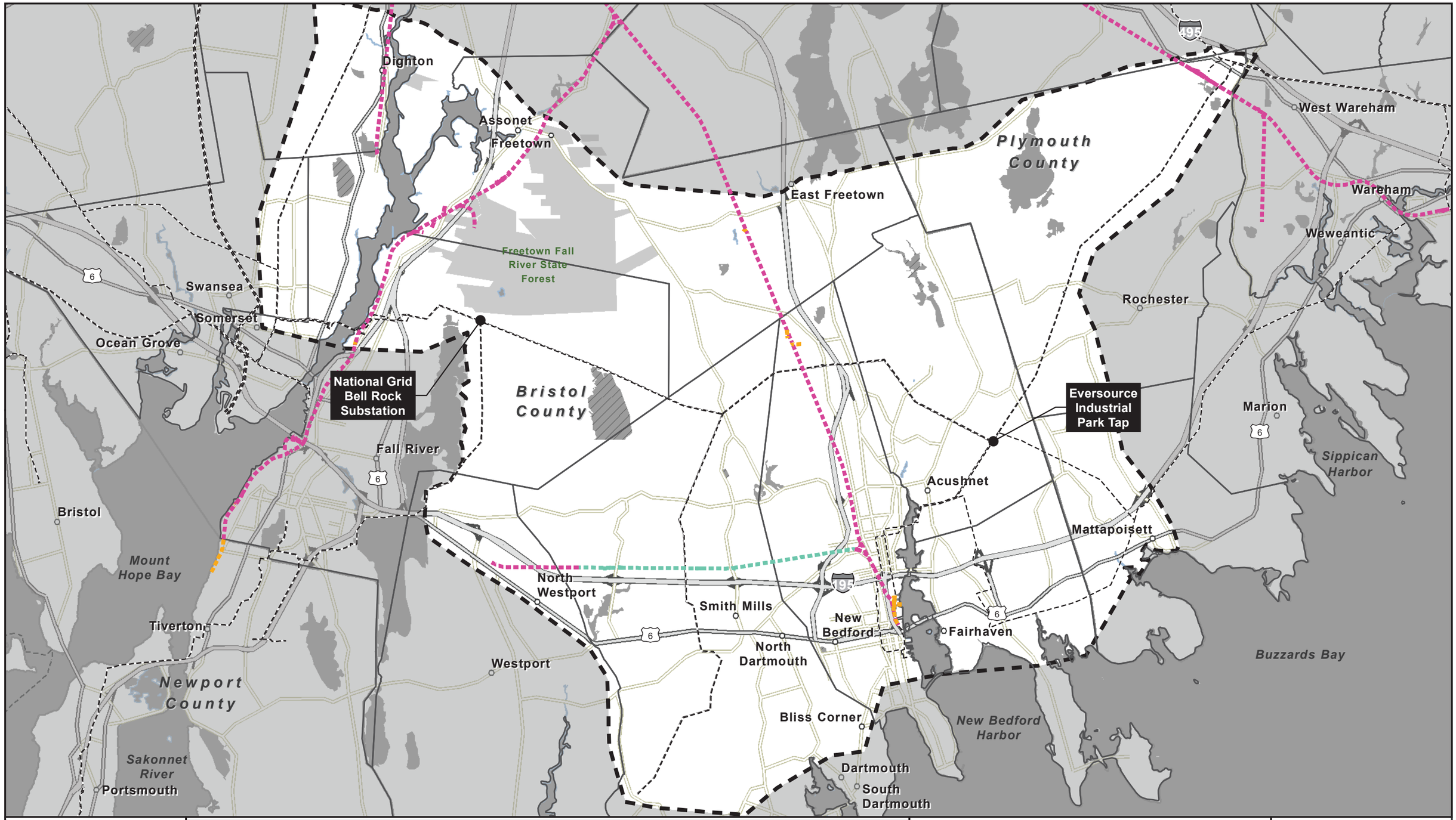

Acushnet to Fall River Reliability Project

Figure 4.3: Railroad Corridors

Commonwealth of Massachusetts

12/6/2021

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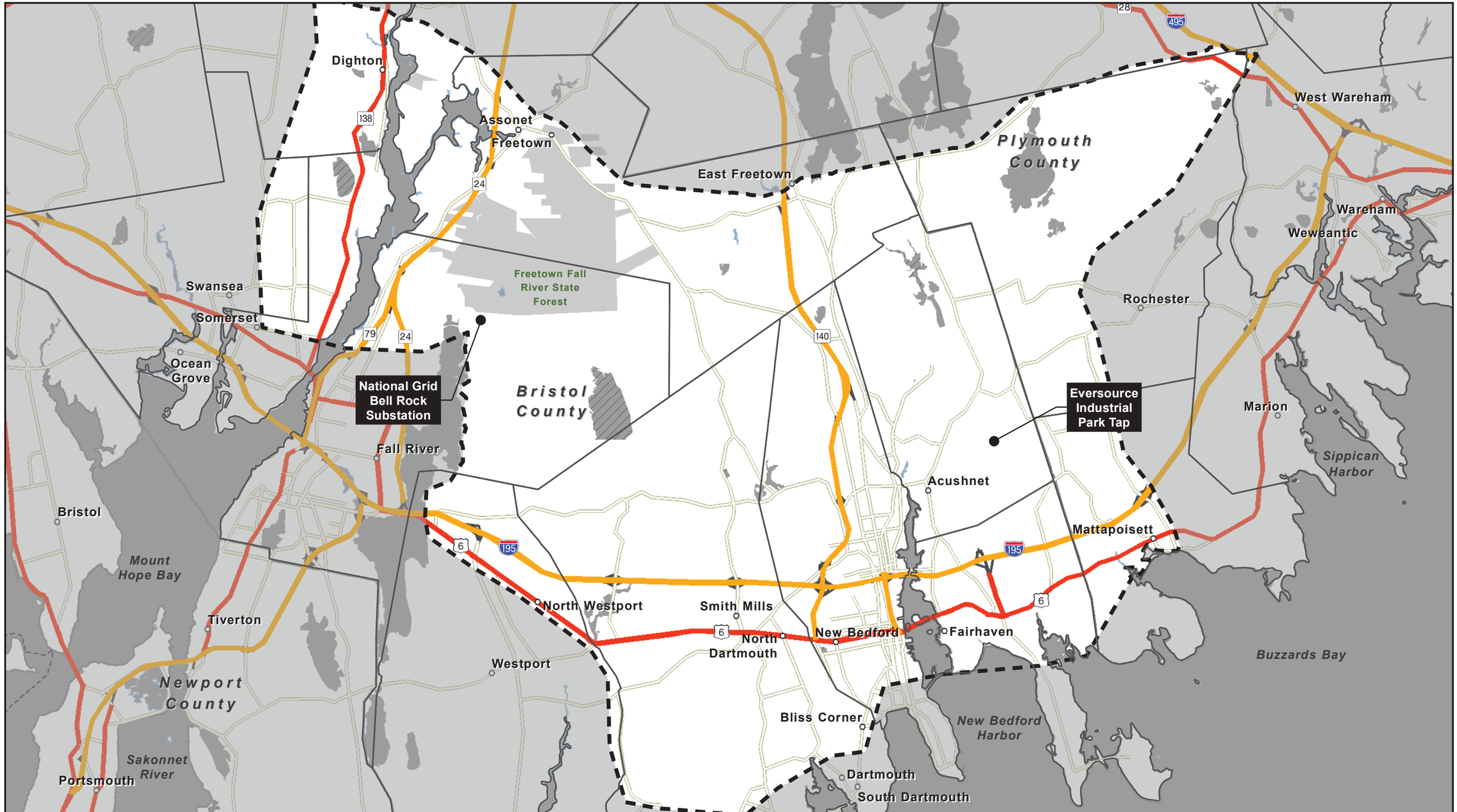

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Legend

- Town Boundary
- Routing Study
- Interstates
- Highways
- Major Roads
- Ramps
- Ferry Crossing

Acushnet to Fall River Reliability Project

Figure 4.4: Highway Corridors

Commonwealth of Massachusetts

12/6/2021

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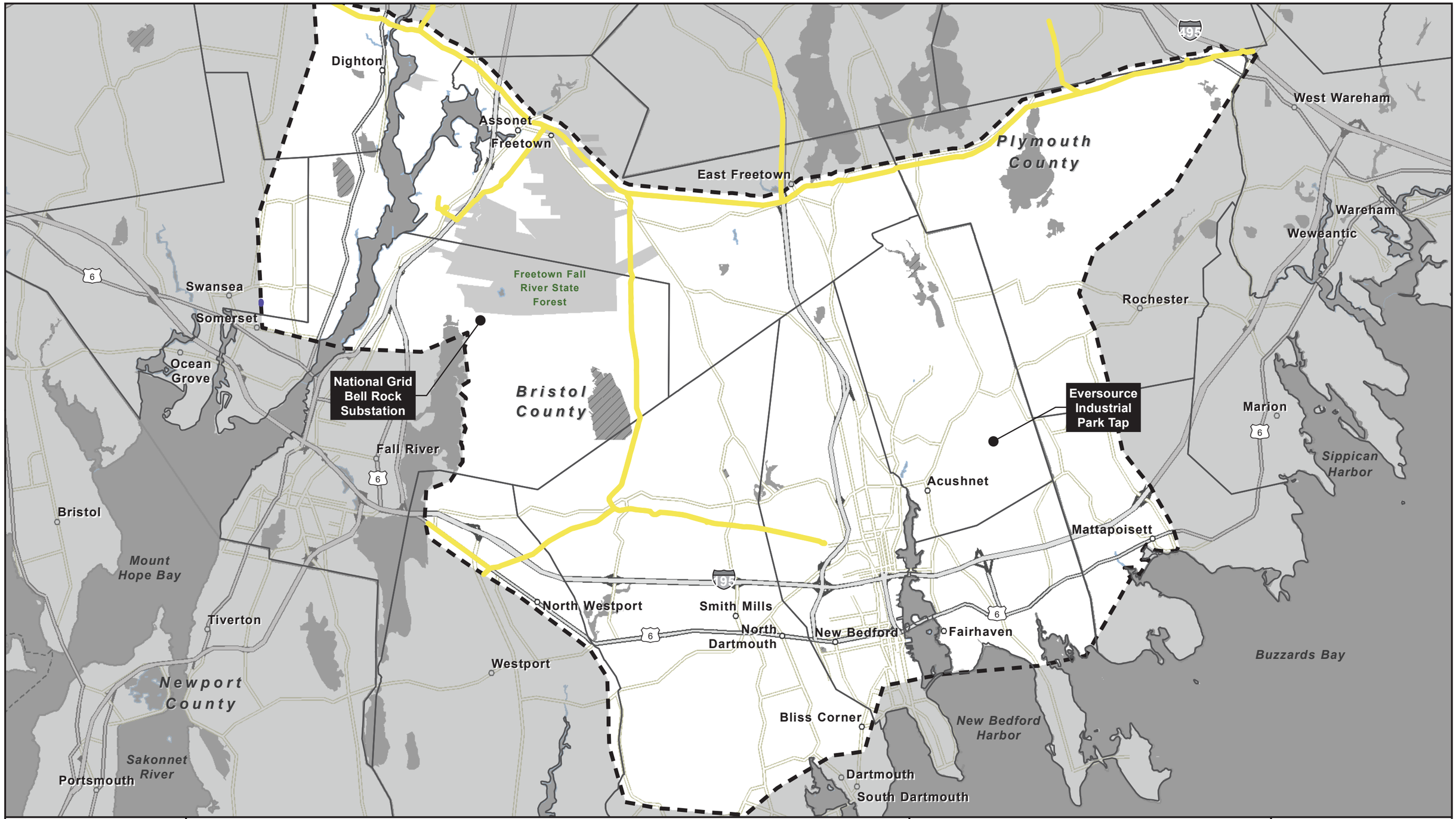

Acushnet to Fall River Reliability Project

Figure 4.5: Pipeline Corridors

Commonwealth of Massachusetts

12/6/2021

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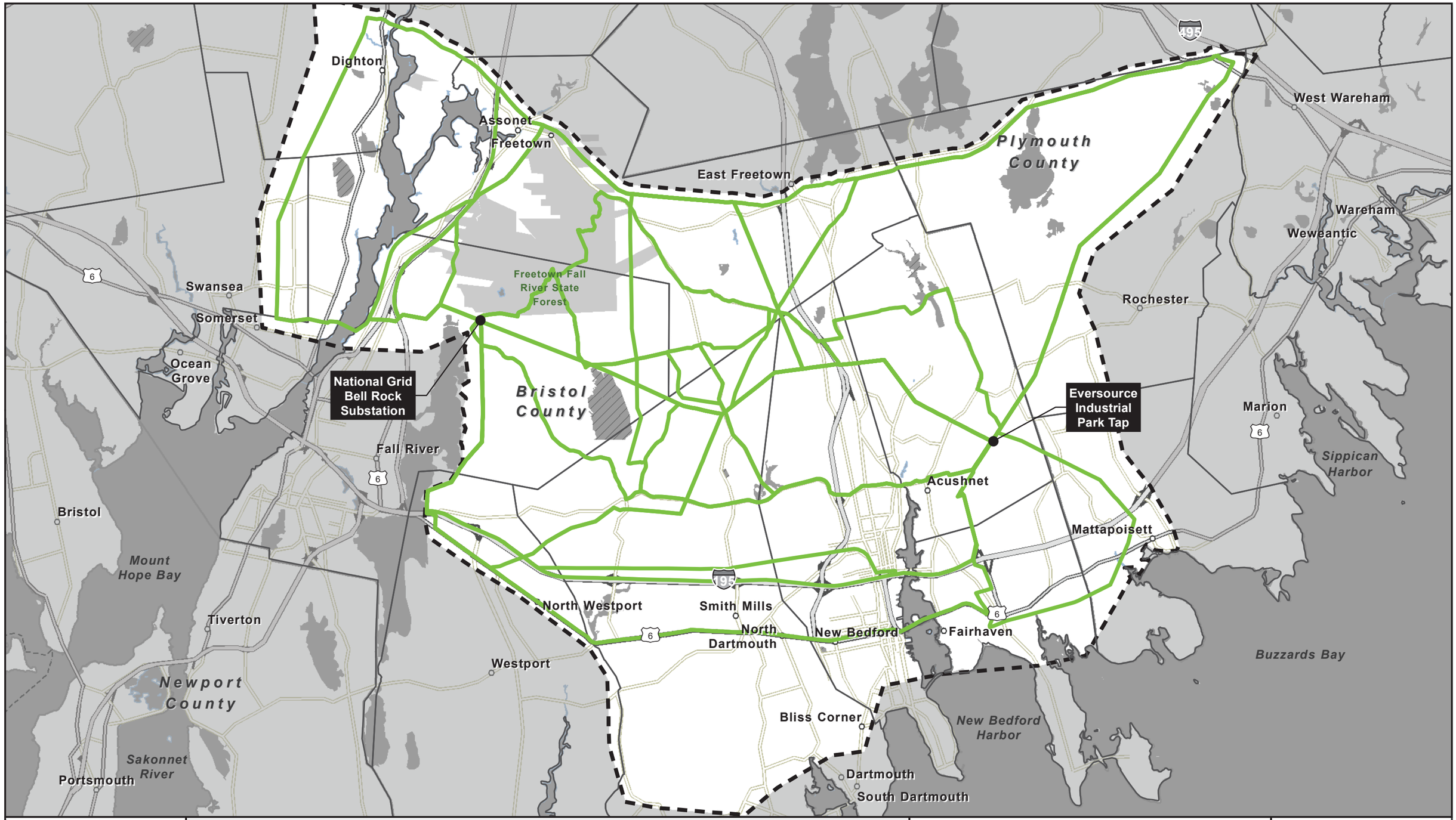

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Legend

- Universe of Routes
- Town Boundary
- Routing Study

Acushnet to Fall River Reliability Project

Figure 4.6: Universe of Routes Index

Commonwealth of Massachusetts

12/6/2021

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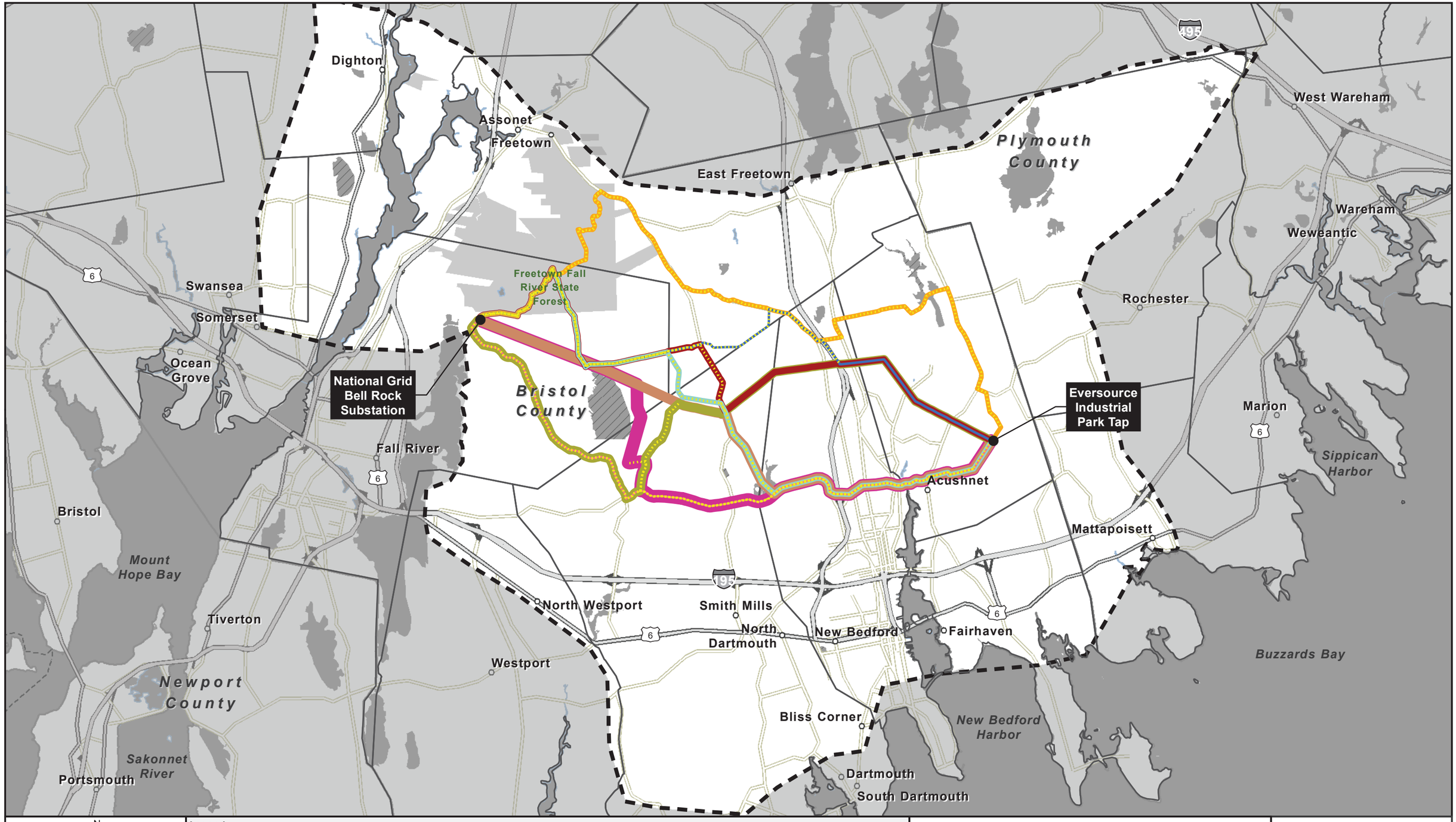

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Legend

- Route 2
- Route 3
- Route 4
- Route 20
- Route 21
- Route 22
- Route 23
- Route 24
- Underground Portion of Alternative
- Town Boundary
- Routing Study

Acushnet to Fall River Reliability Project

Figure 4.6 Detail Sheet 1

Commonwealth of Massachusetts

12/6/2021

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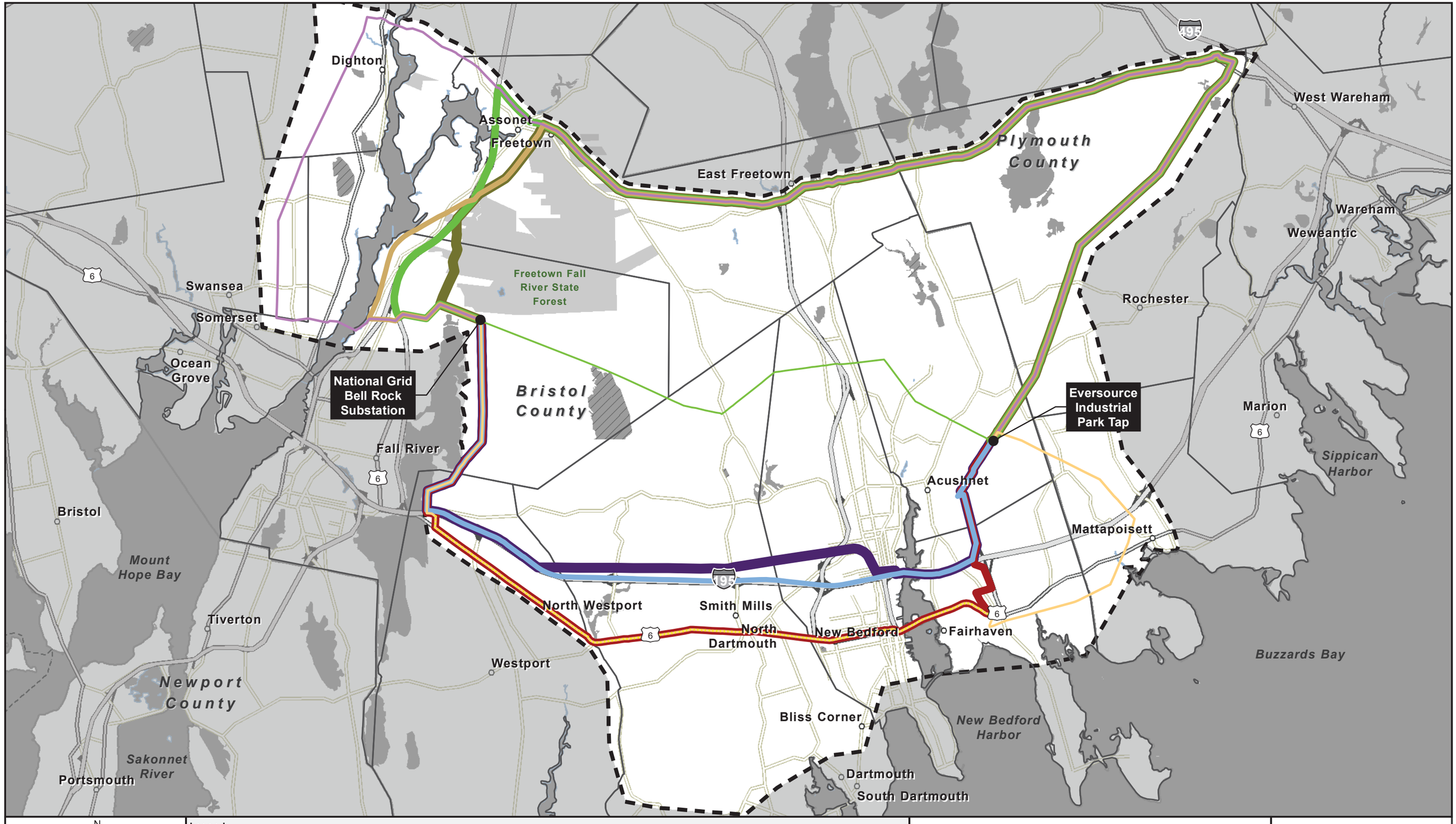

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Miles

Legend

- Route 1
- Route 5
- Route 6
- Route 7
- Route 8
- Route 9
- Route 10
- Route 11
- Route 12
- Underground Portion of Alternative
- Town Boundary
- Routing Study

Acushnet to Fall River Reliability Project

Figure 4.6 Detail Sheet 2

Commonwealth of Massachusetts

12/6/2021

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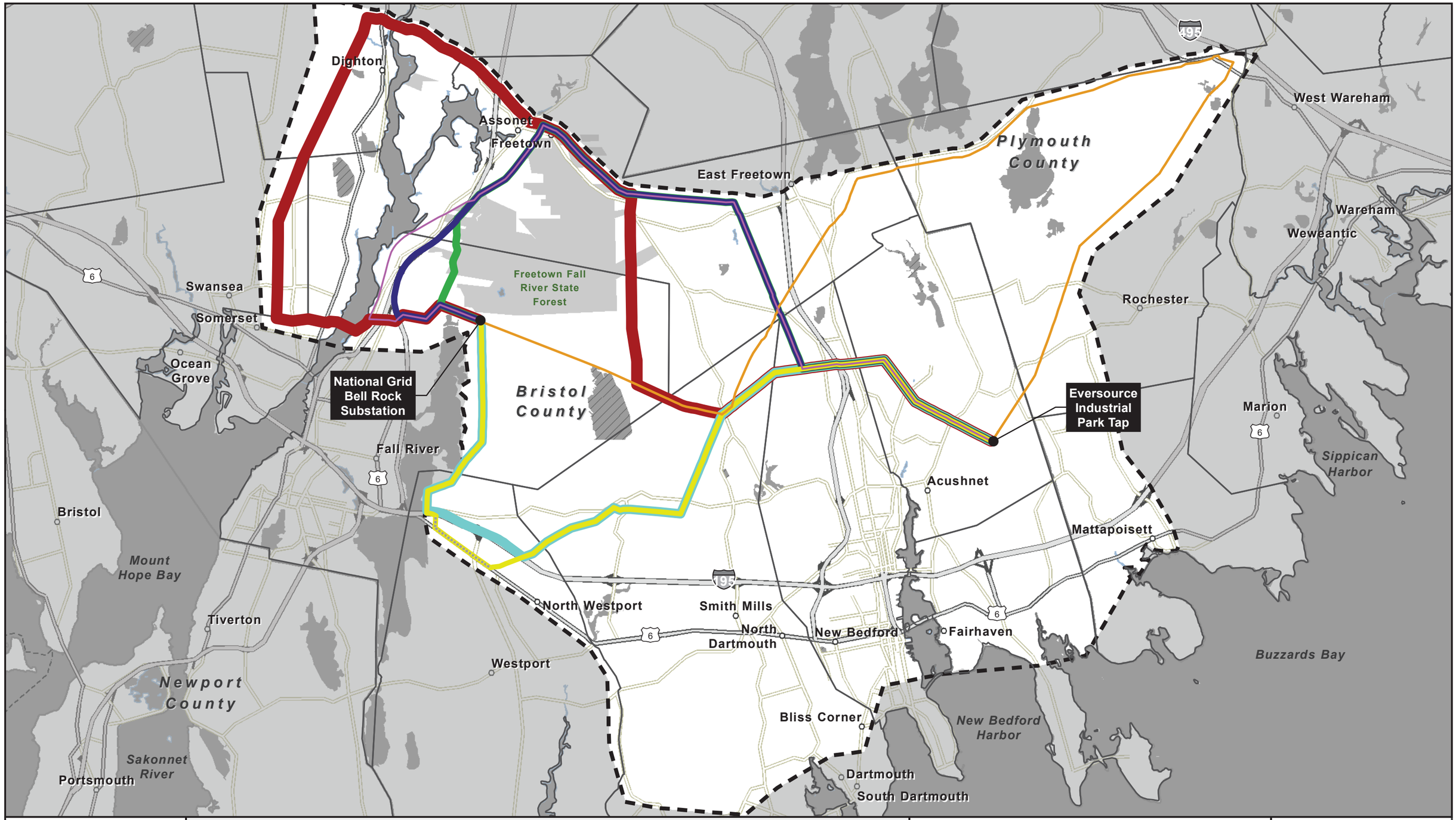

Acushnet to Fall River Reliability Project

Figure 4.6 Detail Sheet 3

Commonwealth of Massachusetts

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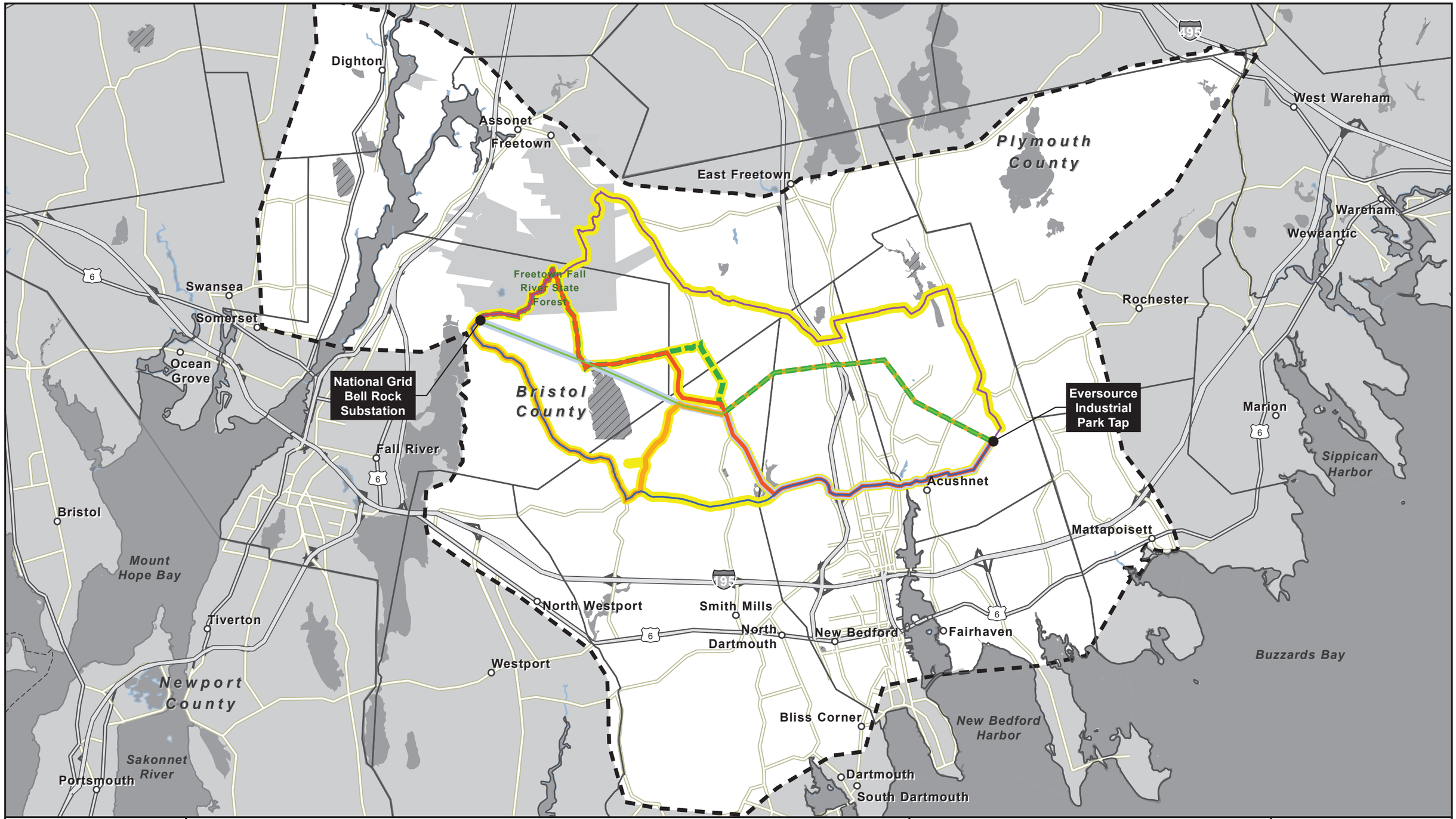

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Miles

Legend

- Route 1
- Route 3
- Route 4
- Route 20
- Route 21
- Route 22
- Route 23
- Underground Portion of Alternative
- Town Boundary
- Routing Study

Acushnet to Fall River Reliability Project

Figure 4.7: Candidate Routes
Overview Map

Commonwealth of Massachusetts

12/6/2021

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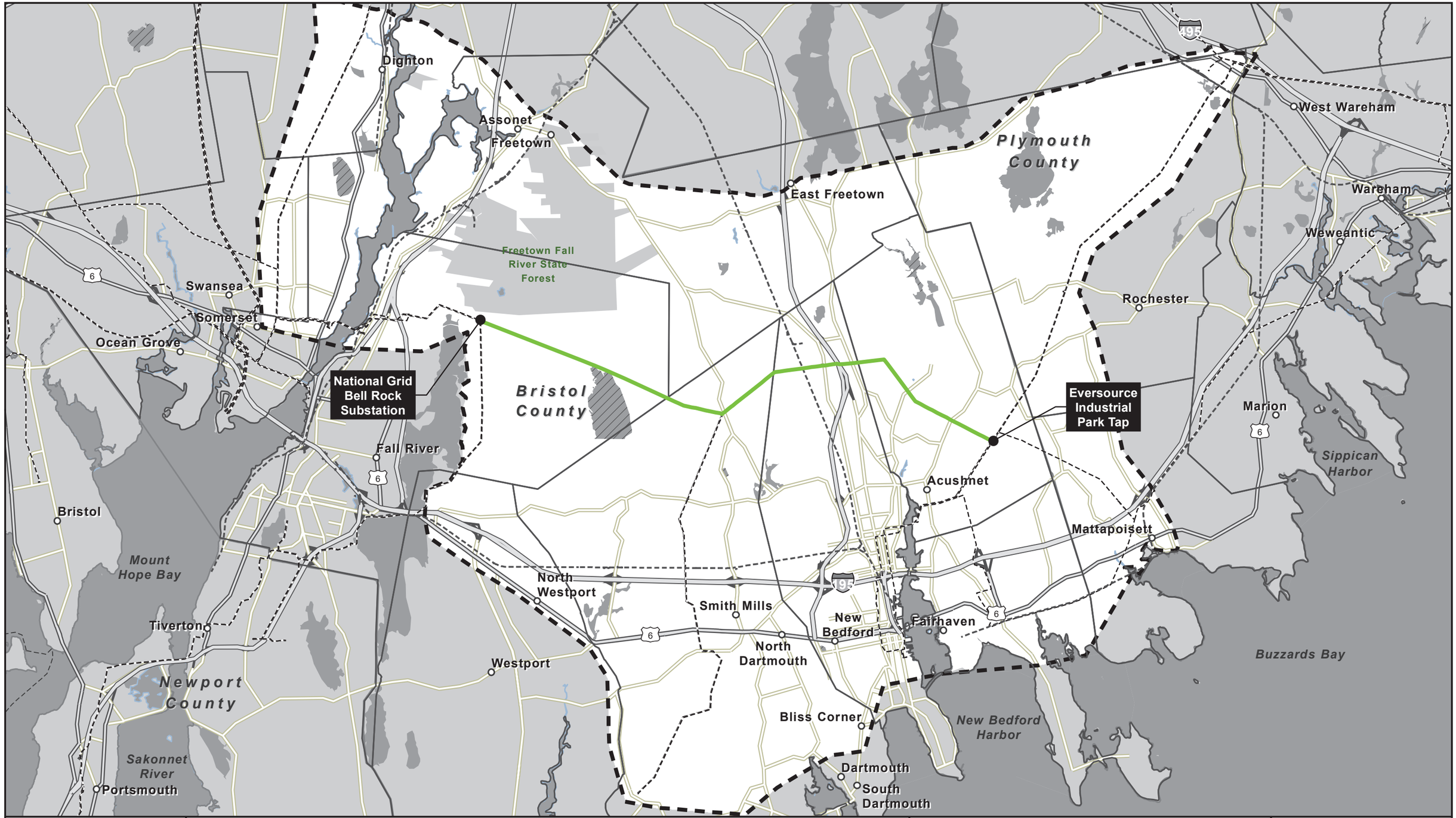

Acushnet to Fall River Reliability Project

Figure 4.8: Preferred Route

Commonwealth of Massachusetts

12/6/2021

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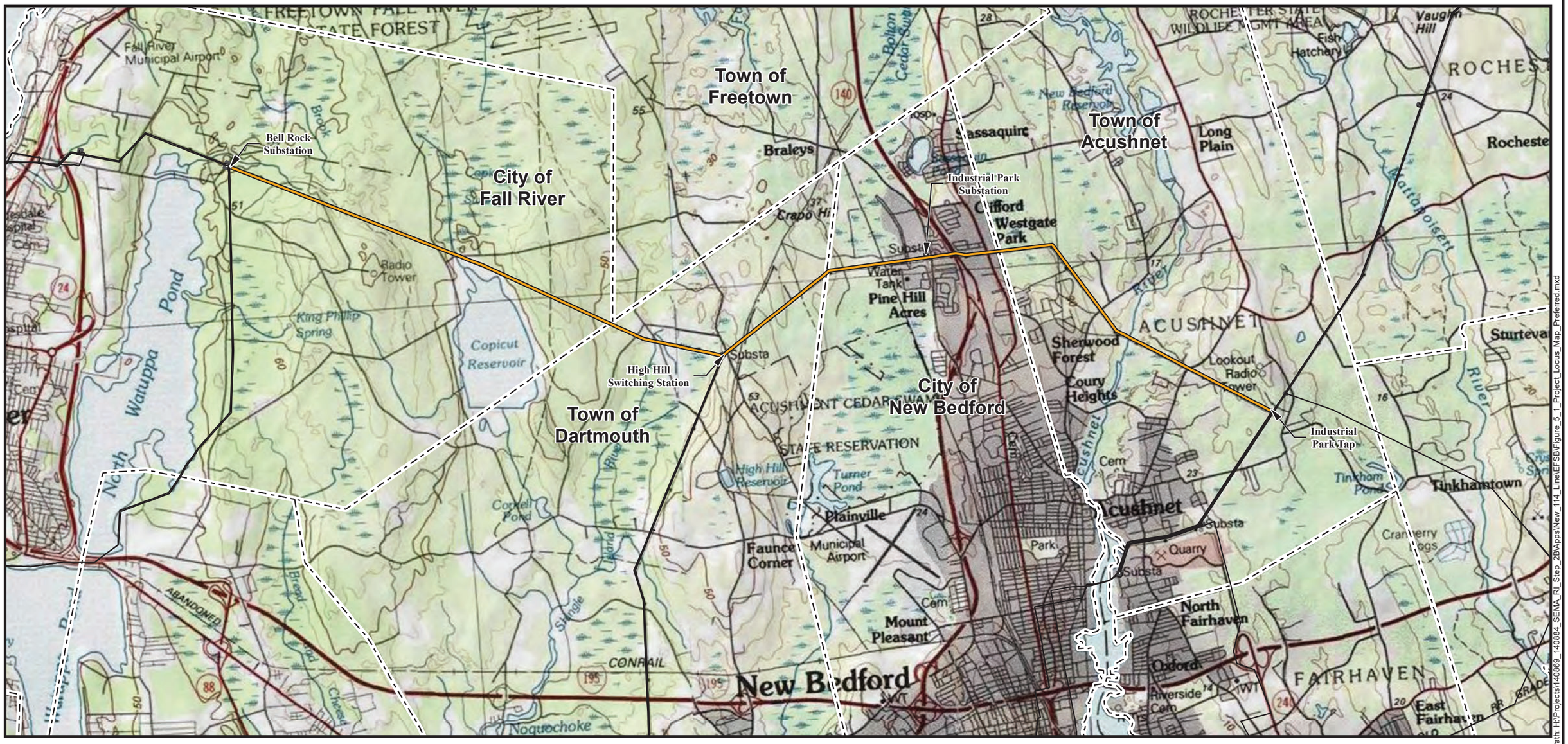
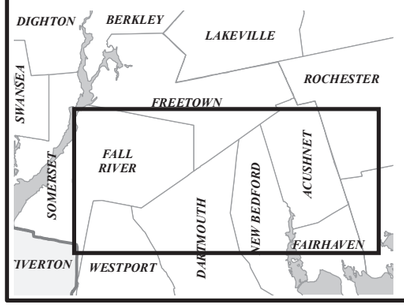
POWER ENGINEERS



Project Vicinity



Legend

- Preferred Route
- Existing Transmission Line
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 5.1: Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE
nationalgrid

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Date: 12/6/2021

Author: TDH

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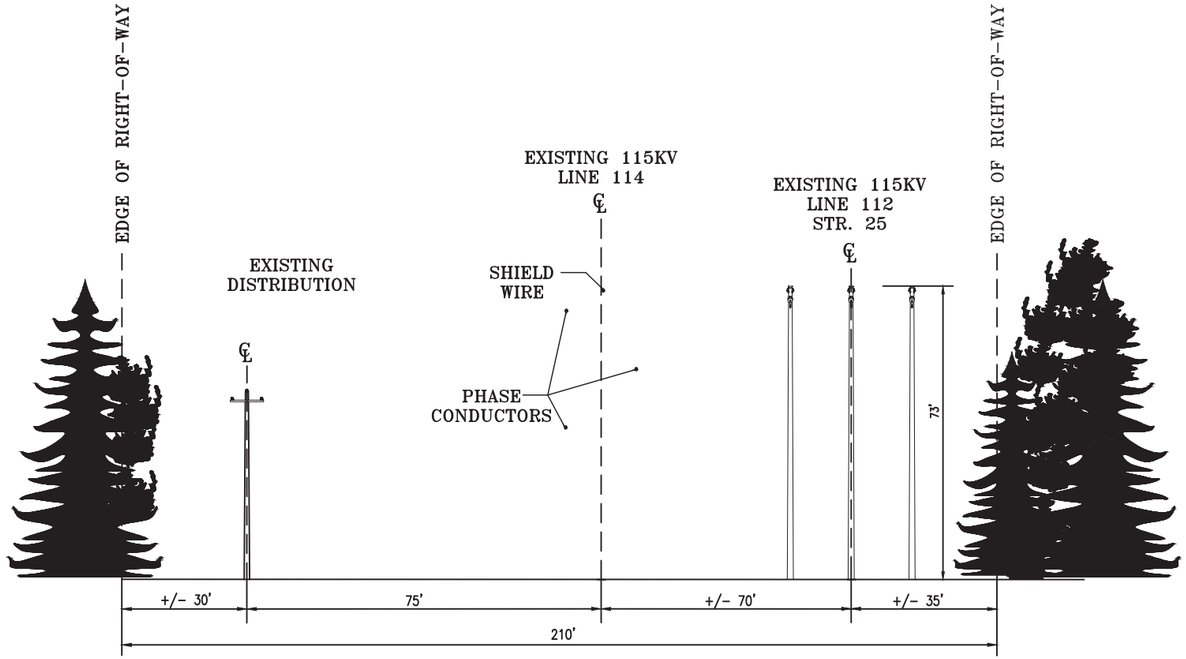
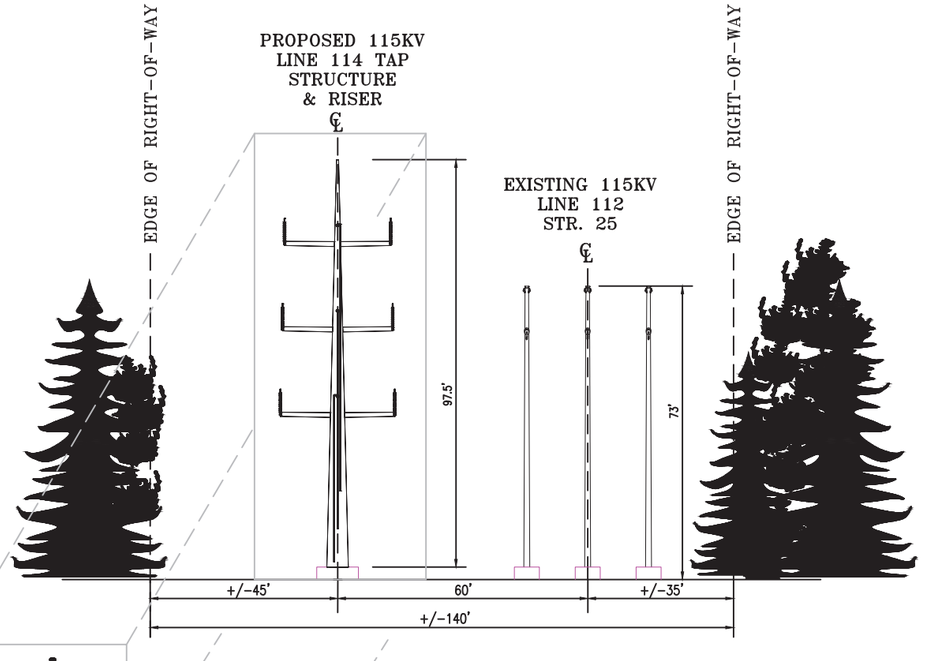


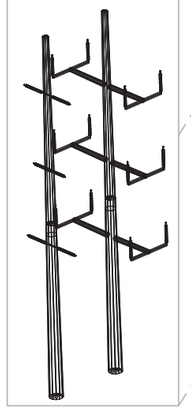
EXISTING R.O.W. AT TAP POINT

EXISTING CONFIGURATION: SINGLE CIRCUIT DELTA MONO POLES (STEEL) & H-FRAME LOOKING NORTH WEST



PROPOSED R.O.W. AT TAP POINT

PROPOSED CONFIGURATION: VERTICAL TAP STRUCTURE & RISER TO UNDERGROUND LOOKING NORTH WEST



ISOMETRIC VIEW

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH1	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH1	

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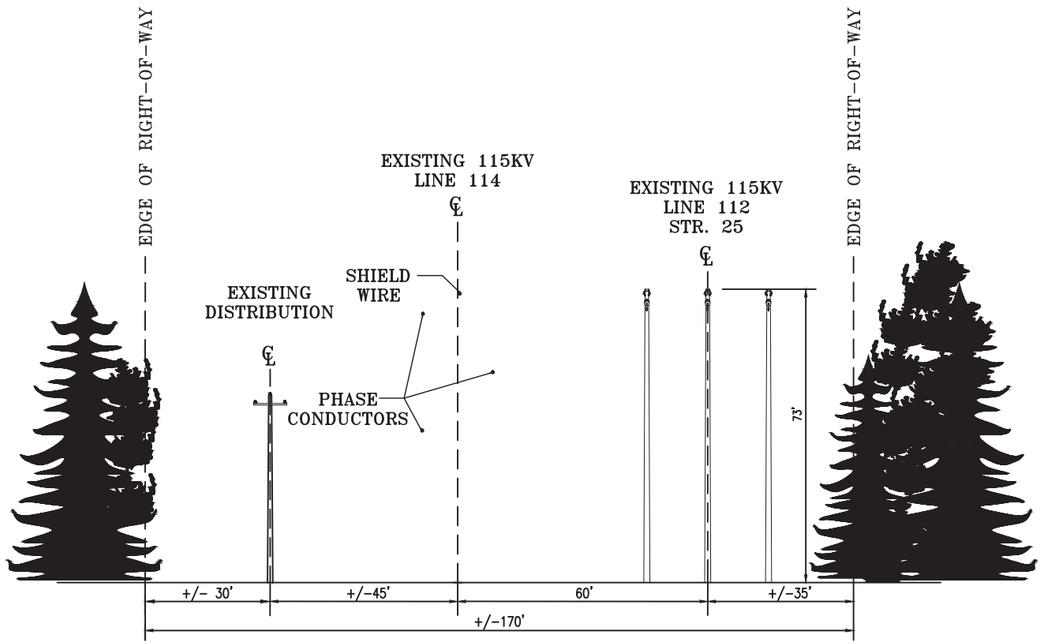
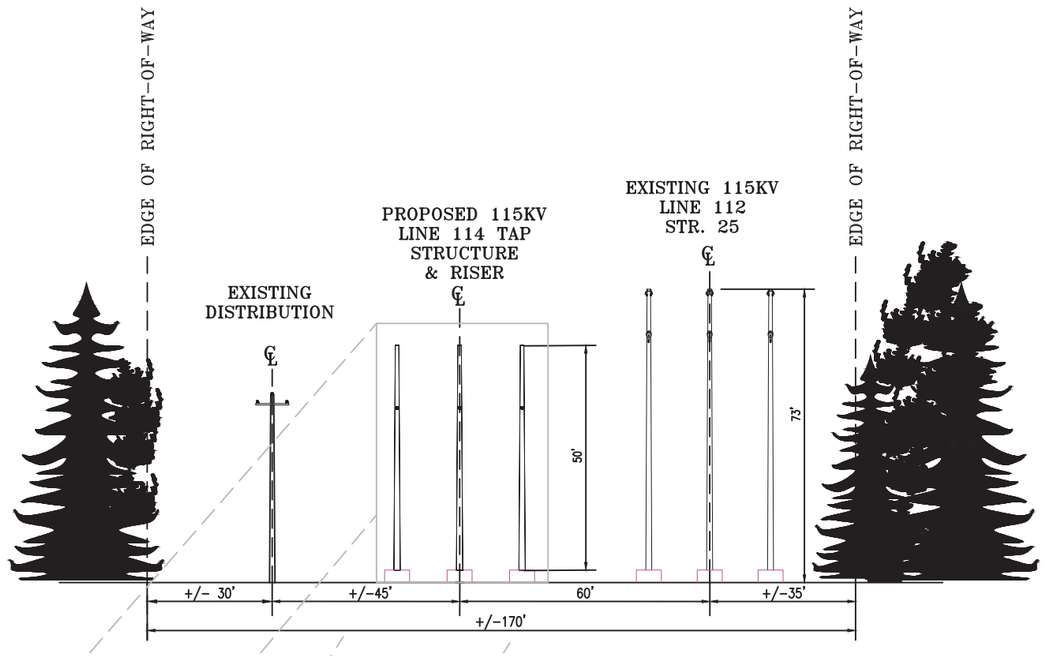


EXISTING R.O.W. AT TAP POINT

EXISTING CONFIGURATION: SINGLE CIRCUIT DELTA MONO POLES (STEEL) &
H-FRAME LOOKING NORTH WEST



PROPOSED R.O.W. AT TAP POINT

PROPOSED CONFIGURATION: VERTICAL TAP STRUCTURE &
RISER TO UNDERGROUND LOOKING NORTH WEST



ISOMETRIC VIEW

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

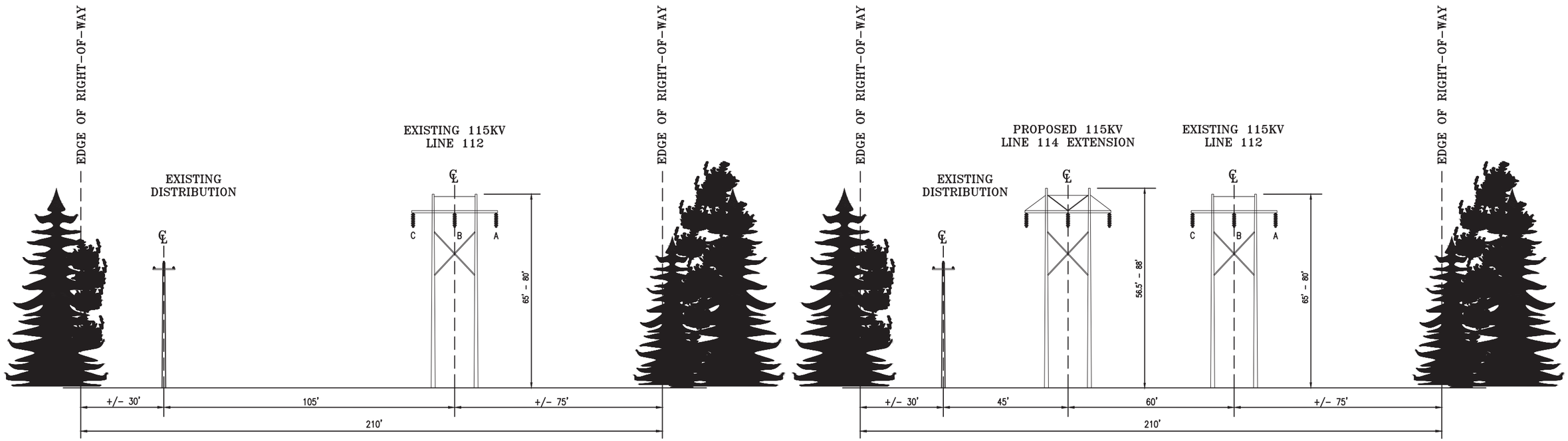
EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH2	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH2	

ES VER: 05/2015

6/30/2021 10:27 AM - KBenner - C:\pwworkingemp\pw1\d2437592\291684-T0001.dwg - SH.3



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRUCTURES (WOOD)
FROM TAP TO LINE 112 STR. 62 4.0 MILES
LOOKING NORTH WEST

PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H-FRAME (STEEL)
NEW 115KV LINE 114 EXTENSION FROM TAP TO RT 140 CROSSING
4.0 MILES LOOKING NORTH WEST
2 POLE H-FRAME TANGENT STRUCTURES
NUMBERS 3 TO 18, 20 TO 28, 30 TO 37

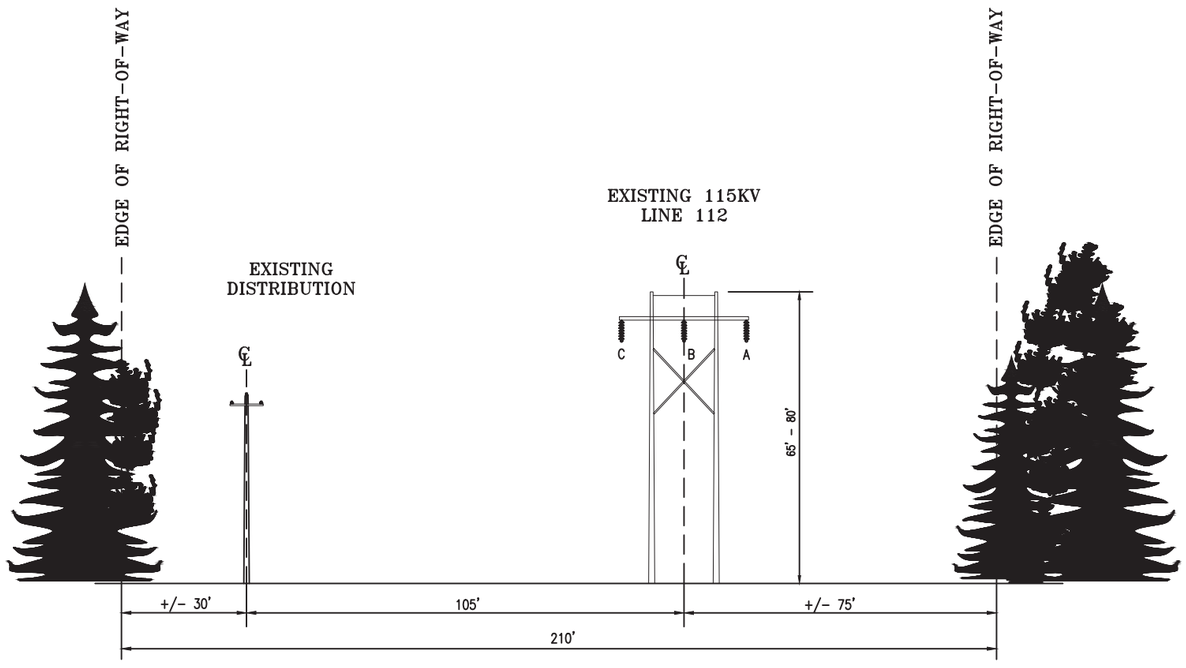
NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

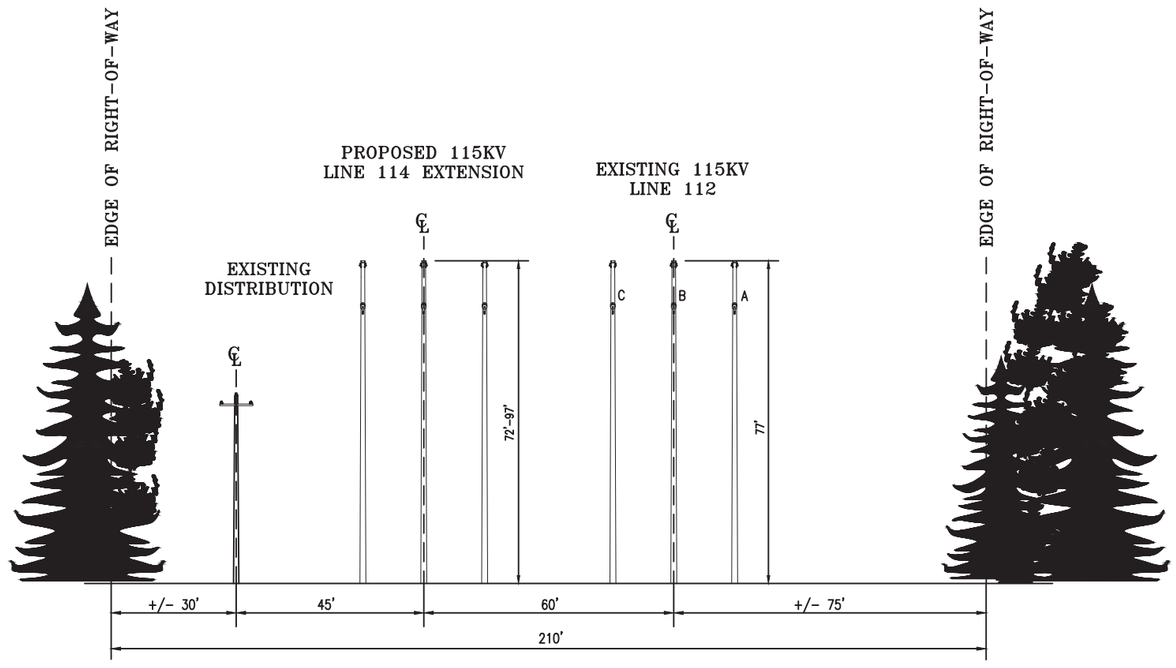
BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH3	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH3	

ES VER: 05/2015



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRUCTURES (WOOD)
FROM TAP TO LINE 112 STR. 62 4.0 MILES
LOOKING NORTH WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H-FRAME (STEEL)
NEW 115KV LINE 114 EXTENSION FROM TAP TO RT 140 CROSSING
4.0 MILES LOOKING NORTH WEST
3 POLE DEADEND STRUCTURES
NUMBERS 19, 29 AND 38

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

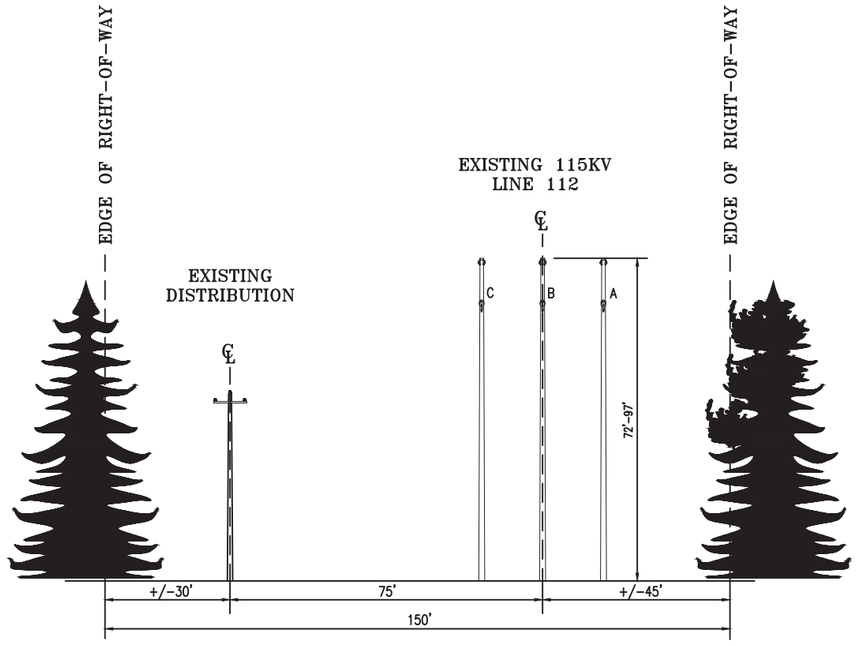
TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH4	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH4	

6/30/2021 10:27 AM - KBenner - C:\pwworkingemp\pw1\d2437592\291684-T0001.dwg - SH.4

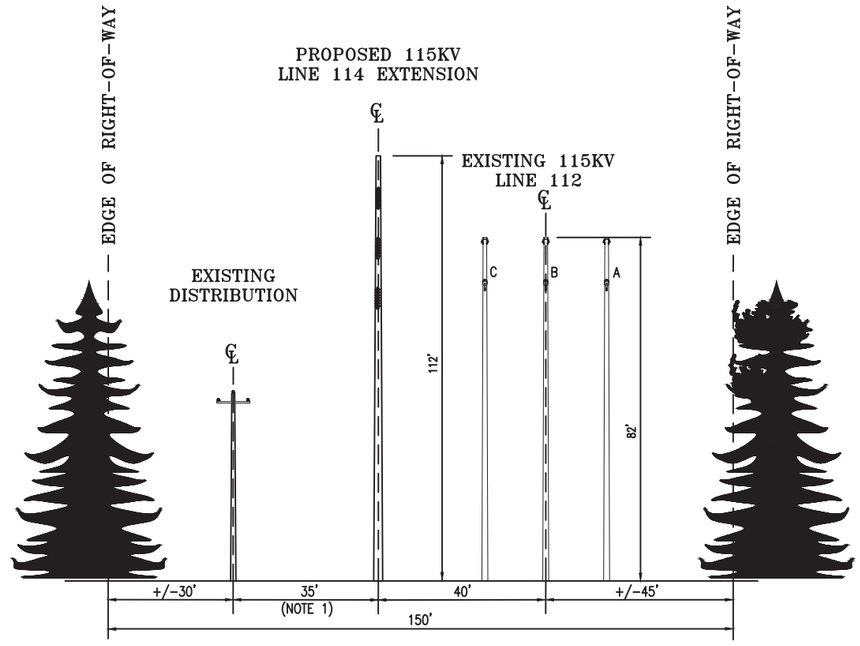
ES VER: 05/2015

6/30/2021 10:27 AM - KBenner - C:\pwworkingemp\pw1\d2437592\291684-T0001.dwg - SH.5



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
RT 140 CROSSING TO INDUSTRIAL PARK TAP 0.27 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT MONOPOLE (STEEL)
RT 140 CROSSING TO INDUSTRIAL PARK TAP 0.27 MILES
LOOKING WEST
MONOPOLE DEADEND STRUCTURE
STRUCTURE 39

NOTE 1: NON-STANDARD ROW SPACING.

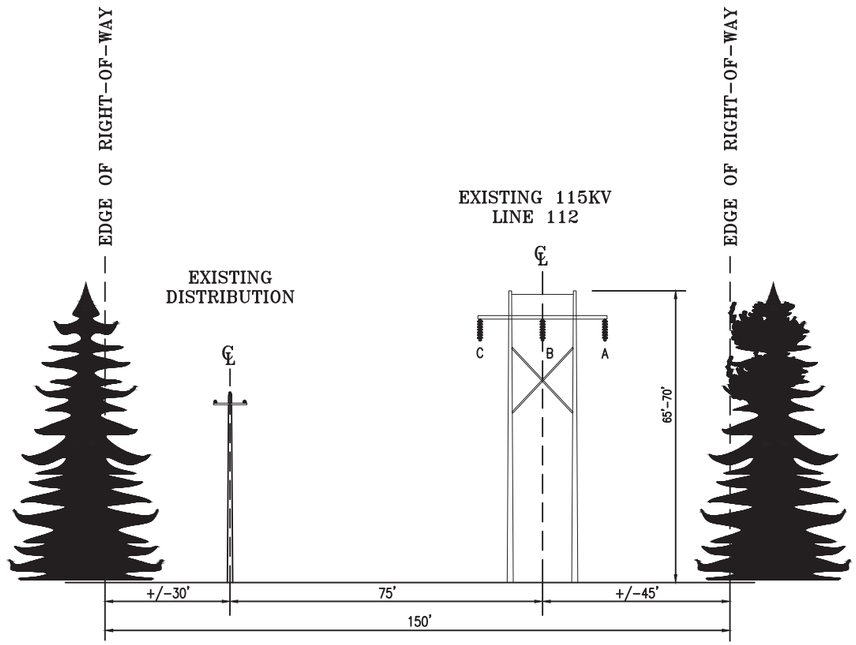
NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

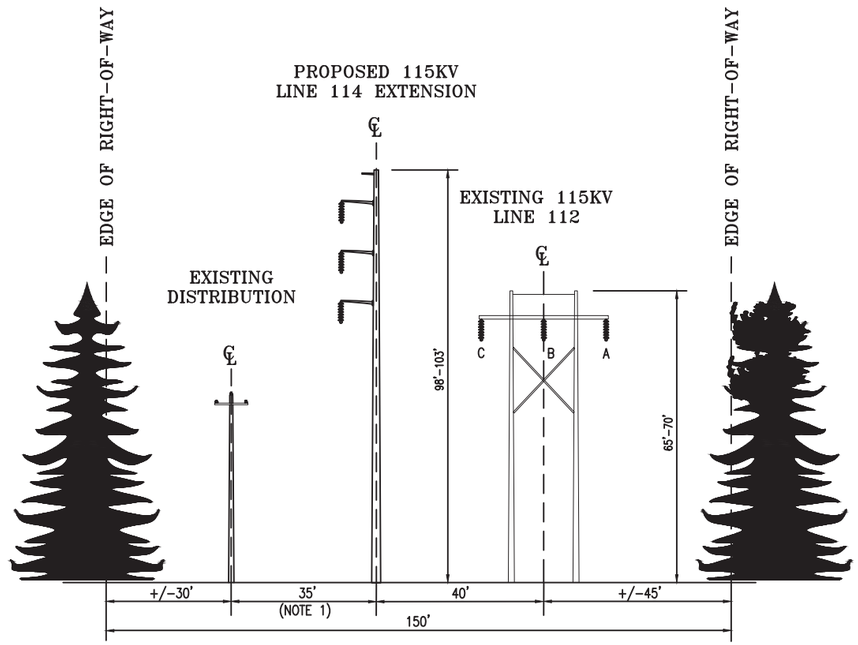
BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH5	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH5	

ES VER: 05/2015



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
RT 140 CROSSING TO INDUSTRIAL PARK TAP 0.27 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT MONOPOLE (STEEL)
RT 140 CROSSING TO INDUSTRIAL PARK TAP 0.27 MILES
LOOKING WEST
MONOPOLE TANGENT STRUCTURES
NUMBERS 40 TO 42

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH6	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH6	

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ES VER: 05/2015

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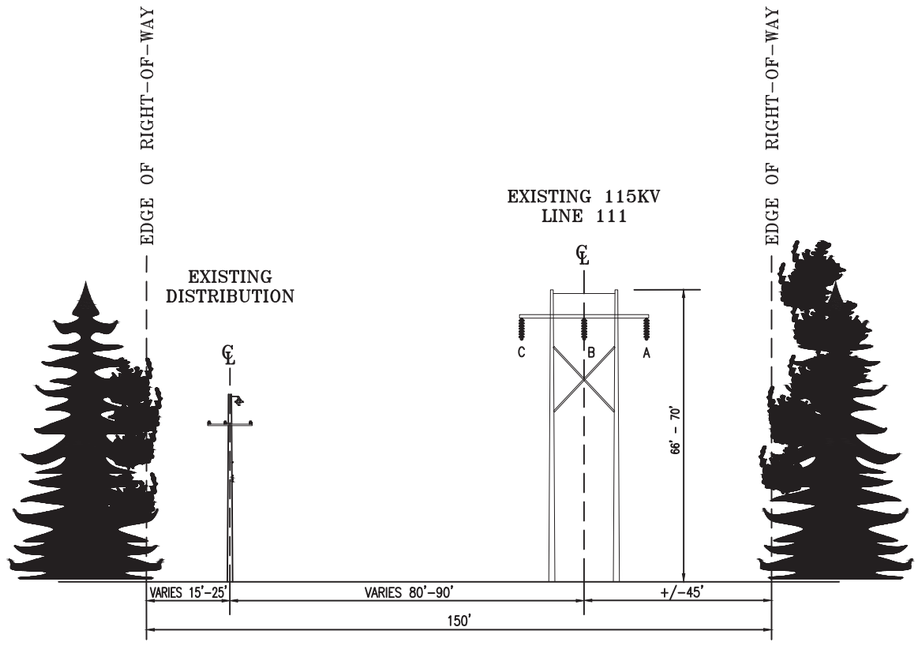
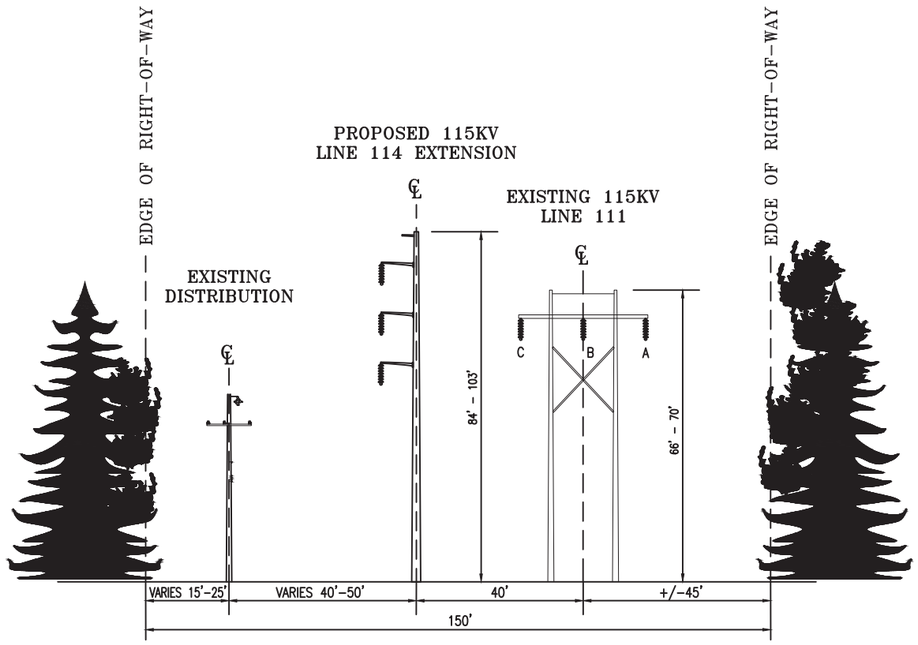


EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
FROM INDUSTRIAL PARK TAP TO LINE 111 STR. 70 0.41 MILES
LOOKING WEST



PROPOSED R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT MONO POLE (STEEL)
NEW 115KV LINE 114 EXTENSION FROM INDUSTRIAL PARK TAP TO LINE 111
STR. 70 0.41 MILES
LOOKING WEST
MONOPOLE TANGENT STRUCTURES
STRUCTURES 43 TO 47

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH7	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH7	

ES VER: 05/2015

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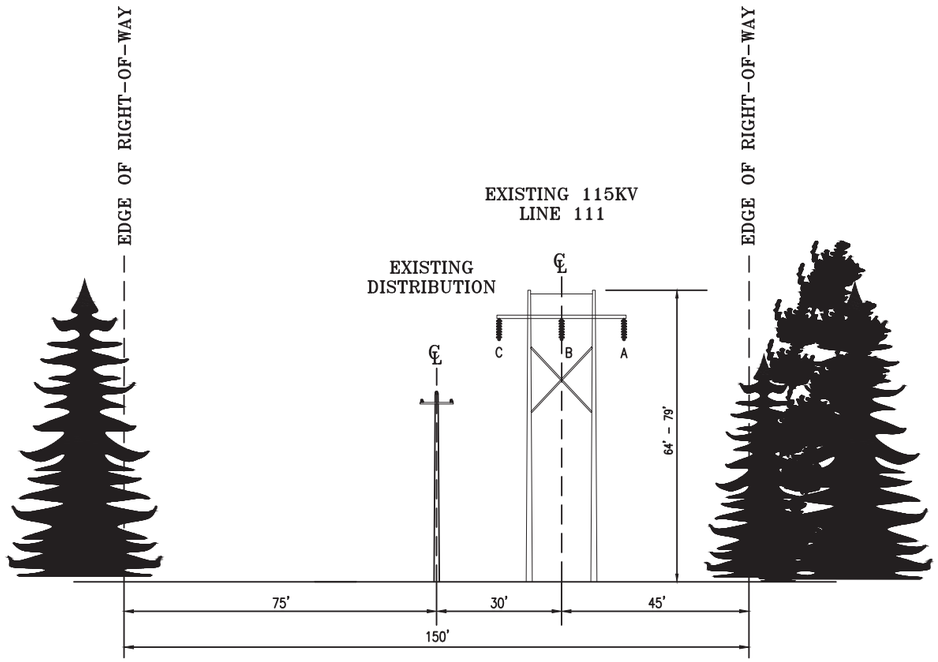
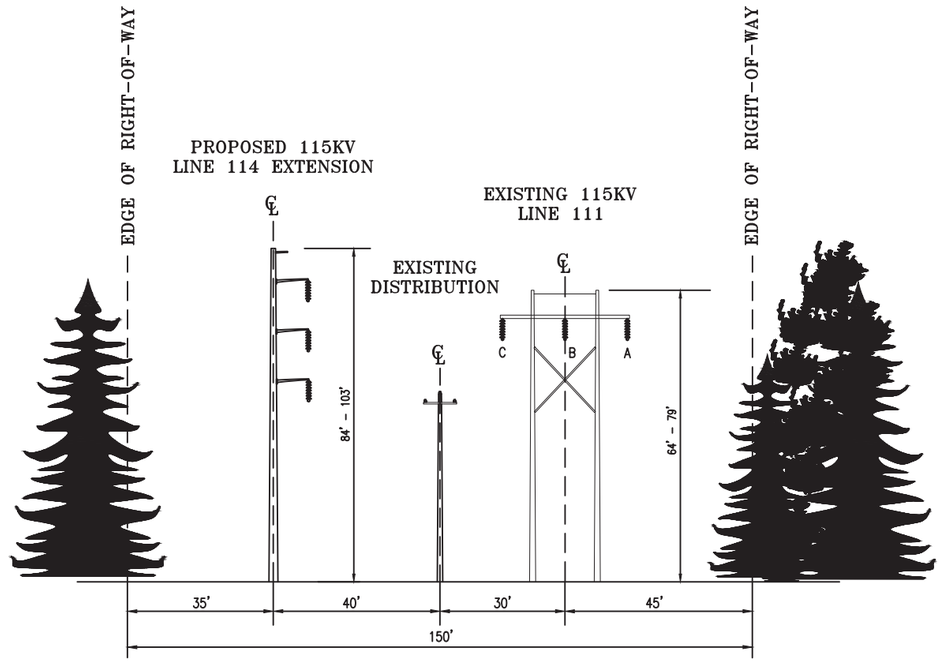


EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRUCTURES (WOOD)
FROM LINE 111 STR. 70 TO HIGH HILL S/S 2 MILES
LOOKING WEST



PROPOSED R.O.W.

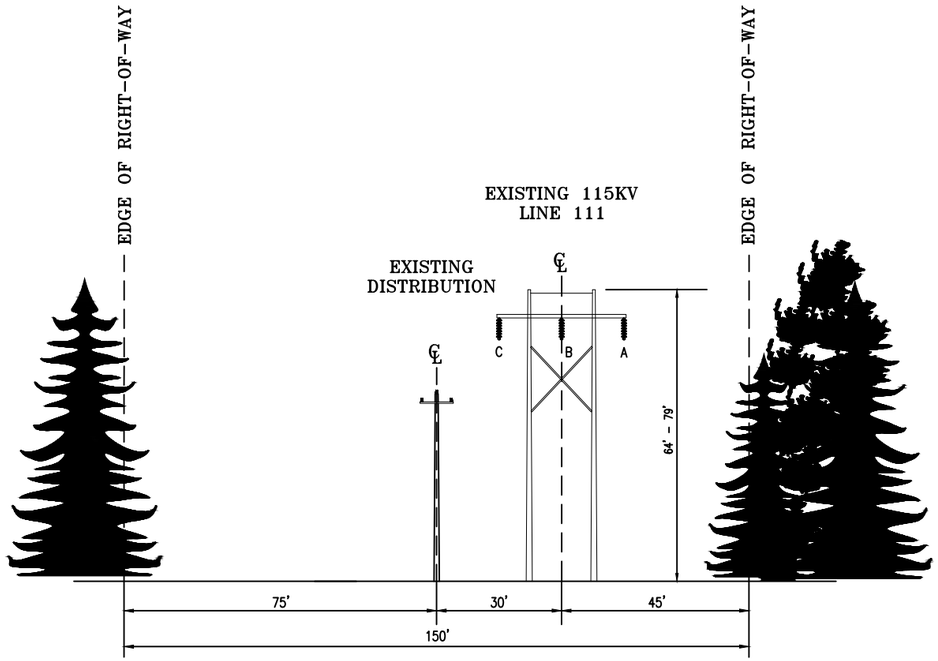
PROPOSED CONFIGURATION: SINGLE CIRCUIT MONO POLES (STEEL)
NEW 115KV LINE 114 EXTENSION FROM LINE 111 STR. 70 TO
HIGH HILL S/S 2 MILES
LOOKING WEST
MONOPOLE TANGENT STRUCTURES
STRUCTURES 48 TO 52 AND 54 TO 65

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

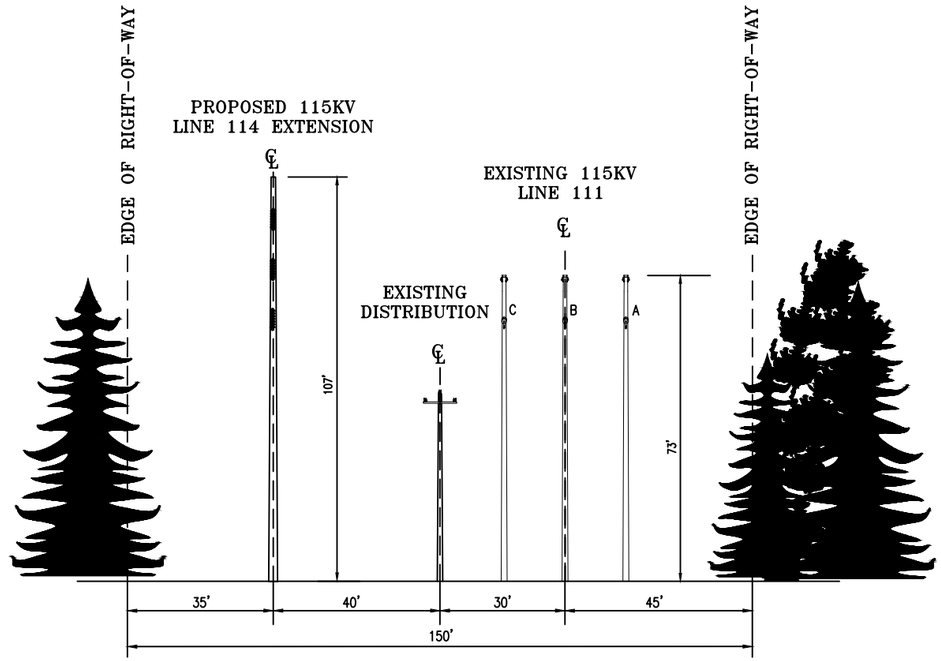
TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH8	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH8	



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRUCTURES (WOOD)
FROM LINE 111 STR. 70 TO HIGH HILL S/S 2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT MONO POLES (STEEL)
NEW 115KV LINE 114 EXTENSION FROM LINE 111 STR. 70 TO
HIGH HILL S/S 2 MILES
LOOKING WEST
MONOPOLE DEADEND STRUCTURE
STRUCTURE 53

Figure 5.2: Typical ROW Cross- Section / Plan & Profile Drawings

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

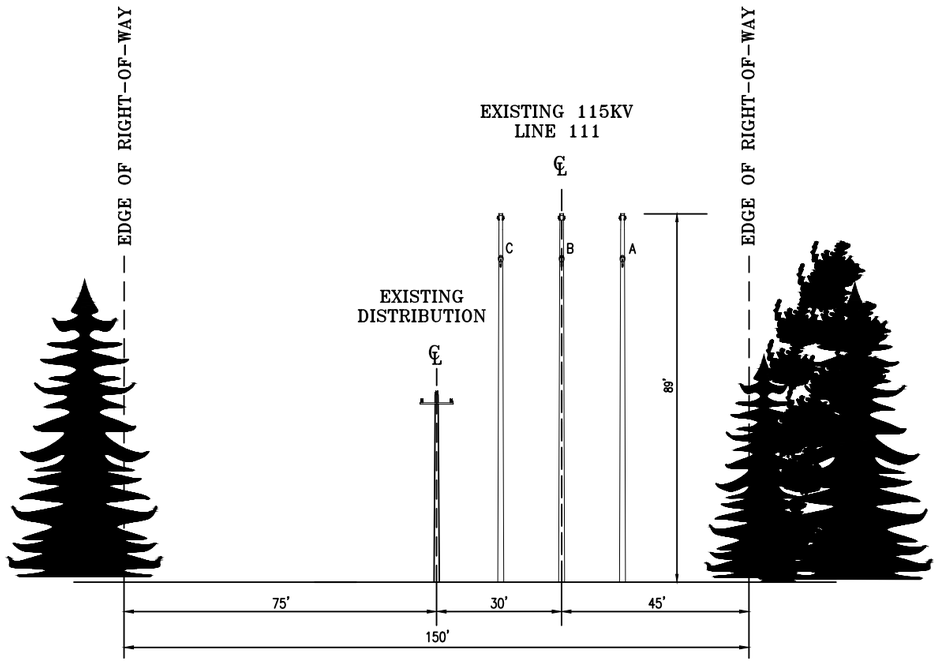
EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH9	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH9	

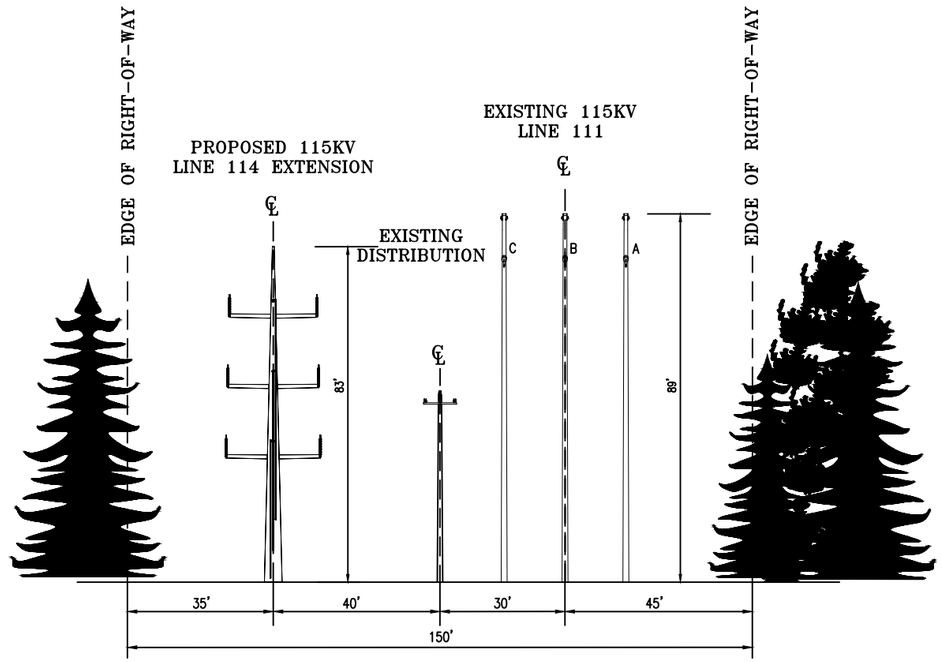
ES VER: 05/2015
6/30/2021 10:27 AM - KBenner - C:\pwworkingemp\pw1\d2437592\291684-T0001.dwg - SH.9

ES VER: 05/2015



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRUCTURES (WOOD)
FROM LINE 111 STR. 70 TO HIGH HILL S/S 2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT MONO POLES (STEEL)
NEW 115KV LINE 114 EXTENSION FROM LINE 111 STR. 70 TO
HIGH HILL S/S 2 MILES
LOOKING WEST
MONOPOLE DEADEND STRUCTURE
STRUCTURE 66

Figure 5.2: Typical ROW Cross- Section / Plan & Profile Drawings

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

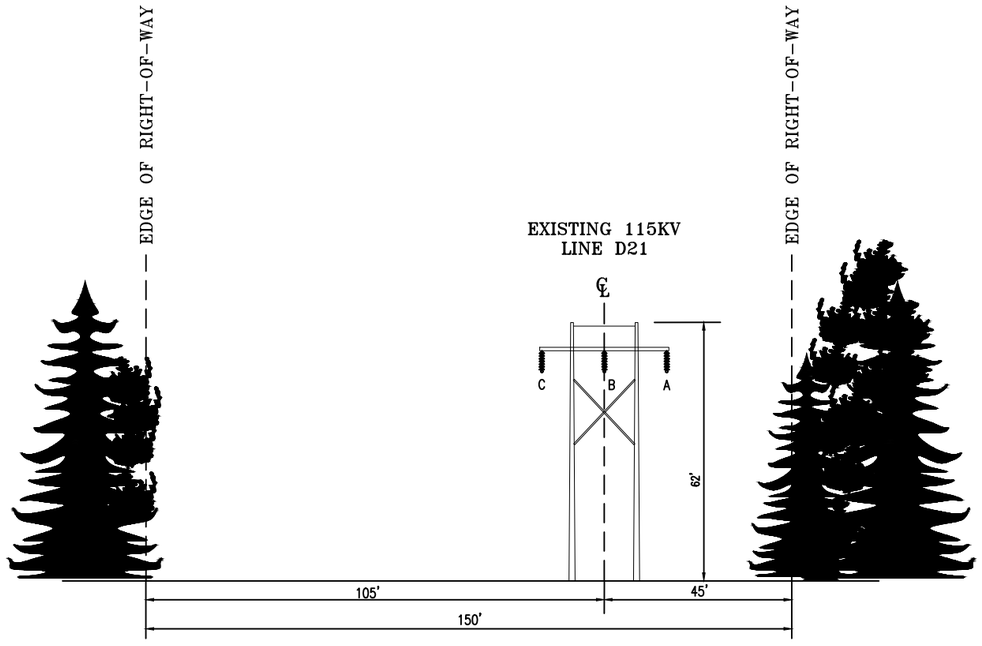
EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH10	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH10	

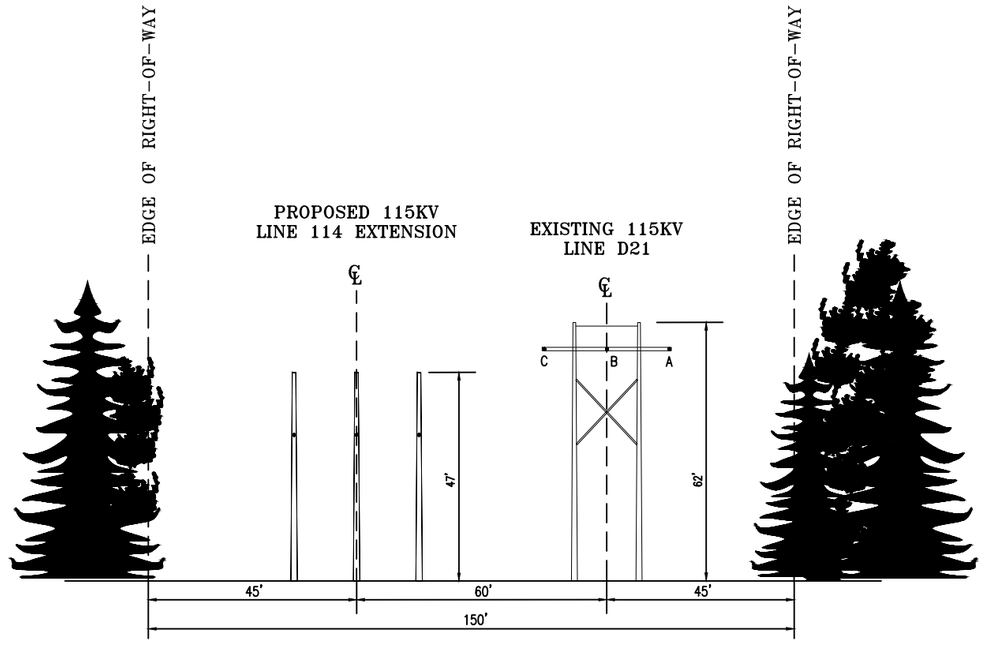
6/30/2021 10:27 AM - KBenner - C:\pwworkingemp\pw1\d2437592\291684-T0001.dwg - SH.10

6/30/2021 10:27 AM - KBenner - C:\pwworkingemp\pw1\d2437592\291684-T0001.dwg - SH.11
ES VER: 05/2015



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS. (STEEL)
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST
3 POLE OH/UG TRANSITION STRUCTURE
STRUCTURE 67

Figure 5.2: Typical ROW Cross- Section / Plan & Profile Drawings

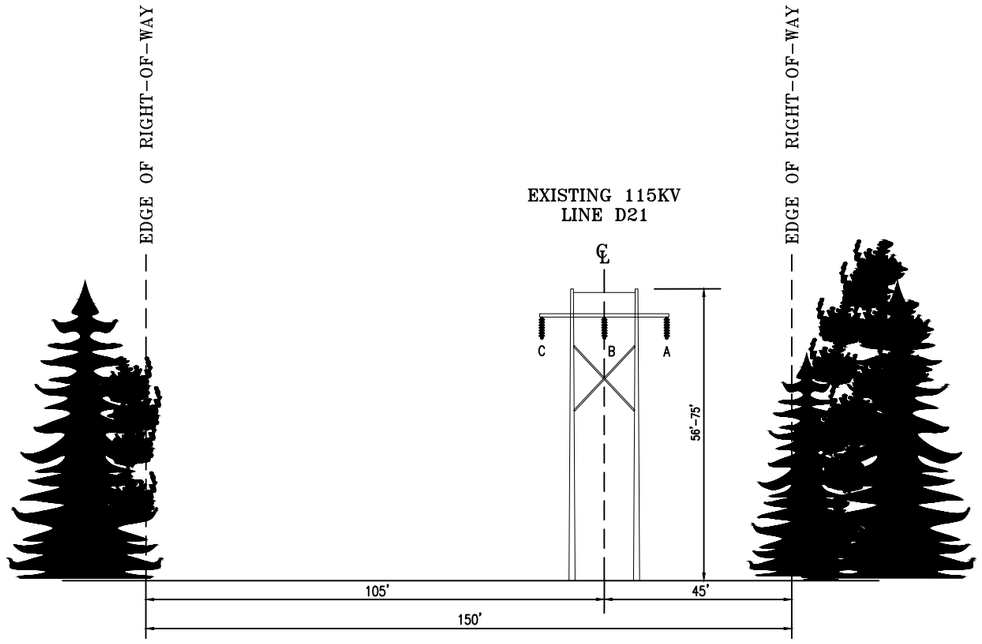
NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

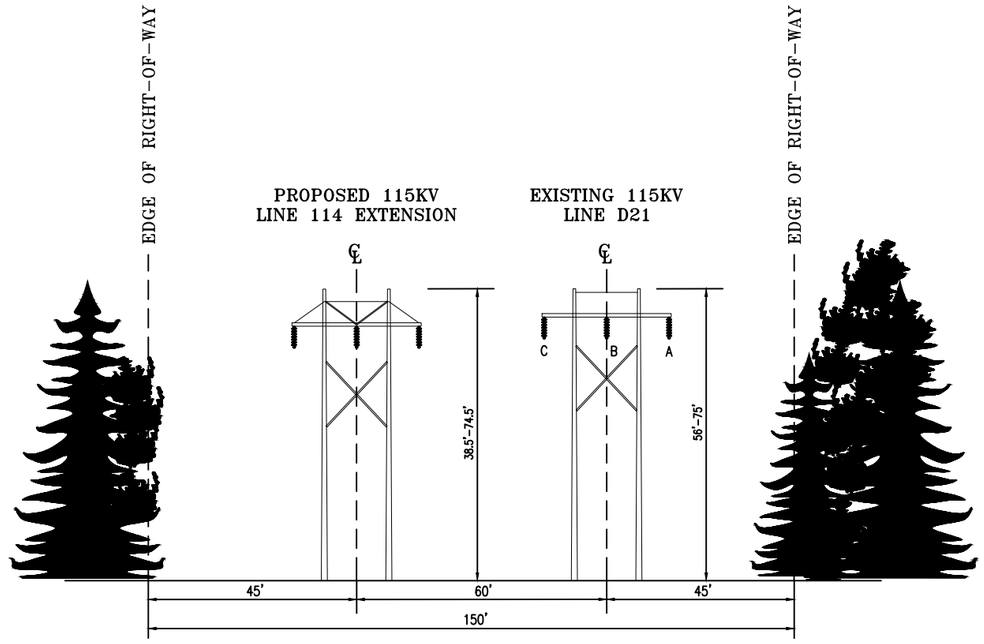
BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH11	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH11	

ES VER: 05/2015



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS. (STEEL)
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST
2 POLE H-FRAME TANGENT STRUCTURES
STRUCTURES 68 TO 74 AND 76 TO 77

Figure 5.2: Typical ROW Cross- Section / Plan & Profile Drawings

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH12	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH12	

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ES VER: 05/2015

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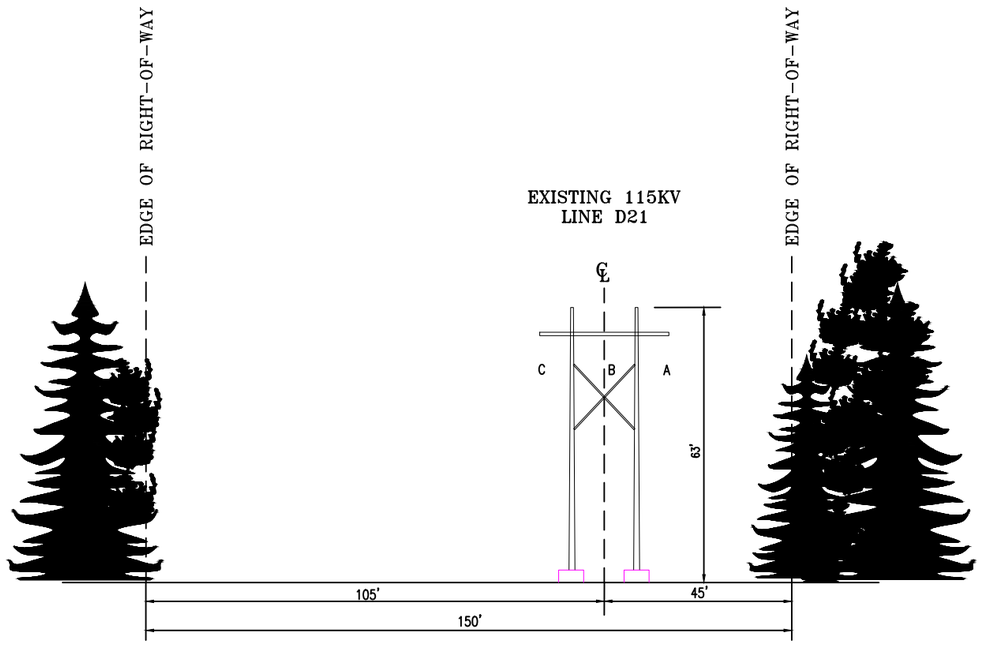
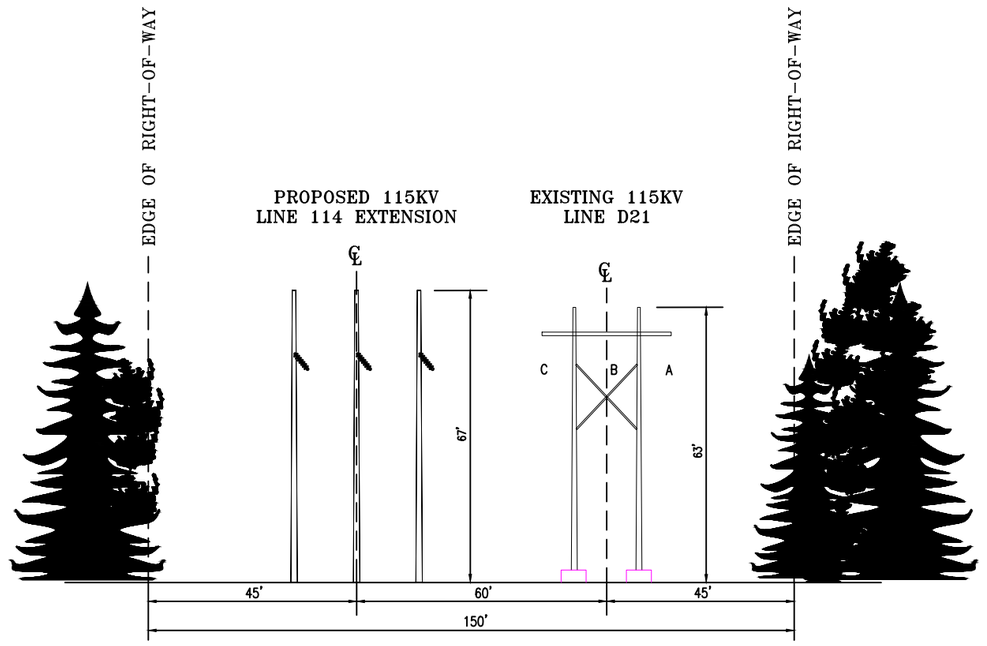


EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS. (STEEL)
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST
3 POLE RUNNING ANGLE STRUCTURE
STRUCTURE 75

Figure 5.2: Typical ROW Cross- Section / Plan & Profile Drawings

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH13	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH13	

ES VER: 05/2015

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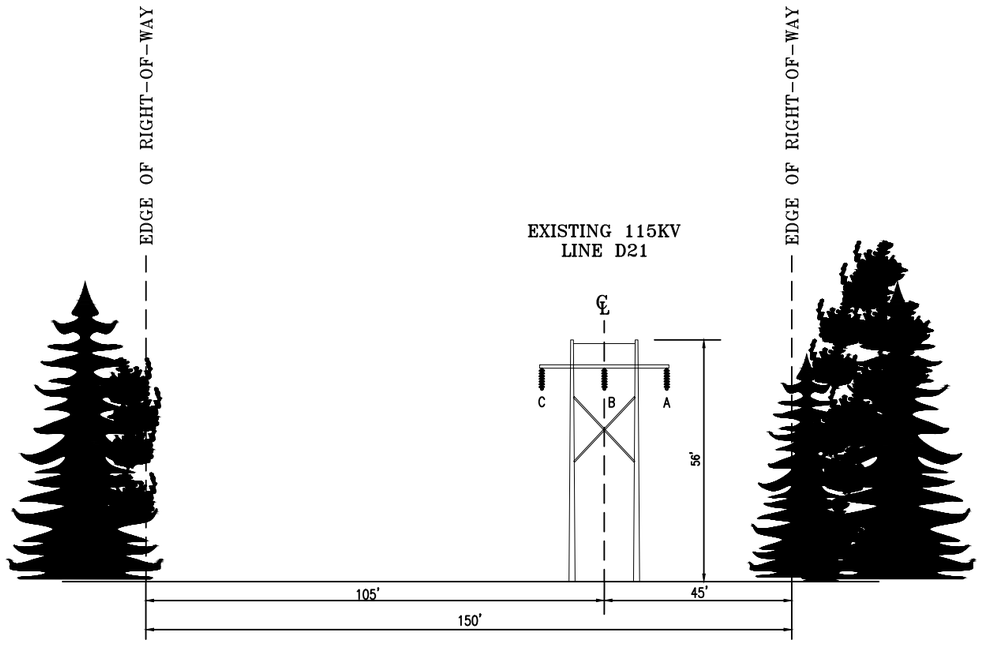
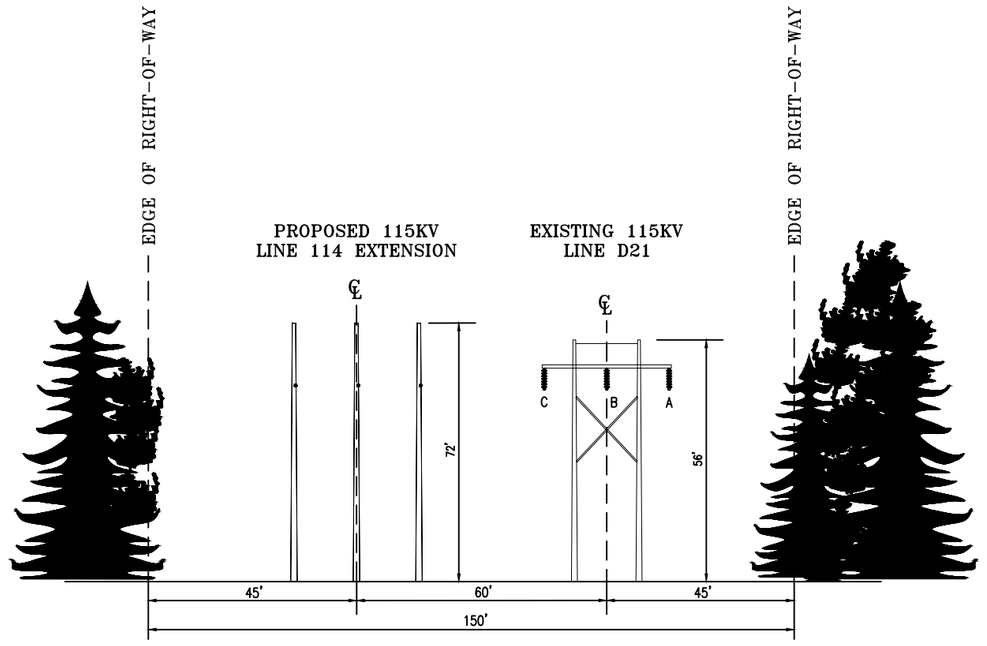


EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS. (STEEL)
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST
3 POLE DEADEND ANGLE STRUCTURE
STRUCTURE 78

Figure 5.2: Typical ROW Cross- Section / Plan & Profile Drawings

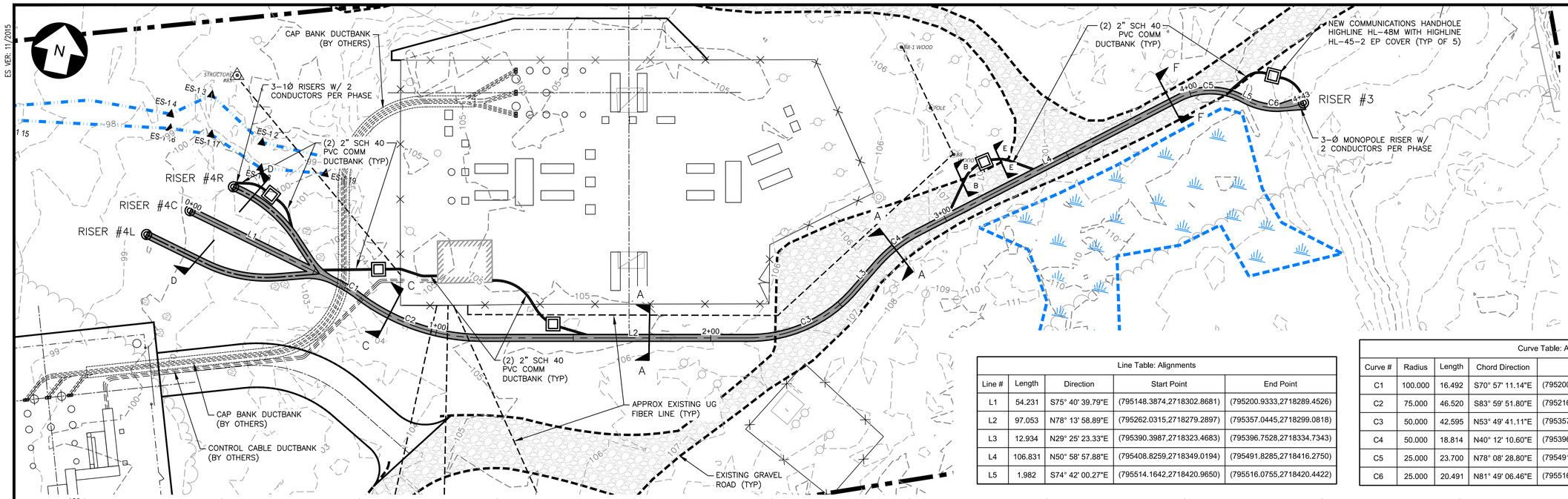
NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
D	6/16/21	REVISED PER CLIENT COMMENTS	KLB	GEO	TRB	
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH14	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH14	

ES VER: 11/2015



RISER CONCRETE ELEVATIONS

RISER #	T.O.C.	B.O.C.
3	114.1	104.1
4R	102.0	92.0
4C	101.0	91.0
4L	100.5	90.5

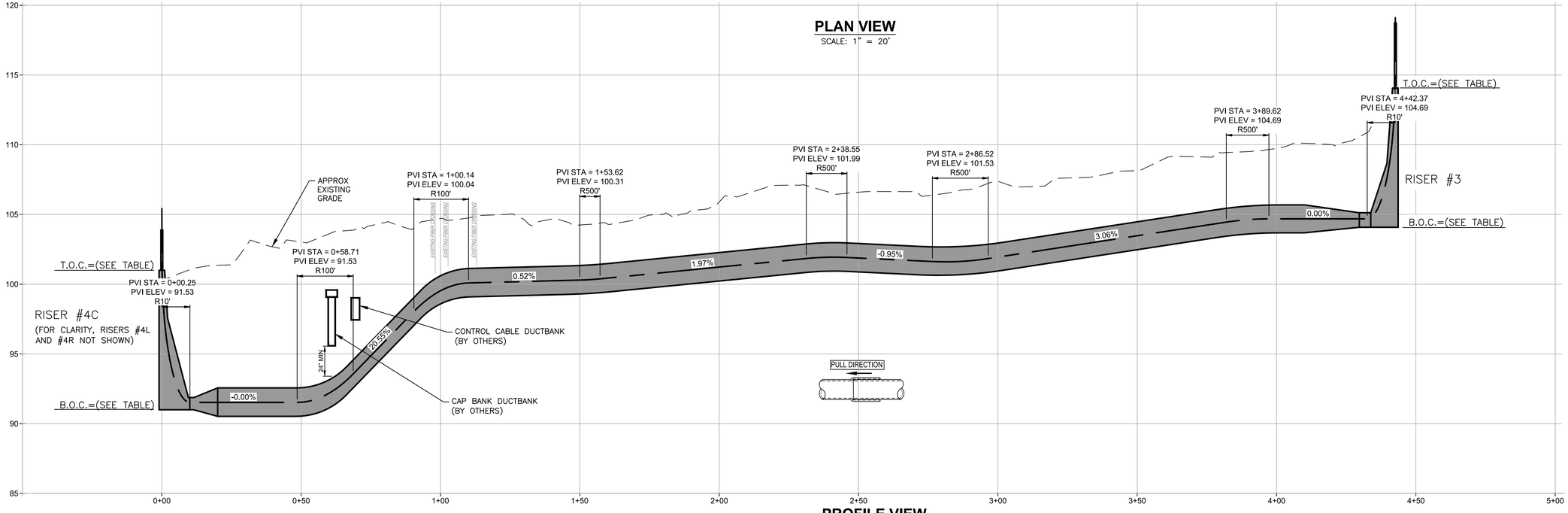
Line Table: Alignments

Line #	Length	Direction	Start Point	End Point
L1	54.231	S75° 40' 39.79"E	(795148.3874,2718302.8681)	(795200.9333,2718289.4526)
L2	97.053	N78° 13' 58.89"E	(795262.0315,2718279.2897)	(795357.0445,2718299.0818)
L3	12.934	N29° 25' 23.33"E	(795390.3987,2718323.4683)	(795396.7528,2718334.7343)
L4	106.831	N50° 58' 57.88"E	(795408.8259,2718349.0194)	(795491.8285,2718416.2750)
L5	1.982	S74° 42' 00.27"E	(795514.1642,2718420.9650)	(795516.0755,2718420.4422)

Curve Table: Alignments

Curve #	Radius	Length	Chord Direction	Start Point	End Point
C1	100.000	16.492	S70° 57' 11.14"E	(795200.9333,2718289.4526)	(795216.5048,2718284.0766)
C2	75.000	46.520	S83° 59' 51.80"E	(795216.5048,2718284.0766)	(795262.0315,2718279.2897)
C3	50.000	42.595	N53° 49' 41.11"E	(795357.0445,2718299.0818)	(795390.3987,2718323.4683)
C4	50.000	18.814	N40° 12' 10.60"E	(795396.7528,2718334.7343)	(795408.8259,2718349.0194)
C5	25.000	23.700	N78° 08' 28.80"E	(795491.8285,2718416.2750)	(795514.1642,2718420.9650)
C6	25.000	20.491	N81° 49' 06.46"E	(795516.0755,2718420.4422)	(795535.7954,2718423.2773)

PLAN VIEW
SCALE: 1" = 20'



PROFILE VIEW
SCALE: H:1" = 20'; V: 1" = 4'

☐ NO EXCEPTIONS TAKEN ☐ REVISE AND RESUBMIT
☐ PROVIDE AS NOTED ☐ REJECTED

THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION IN THE CONTRACT DOCUMENTS. CORRECTIONS OR COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR: DIMENSIONS TO BE CONFIRMED AT THE JOBSITE; INFORMATION PERTAINING TO MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION; COORDINATION WITH OTHER TRADES; AND PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER.

EVERSOURCE ENERGY ENGINEERING & DESIGN

DATE: _____ BY: _____

TRC 670 N. COMMERCIAL ST MANCHESTER, NH 03101

PROJECT NO: 291681

REV	DESCRIPTION	DATE	DES	CHK	APP
C	ISSUED FOR RE–70% IFCR	09/14/21	KAV	DMG	KGM
B	ISSUED FOR 70% IFCR	07/30/21	TRS	AMW	KGM
A	ISSUED FOR REVIEW	05/04/21	KAV	AMW	KGM

CONTRACT SERVICES

REV	DESCRIPTION	ENG/PE#	DATE	DRN	CHKD	APPR
A	WO# LATER – EPN LATER – IFCR	__/__	09/19/18	CMW	.	.
DWG REV	EPN/DESCRIPTION	CONT/PE#	DATE	DRN	CHKD	APPR

DRAWN FOR EPN LATER

EVERSOURCE ENERGY

PLAN AND PROFILE
STATION 644 BYPASS
LINE 114 EXTENSION
DARTMOUTH, MASS

D	.
DRAWN	KAV/TRC
ENGINEER	DMG/TRC
CHECKED	KGM/TRC
APPROVED	.
DATE	09/09/21
SCALE	AS NOTED
FILE:	291684–SK004.DWG
IMAGE:	
DRAWING NO.	291684–SK004

PRELIMINARY
NOT FOR CONSTRUCTION

NO REMOVALS DRAWING REQUIRED

ADDITIONS

20 0 20 40 FT
SCALE: 1" = 20'

Figure 5.2: Typical ROW Cross-Section / Plan & Profile Drawings
Sheet 15 of 20

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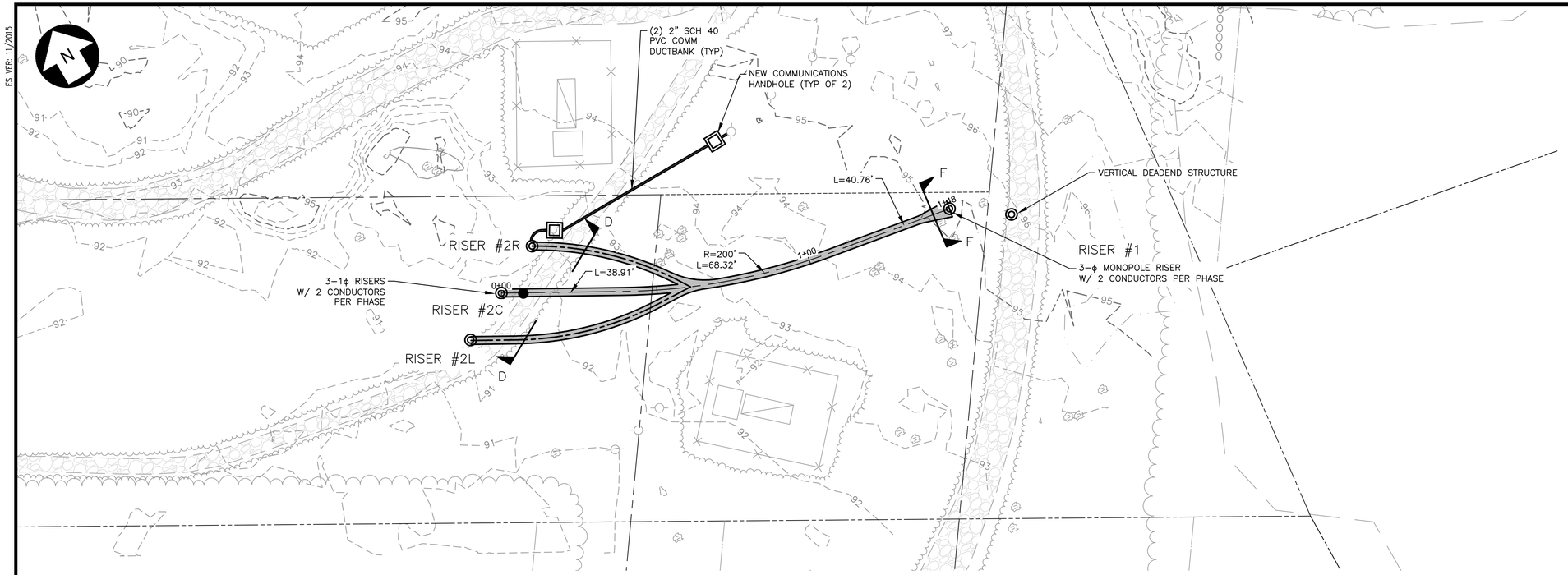
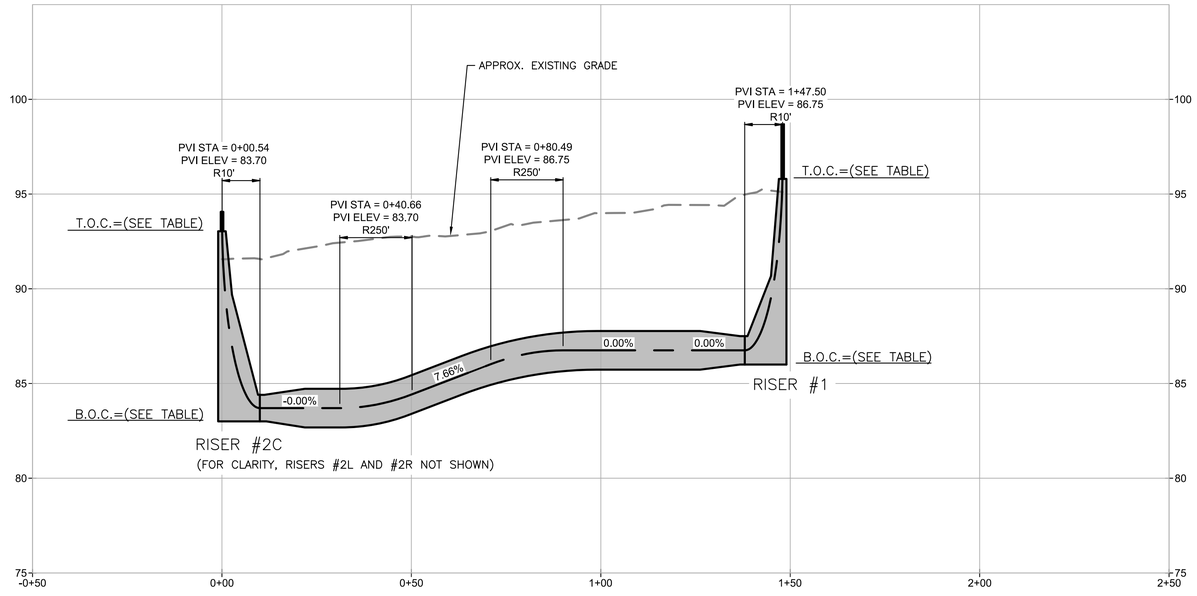
ES VER: 11/2015



PLAN VIEW

SCALE: 1" = 20'



PROFILE VIEW

SCALE: H:1" = 20'; V: 1" = 4'

RISER CONCRETE ELEVATIONS

RISER #	T.O.C.	B.O.C.
2R	93.0	83.0
2C	93.0	83.0
2L	92.0	82.0
1	96.0	86.0

NOTES

1. T-LINE STRUCTURE LOCATION IS APPROXIMATE. FINAL LOCATION WILL BE COORDINATED WITH UNDERGROUND TRANSMISSION DUCT BANK CONFIGURATION.
2. RISER CONDUCTORS TO LINE 114 SHALL BE SUPPORTED ON THE LINE STRUCTURE USING POST INSULATORS.

☐ NO EXCEPTIONS TAKEN ☐ REVISE AND RESUBMIT
☐ PROVIDE AS NOTED ☐ REJECTED

THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION IN THE CONTRACT DOCUMENTS. CORRECTIONS OR COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR: DIMENSIONS TO BE CONFIRMED AT THE JOBSITE; INFORMATION PERTAINING TO MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION; COORDINATION WITH OTHER TRADES; AND PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER.

EVERSOURCE ENERGY ENGINEERING & DESIGN

DATE: _____ BY: _____

NO REMOVALS DRAWING REQUIRED

ADDITIONS

20 0 20 40 FT
SCALE: 1" = 20'

Figure 5.2: Typical ROW Cross-Section / Plan & Profile Drawings
Sheet 16 of 20

PRELIMINARY
NOT FOR CONSTRUCTION

TRC 670 N. COMMERCIAL ST
MANCHESTER, NH 03101

PROJECT NO: 291681

REV	DESCRIPTION	DATE	DES	CHK	APP
A	ISSUED FOR REVIEW	05/04/21	KAV	AMW	KGM

REV	DESCRIPTION	ENG/PE#	DATE	DRN	CHKD	APPR
A	W/I LATER - EPN LATER - IFCR	___/___	09/19/18	CMW	.	.

CONTRACT SERVICES

DRAWN FOR EPN LATER

EVERSOURCE ENERGY

PLAN AND PROFILE
MENDALL TAP
LINE 114 EXTENSION
ACUSHNET, MASS

D	.
DRAWN	KAV/TRC
ENGINEER	AMW/TRC
CHECKED	KGM/TRC
APPROVED	.
DATE	09/17/18
SCALE	AS NOTED
FILE:	291684-SK002.DWG
IMAGE:	
DRAWING NO.	291684-SK-002

DWG REV	EPN/DESCRIPTION	CONT./PE#	DATE	DRN	CHKD	APPR
.	.	.	.	.	.	.

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ES VER: 11/2015

COORDINATE CONTROL

1. ALL COORDINATES AND ELEVATIONS ARE STATED IN U.S. DECIMAL FEET UNLESS NOTED OTHERWISE.
2. HORIZONTAL DATUM: MASSACHUSETTS MAINLAND (2001)
3. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988
4. TOPOGRAPHY IS BASED ON A COMPILATION OF LIDAR AND GROUND SURVEY SOURCE FILES PROVIDED BY EVERSOURCE
5. UNDERGROUND UTILITIES ARE BASED ON RECORD DRAWINGS FOR THE BROOK STREET SUBSTATION (DRAWING 727-018 REV 3 DTD 8/25/18) AND CAPACITOR BANK DESIGN DRAWINGS (644-0410).

GENERAL SAFETY NOTES

1. SMOKING IS PROHIBITED EXCEPT WITHIN DESIGNATED SMOKING AREAS.
2. PROJECT TASKS WILL BE PERFORMED IN THE VICINITY OF ENERGIZED OVERHEAD AND UNDERGROUND TRANSMISSION AND DISTRIBUTION CIRCUITS. THE CONTRACTOR SHALL COMPLY WITH ALL SAFETY REQUIREMENTS AS OUTLINED IN THE EVERSOURCE CONTRACTOR WORK RULES, MUNICIPAL, STATE AND FEDERAL REQUIREMENTS.
3. PROVIDE FIRE WATCH WITH CLASS A-B-C FIRE EXTINGUISHERS AT EACH LOCATION OF HOT WORK. KEEP ONE SPARE EXTINGUISHER ON SITE AT ALL TIMES.
4. CONTRACTOR SHALL REQUEST UTILITY MARK-OUT BY CONTACTING DIG-SAFE TEL 811 PRIOR TO ANY EXCAVATION. MARK OUT OF NON-PARTICIPATING UTILITIES SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY EACH NON-PARTICIPATING UTILITY AND/OR CONTRACT WITH A PRIVATE UTILITY LOCATING SERVICE PROVIDER.
5. UNDERGROUND UTILITY LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS ARE CONSIDERED APPROXIMATE AND SHALL BE VERIFIED BY VACUUM EXCAVATION, HAND EXCAVATION OR OTHER SUITABLE MEANS PRIOR TO HEAVY EQUIPMENT EXCAVATION. ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN ON THESE DRAWINGS.
6. NOT LESS THAN 30 CALENDAR DAYS PRIOR TO THE START OF WORK, CONTRACTOR SHALL PREPARE A TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL BY EVERSOURCE AND THE LOCAL MUNICIPALITY. THE PLAN SHALL ADDRESS EACH PHASE OF THE CONSTRUCTION, ESPECIALLY THOSE INVOLVING WORK IN, OVER OR IMMEDIATELY ADJACENT TO THE PUBLIC WAY.
7. TRENCHES SHALL BE EXCAVATED AND SHORED OR SLOPED IN ACCORDANCE WITH EVERSOURCE CONTRACTOR WORK RULES, STATE AND FEDERAL REGULATION. SHORED EXCAVATIONS WITHIN 20 FEET OF TRANSMISSION LINE STRUCTURES, UTILITY POLES OR RETAINING WALLS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN MASSACHUSETTS.

GENERAL NOTES

1. THE POINT OF DEMARCATION FOR COORDINATION OF THE OVERHEAD TRANSMISSION WORK WITH THAT OF THE UNDERGROUND WORK IS THE POINT OF CONNECTION FOR THE OVERHEAD TRANSMISSION SYSTEM AT THE LIGHTNING/SURGE ARRESTOR.
2. POINT OF DEMARCATION FOR INSTALLATION AND INTERFACE WITH THE OVERHEAD TRANSMISSION WORK FOR THE COMMUNICATIONS DUCT AND CABLE SHALL BE AT THE SPLICE CONTAINER MOUNTED ON THE TRANSMISSION STRUCTURE AT EACH END OF THE UNDERGROUND TRANSMISSION SYSTEM. PROVISION OF THE SPLICE CANISTER AND CABLE SPLICING IS BY THE OVERHEAD TRANSMISSION CONTRACTOR.
3. THE SCOPE OF WORK SPECIFIED HEREIN ALSO INCLUDES
   a. INSTALLATION OF THE COMMUNICATIONS DUCT BANK TO AND INCLUDING THE HANDHOLES LOCATED OUTSIDE THE BROOK STREET SUBSTATION FENCE. DUCT BANK INSTALLATION FROM THESE HANDHOLES INTO THE SUBSTATION IS BY OTHERS.
   b. INSTALLATION OF THE RISER STRUCTURE, STRUCTURE FOUNDATION
   c. RISER STRUCTURE GROUNDING, GROUND GRID
   d. RELATED WORK NOT OTHERWISE SPECIFIED TO BE DONE BY OTHERS.
4. SELECTION AND SUPPLY OF UNDERGROUND TRANSMISSION CABLE, AND ASSOCIATED ACCESSORIES IS BY EVERSOURCE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF THESE PRODUCTS IN ACCORDANCE WITH THE EVERSOURCE STANDARDS AND MANUFACTURER'S WRITTEN SPECIFICATIONS. ANY CONFLICTS BETWEEN THIS DESIGN, THE EVERSOURCE STANDARDS OR THE MANUFACTURER'S REQUIREMENTS SHALL BE IMMEDIATELY BROUGHT TO EVERSOURCE'S ATTENTION FOR RESOLUTION AND DIRECTION.
5. MATERIALS TO BE PROVIDED BY EVERSOURCE INCLUDE THOSE ITEMS LISTED BELOW. ALL OTHER MATERIALS REQUIRED TO PROVIDE A FULLY FUNCTIONAL SYSTEM SHALL BE PROVIDED BY THE CONTRACTOR.
   a. 115 KV CABLE
   b. 500 MCM GROUND CONTINUITY CONDUCTOR
   c. ADSS FIBER OPTIC CABLE
   d. 115 KV CABLE TERMINATIONS
   e. 115 KV SURGE/LIGHTNING ARRESTERS
   f. LINK BOXES
   g. SHEATH VOLTAGE LIMITERS.
   h. SIGNS AND LABELS AS IDICATED BELOW.
6. INSTALLATION OF ADSS FIBER OPTIC CABLE IS BY OTHERS.
7. UNLESS OTHERWISE INDICATED, THE 115 KV DUCT BANK SHALL BE CONSTRUCTED IN ACCORDANCE WITH EVERSOURCE TECHNICAL STANDARDS, INCLUDING, BUT NOT LIMITED TO, UTRM 234, 235, 237.
8. UNLESS OTHERWISE SPECIFIED, AREAS DISTURBED BY THE WORK, SHALL BE RESTORED TO MATCH THE EXISTING TOPOGRAPHY AND GROUND COVER. TRAVEL WAYS SHALL BE RESTORED TO MATCH EXISTING, INCLUDING THE PROVISION OF COMPACTED ROAD BASE MATERIAL AND PAVEMENT AS APPROPRIATE. VEGETATED AREAS SHALL BE RESTORED PROVIDING A MINIMUM OF 3 INCHES OF SUITABLE TOPSOIL, GRASS SEED, LIME, STARTER FERTILIZER AND MULCH. GRASS SEED, LIME AND FERTILIZER SHALL BE AS RECOMMENDED BY THE LOCAL COUNTY EXTENSION SERVICES AND APPLIED AT THE RATES RECOMMENDED.
9. FOR CLARITY, OVERHEAD LINES, SUBSTATION GROUNDING AND CONDUITS ASSOCIATED WITH THE SUBSTATION AND SITE LIGHTING HAVE NOT BEEN SHOWN ON THE PLAN AND PROFILE DRAWINGS.
10. PRIOR TO THE START OF EXCAVATION, THE LOCATION OF EXISTING UNDERGROUND UTILITIES ALONG THE PLANNED EXCAVATION ALIGNMENT SHALL BE DOCUMENTED BY THE CONTRACTOR AND SUBMITTED TO EVERSOURCE FOR REVIEW AND RECORD PURPOSES. NO EXCAVATION SHALL TAKE PLACE UNTIL EVERSOURCE DETERMINES DOCUMENTATION OF THE EXISTING UNDERGROUND UTILITIES IS COMPLETE AND ACCEPTABLE. EXISTING UNDERGROUND UTILITY LOCATING SHALL BE IN ACCORDANCE WITH ASCE 38-02 STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA, QUALITY LEVEL A.
11. OUTDOOR YARD EQUIPMENT SIGNS AND LABELS WILL BE PROVIDED BY EVERSOURCE FOR CONTRACTOR INSTALLATION. SIGNS AND LABELS INCLUDE BUT ARE NOT LIMITED TO:
    a. SAFETY AND SECURITY SIGNS ON GATES AND FENCES
    b. RISER STRUCTURE LABEL
    c. RISER PHASE AND CIRCUIT LABEL
    d. COMMUNICATIONS CABLE ID LABEL IN HANDHOLES

DUCT BANK CONSTRUCTION

1. EIGHT INCH (8 IN) NOMINAL DUCTS SHALL BE PVC SCHEDULE 40 POLYVINYL CHLORIDE (PVC) SCHEDULE 40 (TYPE EPC40) ELECTRICAL GRADE. PVC CONDUIT SHALL BE NEW IN COMPLIANCE WITH NEMA TC-2 WITH FITTINGS IN ACCORDANCE WITH NEMA TC-3.
2. CHANGES IN DIRECTION OF THE DUCTS SHALL UTILIZE BENDS OF THE RADIUS INDICATED IN THE DESIGN DRAWINGS. IN NO CASE SHALL 8 INCH DUCT BE FIELD BENT TO RADII OF LESS THAN 50 FT.
3. DUCT SHALL BE SUPPORTED AND POSITIONED IN THE DUCT BANK USING PLASTIC, PRE-FORMED DUCT SPACERS AS MANUFACTURED BY UNDERGROUND DEVICES OR APPROVED EQUAL. IN NO CASE SHALL CONDUCTIVE MATERIAL BE USED IN THE DUCT BANK TO SUPPORT OR SURROUND CONDUCTORS. ANY USE OF CONDUCTIVE MATERIAL WITHIN THE DUCT BANK SHALL BE SUBJECT TO EVERSOURCE APPROVAL.
4. PVC DUCTS SHALL BE JOINED USING SOLVENT JOINTS OF LONG-BELL AND SPIGOT. BELL AND SPIGOT JOINTS SHALL BE LAID SUCH THAT THE SPIGOT POINTS IN THE DIRECTION OF THE PLANNED CABLE PULL. THE INSIDE EDGE OF THE SPIGOT SHALL BE CHAMFERED AT NO MORE THAN 45 DEGREES TO AXIS OF THE PIPE.
5. SOLVENT JOINTS SHALL BE MADE UP SQUARE TO THE AXIS OF THE PIPE, PREPARED, PRIMED AND SOLVENT APPLIED IN ACCORDANCE WITH THE SOLVENT MANUFACTURERS WRITTEN INSTRUCTIONS. PIPE ENDS SHALL BE FULLY SEATED INTO THE COUPLING OR BELL FITTING.
6. OPEN ENDS OF DUCTS SHALL BE CLOSED WITH PLUGS OR CAPS AS THE WORK PROGRESSES. AT NO POINT SHALL OPEN DUCTS BE ALLOWED TO REMAIN OPEN DURING NON-WORK PERIODS OR DURING WORK PERIODS WITH INCLEMENT WEATHER WHEN DEBRIS AND MUD MIGHT ENTER THE DUCTS.
7. DUCT BANK WALLS SHALL BE FORMED, STRAIGHT AND VERTICAL USING COMMERCIALLY AVAILABLE CONCRETE FORMS OR WOOD FORMS BUILT ON-SITE. DUCT BANK WALLS CAST AGAINST THE EARTH ARE UNACCEPTABLE.
8. CONCRETE FOR DUCT BANK CONSTRUCTION SHALL BE A 3000 PSI MINIMUM COMPRESSIVE STRENGTH THERMAL CONCRETE AS SPECIFIED IN UTRM 234. THERMAL RESISTANCE (TR) OF THE CURED MIX AT 0% MOISTURE SHALL NOT EXCEED 80°C-CM/W NOR 60°C-CM/W AT CRITICAL MOISTURE (ASSUMED 3-5% MOISTURE).
   a. DUCT BANK MIX PROPORTIONS 1
   b. DUCT BANK MIX PROPORTIONS 2
11. BACKFILL FOR THE 115 KV DUCT BANK SHALL UTILIZE A LOW STRENGTH FLOWABLE THERMAL BACKFILL (FTB) AS SPECIFIED IN UTRM 234.
12. DUCT BANK CONCRETE AND FLOW FILL SHALL BE SAMPLED AS SPECIFIED IN THE REFERENCED EVERSOURCE TECHNICAL STANDARD. THERMAL RESISTANCE SAMPLES SHALL BE FORWARDED TO GEOTHERM USA OR OTHER PRE-APPROVED TEST FACILITY FOR PRE- APPROVAL AND QUALITY ASSURANCE THERMAL TESTING.
13. 115 KV DUCT BANK EXCAVATION IN NON-PAVED AREAS SHALL BE BACKFILLED WITH FLOWABLE THERMAL BACKFILL (FTB) TO WITHIN SIX (6) INCHES OF FINISHED GRADE. THE TOP SIX (6) INCHES SHALL BE BACKFILLED WITH NATIVE SOIL AND LOAM, OR CRUSHED STONE TO MATCH THE SURROUNDING AREA AS APPROPRIATE.
14. 115 KV DUCT BANK ACROSS ROADWAYS, SHALL BE BACKFILLED WITH FTB TO THE BOTTOM OF THE SPECIFIED ROAD BASE MATERIAL LAYER.
15. AT THE COMPLETION OF DUCT BANK CONSTRUCTION EACH DUCT SHALL BE CLEANED BY SWABBING FOLLOWED BY MANDREL TESTING. THE MANDREL SHALL BE IN ACCORDANCE WITH THE DIMENSIONS PROVIDED IN UTRM 237.
16. UPON COMPLETION OF THE DUCT BANK, EACH DUCT SHALL HAVE A PULLING LINE (MULE TAPE) RATED AT NO LESS THAN 2500 LBS TENSION INSTALLED.
17. OPEN ENDS OF SPARE DUCTS SHALL BE CLOSED OFF USING SHRINK WRAP OR APPROVED RUBBER CAP AND CLAMP. SIMILARLY, AFTER CABLE INSTALLATION, THE OPEN ANULUS SHALL BE CLOSED OFF USING THE APPROVED SHRINK WRAP DUCT SEALANT.
18. TRENCH BACKFILL AROUND COMMUNICATION DUCT BANKS MAY BE DONE USING APPROVED FTB OR NATIVE SOIL BACKFILLED IN 8 INCH MAXIMUM LIFTS AND COMPACTED TO 93 PERCENT OF THE ASTM D 1557 MAXIMUM THEORETICAL DENSITY.
19. EACH DUCT BANK OR DUCT BANK SEGMENT SHALL BE MARKED BY RED UTILITY WARNING TAPE WITH BLACK LETTERS. TAPE SHALL BE 4 MIL PLASTIC OF NO LESS THAN 6 INCHES WIDE WITH 4 INCH LETTERS.
20. TRENCH BOTTOM THAT BECOMES UNSTABLE DUE TO DISTURBING THE IN-SITU SOIL, EXPOSURE TO WATER OR FREEZING, SHALL BE OVER EXCAVATED AND REPLACED WITH COMPACTED STRUCTURAL BACKFILL. STRUCTURAL BACKFILL SHALL BE PLACED IN THE TRENCH BOTTOM AND COMPACTED TO NOT LESS THAN 95% OF ASTM D 1557 MAXIMUM THEORETICAL DENSITY.
21. LINES AND CURVE DATA TABLES SHOW NORTHINGS AND EASTING ON THE PLAN AND PROFILE DRAWINGS. STATIONING OF PC AND PT'S ARE SHOWN ON THE PLAN.
22. FOR CLARITY ON PLAN AND PROFILE, ONLY THE CENTER PHASE OF THE DUCT BANK HAS BEEN SHOWN IN PROFILE, INCLUDING CENTER PHASE STATIONING AND CURVE DATA. CURVE DATA FOR OUTSIDE PHASES ARE SHOWN AS APPROXIMATE IN PLAN VIEW.
23. AS BUILT RECORDS OF THE INSTALLED DUCT BANKS SHALL BE IN ACCORDANCE WITH UTRM 234 EXCEPT AS MODIFIED HEREIN. IN ADDITION TO THE FINAL DUCTBANK RECORDS REQUIRED UNDER UTRM 234, THE AS BUILT CONDITIONS SHALL BE INCLUDE DOCUMENTATION OF THE DUCT LOCATION AND ELEVATION PRIOR TO CONCRETE PLACEMENT. THE TOP OF THE CENTER DUCT IN EACH DUCTBANK SEGMENT SHALL BE RECORDED PRIOR TO THE CONCRETE PLACEMENT. ALL AS-BUILT RECORDING SHALL UTILIZE SURVEY GRADE INSTRUMENTATION OPERATED BY A LICENSED LAND SURVEY OR OTHERWISE APPROVED, QUALIFIED INDIVIDUAL.
24. IN ADDITION TO THE REQUIREMENTS OF UTRM 234, DUCT BANK AS-BUILT INFORMATION SHALL BE PROVIDED TO EVERSOURCE IN AN AUTOCAD COMPATIBLE FILE SUCH AS .DXF, DWG, OR .SHP. AN ELECTRONIC COPY OF THE GIS DATA OR FIELDBOOK FILE SHALL ALSO BE PROVIDED.

FIBER OPTIC CABLE NOTES

1. FIBER OPTIC CABLE SHALL BE PROVIDED BY EVERSOURCE FOR CONTRACTOR INSTALLATION. UPON RECEIPT OF CABLE CONTRACTOR SHALL PERFORM AN ODTR TEST OF EACH FIBER TO DOCUMENT CONDITION OF THE CABLE AT THE TIME OF RECEIPT.
2. AFTER INSTALLING THE CABLE THE ODTR TEST SHALL BE REPEATED. ANY DECREASE IN THE SIGNAL ATTENUATION SHALL BE BROUGHT TO EVERSOURCES ATTENTION IN WRITING. IN THE SOLE DISCRETION OF EVERSOURCE, ANY SIGNIFICANT REDUCTION IN SIGNAL ATTENUATION MAY BE CAUSE FOR THE CABLE TO BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.
3. CONTRACTOR SHALL PROVIDE A LOOP OF NOT LESS THAN 50 FEET OF EXTRA FIBER OPTIC CABLE LOOPED, AND ANCHORED TO THE TRANSMISSION LINE STRUCTURE AT THE SPLICE ENCLOSURE. IN ADDITION, AT LEAST THREE LOOPS OF EXTRA FIBER OPTIC CABLE AROUND THE INTERIOR OF EACH HANDHOLE SHALL BE PROVIDED.

Figure 5.2: Typical ROW Cross-Section / Plan & Profile Drawings
Sheet 17 of 20

☐ NO EXCEPTIONS TAKEN ☐ REVISE AND RESUBMIT
☐ PROVIDE AS NOTED ☐ REJECTED

THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION IN THE CONTRACT DOCUMENTS. CORRECTIONS OR COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR: DIMENSIONS TO BE CONFIRMED AT THE JOBSITE; INFORMATION PERTAINING TO MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION; COORDINATION WITH OTHER TRADES; AND PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER.

EVERSOURCE ENERGY ENGINEERING & DESIGN

DATE:_____ BY: _____

NO REMOVALS DRAWING REQUIRED

ADDITIONS

PRELIMINARY
NOT FOR CONSTRUCTION

TRC
670 N. COMMERCIAL ST
MANCHESTER, NH 03101

PROJECT NO: 291681

REV	DESCRIPTION	DATE	DES	CHK	APP
A	ISSUED FOR REVIEW	05/04/21	KAV	AMW	KGM

CONTRACT SERVICES

REV	DESCRIPTION	ENG/PE#	DATE	DRN	CHKD	APPR
A	WO# LATER - EPN LATER - IFCR	__/__	09/19/18	CMW	.	.

DWG REV	EPN/DESCRIPTION	CONT/PE#	DATE	DRN	CHKD	APPR

DRAWN FOR EPN LATER

EVERSOURCE ENERGY

GENERAL NOTES

LINE 114
PLYMPTON/KINGSTON, MASS

D	.
DRAWN	KAV/TRC
ENGINEER	AMW/TRC
CHECKED	KGM/TRC
APPROVED	.
DATE	09/17/18

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IMAGE:
DRAWING NO.: 291684-SK-003

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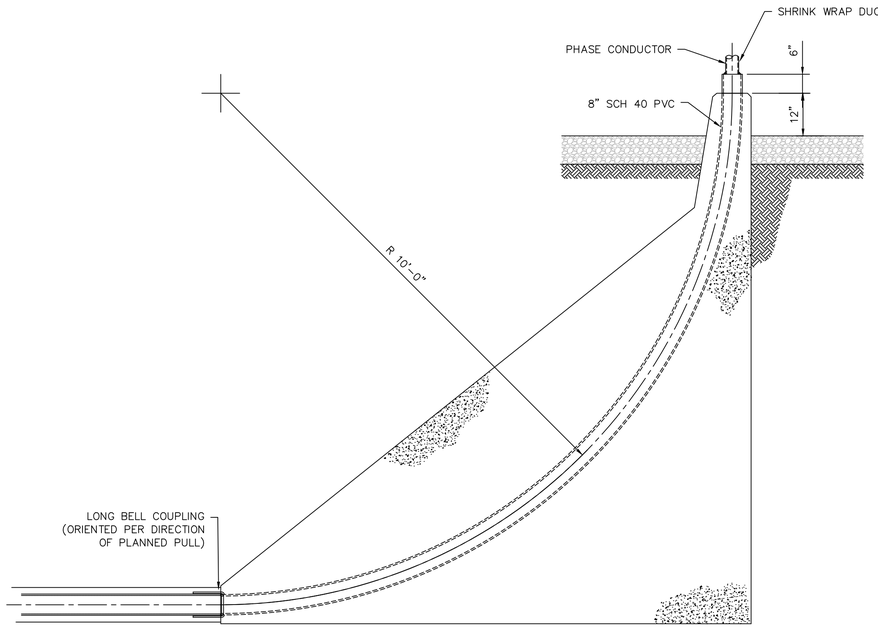
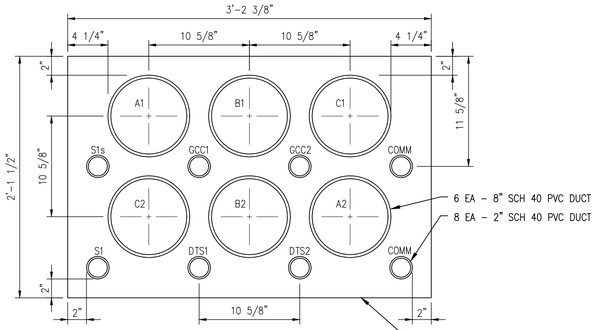
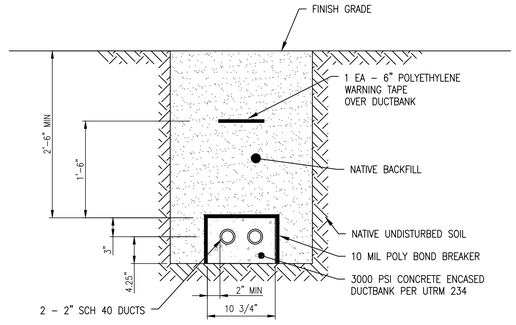


TYPICAL RISER SWEEP DETAIL
NOT TO SCALE
(RISER #1 SHOWN, OTHERS RISERS SIMILAR)



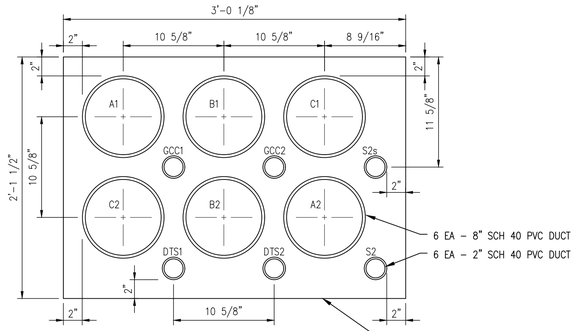
TWO CIRCUIT DUCTBANK

A SECTION
SCALE: 1½"=1'-0"



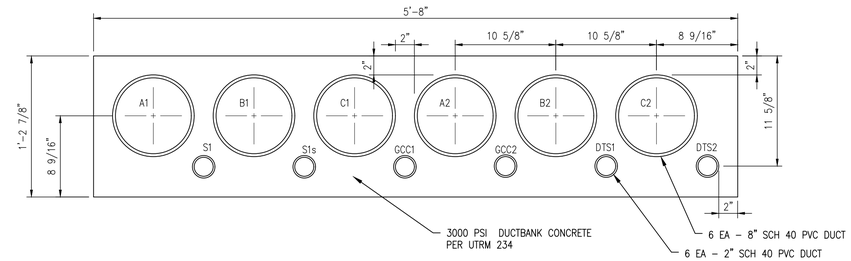
COMM DUCTBANK SECTION

E SECTION
SCALE: 1"=1'-0"



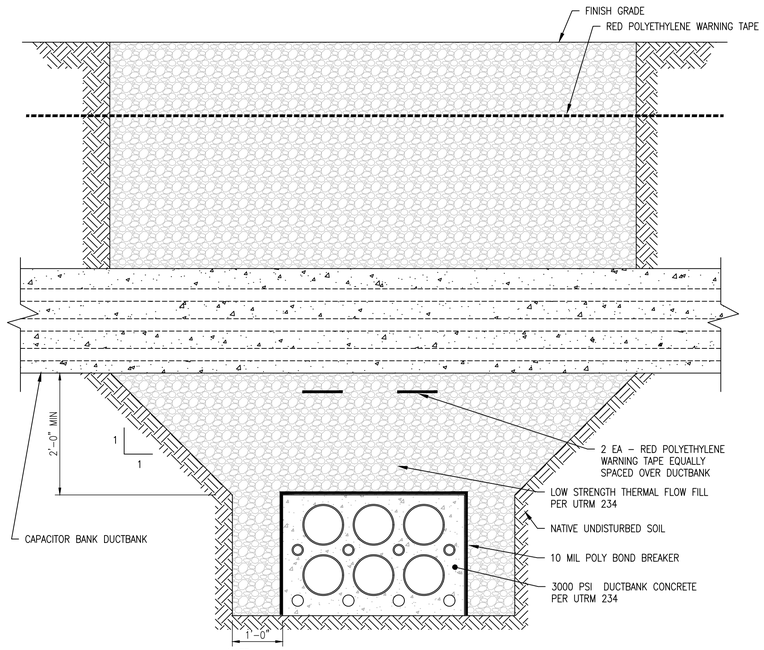
TWO CIRCUIT DUCTBANK

B SECTION
SCALE: 1½"=1'-0"



HORIZONTAL DUCTBANK

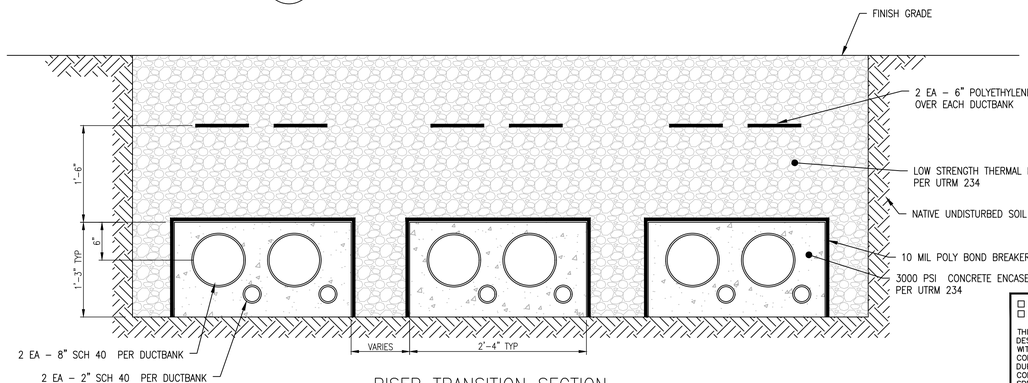
F SECTION
SCALE: 1½"=1'-0"



NOTE:
TOP OF DUCTBANK EXCAVATION SHALL FLAIR AT 1:1 OR LESSER SLOPE. BACKFILL ENTIRE EXCAVATION WITH THERMAL FLOW FILL. EXCAVATION FLAIR SHALL EXTEND A MINIMUM OF 10 FT EACH SIDE OF CAP BANK DUCTBANK CROSSING.

CAP BANK DUCT CROSSING

C SECTION
NOT TO SCALE



RISER TRANSITION SECTION

D SECTION
SCALE: 1"=1'-0"

☐ NO EXCEPTIONS TAKEN ☐ REVISE AND RESUBMIT
☐ PROVIDE AS NOTED ☐ REJECTED

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EVERSOURCE ENERGY ENGINEERING & DESIGN

DATE:_____ BY:_____

NO REMOVALS DRAWING REQUIRED

ADDITIONS

Figure 5.2: Typical ROW Cross-Section / Plan & Profile Drawings
Sheet 18 of 20

PRELIMINARY
NOT FOR CONSTRUCTION

TRC
670 N. COMMERCIAL ST
MANCHESTER, NH 03101

PROJECT NO: 291681

REV	DESCRIPTION	DATE	DES	CHK	APP
A	ISSUED FOR REVIEW	05/04/21	KAV	AMW	KGM

CONTRACT SERVICES

REV	DESCRIPTION	ENG/PE#	DATE	DRN	CHKD	APPR
A	WO# LATER – EPN LATER – IFCR	__/__	09/19/18	ESP	.	.

DWG REV	EPN/DESCRIPTION	CONT/PE#	DATE	DRN	CHKD	APPR
.	.	.	.	.	.	.

DRAWN FOR EPN LATER

EVERSOURCE ENERGY

DUCT BANKS
PLAN, ELEVATION, AND SECTIONS
LINE 114
ACUSHNET–DARTMOUTH, MASS

D	.
DRAWN	KAV/TRC
ENGINEER	AMW/TRC
CHECKED	KGM/TRC
APPROVED	.
DATE	09/17/18

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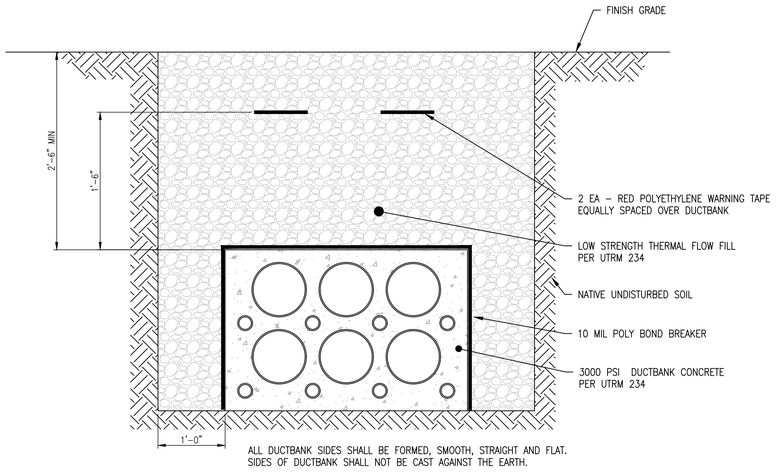
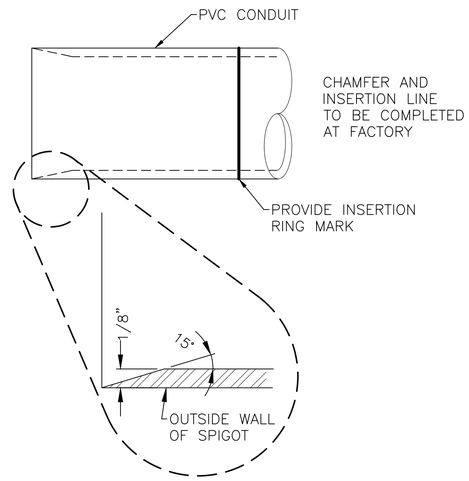
FILE: 291684–SK004.DWG
IMAGE:
DRAWING NO.: 291684–SK004

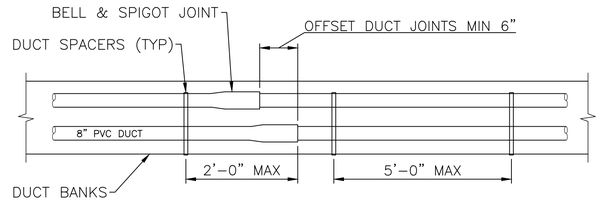
ES VER: 11/2015



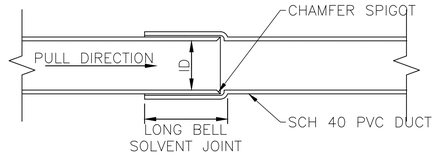
TYPICAL TRENCH SECTION
NOT TO SCALE



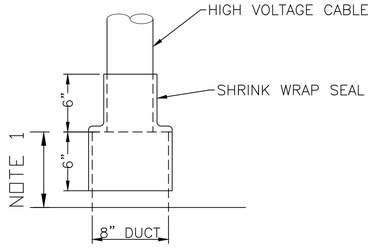
SPIGOT DETAIL
N.T.S.



DUCT SPACER DETAIL
N.T.S.



BELL & SPIGOT DUCT DETAIL
N.T.S.



DUCT SEALING DETAIL
N.T.S.

NOTES:

1. CUT DUCT SQUARE 6 TO 8 INCHES ABOVE CONCRETE.
2. CENTER CABLE IN DUCT AND APPLY SHRINK WRAP SEAL. SEAL SHALL EXTEND MIN 6" ONTO CABLE AND DUCT.
3. SHRINK WRAP TO BE APPLIED PER MANUFACTURER'S WRITTEN INSTRUCTIONS.
4. 115KV DUCT AND CABLE SHOWN, OTHERS TO BE SEALED SIMILARLY.

☐ NO EXCEPTIONS TAKEN ☐ REVISE AND RESUBMIT
☐ PROVIDE AS NOTED ☐ REJECTED

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EVERSOURCE ENERGY ENGINEERING & DESIGN

DATE:_____ BY: _____

NO REMOVALS DRAWING REQUIRED

ADDITIONS

Figure 5.2: Typical ROW Cross-Section / Plan & Profile Drawings
Sheet 19 of 20

TRC 670 N. COMMERCIAL ST MANCHESTER, NH 03101

PROJECT NO: 291681

REV	DESCRIPTION	DATE	DES	CHK	APP
A	ISSUED FOR REVIEW	05/04/21	KAV	AMW	KGM

CONTRACT SERVICES

REV	DESCRIPTION	ENG/PE#	DATE	DRN	CHKD	APPR
A	W0# LATER – EPN LATER – IFCR	__/__	09/19/18	ESP	.	.
DWG REV	EPN/DESCRIPTION	CONT/PE#	DATE	DRN	CHKD	APPR

DRAWN FOR EPN LATER

EVERSOURCE ENERGY

DUCT BANKS
PLAN, ELEVATION, AND SECTIONS
LINE 114
ACUSHNET–DARTMOUTH, MASS

D	.
DRAWN	KAV/TRC
ENGINEER	AMW/TRC
CHECKED	KGM/TRC
APPROVED	.
DATE	09/17/18

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FILE: 291684-SK005..DWG
IMAGE:
DRAWING NO.: 291684-SK005

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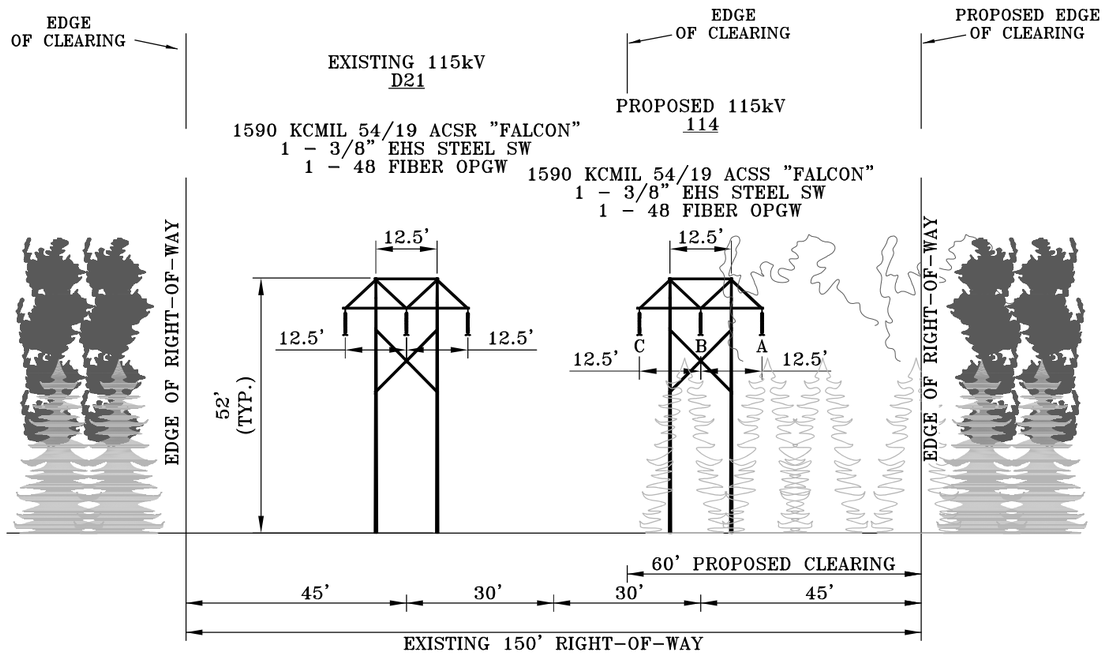
- CONCEPTUAL -
FOR REFERENCE ONLY



TYPICAL PROPOSED RIGHT-OF-WAY CROSS SECTION
BELL ROCK SUBSTATION TO THE DARTMOUTH TOWN LINE
VIEW EAST
APPROXIMATELY 4.2 MILES
FALL RIVER, MA

NOTE:
PROPOSED PHASING SHOWN IS TYPICAL. STRUCTURE 114-1 IS VERTICALLY CONFIGURED TO ACCOMMODATE A TRANSPOSITION AND TO MAINTAIN THE PHASING PROPOSED AT THE SUBSTATION.

Figure 5.2: Typical ROW Cross- Section / Plan & Profile Drawings
Sheet 20 of 20

nationalgrid

114 115kV NEW LINE
BELL ROCK TO DARTMOUTH TOWN LINE
MILE 0.0 TO 4.2
CROSS SECTION #1 OF 1

SCALE: NONE REV: D DATE: 01/16/19

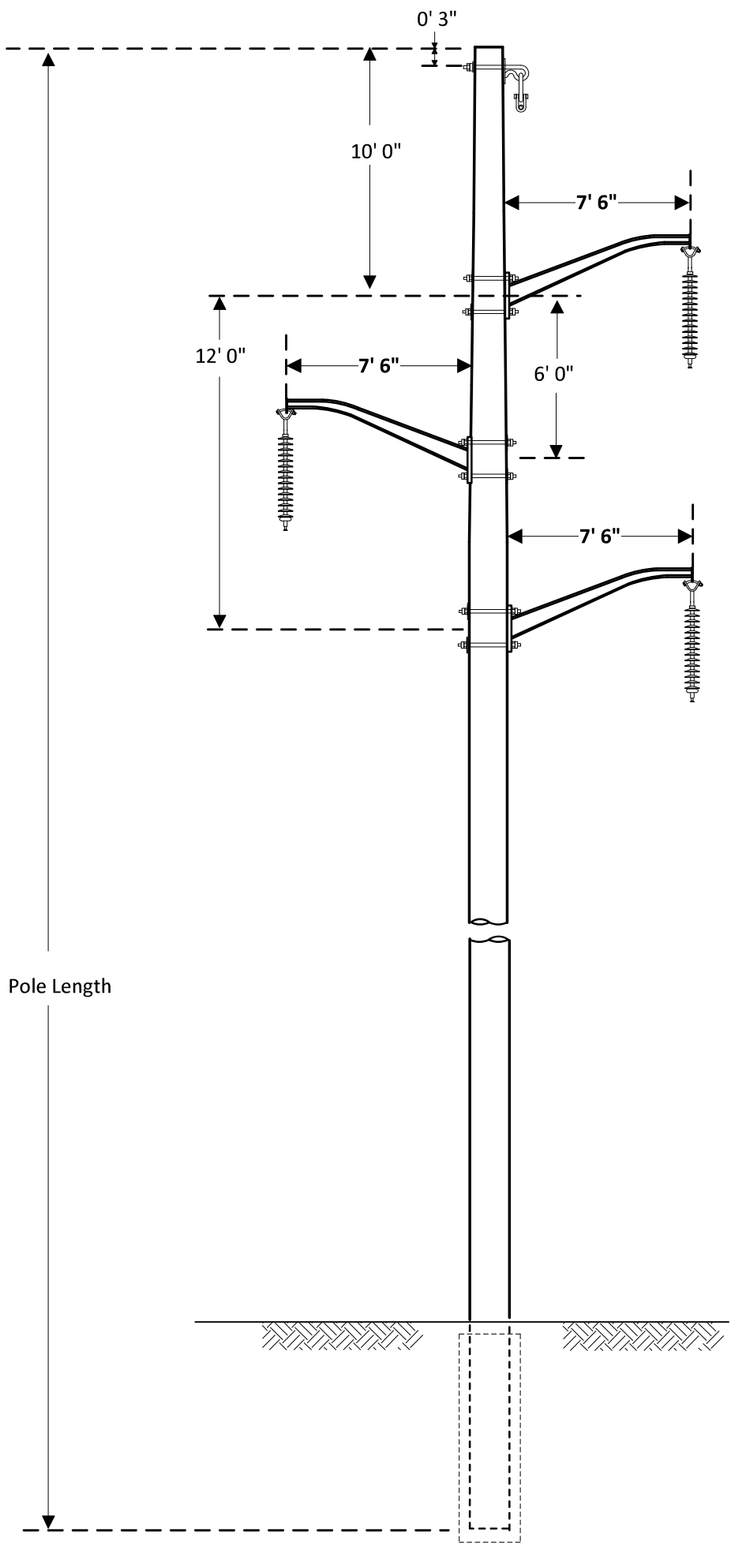
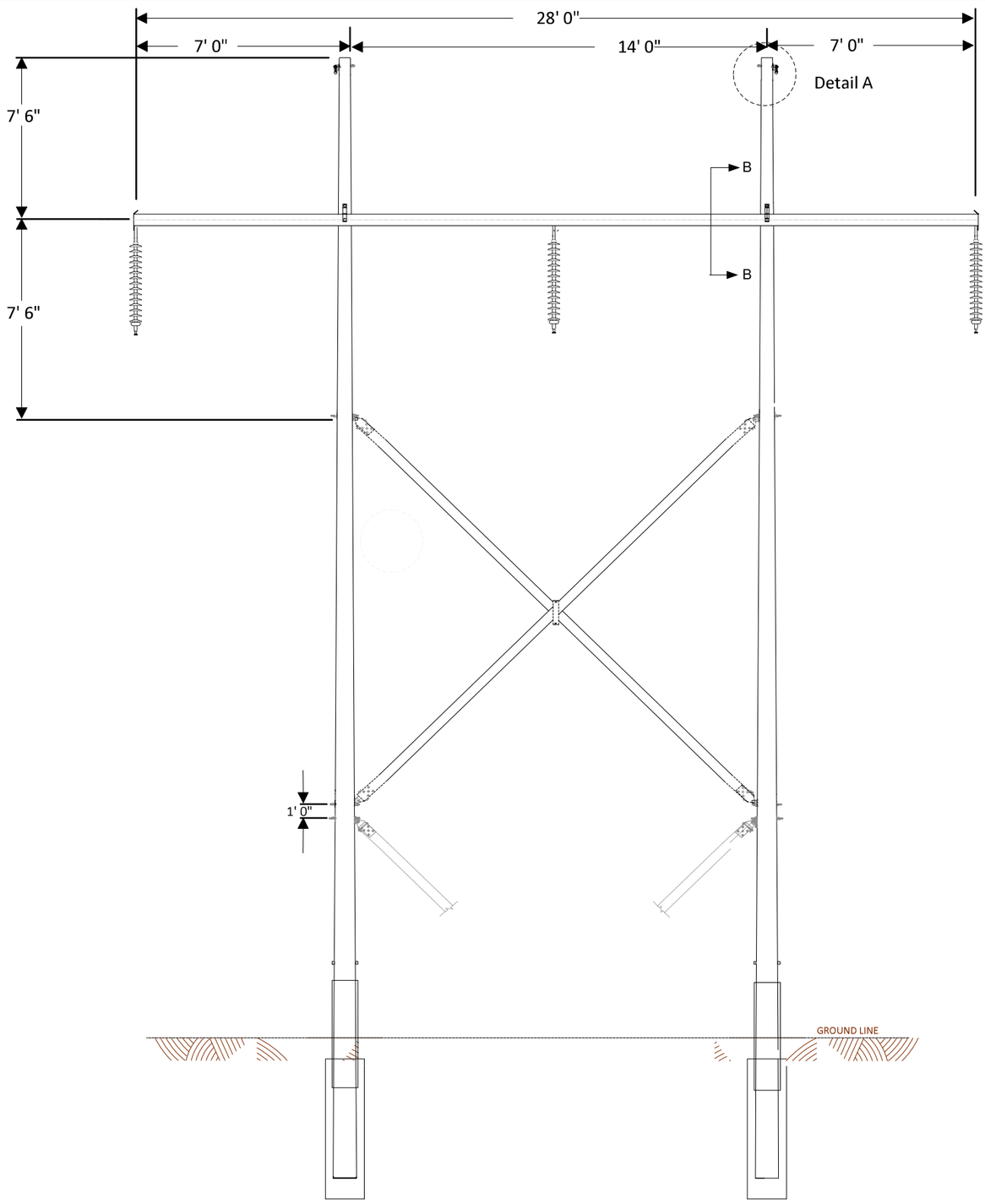
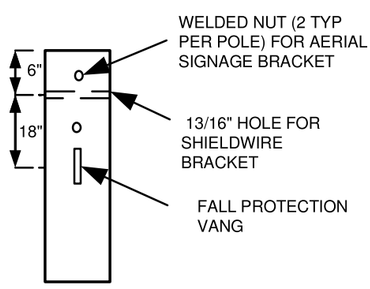


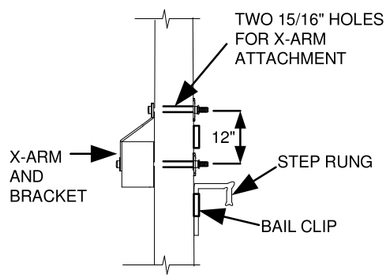
Figure 5.3: Preferred Route Typical Structure Detail Drawings
Sheet 1 of 6

EVERSOURCE ENERGY	Structure Outline – Typical Single Circuit Steel Monopole with Davit Arms	EMA 5-0115





DETAIL A
POLE TOP DETAILS



SECTION B-B

Figure 5.3: Preferred Route Typical Structure Detail Drawings
Sheet 2 of 6

EVERSOURCE	STRUCTURE OUTLINE - TYPICAL SINGLE CIRCUIT STEEL H-FRAME TANGENT LIGHT DUTY STEEL STRUCTURE	EMA 5-0150

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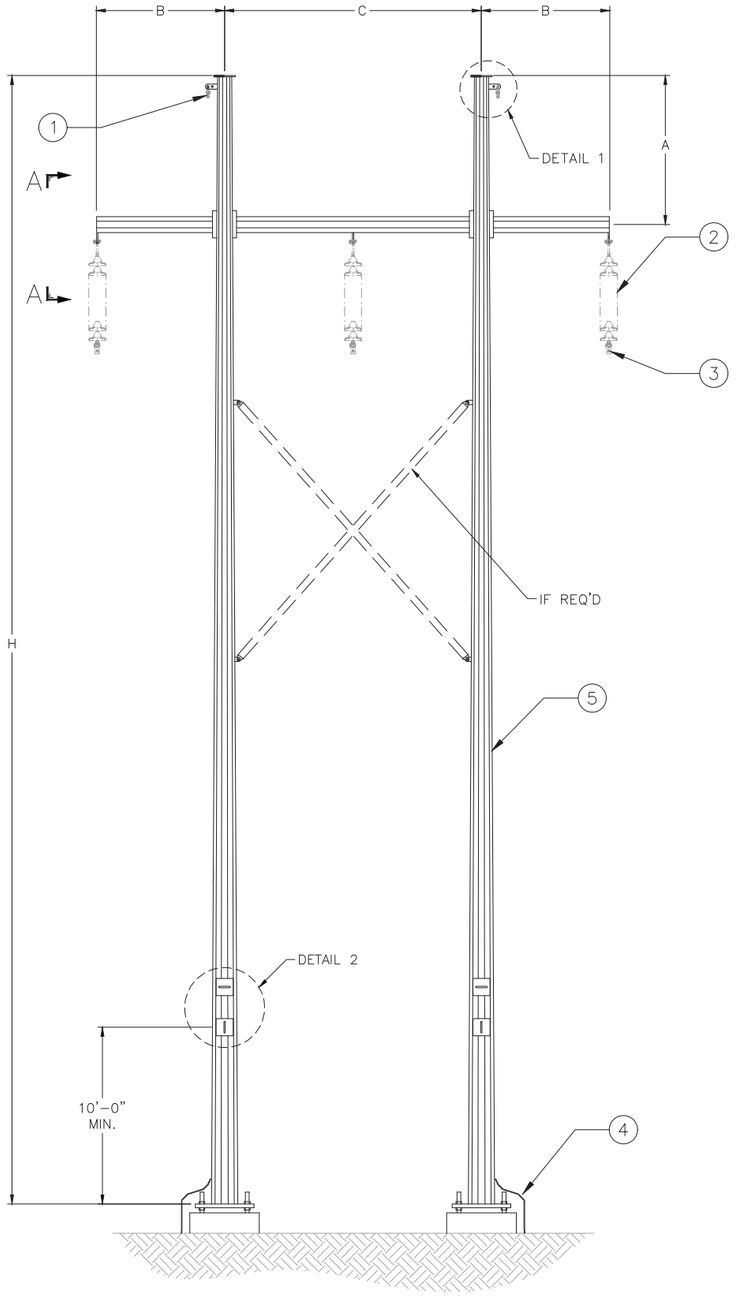
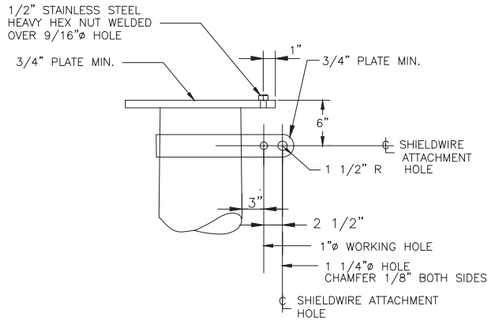


FRONT ELEVATION

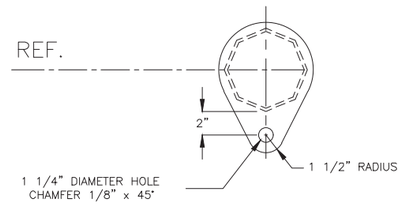
ASSEMBLY LIST				
Tag	STANDARD ASSEMBLY ID	MU VARIABLE		Description
		Galvanized Steel	Weathering Steel	
		01	02	
1	SW.SU.AG.VA	2	2	Shieldwire (SW), Suspension (SU), AGS Unit (AG), Vang Attached (VA)
2	IN.SU.SS.00	3	3	Insulator (IN), Suspension (SU), Single String (SS)
3	CN.SU.CG.00	3	3	Conductor (CN), Suspension (SU), CGS (AG)
4	GN.CP.ST.00	1	1	Grounding (GN), Capital (CP), Steel Structures (ST)
5	PO.ST.00.00	1	1	Pole (PO), Steel (ST)



DETAIL 1

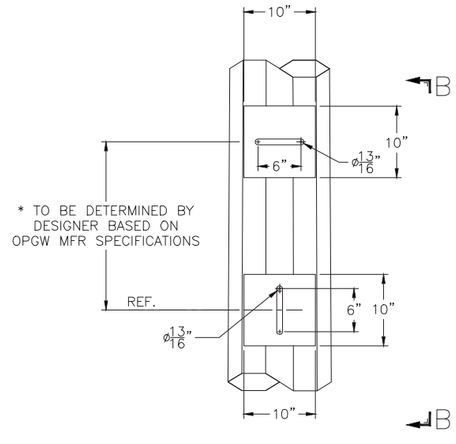
SHIELDWIRE SUSPENSION VANG
(TYPICAL 2 PLACES)

DIMENSION TABLE					
	A	B	C	DISCS	VOLTAGE
1 & 2	8'-0"	6'-3"	12'-6"	10	115 kV



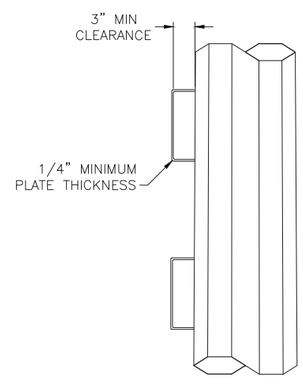
SECTION A-A

CONDUCTOR SUSPENSION VANG
(TYPICAL 3 PLACES)



DETAIL 2

OPGW SPLICE BRACKET



SECTION B-B

Figure 5.3: Preferred Route Typical Structure Detail Drawings

Sheet 3 of 6

VER	DATE	VERSION DESCRIPTION	PREPARED	REVIEWED	APPROVED
4	05/09/14	INSERT NEW ASSEMBLY LIST BASED ON STORMS MU/CU PROJECT	TEC	RAR	BMR
5	07/18/14	REVISED ASSEMBLY LIST	TEC	RAR	BMR
6	03/24/15	MOVE HIGH VOLTAGE ASSEMBLY OPTIONS TO HE.ST.SU.00, PROBLEM LOG ENTRY 237	TEC	BMR	
7	11/19/15	CHANGE FROM AGS CLAMPS TO CGS FOR STANDARD CONSTRUCTION	TEC		
8	06/28/16	CORRECT REFERENCES IN NOTES, PROBLEM LOG ENTRY 281	TEC		
9	07/28/16	ADD OPGW SPLICE BRACKET LOCATION AND DETAIL, PROBLEM LOG ENTRY 283	TEC	NLD	
10	06/26/17	REPLACE TAG 4 WITH GN.CP.ST.00, PROBLEM LOG ENTRY 307	TEC	BMR	NMM

VERSION 10

nationalgrid

PREPARED BY		
REVIEWED BY	JLC	03/23/11
APPROVED BY		
SCALE	NTS	
SHEET	1 OF 2	
INDEX		

Figure 5.3: Typical Structure Details

H-FRAME (H2)
STEEL (ST)
SUSPENSION (SU)

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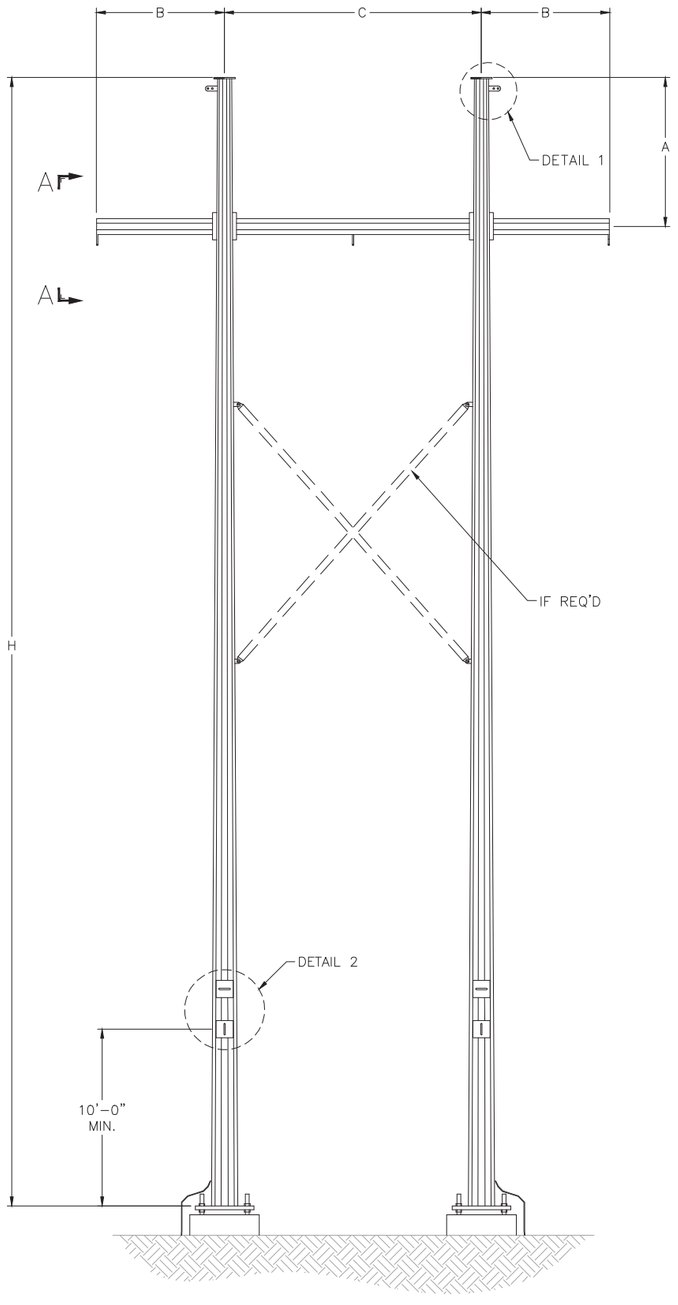
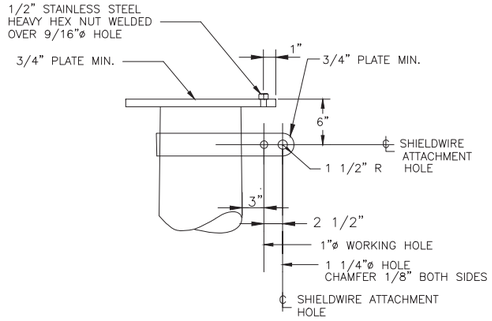
H2.ST.SU.00

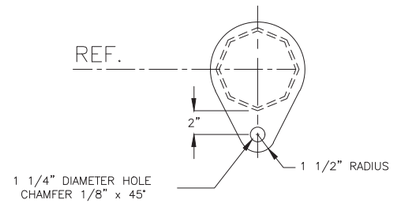


FRONT ELEVATION



DETAIL 1

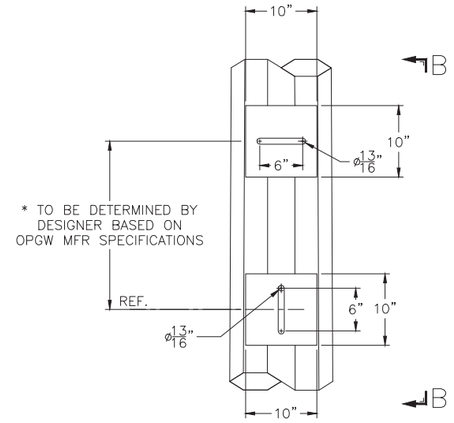
SHIELDWIRE SUSPENSION VANG
(TYPICAL 2 PLACES)



SECTION A–A

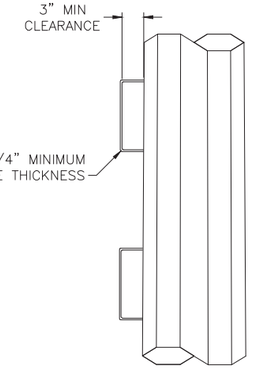
CONDUCTOR SUSPENSION VANG
(TYPICAL 3 PLACES)

DIMENSION TABLE				
	A	B	C	VOLTAGE
1 & 2	8'–0"	6'–3"	12'–6"	115 kV



DETAIL 2

OPGW SPLICE BRACKET



SECTION B–B

NOTES:
1. REFER TO PROJECT SPECIFICATION FOR STRUCTURE CONNECTION TYPE AND FINISH, STRUCTURE QUANTITIES, HEIGHTS, TYPES, AND OTHER PROJECT SPECIFIC INFORMATION AND CONFLICTS.
2. STAINLESS STEEL GROUNDING PLATES SHALL BE PROVIDED AS INDICATED. SEE SP.06.01.407 SECTION 2.4.1.1 AND DRAWING SP.06.01.407.001.
3. STEP BOLT LUGS, STEP BOLTS, AND LEFT AND RIGHT FALL PROTECTION FLANGES SHALL BE PROVIDED. SEE SP.06.01.407 SECTION 1.12.3.1 AND DRAWING SP.06.01.407.003.
4. BAIL STEP LUGS AND BAIL STEPS SHALL BE PROVIDED AS INDICATED. SEE SP.06.01.407 SECTIONS 1.12.2.1 THROUGH 1.12.2.2 AND DRAWING SP.06.01.407.002. IF CROSSARM LADDER ATTACHMENTS ARE REQUIRED, SEE DRAWING SP.06.01.407.005.
5. SIGNAGE BRACKETS, IF REQUIRED, SHALL BE PROVIDED ON FRONT AND BACK FACES OF STRUCTURES. SEE SP.06.01.407 SECTION 1.14 AND DRAWING SP.06.01.407.004.
6. OPGW SPLICE BRACKETS, IF REQUIRED, SHALL BE PLACED A MINIMUM OF 10' ABOVE THE BASE OF THE POLE.

Figure 5.3: Preferred Route Typical Structure Detail Drawings
Sheet 4 of 6

VER	DATE	VERSION DESCRIPTION	PREPARED/REVIEWED/APPROVED
4	05/09/14	INSERT NEW ASSEMBLY LIST BASED ON STORMS MU/CU PROJECT	TEC RAR BMR
5	07/18/14	REVISED ASSEMBLY LIST	TEC RAR BMR
6	03/24/15	MOVE HIGH VOLTAGE ASSEMBLY OPTIONS TO HE.ST.SU.00, PROBLEM LOG ENTRY 237	TEC BMR
7	11/19/15	CHANGE FROM AGS CLAMPS TO CGS FOR STANDARD CONSTRUCTION	TEC
8	06/28/16	CORRECT REFERENCES IN NOTES, PROBLEM LOG ENTRY 281	TEC
9	06/28/16	ADD DOWN LEAD BRACKET LOCATION AND DETAIL, PROBLEM LOG ENTRY 283	TEC NLD
10	06/26/17	REPLACE ACAD TAG 4 WITH SP.06.01.407.003, PROBLEM LOG ENTRY 307	TEC BMR NMM

VERSION 10

nationalgrid

PREPARED BY	JLC	03/23/11
REVIEWED BY		
APPROVED BY		
SCALE	NTS	
SHEET	2 OF 2	
INDEX		

Figure 5.3: Typical Structure Details
H-FRAME (H2)
STEEL (ST)
SUSPENSION (SU)

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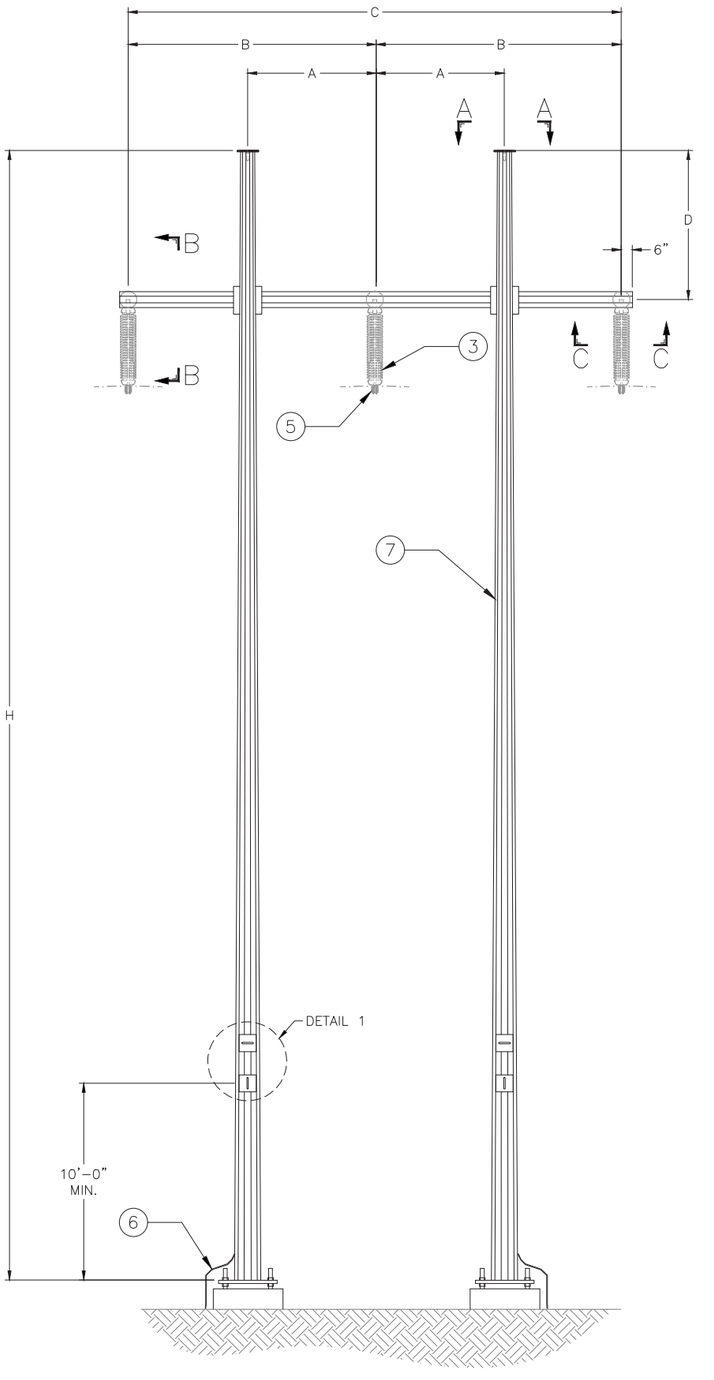
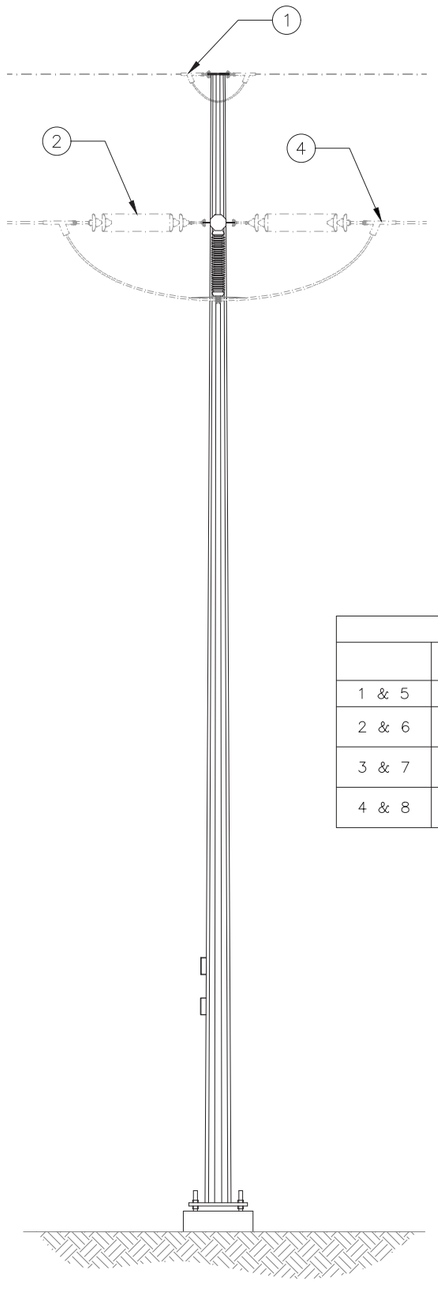


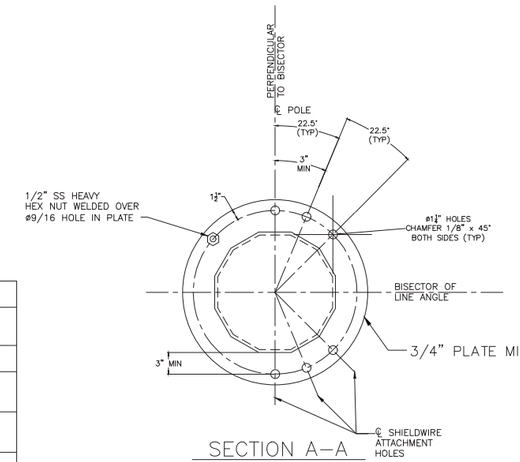
FRONT ELEVATION



SIDE ELEVATION

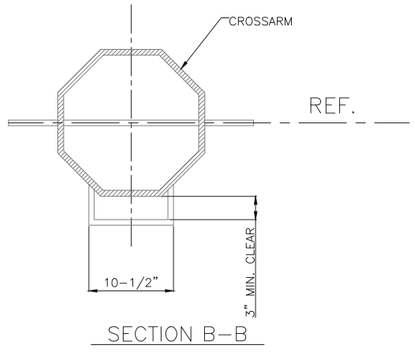
ASSEMBLY LIST										
Tag	STANDARD ASSEMBLY ID	MU VARIABLE								Description
		Galvanized Steel				Weathering Steel				
		01	02	03	04	05	06	07	08	
1	SW.DE.QU.VA	2	2	2	2	2	2	2	2	Shieldwire (SW), Deadend (DE), Quadrant Clamp (QU), Vang Attached (VA)
2	IN.DE.SS.VA	3	3	3	3	3	3	3	3	Insulator (IN), Deadend (DE), Single String (SS), Vang Attached (VA)
3	IN.PS.LV.00	-	3	3	3	-	3	3	3	Insulator (IN), Station Post (PS), Low Voltage (LV)
4	CN.DE.QU.00	6	6	6	6	6	6	6	6	Conductor (CN), Deadend (DE), Quadrant Clamp (QU)
5	CN.CL.PS.00	-	3	3	3	-	3	3	3	Conductor (CN), Clamp (CL), Station Post (PS)
6	GN.CP.ST.00	1	1	1	1	1	1	1	1	Grounding (GN), Capital (CP), Steel Structures (ST)
7	PO.ST.00.00	1	1	1	1	1	1	1	1	Pole (PO), Steel (ST)

DIMENSION TABLE							
	A	B	C	D	θ	DISCS	VOLTAGE
1 & 5	7'-6"	15'-0"	30'-0"	7'-0"	0° – 20°	10	115 kV
2 & 6	8'-0"	16'-0"	32'-0"	7'-0"	>20° – 40°	10	115 kV
3 & 7	8'-6"	17'-0"	34'-0"	7'-0"	>40° – 60°	10	115 kV
4 & 8	9'-0"	18'-0"	36'-0"	7'-0"	>60° – 80°	10	115 kV



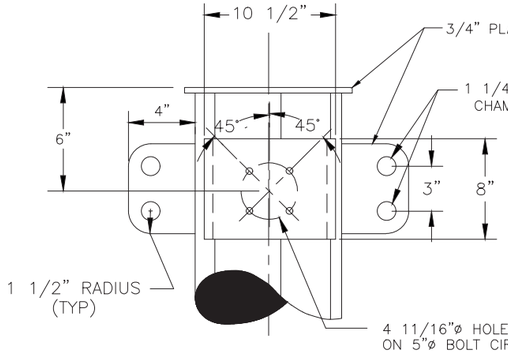
SECTION A–A

POLE CAP WITH SHIELD WIRE ATTACHMENT AND GROUNDING NUT (TYPICAL 2 LOCATIONS)



SECTION B–B

CONDUCTOR ATTACHMENT PLATE AND POST INSUALTOR ATTACHMENT PLATE (TYPICAL 3 LOCATIONS)



SECTION C–C

CONDUCTOR ATTACHMENT PLATE AND POST INSULATOR ATTACHMENT PLATE (TYPICAL 3 LOCATIONS)

Figure 5.3: Preferred Route Typical Structure Detail Drawings
Sheet 5 of 6

VER	DATE	VERSION DESCRIPTION	PREPARED/REVIEWED/APPROVED
1	03/25/11	INITIAL RELEASE	TEC
2	05/08/14	INSERT NEW ASSEMBLY LIST BASED ON STORMS MU/CU PROJECT	TEC
3	07/18/14	REVISED ASSEMBLY LIST	TEC RAR BMR
4	03/24/15	MOVE HIGH VOLTAGE ASSEMBLY OPTIONS TO H2.ST.DE.00, PROBLEM LOG ENTRY 237	TEC BMR
5	06/28/16	CORRECT REFERENCES IN NOTES, PROBLEM LOG ENTRY 281	TEC NLD
6	06/28/16	ADD OPEN SPACE CONDITION AND DETAIL, PROBLEM LOG ENTRY 283	TEC NLD
7	06/26/17	REPLACE TAG WITH GN.CP.ST.00, PROBLEM LOG ENTRY 307	TEC BMR/NMM

VERSION 7

nationalgrid

PREPARED BY	JLC	03/23/11
REVIEWED BY		
APPROVED BY		
SCALE	NTS	
SHEET	1 OF 2	
INDEX		

Figure 5.3: Typical Structure Details
H-FRAME (H2)
STEEL (ST)
DEADEND (DE)

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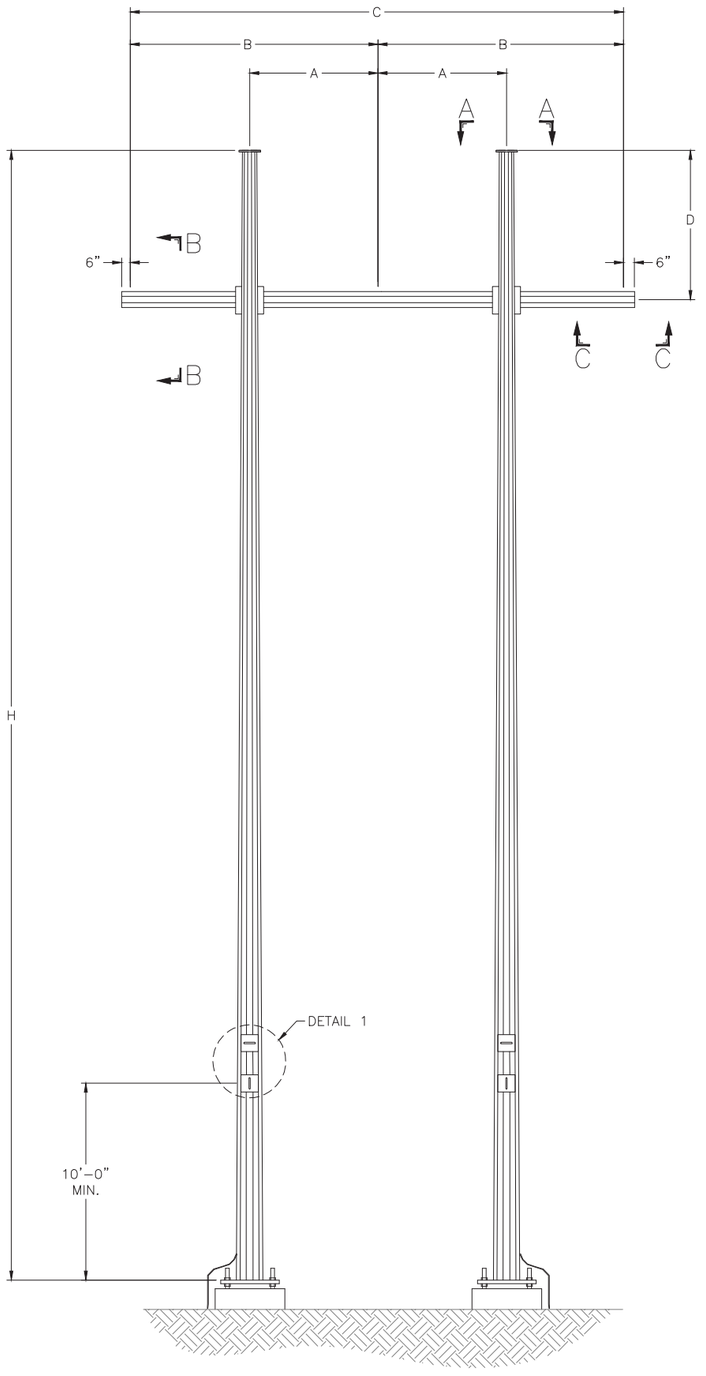
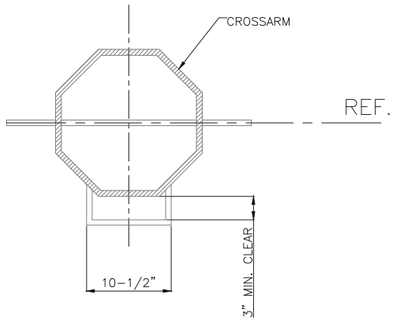


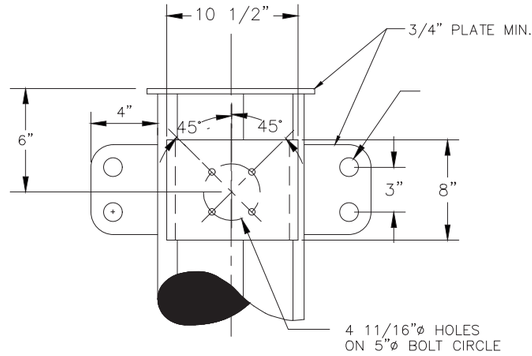
FRONT ELEVATION

DIMENSION TABLE					
	A	B	C	D	θ
1 & 5	7'–6"	15'–0"	30'–0"	7'–0"	0° – 20°
2 & 6	8'–0"	16'–0"	32'–0"	7'–0"	>20° – 40°
3 & 7	8'–6"	17'–0"	34'–0"	7'–0"	>40° – 60°
4 & 8	9'–0"	18'–0"	36'–0"	7'–0"	>60° – 80°



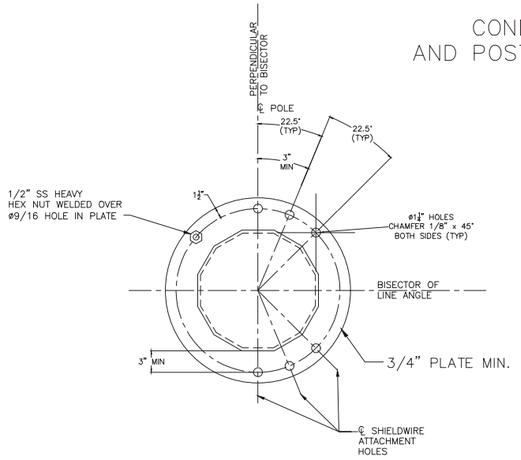
SECTION B–B

CONDUCTOR ATTACHMENT PLATE
AND POST INSULATOR ATTACHMENT PLATE
(TYPICAL 3 LOCATIONS)



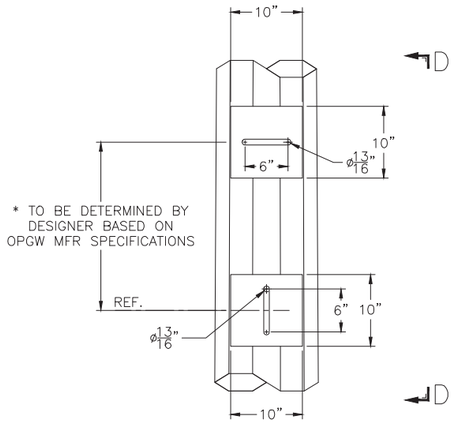
SECTION C–C

CONDUCTOR ATTACHMENT PLATE AND POST
INSULATOR ATTACHMENT PLATE
(TYPICAL 3 LOCATIONS)



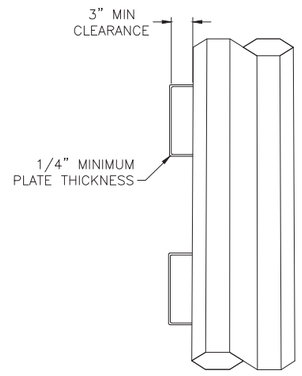
SECTION A–A

POLE CAP WITH SHIELD WIRE
ATTACHMENT AND GROUNDING NUT
(TYPICAL 2 LOCATIONS)



DETAIL 1

OPGW SPLICE BRACKET



SECTION D–D

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4. BAIL STEP LUGS AND BAIL STEPS SHALL BE PROVIDED AS INDICATED. SEE SP.06.01.407 SECTIONS 1.12.2.1 THROUGH 1.12.2.2 AND DRAWING SP.06.01.407.002. IF CROSSARM LADDER ATTACHMENTS ARE REQUIRED, SEE DRAWING SP.06.01.407.005.
5. SIGNAGE BRACKETS, IF REQUIRED, SHALL BE PROVIDED ON FRONT AND BACK FACES OF STRUCTURES. SEE SP.06.01.407 SECTION 1.14 AND DRAWING SP.06.01.407.004.
6. OPGW SPLICE BRACKETS, IF REQUIRED, SHALL BE PLACED A MINIMUM OF 10' ABOVE THE BASE OF THE POLE.

Figure 5.3: Preferred Route Typical Structure Detail Drawings
Sheet 6 of 6

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4	03/24/15	MOVE HIGH VOLTAGE ASSEMBLY OPTIONS TO HE.ST.DE.00, PROBLEM LOG ENTRY 237	TEC BMR
5	06/28/16	CORRECT REFERENCES IN NOTES, PROBLEM LOG ENTRY 281	TEC
6	07/28/16	ADD OPGW SPLICE BRACKET LOCATIONAL AND DETAIL, PROBLEM LOG ENTRY 283	TEC NLD
7	06/26/17	REPLACE TAG 6 WITH ON.CP.3.003, PROBLEM LOG ENTRY 307	TEC BMR NMM

VERSION 7

PREPARED BY JLC 03/23/11
REVIEWED BY
APPROVED BY
SCALE NTS
SHEET INDEX 2 OF 2

nationalgrid

Figure 5.3: Typical Structure Details

H-FRAME (H2)
STEEL (ST)
DEADEND (DE)

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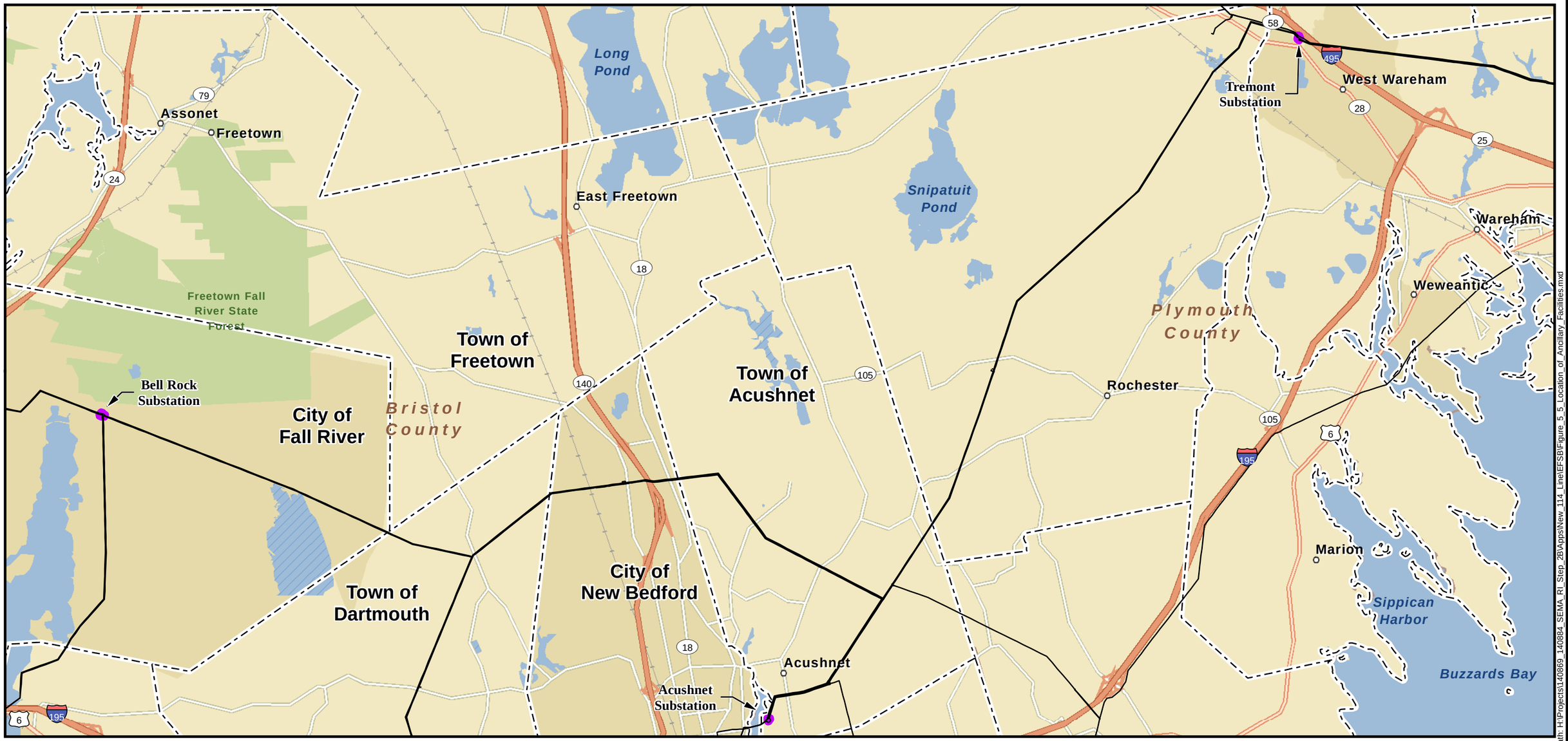

Project Vicinity



Legend

- Existing Transmission Line
- Existing Station
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 5.5: Location of Ancillary Facilities

Commonwealth of Massachusetts

Bristol and Plymouth Counties:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet, Town of Wareham

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N W E S

0 1 2 Miles

1:85,000

EVERSOURCE nationalgrid

NOT FOR CONSTRUCTION

Date: 12/6/2021

Author: TDH

Path: H:\Projects\140869_140884_SEMA_RI_Step_2B\Apps\New_114_Line\EFSB\Figure_5_5_Location_of_Ancillary_Facilities.mxd





Legend

- Existing Transmission Structure
- Existing Transmission Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Interstate Highway
- State Highway
- Local Road
- Town Boundary
- Church
- MHC Historic Inventory
- MHC Historic Inventory Area
- Underground Storage Tanks
- Perennial Stream (NHD)
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.5.1 : Tremont Substation
Environmental Resources Constraints

Commonwealth of Massachusetts
Town of Wareham

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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POWER ENGINEERS

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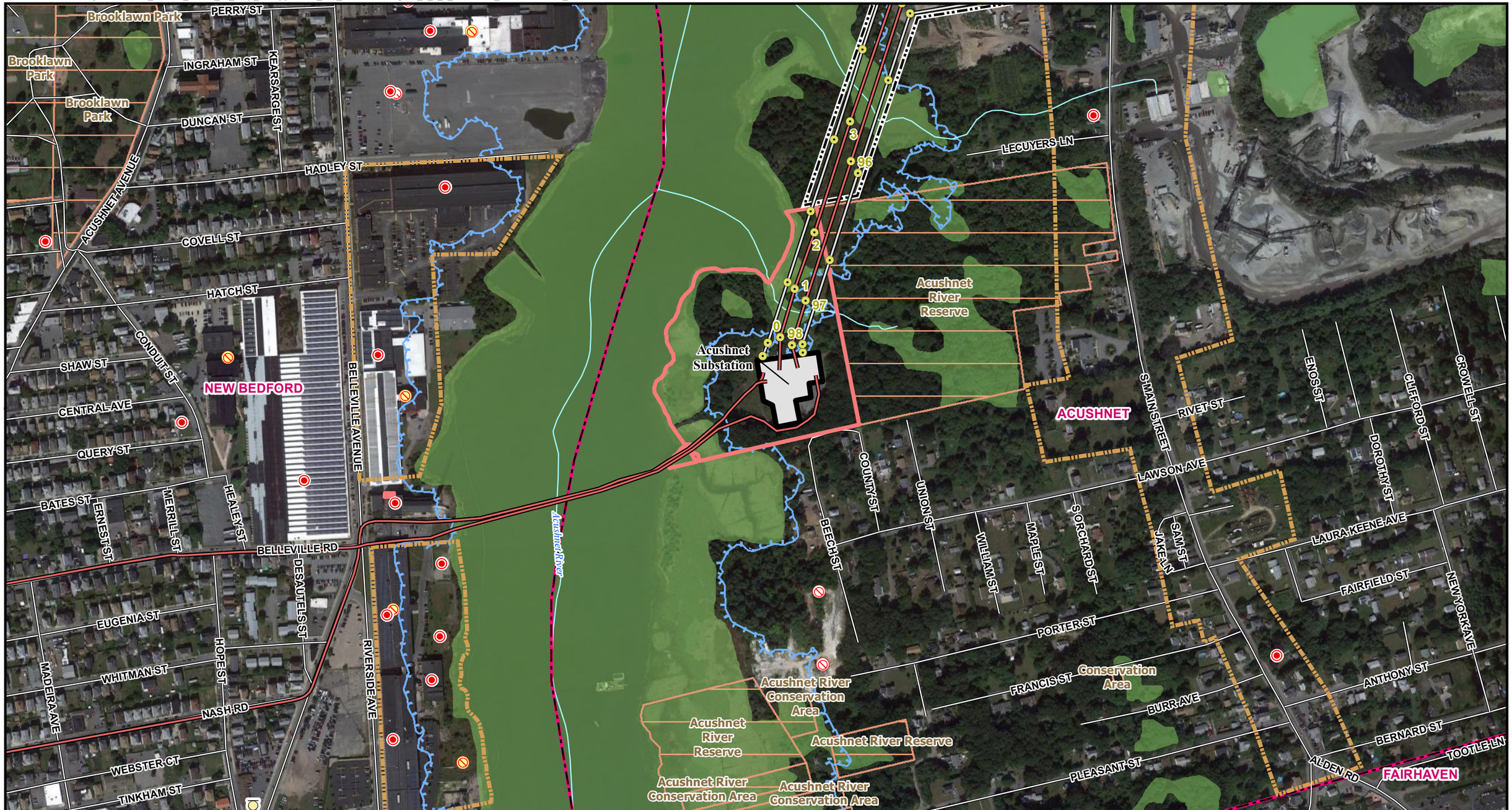



Legend

- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- MHC Historic Inventory
- MassDEP Tier Classified Oil and/or Hazardous Material Sites
- MassDEP Oil and/or Hazardous Material Sites with Activity and Use Limitations
- Underground Storage Tanks
- Perennial Stream (NHD)
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- Other Protected Lands
- MHC Historic Inventory Area

*Indicates Layers Set to Transparency

N

1 inch = 400 feet

0 200 400

Feet

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.5.2 : Acushnet Substation
Environmental Resources Constraints

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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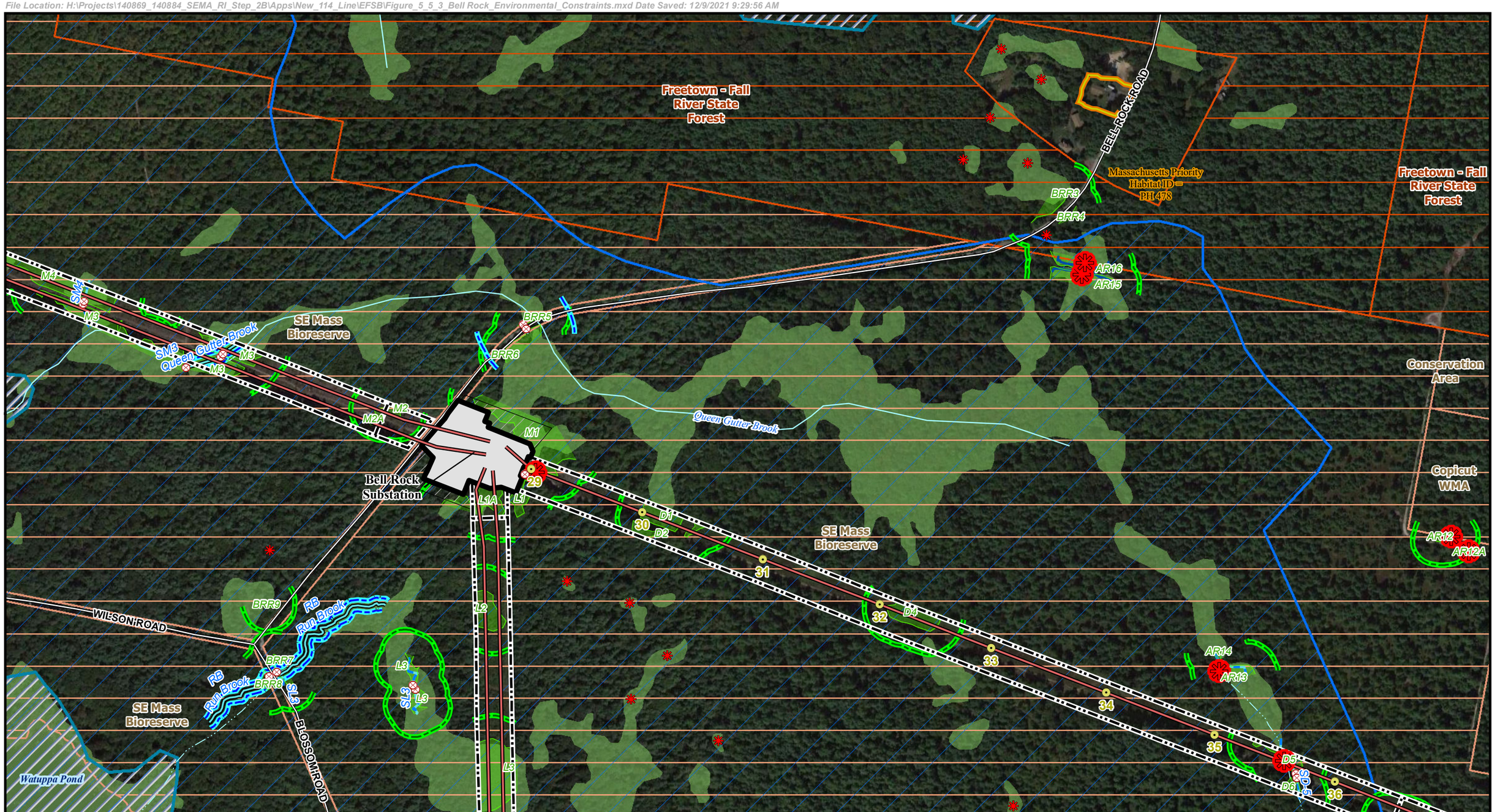



Legend

- Existing Transmission Structure
- Existing Transmission Line
- Existing Station
- Existing Right of Way
- National Grid Owned Land
- Local Road
- Town Boundary
- Vernal Pool
- Culvert
- Certified Vernal Pools (NHESP)
- Perennial Stream or River
- Intermittent Stream
- Wetland Border
- Isolated Wetland Border
- Inundation Area
- Riverfront Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Delineated Open Water
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 400 feet

0 200 400

Feet

*Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.5.3 : Bell Rock Environmental Resources Constraints

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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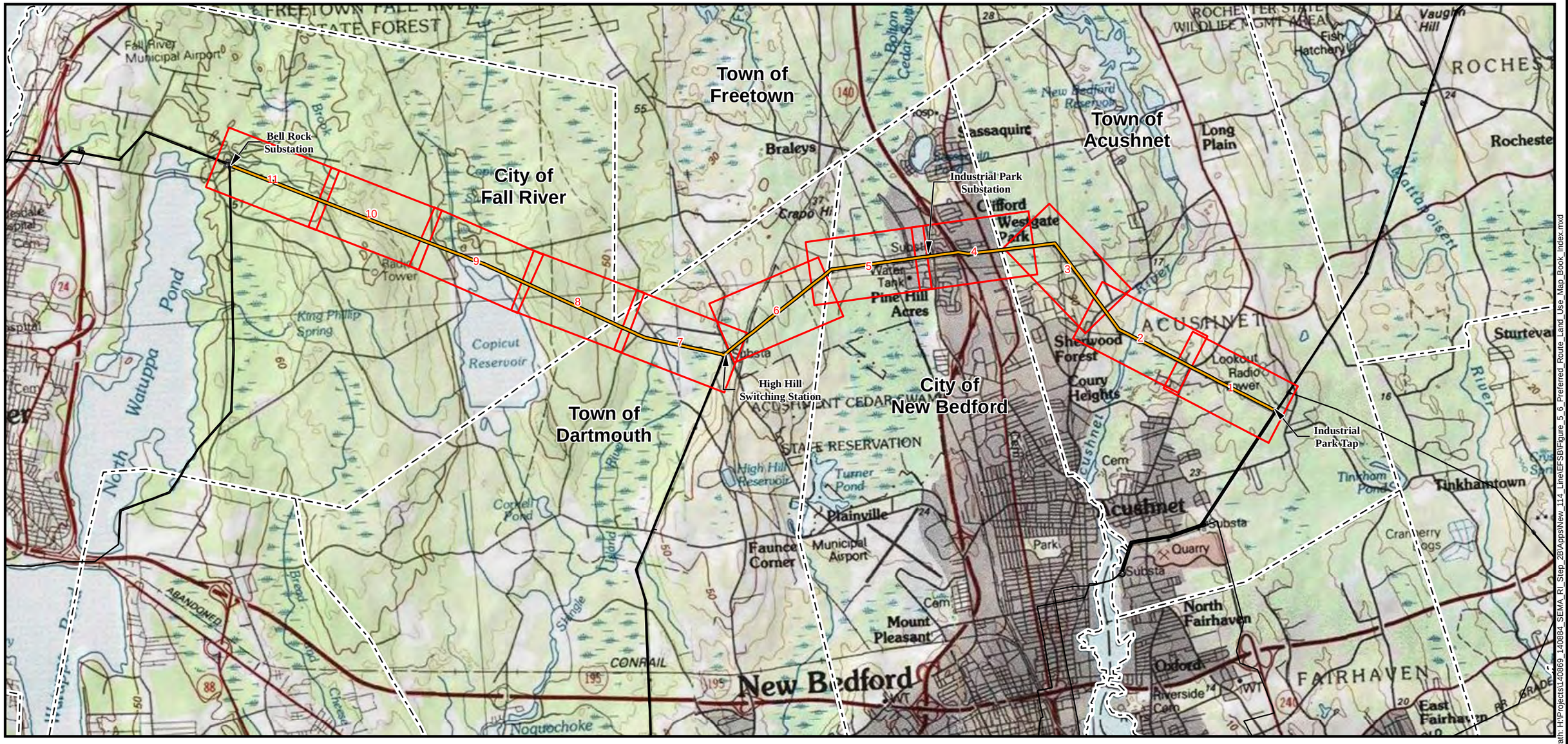
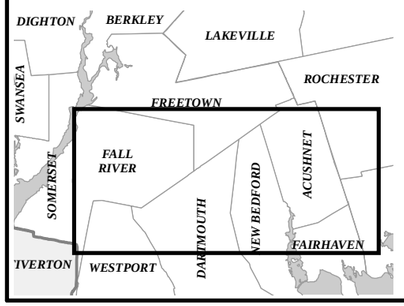


Project Vicinity



Legend

- Preferred Route
- Page Boundary
- Existing Transmission Line
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 5.6 : Land Use
Map Book Index

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

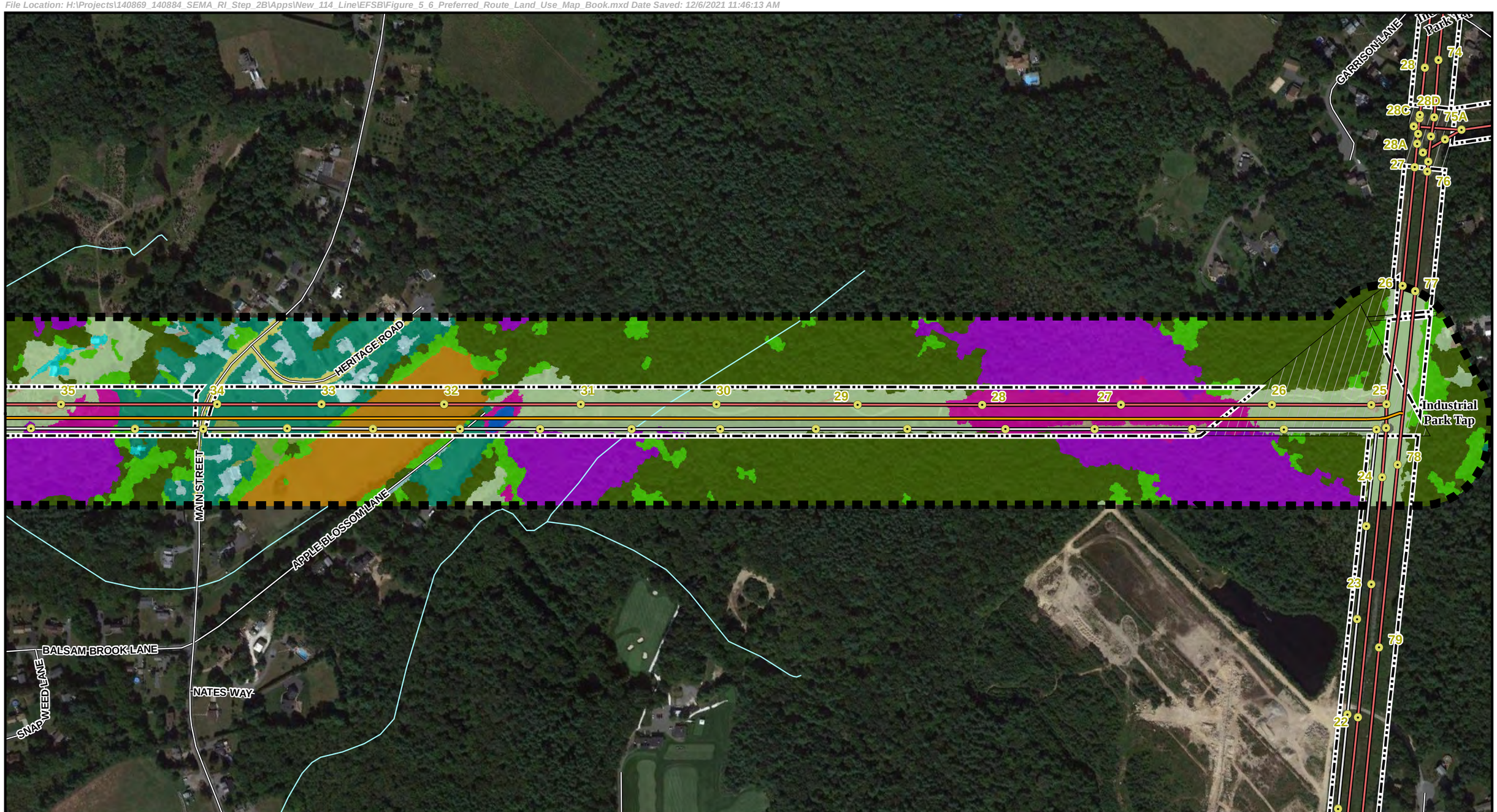
1 " = 1 miles

EVERSOURCE
nationalgrid

NOT FOR CONSTRUCTION

Date: 12/6/2021

Author: TDH





Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- Perennial Stream (NHD)
- Residential - Single Family*
- Residential - Multi-Family*
- Other Impervious*
- Right-of-way*
- Pasture/Hay*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*
- Water*

N

1 inch = 400 feet
0 200 400
Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
Town of Acushnet

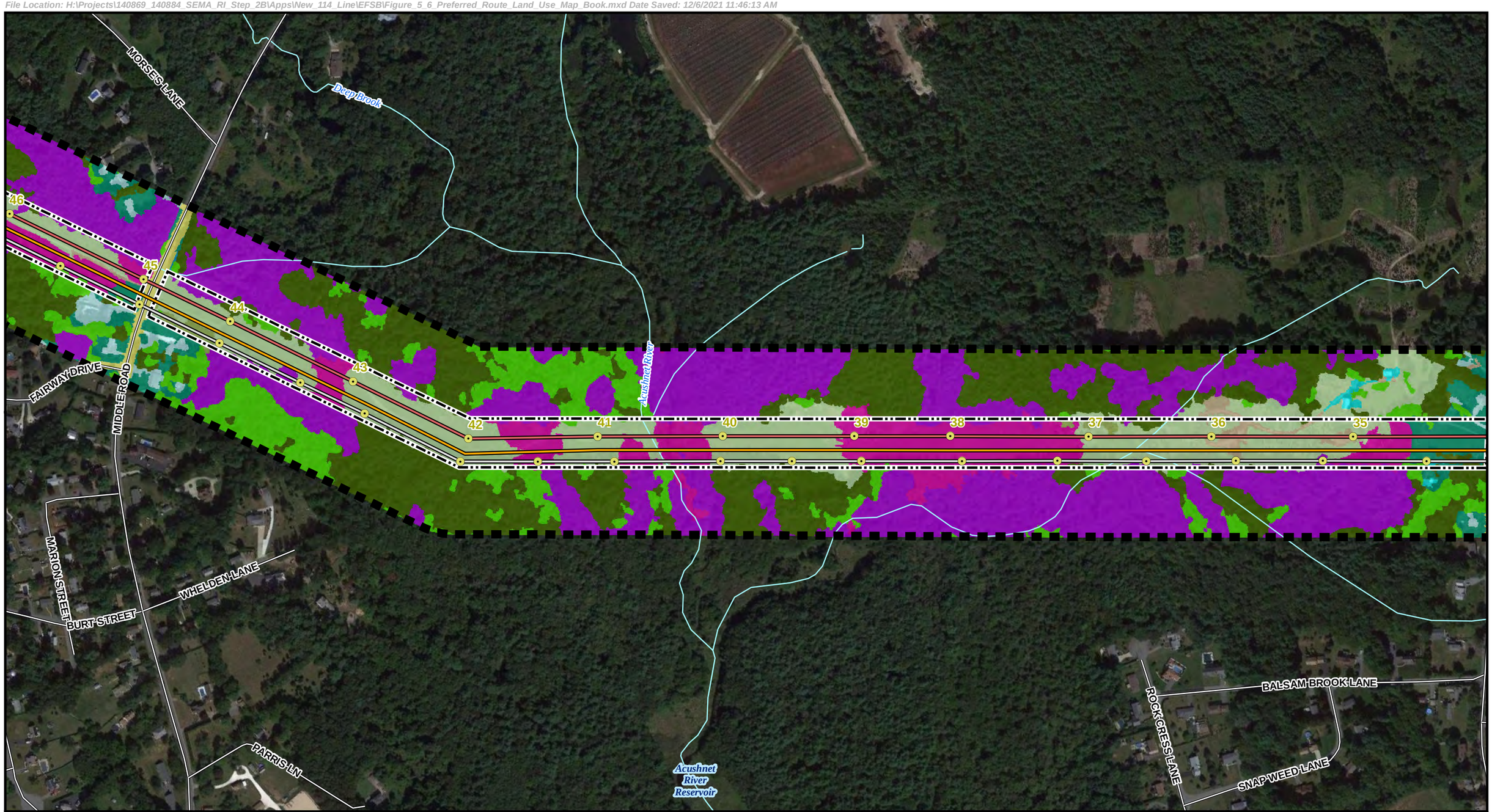
Date: 12/6/2021

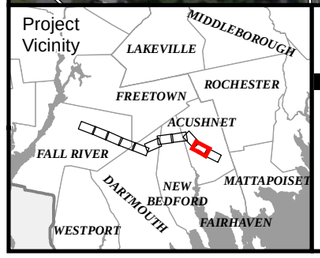
NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid
POWER ENGINEERS

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.





Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Local Road
- Town Boundary
- Perennial Stream (NHD)
- Residential - Single Family*
- Residential - Multi-Family*
- Mixed Use - Primarily Residential*
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*

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1 inch = 400 feet

0 200 400

Feet

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

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Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Residential - Single Family*
- Mixed Use - Primarily Residential*
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid
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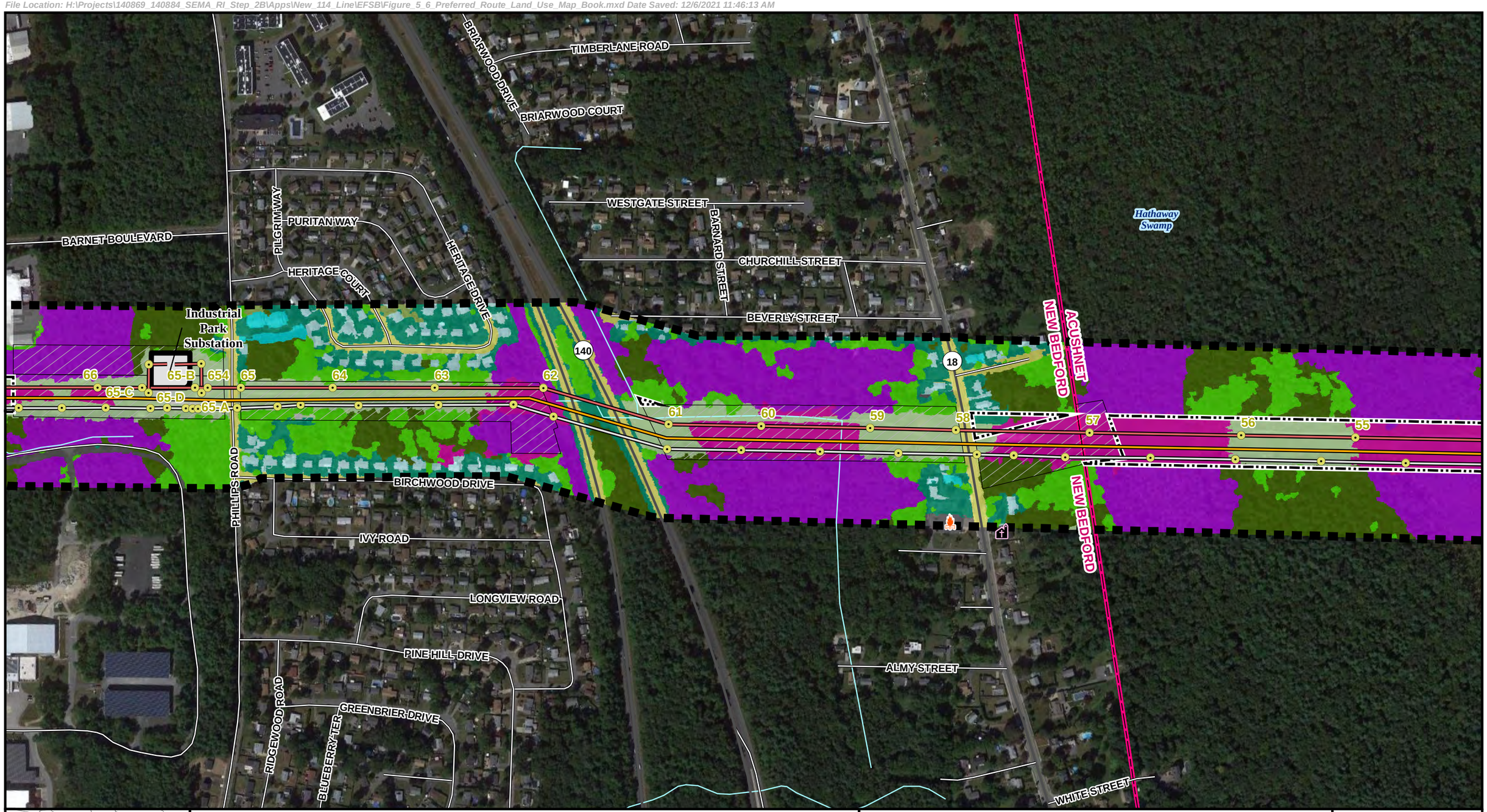

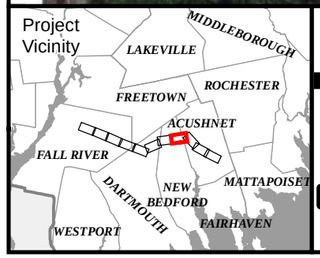

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- State Highway
- Local Road
- Town Boundary
- Fire Station
- Church
- Perennial Stream (NHD)
- Residential - Single Family*
- Residential - Multi-Family*
- Industrial*
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
City of New Bedford, Town of Acushnet

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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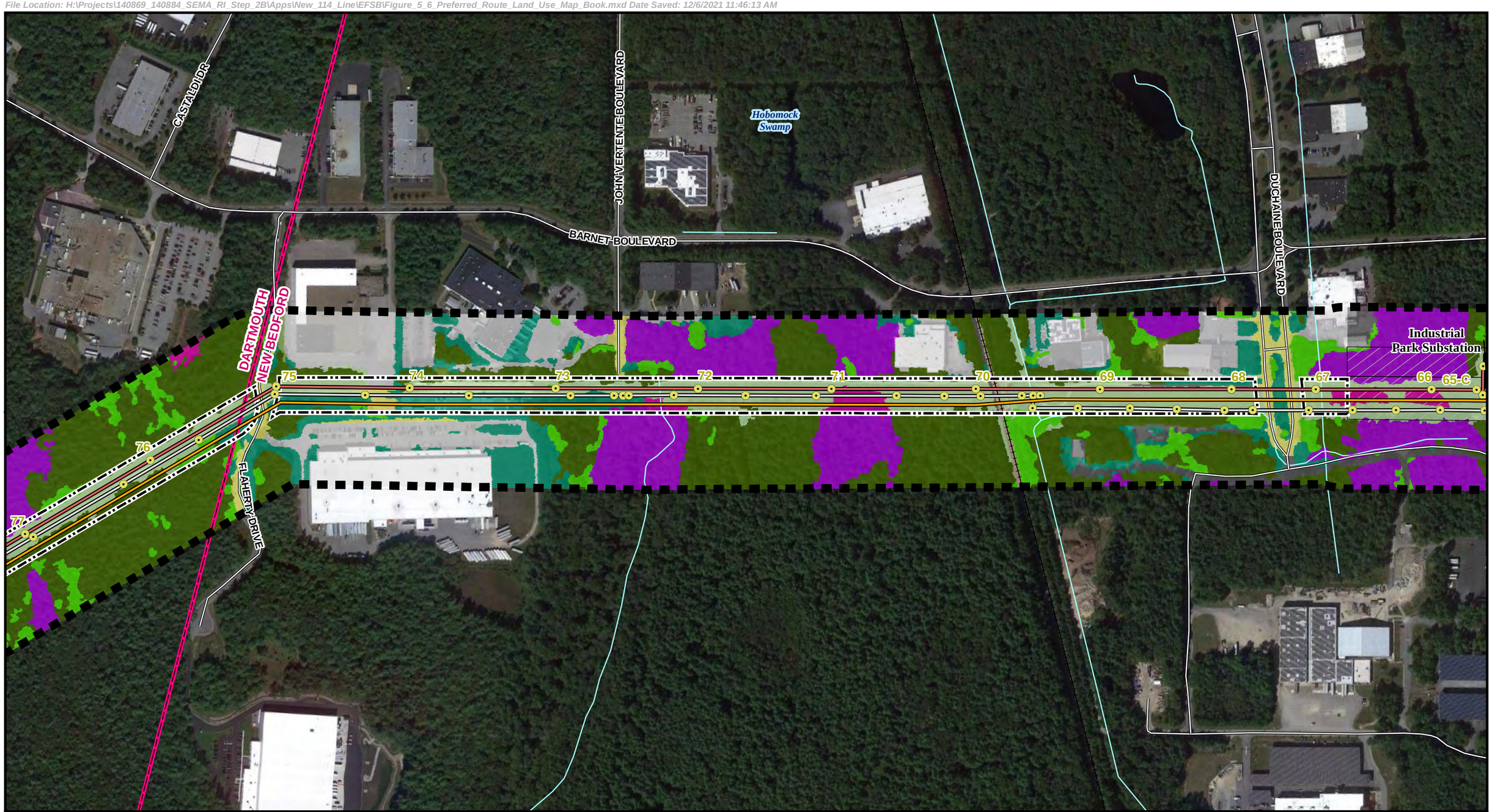

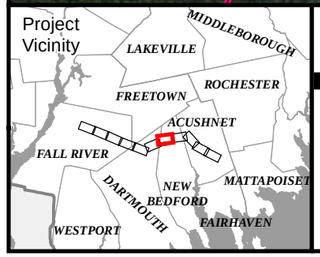

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Railroad
- Town Boundary
- Perennial Stream (NHD)
- Industrial*
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*

N

1 inch = 400 feet
0 200 400
Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
City of New Bedford, Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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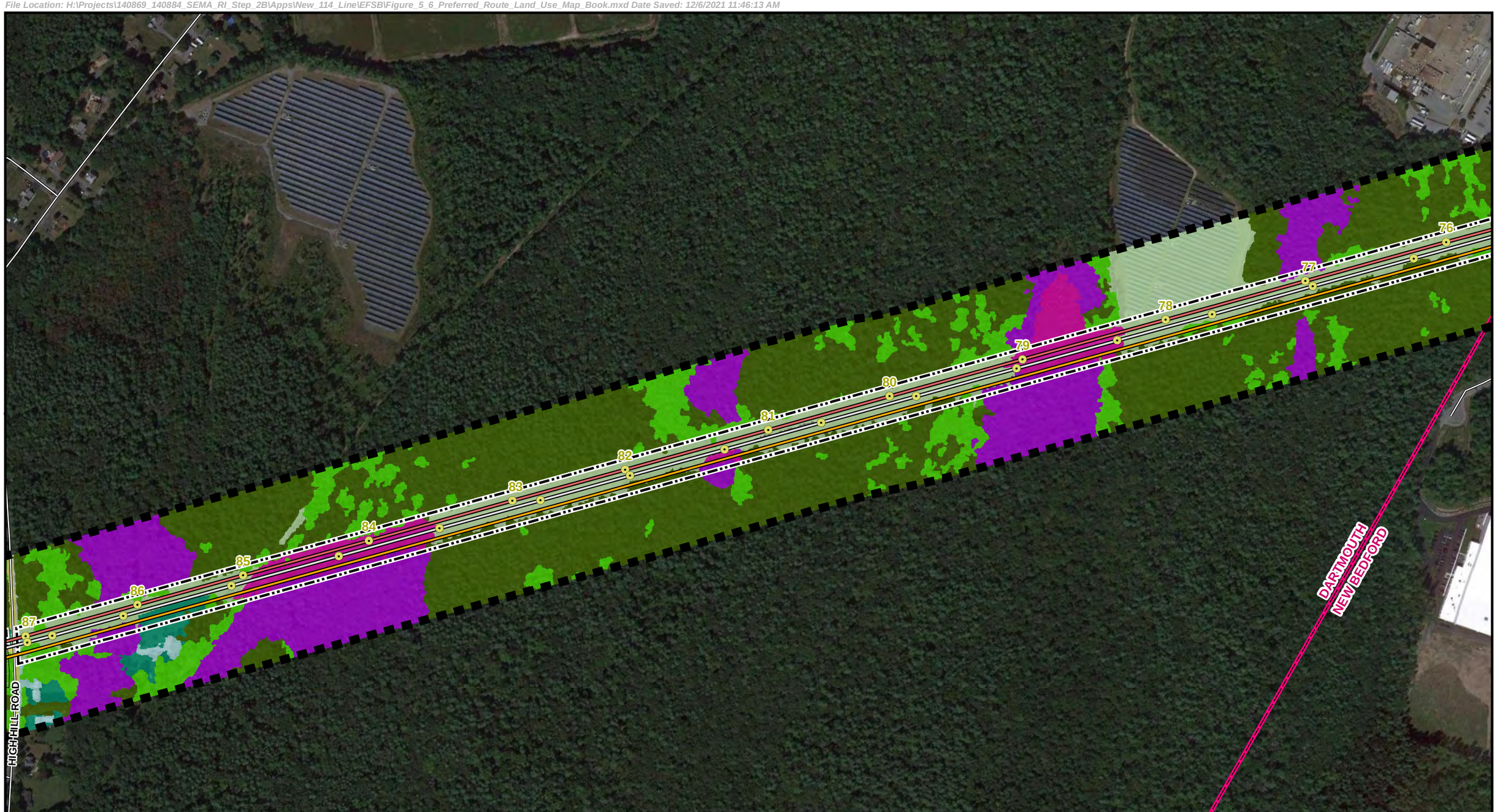



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- Residential - Single Family*
- Industrial*
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Bare Land*
- Grassland*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*

N

1 inch = 400 feet
0 200 400
Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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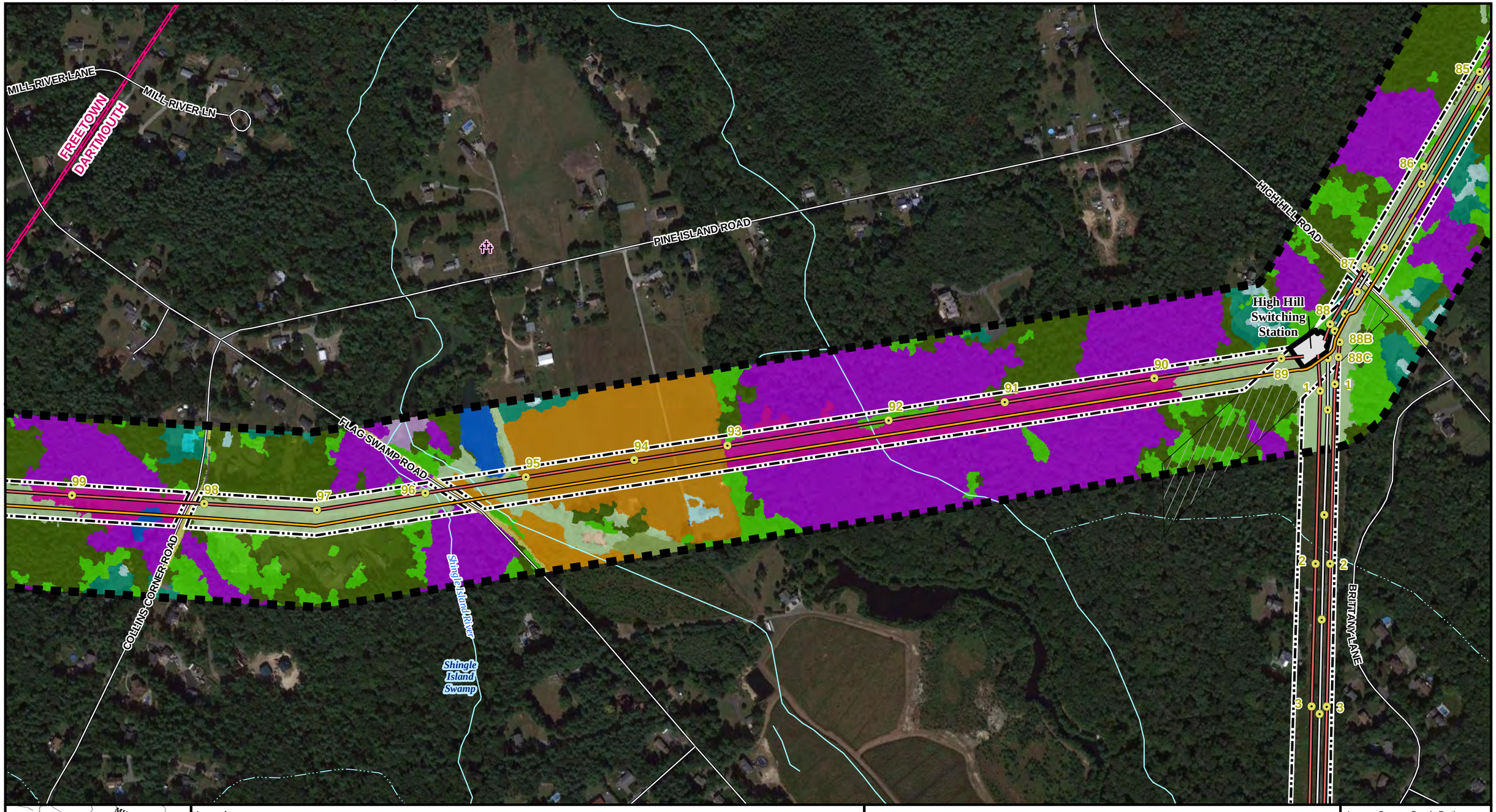



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- Cemetery
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Residential - Single Family*
- Residential - Multi-Family*
- Industrial*
- Other Impervious*
- Right-of-way*
- Cultivated*
- Pasture/Hay*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Aquatic Bed*
- Forested Wetland*
- Non-forested Wetland*
- Water*

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

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Imagery Source: Google Earth

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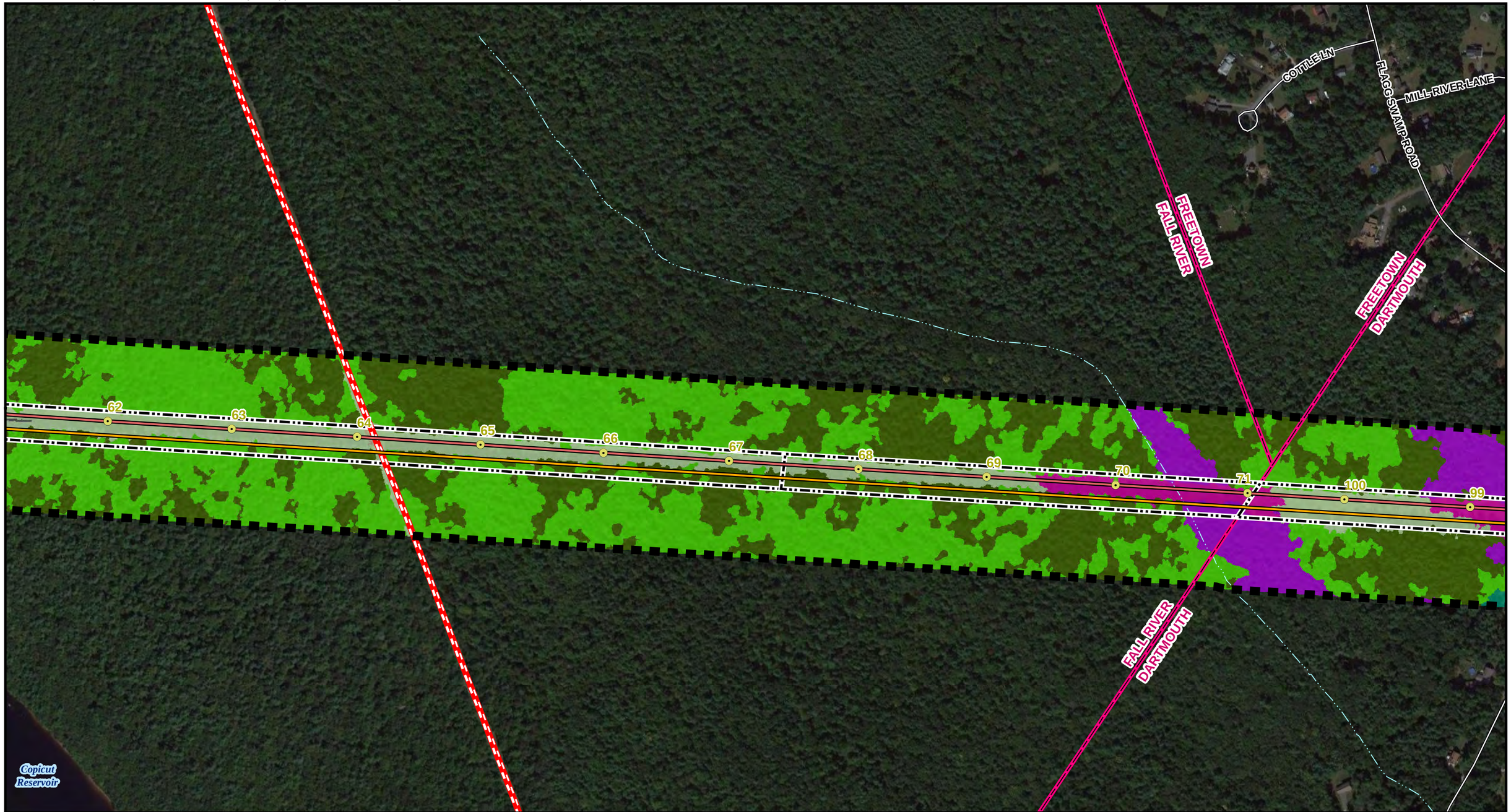

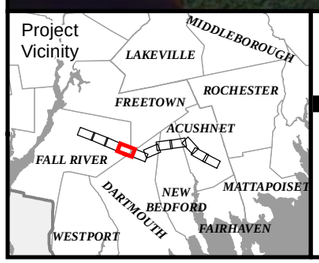

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Existing Right of Way
- Local Road
- Town Boundary
- Intermittent Stream (NHD)
- Residential - Single Family*
- Other Impervious*
- Developed Open Space*
- Bare Land*
- Grassland*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
City of Fall River, Towns of Dartmouth and Freetown

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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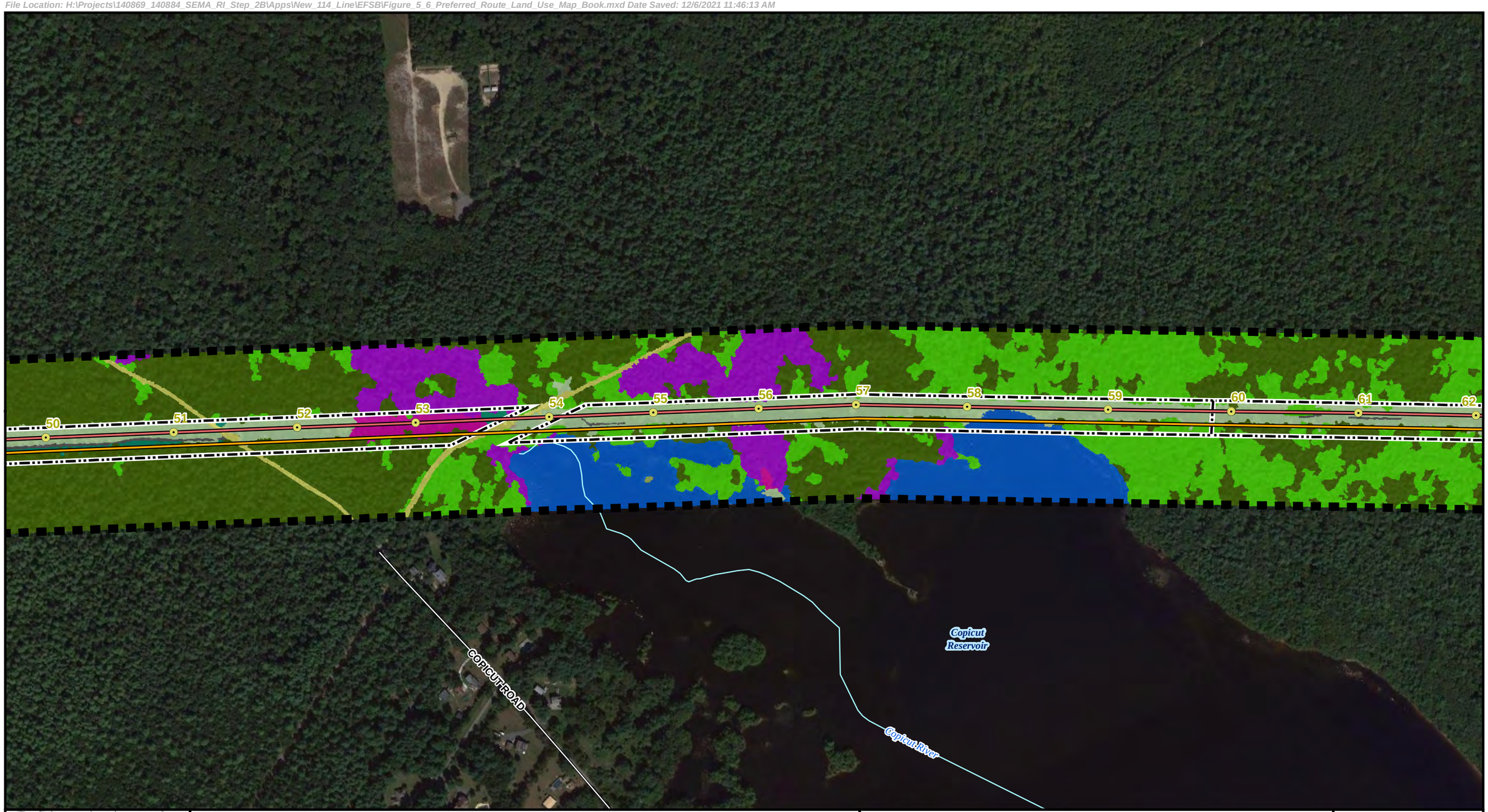

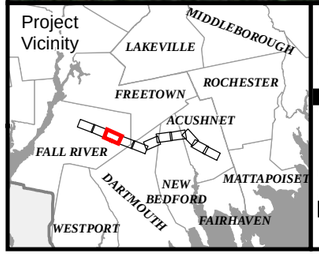

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Right of Way
- Local Road
- Town Boundary
- Perennial Stream (NHD)
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*
- Water*

N

1 inch = 400 feet

0 200 400

Feet

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

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Imagery Source: Google Earth

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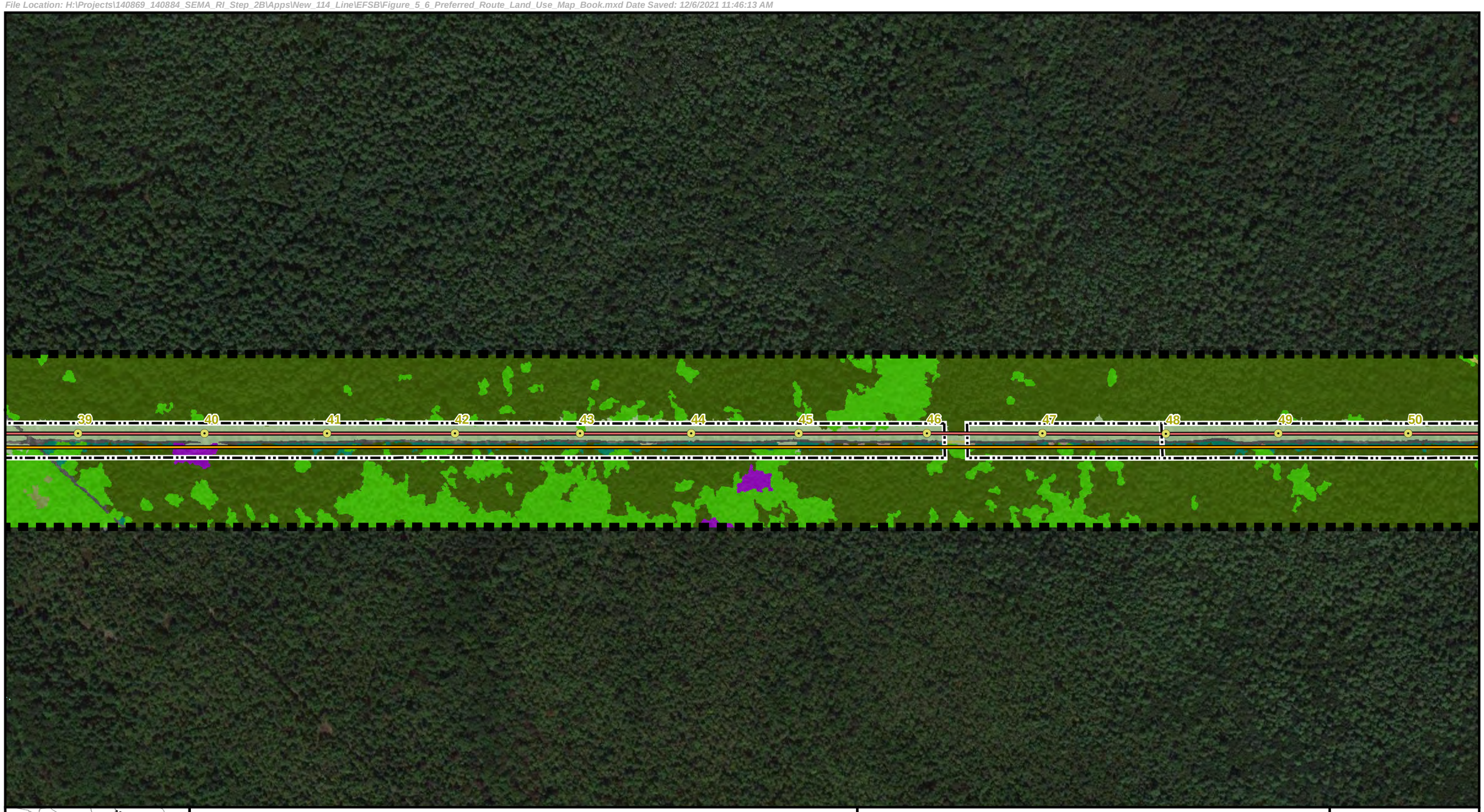



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Right of Way
- Town Boundary
- Intermittent Stream (NHD)
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

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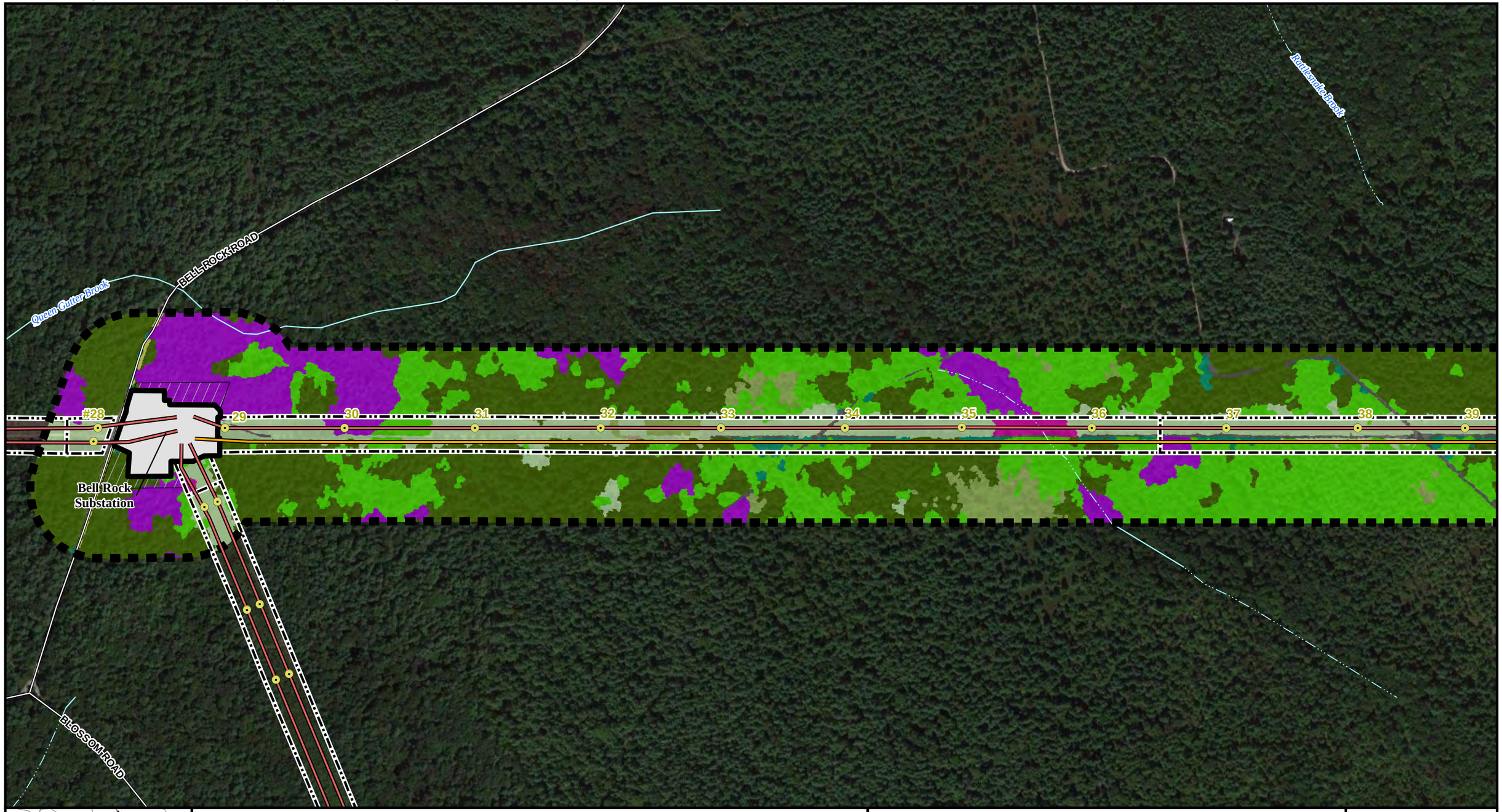

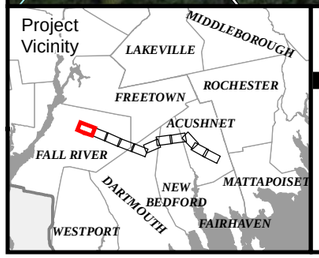

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Station
- Existing Right of Way
- National Grid Owned Land
- Local Road
- Town Boundary
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Industrial*
- Other Impervious*
- Right-of-way*
- Developed Open Space*
- Bare Land*
- Grassland*
- Scrub/Shrub*
- Deciduous Forest*
- Evergreen Forest*
- Forested Wetland*
- Non-forested Wetland*

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0 200 400

Feet

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.6 : Land Use Maps

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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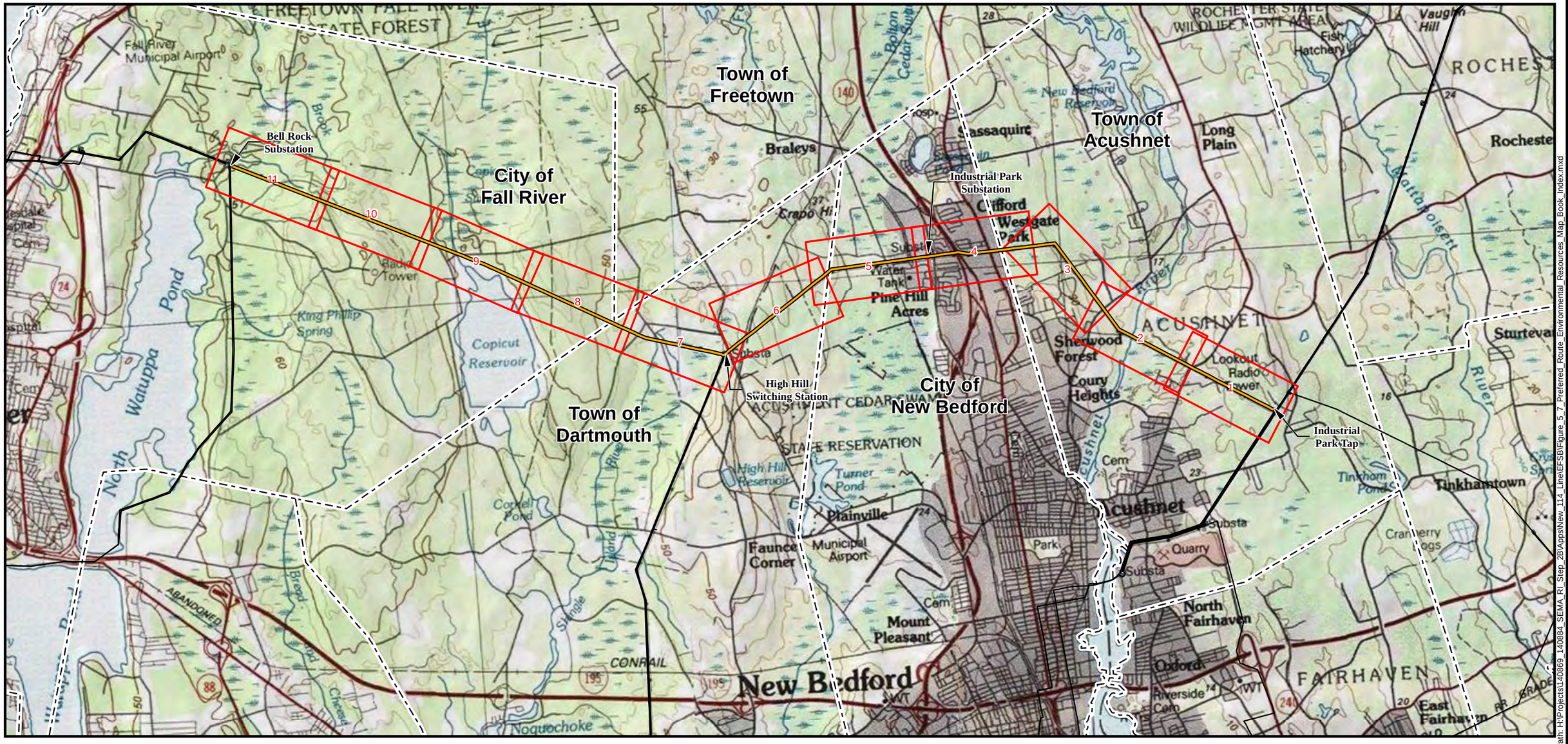
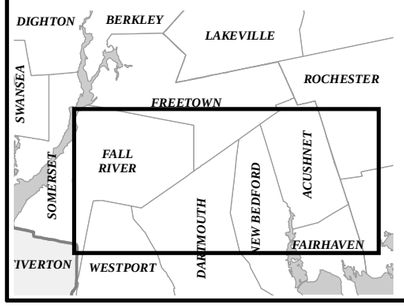


Project Vicinity



Legend

- Preferred Route
- Page Boundary
- Existing Transmission Line
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 5.7 : Environmental Resources Map Book Index

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE
nationalgrid

NOT FOR CONSTRUCTION

Date:12/6/2021

Author: TDH

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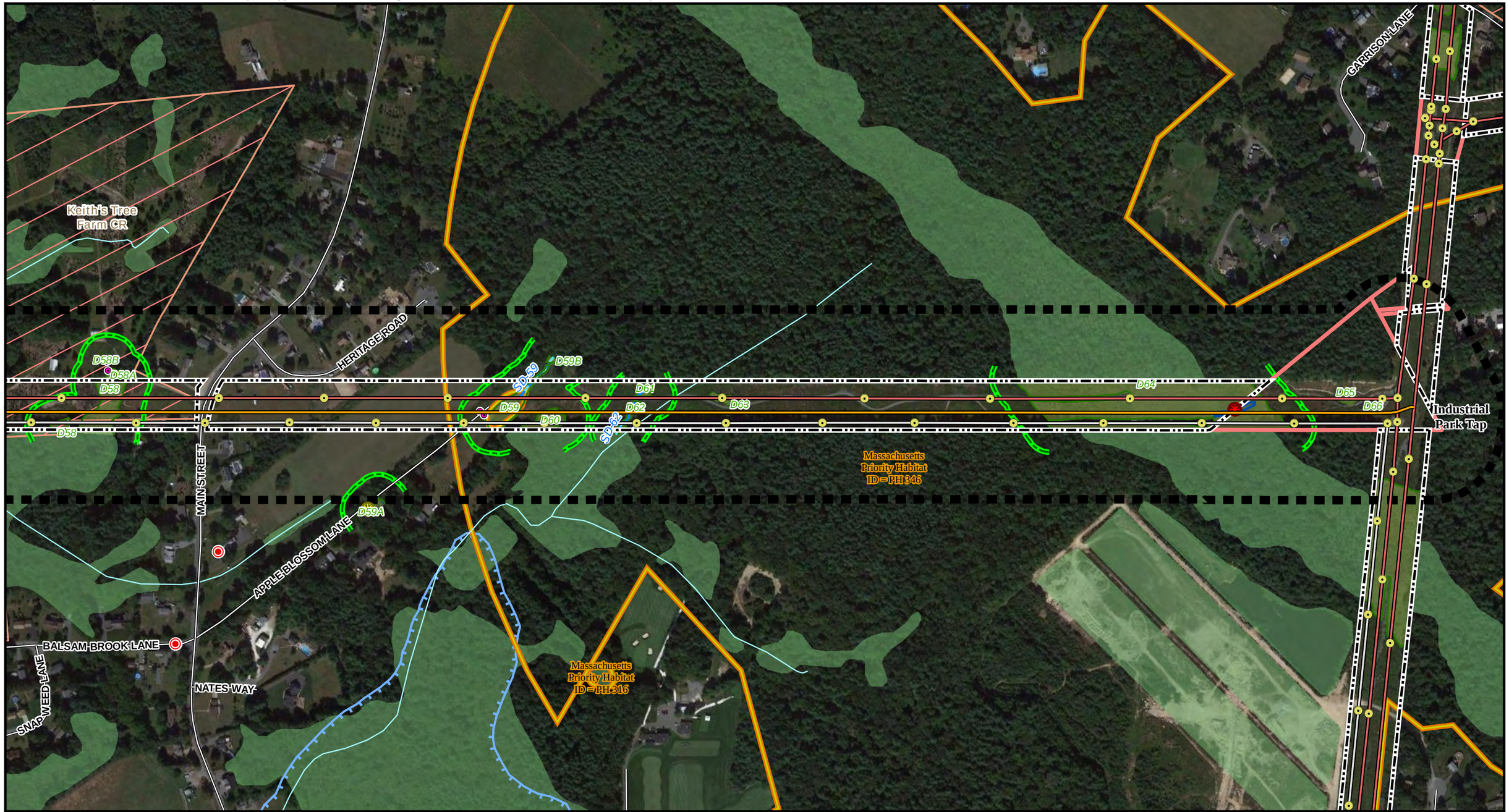

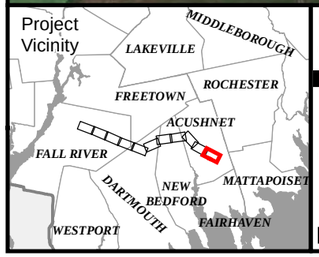

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- MHC Historic Inventory
- Field Identified Vernal Pool
- Potential Vernal Pool
- Culvert
- Intermittent Stream
- Ditch
- Wetland Border
- Isolated Wetland Border
- Inundation Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species
- Other Protected Lands

1 inch = 400 feet
0 200 400
Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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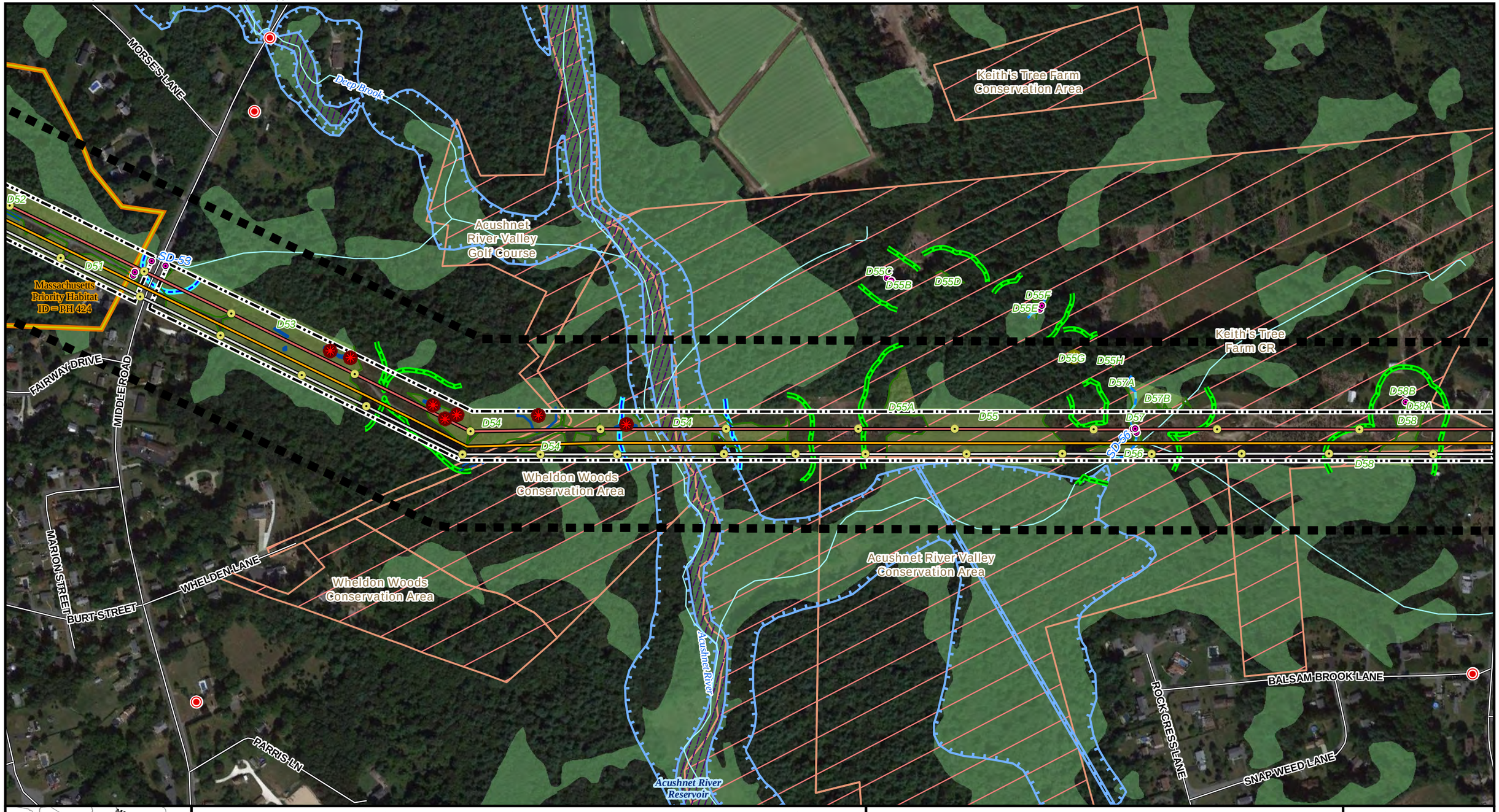

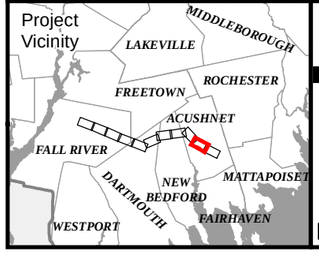

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Local Road
- Town Boundary
- MHC Historic Inventory
- Field Identified Vernal Pool
- Potential Vernal Pool
- Culvert
- Perennial Stream or River
- Intermittent Stream
- Ditch
- Wetland Border
- Inundation Area
- Riverfront Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- Floodway
- MA-NHESP Priority Habitats Rare Species
- Other Protected Lands

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

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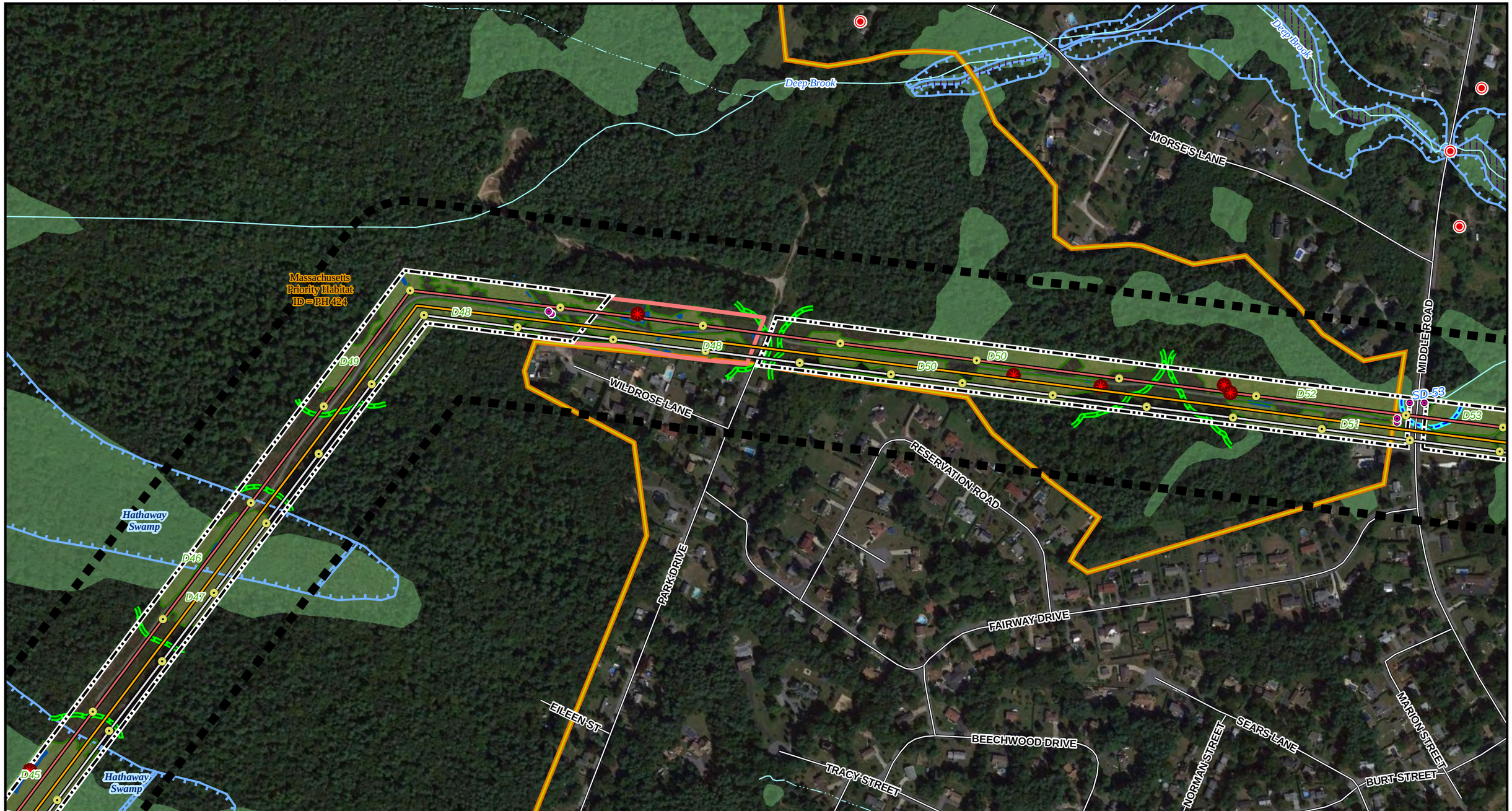



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- MHC Historic Inventory
- Field Identified Vernal Pool
- Culvert
- Perennial Stream or River
- Ditch
- Wetland Border
- Inundation Area
- Riverfront Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- Floodway
- MA-NHESP Priority Habitats Rare Species

1 inch = 400 feet
0 200 400
Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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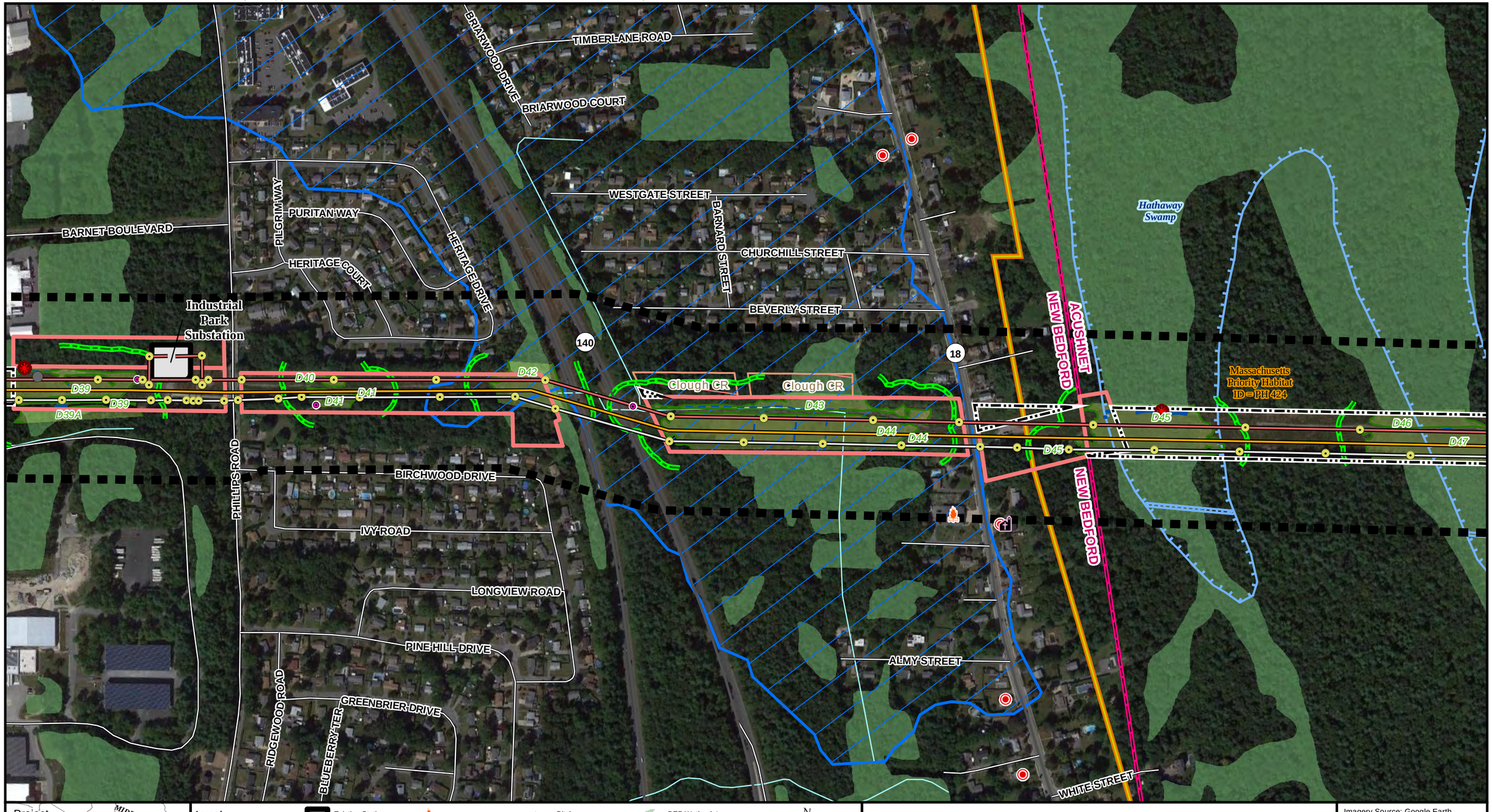
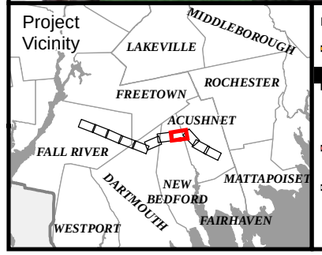




Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- State Highway
- Local Road
- Town Boundary
- Fire Station
- Church
- MHC Historic Inventory
- Field Identified Vernal Pool
- Culvert
- Man Hole
- Ditch
- Wetland Border
- Inundation Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
City of New Bedford, Town of Acushnet

Date: 12/6/2021

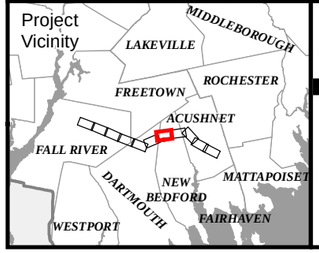
NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.





Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Railroad
- Town Boundary
- Field Identified Vernal Pool
- Culvert
- Man Hole
- Hydrant
- Certified Vernal Pools (NHESP)
- Perennial Stream or River
- Intermittent Stream
- Ditch
- Wetland Border
- Inundation Area

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
City of New Bedford, Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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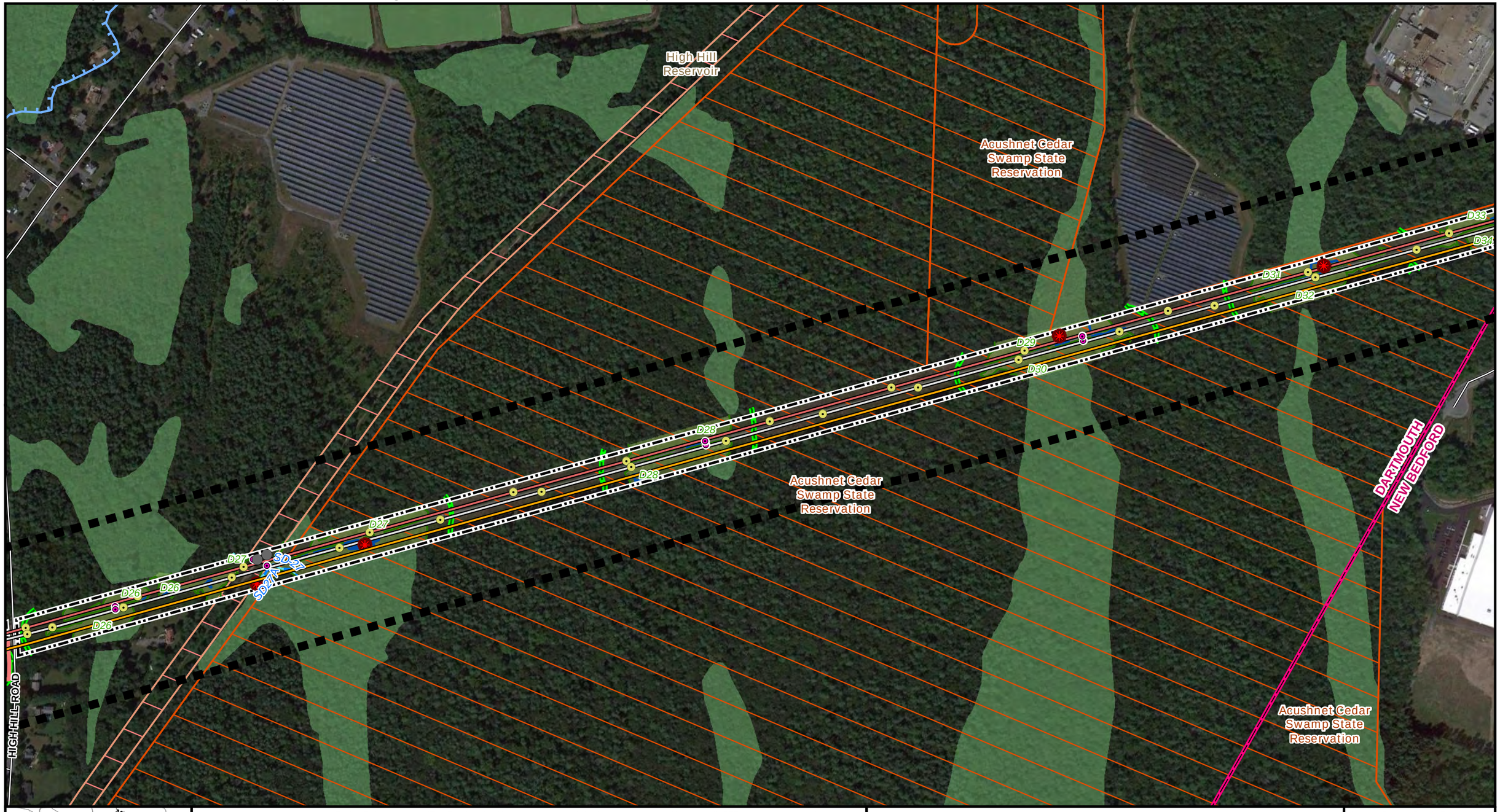



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- Field Identified Vernal Pool
- Culvert
- Man Hole
- Intermittent Stream
- Ditch
- Wetland Border
- Inundation Area
- 100 ft Buffer Wetland
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- Massachusetts DCR Protected Lands
- Other Protected Lands

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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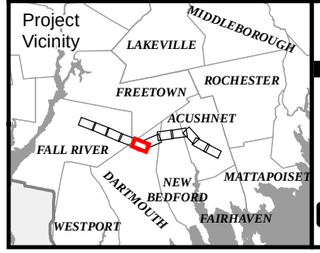

Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Station
- Existing Right of Way
- Eversource Owned Land
- Local Road
- Town Boundary
- Cemetery
- MHC Historic Inventory
- Field Identified Vernal Pool
- Culvert
- Man Hole
- Well
- Perennial Stream or River
- Intermittent Stream
- Ditch
- Wetland Border
- Isolated Wetland Border
- Inundation Area
- Riverfront Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species
- Other Protected Lands

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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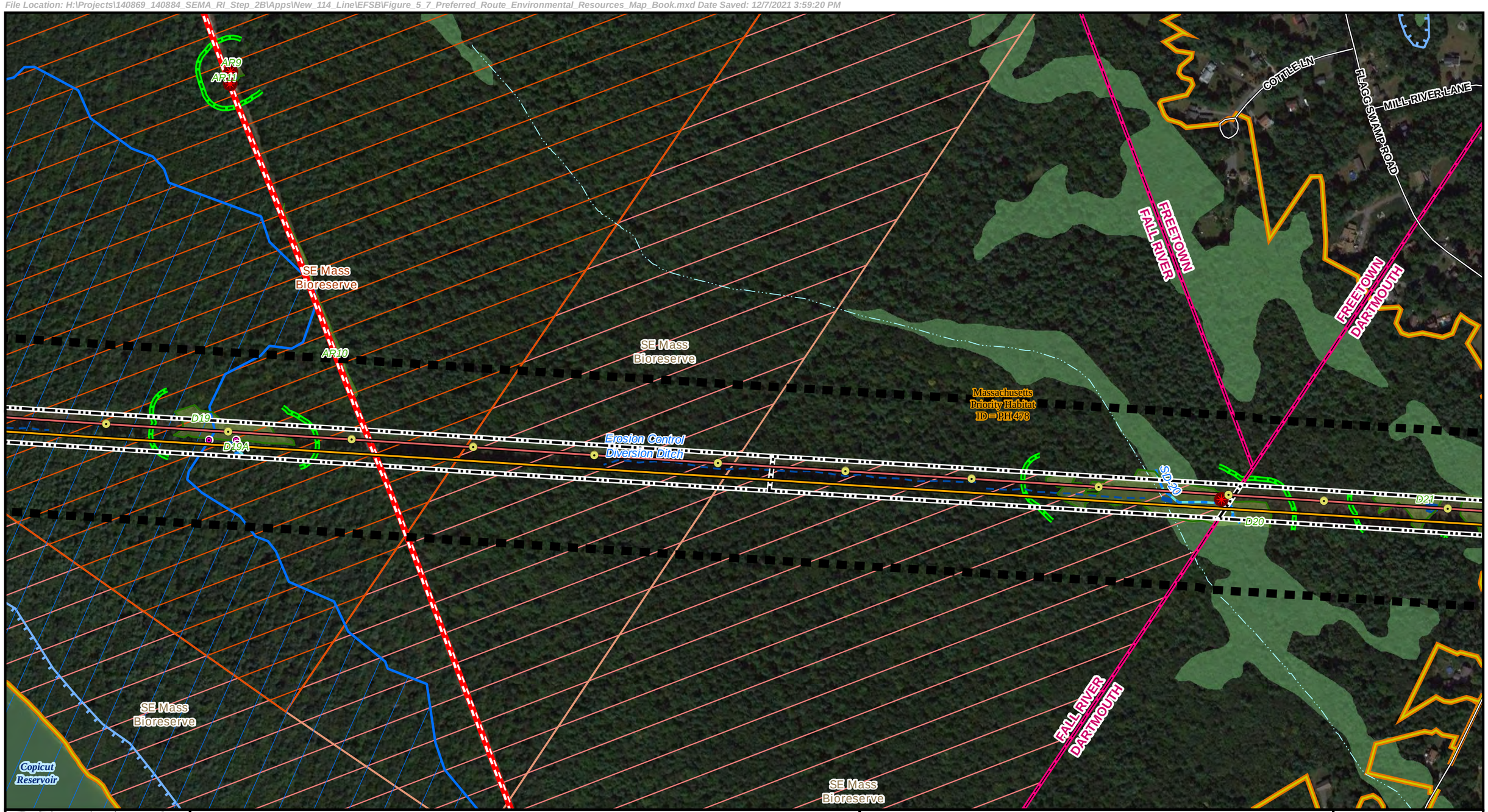



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Existing Right of Way
- Local Road
- Town Boundary
- Field Identified Vernal Pool
- Culvert
- Intermittent Stream
- Ditch
- Wetland Border
- Isolated Wetland Border
- Inundation Area
- 100 ft Buffer Wetland
- Intermittent Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
City of Fall River, Towns of Dartmouth and Freetown

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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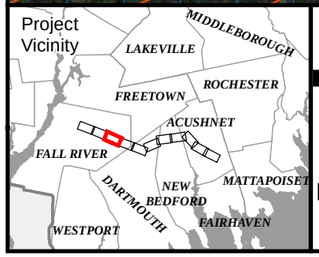
Project Vicinity



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Right of Way
- Local Road
- Town Boundary
- Field Identified Vernal Pool
- Culvert
- Certified Vernal Pools (NHESP)
- Perennial Stream or River
- Ditch
- Wetland Border
- Isolated Wetland Border
- Inundation Area
- Riverfront Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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Watuppa Reservation
Watuppa Reservation
Massachusetts Priority Habitat ID=PH478
Copicut WMA
SE Mass Bioreserve
D7A
D8
Copicut WCE
Copicut WMA
SE Mass Bioreserve

Project Vicinity



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Right of Way
- Town Boundary
- Field Identified Vernal Pool
- Intermittent Stream
- Wetland Border
- Isolated Wetland Border
- Inundation Area
- 100 ft Buffer Wetland
- Intermittent Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- FEMA Flood Hazard (DFIRM 100yr)
- MA-NHESP Priority Habitats Rare Species
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 400 feet
0 200 400
Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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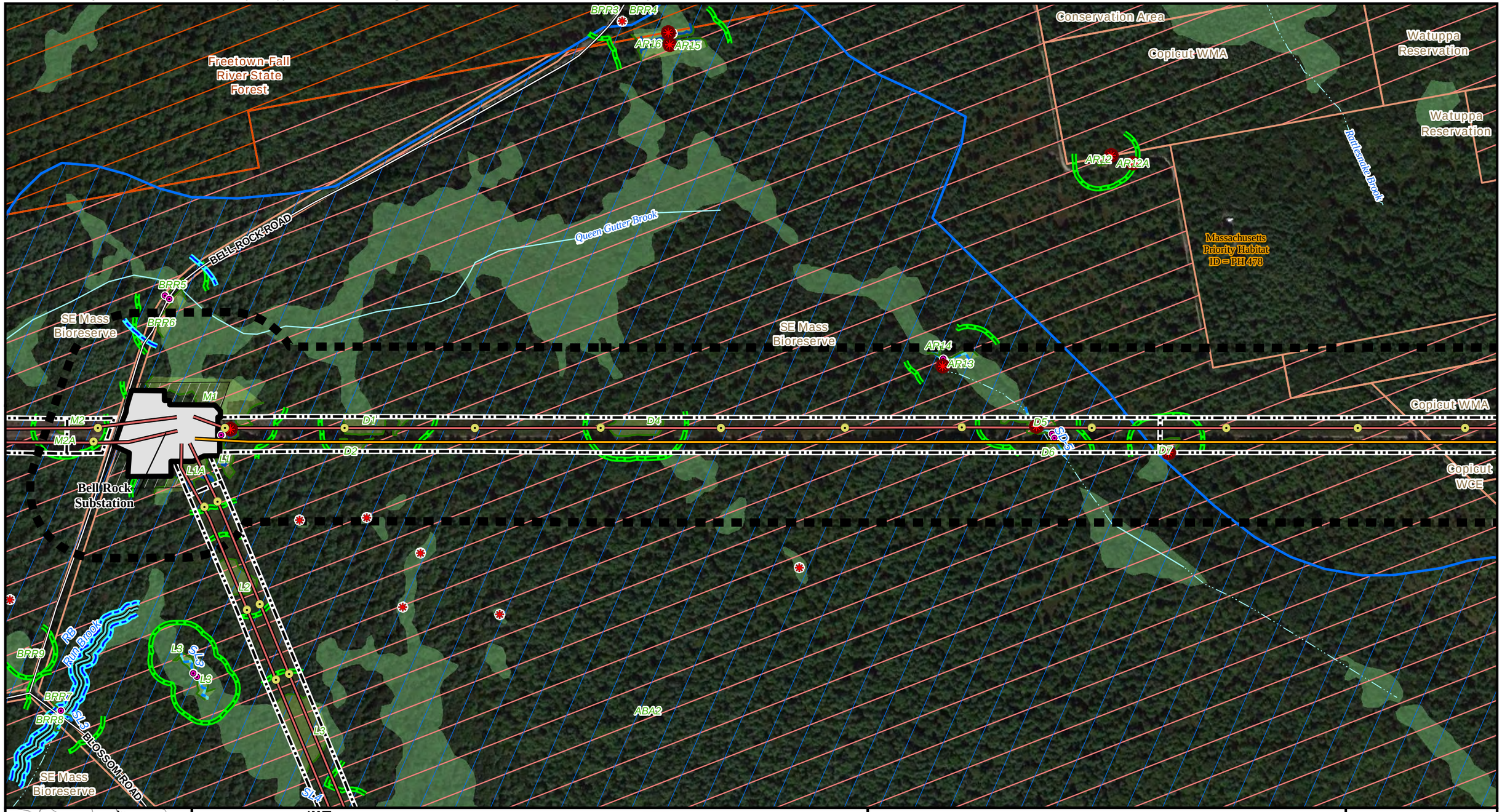



Legend

- Preferred Route
- Study Area
- Existing Transmission Structure
- Existing Transmission Line
- Existing Station
- Existing Right of Way
- National Grid Owned Land
- Local Road
- Town Boundary
- Field Identified Vernal Pool
- Culvert
- Certified Vernal Pools (NHESP)
- Perennial Stream or River
- Intermittent Stream
- Wetland Border
- Isolated Wetland Border
- Inundation Area
- Riverfront Area
- 100 ft Buffer Wetland
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Field Delineated Wetland*
- DEP Wetlands*
- MA-NHESP Priority Habitats Rare Species
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 400 feet

0 200 400

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Figure 5.7 : Environmental Resources Maps

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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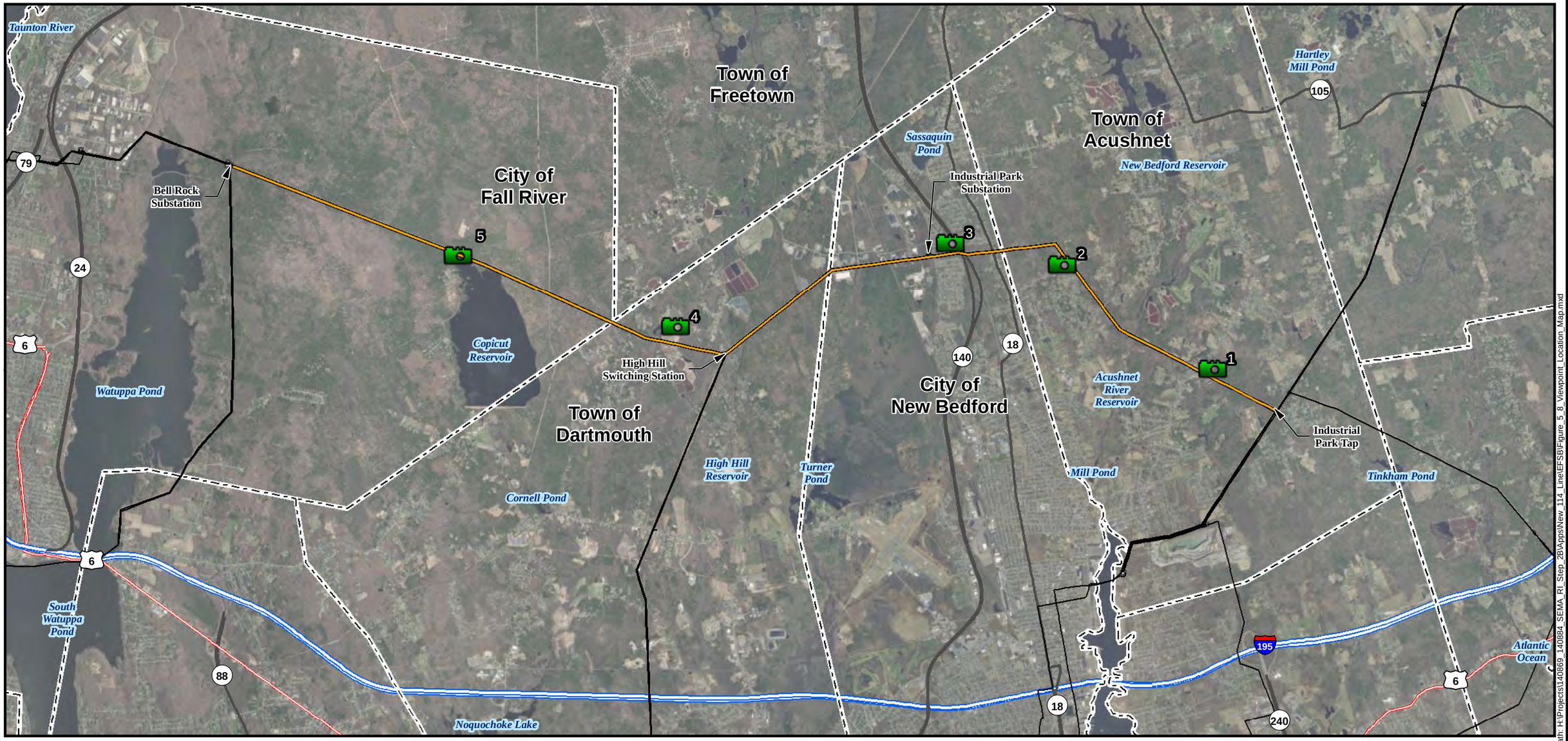
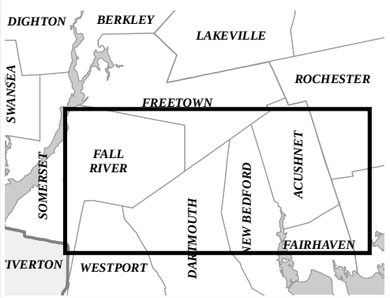


Project Vicinity



Legend

- Viewpoint
- Preferred Route
- Existing Transmission Line
- Town Boundary
- Interstate Highway
- US Highway
- State Highway

Acushnet to Fall River Reliability Project

Figure 5.8: Viewpoint Location Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE
nationalgrid

NOT FOR CONSTRUCTION

Date: 12/6/2021

Author: TDH

Path: H:\Projects\140869_140884_SEMA_RI_Step_2B\Apps\New_114_LineEFSB\Figure_5_8_Viewpoint_Location_Map.mxd

Site Location: Viewpoint 1: View west from Heritage Road in the Town of Acushnet
June 2018



EXISTING CONDITIONS



PROPOSED CONDITIONS

Site Location: Viewpoint 2: View east from Wildrose Lane in the Town of Acushnet
June 2018



EXISTING CONDITIONS



PROPOSED CONDITIONS

Site Location: Viewpoint 3: View southeast from Heritage Drive in the City of New Bedford
June 2018



EXISTING CONDITIONS



PROPOSED CONDITIONS

Site Location: Viewpoint 4: View south from Pine Island Road in the Town of Dartmouth
June 2018



EXISTING CONDITIONS



PROPOSED CONDITIONS

Site Location: Viewpoint 5: View east from Quanapoag Road in the City of Fall River
June 2018



EXISTING CONDITIONS



PROPOSED CONDITIONS

Town of Lakeville
Great Quittacas Pond
Long Pond
Taunton River
Snipatuit Pond
Town of Rochester
Tremont Substation
Town of Wareham
Town of Freetown
Town of Acushnet
Industrial Park Substation
Bell Rock Substation
Atlantic Ocean
Town of Marion
City of Fall River
Copicut Reservoir
High Hill Switching Station
City of New Bedford
Industrial Park Tap
Watuppa Pond
Town of Dartmouth
Town of Mattapoisett
Acushnet Substation
79
24
58
495
28
25
18
140
105
195
6

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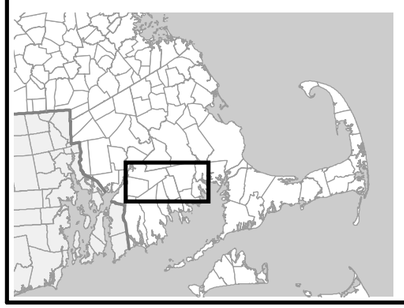
Project Vicinity



Legend

- Preferred Route
- Preferred Route 1 Mile Buffer
- Other Existing Transmission Line
- Town Boundary

Environmental Justice 2020 Populations

- Income
- Minority
- Minority and income

Acushnet to Fall River Reliability Project

Figure 5.9: Environmental Justice Populations

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

1:84,000

EVERSOURCE
nationalgrid

NOT FOR CONSTRUCTION

Date: 12/6/2021

Author: TDH

APPENDIX 1-1 EXPANDED ENVIRONMENTAL NOTIFICATION FORM DATED NOVEMBER 15, 2018

Erin Whoriskey
Lead Environmental Scientist
NE Environmental Permitting

Michael Zylich, P.G., LSP
Sr. Environmental Engineer
Licensing & Permitting

November 15, 2018

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Subject: New England Power Company d/b/a National Grid and
NSTAR Electric Company d/b/a Eversource Energy
Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project
Expanded Environmental Notification Form
Acushnet, New Bedford, Dartmouth and Fall River, Massachusetts

Dear Secretary Beaton:

The New England Power Company d/b/a National Grid ("NEP") and NSTAR Electric Company d/b/a Eversource Energy ("Eversource") (collectively, the "Companies") are pleased to submit the enclosed Expanded Environmental Notification Form ("EENF") for the Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project ("AFRRP") located in the municipalities of Acushnet, New Bedford, Dartmouth and Fall River.

In December 2016, the Independent System Operator, New England ("ISO-NE") presented preliminary preferred solutions to the Planning Advisory Committee. The ISO-NE Southeastern Massachusetts and Rhode Island Area ("SEMA-RI") 2026 Solutions Study, Revision 1 was released in March 2017. The ISO-NE Second Addendum Analysis Report to the Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment was issued in July 2018. The AFRRP and the Bell Rock Substation Rebuild Project are among the projects identified in the Solutions Study as necessary to ensure the reliability of the transmission system serving SEMA-RI.

The Companies maintain that the Bell Rock Substation Rebuild Project and the AFRRP are independent projects that serve separate purposes and needs distinct from one another. Nevertheless, at the request of the MEPA Office, the Companies are including both projects in this filing. In accordance with 301 CMR 11.11, the Companies respectfully request the Secretary grant a phase one waiver to allow the Bell Rock Substation Rebuild Project to proceed in advance of filing an Environmental Impact Report ("EIR") for the AFRRP in order to ensure that the schedule for the Bell Rock Substation Rebuild Project, and the delivery of important reliability benefits from that project, is not delayed. In the alternative, if the Secretary does not grant the waiver, the Companies request that the Secretary provide the same relief by granting a special review procedure under 301 CMR 11.09.

The Bell Rock Substation Rebuild Project will accommodate transmission line connections from the existing 115 kV M13 Line into the substation. The existing M13 Line currently crosses over, but does not electrically connect into, the station. As determined by the ISO-NE, the Bell Rock Substation Rebuild Project is needed in order to split the M13 Line into the M13N and M13S Line, and terminate both lines at the substation. In order to accommodate the two new M13N and M13S transmission line terminations,

the existing 115 kV Bell Rock Substation needs to be rebuilt and expanded into a breaker and a half configuration.

The AFRRP involves the construction of approximately 12 miles of new 115 kV overhead transmission line within existing NEP and Eversource ROWs. The purpose and need for the AFRRP is to eliminate the potential widespread voltage collapse and loss of load across 17 municipalities following a single (N-1) transmission contingency by providing an additional transmission source into the load pocket and additional voltage support at the existing NEP Bell Rock Substation and several of Eversource's existing substations including the High Hill and Wing Lane Substations. In so doing, it ensures continued compliance with applicable federal and regional transmission reliability standards and criteria and maintains reliable electric service to the SEMA-RI area.

The Companies respectfully request that the Notice of Availability for this EENF be published in the November 21, 2018 issue of the Environmental Monitor to initiate the public review and comment period. We acknowledge that the review period for the EENF requesting a phase one waiver and Single EIR lasts for 37 Days. Copies of the EENF have been distributed to public agencies and town officials in accordance with 301 CMR 11.16 (see enclosed circulation list). The New Bedford Standard Times and the Fall River Herald News will each publish a Public Notice of Environmental Review on November 15, 2018.

Please do not hesitate to contact me at (781) 907-3598, or Erin.Whoriskey@nationalgrid.com, or Michael Zylich, 781-441-3804 or michael.zylich@eversource.com, if you have any questions or require additional information. Thank you for your consideration and review.

Sincerely,





Erin Whoriskey
Lead Environmental Scientist
National Grid

Michael Zylich, P.G., LSP
Sr. Environmental Engineer
Licensing & Permitting

Attachments

c: Circulation List (attached)
D. Beron, NEP
N. Dennis, Eversource
W. Levine, NEP
L. Peloquin Shea, NEP
K. Hanecak, POWER
J. Durand, POWER

Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act (MEPA) Office

Environmental Notification Form

For Office Use Only

EEA#: _____

MEPA Analyst: _____

The information requested on this form must be completed in order to submit a document electronically for review under the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name: Bell Rock Substation Rebuild Project and the Acushnet to Fall River Reliability Project (AFRRP)		
Street Address: 181 Bell Rock Road in Fall River (Bell Rock Substation) and existing overhead transmission rights-of-way in Acushnet, New Bedford, Dartmouth and Fall River (AFRRP)		
Municipality: Acushnet, New Bedford, Dartmouth and Fall River	Watershed: Mount Hope Bay/ Narragansett Bay/ Buzzards Bay	
Universal Transverse Mercator Coordinates: UTM 18N NAD83 (Meters) Start: 825,445.6 Easting, 4,628,034.3 Northing End: 842,725.3 Easting, 4,623,958.7 Northing	Latitude: Start: -71.086728 End: -70.881797 Longitude: Start: 41.737478 End: 41.693607	
Estimated commencement date: 1st Quarter 2020 (Bell Rock Substation) 1st Quarter 2021 (AFRRP)	Estimated completion date: 2nd Quarter 2021 (Bell Rock Substation) 4th Quarter 2021 (AFRRP)	
Project Type: Electric substation (Bell Rock) and new transmission line (AFRRP)	Status of project design: ~30% complete	
Proponent: New England Power Company d/b/a National Grid (NEP) and NSTAR Electric Company d/b/a Eversource Energy (Eversource)		
Street Address: NEP, 40 Sylvan Road, Waltham, MA 02451 Eversource, 247 Station Drive, Westwood, MA 02090		
Municipality:	State:	Zip Code:
Name of Contact Person: Jamie Durand		
Firm/Agency: POWER Engineers, Inc.	Street Address: 100 John L. Dietsch Square	
Municipality: North Attleboro	State: MA	Zip Code: 02763
Phone: 774-643-1829	Fax: 774-643-1899	E-mail: jamie.durand@powereng.com

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?
☒Yes ☐No

If this is an Expanded Environmental Notification Form (ENF) (see 301 CMR 11.05(7)) or a Notice of Project Change (NPC), are you requesting:

a Single EIR? (see 301 CMR 11.06(8)) ☒Yes ☐No
a Special Review Procedure? (see 301CMR 11.09) ☒Yes ☐No (this is an alternative to the phase one waiver request below)
a Waiver of mandatory EIR? (see 301 CMR 11.11) ☐Yes ☐No
a Phase I Waiver? (see 301 CMR 11.11) ☒Yes ☐No
(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?

BELL ROCK SUBSTATION REBUILD PROJECT MEPA ENVIRONMENTAL NOTIFICATION FORM (ENF) THRESHOLDS
Wetlands, Waterways and Tidelands: alteration of 5,000 or more square feet of bordering or isolated vegetated wetlands. (301 CMR 11.03(3)(b)(1)(d))
Wetlands, Waterways and Tidelands: alteration of 1,000 or more sf of outstanding resource waters. (301 CMR 11.03(3)(b)(1)(c))

ACUSHNET TO FALL RIVER RELIABILITY PROJECT MEPA ENVIRONMENTAL IMPACT REPORT (EIR) THRESHOLDS
Wetlands, Waterways and Tidelands: alteration of one or more acres of bordering vegetated wetlands. (301 CMR 11.03(3)(a)(1)(a))
ACUSHNET TO FALL RIVER RELIABILITY PROJECT MEPA ENVIRONMENTAL NOTIFICATION FORM (ENF) THRESHOLDS
State-listed Species under M.G.L c. 131A: greater than two acres of disturbance of designated priority habitat, as defined in 321 CMR 10.02, that results in a take of a state-listed endangered or threatened species or species of special concern. (301 CMR 11.03(2)(b)(2))
Wetlands, Waterways and Tidelands: alteration of 5,000 or more sf of bordering or isolated vegetated wetlands. (301 CMR 11.03(3)(b)(1)(d))

Which State Agency Permits will the project require?

PROJECT	AGENCY/ REGULATORY AUTHORITY	PERMIT AND/OR PURPOSE OF APPROVAL
Bell Rock Substation Rebuild Project	Massachusetts Department of Environmental Protection (MassDEP)	Individual Section 401 Water Quality Certification
	MassDEP	Massachusetts Wetlands Protection Act (WPA) – Superseding Order of Conditions (potential)
	MA Natural Heritage and Endangered Species Program (NHESP)	Massachusetts Endangered Species Act (MESA) Review
	Massachusetts Historical Commission (MHC)	Massachusetts Historical Commission and Protection of Properties Included in the State Register of Historic Places (950 CMR 70 and 71) – Project Notification Form (PNF)
	Massachusetts Department of Conservation and Recreation (MA DCR)	Construction and Access Permit (potential)
Acushnet to Fall River Reliability Project	Massachusetts Energy Facilities Siting Board (EFSB)	Approval to construct and operate the project pursuant to G.L. c. 164, § 69J
	Massachusetts Department of Public Utilities (DPU)	Approval to construct and operate the project pursuant to G.L. c. 164, § 72
	MassDEP	Individual Section 401 Water Quality Certification

	MassDEP	Massachusetts WPA – Superseding Order of Conditions (potential)
	NHESP	MESA Review and approval of a Conservation Management Permit
	MHC	MHC and Protection of Properties Included in the State Register of Historic Places (950 CMR 70 and 71) –PNF
	Massachusetts Department of Conservation and Recreation (MA DCR)	Construction and Access Permit (potential)
	Massachusetts Department of Transportation (MassDOT)	State and Interstate Highway Right-of-Way Encroachment Permit and Crossing Permit

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:

Not Applicable: No financial assistance or land transfer will be associated with this Project.

Summary of Cumulative Project Size & Environmental Impacts[1]	**Existing**	**Change**	**Total**
LAND			
Total site acreage	294.75		
New acres of land altered		28.62[2]	
Acres of impervious area	0.05[3]	0.3	0.35[4]
Square feet of new bordering vegetated wetlands alteration		40,952[5]	
Square feet of new other wetland alteration		0	
Acres of new non-water dependent use of tidelands or waterways		0	
STRUCTURES			
Gross square footage	704 sf[6]	+1,600 sf[7]	2,304 sf (64ft x 36ft) control building[7]
Number of housing units	N/A	N/A	N/A
Transmission Line Structures	2	122 (121 permanent and one temporary) 2 existing structures to be removed	120
Maximum height (feet)	65 ft	+45	110 ft
TRANSPORTATION			
Vehicle trips per day	N/A	N/A	N/A
Parking spaces	N/A	N/A	N/A
WASTEWATER			
Water Use (Gallons per day)	N/A	N/A	N/A

Water withdrawal (GPD)	N/A	N/A	N/A
Wastewater generation/treatment (GPD)	N/A	N/A	N/A
Length of water mains (miles)	N/A	N/A	N/A
Length of sewer mains (miles)	N/A	N/A	N/A
Has this project been filed with MEPA before? ☐ Yes (EEA #_____) ☒No			
Has any project on this site been filed with MEPA before? ☐ Yes (EEA #_____) ☒No			

Notes:
[1] Refer to the EENF narrative for a separate summary of impacts for the Bell Rock Substation Rebuild Project and AFRRP.
[2]Area of Bell Rock Substation upgrade (limits of site clearing) and tree clearing for the AFRRP.
[3]Acres of existing impervious surface at the Bell Rock Substation as determined by aerial interpretation.
[4] Proposed impervious area (pavement and building roof) for the Bell Rock Substation.
[5] Total permanent fill in BVW for the AFRRP and Bell Rock Substation Rebuild Project
[6]Control Building to be removed at Bell Rock Substation.
[7] Difference between Existing and Total.
[8]Total is the proposed building at Bell Rock Substation.

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:

The attached EENF contains a comprehensive Project Narrative for the two projects included in this filing:

- Bell Rock Substation Rebuild Project being proposed by NEP; and
- The Acushnet to Fall River Reliability Project being proposed jointly by Eversource and NEP

Section 1.0 of the narrative includes the Introduction. Section 2.0 includes a detailed description of the Projects. Section 3.0 provides a description of the Project alternatives. Existing and proposed Land Use is discussed in Section 4.0. Wetlands and wildlife and rare species are addressed in Sections 5.0 and 6.0. Section 7.0 addresses Outstanding Resource Waters. Section 8.0 includes Historic and Archaeological Resource discussions. Section 9 addresses Cumulative Impacts. Climate Change Adaptation and Resiliency Greenhouse Gas Analysis, Noise, and Air Quality are described in Sections 10.0 - 11.0, respectively. Construction-Period Considerations are included in Section 12.0. Section 13.0 describes the Project Regulatory Compliance. Mitigation measures are described throughout the EENF and are summarized in Section 14.0.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN:
Is the project within or adjacent to an Area of Critical Environmental Concern?
☐Yes (Specify_____)
☒No
if yes, does the ACEC have an approved Resource Management Plan? ___ Yes ___ No;
If yes, describe how the project complies with this plan.
_____
Will there be stormwater runoff or discharge to the designated ACEC? ___ Yes ___ No;
If yes, describe and assess the potential impacts of such stormwater runoff/discharge to the designated ACEC.
_____

RARE SPECIES:
Does the project site include Estimated and/or Priority Habitat of State-Listed Rare Species? (see http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm)
☒Yes [Specify: Eastern Whip-poor-will (*Caprimulgus vociferous*), Eastern Box Turtle (*Terrapene carolina*), Long-leaved Panic-grass (*Panicum rigidulum ssp. pubescens*), Rigid Flax (*Linum medium var texanum*), Weak Rush (*Juncus debilis*), Philadelphia Panic-Grass (*Panicum philadelphicum spp. Philadelphicum*), Marbled Salamander (*Ambystoma opacum*).
Refer to section 6.0 for more information.]
☐No

HISTORICAL /ARCHAEOLOGICAL RESOURCES:
Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?
☒Yes (Specify_See Below_) ☒No

Please refer to Section 8.0 in EENF for detailed information on historic/archaeological resources.

If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources? ☐Yes (Specify_____) ☒No

WATER RESOURCES:
Is there an Outstanding Resource Water (ORW) on or within a half-mile radius of the project site?
_X_Yes ___No;
if yes, identify the ORW and its location.

North Watuppa Pond/Reservoir and Copicut Reservoir are identified as Class A public water supplies. Refer to Section 7.0 for more information.

(NOTE: Outstanding Resource Waters include Class A public water supplies, their tributaries, and bordering wetlands; active and inactive reservoirs approved by MassDEP; certain waters within Areas of Critical Environmental Concern, and certified vernal pools. Outstanding resource waters are listed in the Surface Water Quality Standards, 314 CMR 4.00.)

Are there any impaired water bodies on or within a half-mile radius of the project site? _X_Yes _No; if yes, identify the water body and pollutant(s) causing the impairment:_

North Watuppa Pond, Mercury in fish tissue (Category 4A), EPA TMDL No. 33880.
Acushnet River, Fecal Coliform, (Category 5) EPA TMDL No. 36170
Copicut Reservoir, Mercury in fish tissue (Category 5)
Copicut River, Mercury and PCB in fish tissue (Category 5)

Is the project within a medium or high stress basin, as established by the Massachusetts Water Resources Commission? ___Yes _X_No

STORMWATER MANAGEMENT:

Generally describe the project's stormwater impacts and measures that the project will take to comply with the standards found in MassDEP's Stormwater Management Regulations

According to the National Pollution Discharge Elimination System (NPDES) program in Massachusetts, Notices of Intent (NOI) will be submitted to the United States Environmental Protection Agency (USEPA) under the (NPDES) Stormwater Construction General Permit for Stormwater Discharge from Construction Activities. As required under this program, a site-specific Stormwater Pollution Prevention Plan (SWPPP) will be developed to ensure that the best management practices (BMPs) are implemented during construction to minimize pollutant discharges. Implementation of this plan will include extensive use of erosion and sediment control measures designed to minimize site disturbance and prevent opportunities for sedimentation to occur offsite or toward wetland resource areas.

NEP will also prepare a stormwater report for the Bell Rock Substation Rebuild Project for work associated with the increase in impervious area, which will submitted during the NOI process.

MASSACHUSETTS CONTINGENCY PLAN:

Has the project site been, or is it currently being, regulated under M.G.L.c.21E or the Massachusetts Contingency Plan? Yes ___ No _X__ ; if yes, please describe the current status of the site (including Release Tracking Number (RTN), cleanup phase, and Response Action Outcome classification):_____

Is there an Activity and Use Limitation (AUL) on any portion of the project site? Yes ___ No X; if yes, describe which portion of the site and how the project will be consistent with the AUL: _____.

Are you aware of any Reportable Conditions at the property that have not yet been assigned an RTN? Yes ___ No X ; if yes, please describe:_____

SOLID AND HAZARDOUS WASTE:

If the project will generate solid waste during demolition or construction, describe alternatives considered for re-use, recycling, and disposal of, e.g., asphalt, brick, concrete, gypsum, metal, wood:

The Projects will comply with MassDEP's Solid Waste and Air Pollution control regulations, pursuant to M.G.L c40, s.54.

If contaminated soils are encountered during construction, the soils will be handled in accordance with the following policies:

- National Grid*'s Environmental Guidance Documents* regarding projects at existing substations and excess soil management from construction projects on ROWs.
- Eversource *Construction & Maintenance Environmental Requirements. Best Management Practices Manual for Massachusetts and Connecticut.*

(NOTE: Asphalt pavement, brick, concrete and metal are banned from disposal at Massachusetts landfills and waste combustion facilities and wood is banned from disposal at Massachusetts landfills. See 310 CMR 19.017 for the complete list of banned materials.)

Will your project disturb asbestos containing materials? Yes _ _ No __ ; See response below.
if yes, please consult state asbestos requirements at http://mass.gov/MassDEP/air/asbhom01.htm

Prior to construction, NEP will complete a pre-characterization and building materials assessment at the Bell Rock Substation site. If any potentially hazardous materials are encountered, any required remediation will be performed in consultation with the MassDEP.

Describe anti-idling and other measures to limit emissions from construction equipment:

Eversource and NEP shall take measures to limit vehicle idling times and to reduce air emissions, including the following:

- In Massachusetts, any diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction will either be USEPA Tier 4-compliant or will be retrofitted with USEPA-verified (or equivalent) emission control devices such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine.

- The use of ultra-low sulfur diesel fuel in its diesel-powered construction equipment and limits idling time to five minutes except when engine power is necessary for the delivery of materials or to operate accessories to the vehicle such as power lifts.

- Vehicle idling is to be minimized during the construction phase of the Project, in compliance with the following:

    - Massachusetts Anti-idling Law, G.L. c. 90 § 16A, c. 111 §§ 142A – 142M, and 310 CMR 7.11.

In addition, NEP contractors will adhere to National Grid's Environmental Guidance (EG-802MA) Vehicle Idling – Massachusetts.

DESIGNATED WILD AND SCENIC RIVER:

Is this project site located wholly or partially within a defined river corridor of a federally designated Wild and Scenic River or a state designated Scenic River? Yes ___ No _X__ ;
if yes, specify name of river and designation:

If yes, does the project have the potential to impact any of the "outstandingly remarkable" resources of a federally Wild and Scenic River or the stated purpose of a state designated Scenic River?
Yes ___ No ___ ; if yes, specify name of river and designation: _____;
if yes, will the project will result in any impacts to any of the designated "outstandingly remarkable" resources of the Wild and Scenic River or the stated purposes of a Scenic River.
Yes ___ No ___ ;
if yes,describe the potential impacts to one or more of the "outstandingly remarkable" resources or stated purposes and mitigation measures proposed.

ATTACHMENTS:

1. List of all attachments to this document.
   - **Cover Letter and Circulation List**
   - **Project Narrative**
   - **Appendices A through K**

2. U.S.G.S. map (good quality color copy, 8-½ x 11 inches or larger, at a scale of 1:24,000) indicating the project location and boundaries. **(See Appendix A)**

3.. Plan, at an appropriate scale, of existing conditions on the project site and its immediate environs, showing all known structures, roadways and parking lots, railroad rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities. **(See Appendix A)**

4 Plan, at an appropriate scale, depicting environmental constraints on or adjacent to the project site such as Priority and/or Estimated Habitat of state-listed rare species, Areas of Critical Environmental Concern, Chapter 91 jurisdictional areas, Article 97 lands, wetland resource area delineations, water supply protection areas, and historic resources and/or districts. **(See Appendix A)**

5. Plan, at an appropriate scale, of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase). **(See Appendix A)**

6. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2). **(See Cover Letter and attached Circulation List)**

7. List of municipal and federal permits and reviews required by the project, as applicable. **(See Table 1-5: State Agency Permits, Reviews and Approvals)**

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to **land** (see 301 CMR 11.03(1)
___ Yes _X_ No; if yes, specify each threshold:

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

Bell Rock Substation*	Existing	Change	Total
Footprint of buildings	0.02[1]	0.04[2]	~0.06[3]
Internal roadways	N/A	N/A	N/A
Parking and other paved areas	0	0.3[4]	0.3[4]
Other altered areas	N/A	N/A	N/A
Undeveloped areas	N/A	N/A	N/A
Total: Project Site Acreage	2.75	0	2.75

Notes:
[1]Existing Building as Bell Rock Substation 704 square feet (32ft x 22ft).
[2]Difference between Existing and Total.
[3]Proposed building for Bell Rock Substation (64ft x 36ft).
[4]Proposed paved surfaces at Bell Rock Substation.
* Facilities described above pertain only to the Bell Rock Substation. No buildings or other paved areas are proposed for the AFRRP.

B. Has any part of the project site been in active agricultural use in the last five years?
Yes ___ No _X_; if yes, how many acres of land in agricultural use (with prime state or locally important agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use?
Yes __ No _X_; if yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a forest management plan approved by the Department of Conservation and Recreation:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? Yes ___ No _X_; if yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction? Yes ___ No _X_; if yes, does the project involve the release or modification of such restriction? ___ Yes ___ No; if yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? Yes ___ No _X_; if yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? Yes ___ No X_; if yes, describe:

III. Consistency

A. Identify the current municipal comprehensive land use plan
Title: City of Fall River Master Plan 2009-2030 Date_____12/11/2009_____

Title: City of Fall River Community Preservation Plan Date_____April 2014_____
Title: Town of Acushnet Master Plan Date_____January 2008_____
Title: City of New Bedford Preservation Plan Date_____June 2017_____
Title: City of New Bedford Master Plan 2020 Date_____2010_____
Title: Town of Dartmouth Master Plan 2007 Date_____2007 _____

B. Describe the project's consistency with that plan with regard to:
1) economic development __See Below_____
2) adequacy of infrastructure __See Below _____
3) open space impacts _See Below _____
4) compatibility with adjacent land uses___See Below_____

Since the both the Bell Rock Substation Rebuild Project and the AFRRP are located entirely within existing utility easements held by NEP or Eversource, permanent impacts to adjacent land uses will be minimized, despite tree clearing activities which are a component of the Project. Overall, the Bell Rock Substation Rebuild Project and the AFRRP are not expected to change or significantly impact land uses since no acquisition of additional land is required and there will be no change to the present use. Therefore, the Bell Rock Substation Rebuild Project and the AFRPP are consistent with the existing public utility presence in the area.

Community Preservation Plan
In terms of regional and local land use planning, the Bell Rock Substation Rebuild Project and the AFRRP are anticipated to remain consistent with the Community Preservation Plans of the area. These plans discuss community preservation goals and projects specific to preservation within each of the four designated purposes of the Community Preservation Act (these include open space, recreation, historic preservation, and community housing). These plans do not specifically address energy or electrical transmission lines.

Refer to Section 4 for more information.

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)
RPA: Southeastern Regional Planning and Economic Development District

Title: _Regional Land Use: Role, Policies and Plan Outline for Southeastern Massachusetts_____ Date _June 1996_____

D. Describe the project's consistency with that plan with regard to:
1) economic development __See Below_____
2) adequacy of infrastructure ___See Below_____
3) open space impacts _____See Below_____

The Bell Rock Substation Rebuild Project and the AFRRP are located within the areas covered by the Southeastern Regional Planning and Economic Development District (SRPEDD). The SRPEDD's existing plans include the *Regional Land Use: Role, Policies and Plan Outline for Southeastern Massachusetts (1996), Southeastern Massachusetts: Vision 2020 - An Agenda for the Future (1999), and the Regional Transportation Plan (2012).* These documents review growth trends within the region, and outline the strategic goals and policies aimed at promoting sound land use planning. The policies discussed in these Plans are primarily concerned with preventing sprawl; reducing the loss of open space and farmland; and encouraging appropriate infill in more developed "growth" areas. Utility facilities or services are not explicitly addressed in these documents.

The purpose of the Bell Rock Substation Rebuild Project and the AFRRP are to improve

electric transmission reliability in the Southeastern Massachusetts area. The Bell Rock Substation Rebuild Project and the AFRRP will also maintain compliance with regional and national electric standards. The Bell Rock Substation Rebuild Project and the AFRRP are within existing utility easements. No new cross-country ROWs are proposed. As a result, the Bell Rock Substation Rebuild Project and the AFRRP are consistent with the policies contained in the planning documents.

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **rare species or habitat** (see 301 CMR 11.03(2))? _X_ Yes ___ No; if yes, specify, in quantitative terms:

(NOTE: If you are uncertain, it is recommended that you consult with the Natural Heritage and Endangered Species Program (NHESP) prior to submitting the ENF.)

B. Does the project require any state permits related to **rare species or habitat**? _X_ Yes ___ No

C. Does the project site fall within mapped rare species habitat (Priority or Estimated Habitat?) in the current Massachusetts Natural Heritage Atlas (attach relevant page)? __X_ Yes ___ No.

D. If you answered "No" to all questions A, B and C, proceed to the **Wetlands, Waterways, and Tidelands Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? _X _ Yes ___ No. Priority Habitat PH364 and PH517 and Estimated Habitat EH336 & EH449. If yes,
1. Have you consulted with the Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP)? _X_Yes ___No; Refer to EENF, Appendix B. if yes, have you received a determination as to whether the project will result in the "take" of a rare species? ___ Yes _X_ No; if yes, attach the letter of determination to this submission.

2. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes __ No; if yes, provide a summary of proposed measures to minimize and mitigate rare species impacts

The Companies are actively coordinating with the NHESP regarding the state-listed species in the vicinity of the Bell Rock Substation Rebuild Project and AFRRP, and will continue with this consultation in order to minimize or avoid potential adverse effects on rare species during design, construction, and operation. At this time, no formal take determine has been made for the Bell Rock Substation Rebuild Project or AFRRP. Refer to Section 6 for more information.

3. Which rare species are known to occur within the Priority or Estimated Habitat?

SCIENTIFIC NAME	COMMON NAME	TAXONOMIC GROUP	STATE STATUS
Panicum rigidulum ssp *pubescens*	Long-leaved Panic-grass	Plant	Threatened
Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern
Linum medium var *texanum*	Rigid Flax	Plant	Threatened
Juncus debilis	Weak Rush	Plant	Endangered
Panicum philadelphicum	Philadelphia	Plant	Special Concern

ssp. *philadelphicum*	Panic-Grass		
Ambystoma opacum	Marbled Salamander	Amphibian	Threatened

4. Has the site been surveyed for rare species in accordance with the Massachusetts Endangered Species Act? _X_ Yes ___ No

5. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? __ Yes _X__ No; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? __ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes __ No; if yes, provide a summary of proposed measures to minimize and mitigate impacts to significant habitat:

The Companies are actively coordinating with the NHESP regarding the state-listed species in the vicinity of the Bell Rock Substation Rebuild Project and AFRRP, and will continue with this consultation in order to minimize or avoid potential adverse effects on rare species during design, construction, and operation. At this time, no formal take determine has been made for the Bell Rock Substation Rebuild Project or AFRRP. Refer to Section 6 for more information.

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wetlands, waterways, and tidelands** (see 301 CMR 11.03(3))? _X_ Yes ___ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? _X_ Yes ___ No; if yes, specify which permit:

MassDEP / Local Conservation Commissions – Massachusetts Wetlands Protection Act (WPA)

C. If you answered "No" to both questions A and B, proceed to the **Water Supply Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? _X_ Yes ___ No;
if yes, has a Notice of Intent been filed? ___ Yes _X_ No;
if yes, list the date and MassDEP file number: _____;
if yes, has a local Order of Conditions been issued? ___ Yes ___ No;
Was the Order of Conditions appealed? ___ Yes ___ No.
Will the project require a Variance from the Wetlands regulations? ___ Yes ___ No.

B. Describe any proposed permanent or temporary impacts to wetland resource areas located on the project site: **See Section 5.0**

C. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Coastal Wetlands		
Land Under the Ocean Designated Port Areas	___N/A___	_____
Coastal Beaches	___N/A___	_____
Coastal Dunes	___N/A___	_____
Barrier Beaches	___N/A___	_____
Costal Banks	___N/A___	_____
Rocky Intertidal Shores	___N/A___	_____
Salt Marshes	___N/A___	_____
Land Under Salt Ponds	___N/A___	_____
Land Containing Shellfish	___N/A___	_____
Fish Runs	___N/A___	_____
Land Subject to Costal Storm Flowage	___N/A___	_____

	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Inland Wetlands		
Bank (lf)	202 lf	Temporary Linear feet of construction mats where stream crossings could not be avoided.
	625 square feet	Permanent Square feet of impact associated with one culvert crossing in a stream.
Bordering Vegetated Wetlands (BVW)	449,089 sf	Temporary Approximately 313,427 sf (7.20 acres) for construction mats for access routes and work pads where BVW crossings could not be avoided.
		Permanent Approximately 40,952 sf (0.94 acres) of permanent fill for the Bell Rock Substation footprint and AFRRP structures. Approximately 94,710 sf (2.17 acres) of conversion of forested wetlands to scrub shrub wetlands due to tree clearing.
Land Under Water (LUW)	0	
Bordering Land Subject to Flooding (BLSF)	91,992 sf	Temporary Approximately 91,707 sf (2.11 acre) for temporary construction access for access routes and work pads where BLSF crossings could not be avoided.
		Permanent Approximately 285 sf (0.01 acre) of permanent fill for AFRRP Line Structures.

	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Riverfront Area (RFA)	56,535 sf	Temporary Approximately 49,309 sf (1.13 acre) for temporary construction access for access routes and work pads where RFA crossings could not be avoided. Permanent Approximately 7,226 sf (0.17 acre) of permanent fill for AFRRP Line Structures.

Notes: Impacts are based on preliminary design and represent a conservative estimate of Project-related disturbances. The EENF narrative provides a separate summary of impacts for the Bell Rock Substation and AFRRP impacts.

D. Is any part of the project:

1. proposed as a **limited project**? _X_ Yes ___ No; if yes, what is the area (in sf)?____ Each project is proposed as a limited project.
2. the construction or alteration of a **dam**? ___ Yes _X_ No; if yes, describe:
3. fill or structure in a **velocity zone** or **regulatory floodway**? ___ Yes _X_ No The AFRRP will result in impacts to the 100-year floodplain. No impacts are anticipated to regulatory floodways.
4. dredging or disposal of dredged material? ___ Yes _X_ No; if yes, describe the volume of dredged material and the proposed disposal site:
5. a discharge to an **Outstanding Resource Water (ORW)** or an **Area of Critical Environmental Concern (ACEC)**? _X_ Yes ___ No
6. subject to a wetlands restriction order? ___ Yes _X__ No; if yes, identify the area (in sf):
7. located in buffer zones? _X_Yes ___No; if yes, how much (in sf) _107,125 sf of permanent impacts to 100' buffer zones.

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? __ Yes ___ No
2. alter any federally-protected wetlands not regulated under state law? __ Yes _X_ No; if yes, what is the area (sf)? *No permanent impacts to IVW are proposed.

The Companies will consult with the MassDEP as the AFRRP design is finalized and anticipate that, if the work is not exempt, notices of minor modification will be sufficient to address crossings of waterways determined to be navigable and jurisdictional by the MassDEP.

III. Waterways and Tidelands Impacts and Permits

A. Does the project site contain waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? _X__ Yes __ No; if yes, is there a current Chapter 91 License or Permit affecting the project site? _X__ Yes ___ No; if yes, list the date and license or permit number and provide a copy of the historic map used to determine extent of filled tidelands: Acushnet River Crossing – License No. 4374, Recorded October 19, 1960

NEP and Eversource will coordinate with the MassDEP Waterways Program to review project plans as they relate to Chapter 91 jurisdiction and will obtain any necessary approval(s) under the Chapter 91 Waterways Program.

B. Does the project require a new or modified license or permit under M.G.L.c.91? ___ Yes __ No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water-dependent

use? Current ___ Change ___ Total ___
If yes, how many square feet of solid fill or pile-supported structures (in sf)?

NEP and Eversource will coordinate with the MassDEP Waterways Program to review project plans as they relate to Chapter 91 jurisdiction and will obtain any necessary approval(s) under the Chapter 91 Waterways Program.

C. For non-water-dependent use projects, indicate the following:
Area of filled tidelands on the site:_____N/A_____
Area of filled tidelands covered by buildings:__N/A_____
For portions of site on filled tidelands, list ground floor uses and area of each use: ____N/A_____
Does the project include new non-water-dependent uses located over flowed tidelands? Yes ___ No ___
Height of building on filled tidelands____N/A_____

Also show the following on a site plan: Mean High Water, Mean Low Water, Water-dependent Use Zone, location of uses within buildings on tidelands, and interior and exterior areas and facilities dedicated for public use, and historic high and historic low water marks.

D. Is the project located on landlocked tidelands? ___ Yes _X_ No; if yes, describe the project's impact on the public's right to access, use and enjoy jurisdictional tidelands and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

E. Is the project located in an area where low groundwater levels have been identified by a municipality or by a state or federal agency as a threat to building foundations? ___Yes _X_ No; if yes, describe the project's impact on groundwater levels and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

F. Is the project non-water-dependent **and** located on landlocked tidelands **or** waterways or tidelands subject to the Waterways Act **and** subject to a mandatory EIR? ___ Yes _X_ No;
(NOTE: If yes, then the project will be subject to Public Benefit Review and Determination.)

G. Does the project include dredging? ___ Yes _X_ No; if yes, answer the following questions:
What type of dredging? Improvement ___ Maintenance ___ Both ____
What is the proposed dredge volume, in cubic yards (cys) _____
What is the proposed dredge footprint ____length (ft) ___width (ft)____depth (ft);
Will dredging impact the following resource areas?
Intertidal Yes__ No__; if yes, ___ sq ft
Outstanding Resource Waters Yes__ No__; if yes, ___ sq ft
Other resource area (i.e. shellfish beds, eel grass beds) Yes__ No__; if yes __ sq ft
If yes to any of the above, have you evaluated appropriate and practicable steps to: 1) avoidance; 2) if avoidance is not possible, minimization; 3) if either avoidance or minimize is not possible, mitigation?
If no to any of the above, what information or documentation was used to support this determination?
Provide a comprehensive analysis of practicable alternatives for improvement dredging in accordance with 314 CMR 9.07(1)(b). Physical and chemical data of the sediment shall be included in the comprehensive analysis.
Sediment Characterization
Existing gradation analysis results? __Yes ___No: if yes, provide results.

Existing chemical results for parameters listed in 314 CMR 9.07(2)(b)6? ___Yes
____No; if yes, provide results.

Do you have sufficient information to evaluate feasibility of the following management options for dredged sediment? If yes, check the appropriate option.

Beach Nourishment ___
Unconfined Ocean Disposal ___
Confined Disposal:
Confined Aquatic Disposal (CAD) ___
Confined Disposal Facility (CDF) ___
Landfill Reuse in accordance with COMM-97-001 ___
Shoreline Placement ___
Upland Material Reuse____
In-State landfill disposal____
Out-of-state landfill disposal ____
(NOTE: This information is required for a 401 Water Quality Certification.)

IV. Consistency:

A. Does the project have effects on the coastal resources or uses, and/or is the project located within the Coastal Zone? ___ Yes _X_ No; if yes, describe these effects and the projects consistency with the policies of the Office of Coastal Zone Management:

B. Is the project located within an area subject to a Municipal Harbor Plan? ___ Yes _X_ No; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **water supply** (see 301 CMR 11.03(4))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **water supply**? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Wastewater Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

II. Impacts and Permits

A. Describe, in gallons per day (gpd), the volume and source of water use for existing and proposed activities at the project site:

	Existing	Change	Total
Municipal or regional water supply	_____	_____	_____
Withdrawal from groundwater	_____	_____	_____
Withdrawal from surface water	_____	_____	_____
Interbasin transfer	_____	_____	_____

(NOTE: Interbasin Transfer approval will be required if the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged.)

B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No

C. If the project involves a new or expanded withdrawal from a groundwater or surface water source, has a pumping test been conducted? ___ Yes ___ No; if yes, attach a map of the drilling sites and a summary of the alternatives considered and the results. _____

D. What is the currently permitted withdrawal at the proposed water supply source (in gallons per day)? _____Will the project require an increase in that withdrawal? ___Yes ___No; if yes, then how much of an increase (gpd)? _____

E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? ___ Yes ___No. If yes, describe existing and proposed water supply facilities at the project site:

	Permitted Flow	Existing Avg Daily Flow	Project Flow	Total
Capacity of water supply well(s) (gpd)	_____	_____	_____	_____
Capacity of water treatment plant (gpd)	_____	_____	_____	_____

F. If the project involves a new interbasin transfer of water, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed?

G. Does the project involve:

1. new water service by the Massachusetts Water Resources Authority or other agency of the Commonwealth to a municipality or water district? ___ Yes ___ No
2. a Watershed Protection Act variance? ___ Yes ___ No; if yes, how many acres of alteration?
3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking

water supply for purpose of forest harvesting activities? ___ Yes ___ No

III. Consistency

Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities and services:

WASTEWATER SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wastewater** (see 301 CMR 11.03(5))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **wastewater**? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Transportation -- Traffic Generation Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

II. Impacts and Permits

A. Describe the volume (in gallons per day) and type of disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00 for septic systems or 314 CMR 7.00 for sewer systems):

	Existing	Change	Total
Discharge of sanitary wastewater	_____	_____	_____
Discharge of industrial wastewater	_____	_____	_____
TOTAL	_____	_____	_____

	Existing	Change	Total
Discharge to groundwater	_____	_____	_____
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Discharge to municipal or regional wastewater facility	_____	_____	_____
TOTAL	_____	_____	_____

B. Is the existing collection system at or near its capacity? ___ Yes ___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

C. Is the existing wastewater disposal facility at or near its permitted capacity? ___ Yes___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

D. Does the project site currently contain a wastewater treatment facility, sewer main, or other wastewater disposal facility, or will the project involve construction of a new facility? ___ Yes ___ No; if yes, describe as follows:

	Permitted	Existing Avg Daily Flow	Project Flow	Total
Wastewater treatment plant capacity (in gallons per day)	_____	_____	_____	_____

E. If the project requires an interbasin transfer of wastewater, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or new?

(NOTE: Interbasin Transfer approval may be needed if the basin and community where wastewater will be discharged is different from the basin and community where the source of water supply is located.)

F. Does the project involve new sewer service by the Massachusetts Water Resources Authority (MWRA) or other Agency of the Commonwealth to a municipality or sewer district? ___ Yes ___ No

G. Is there an existing facility, or is a new facility proposed at the project site for the storage, treatment, processing, combustion or disposal of sewage sludge, sludge ash, grit, screenings, wastewater reuse (gray water) or other sewage residual materials? ___ Yes ___ No; if yes, what is the capacity (tons per day):

	Existing	Change	Total
Storage	_____	_____	_____
Treatment	_____	_____	_____
Processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

H. Describe the water conservation measures to be undertaken by the project, and other wastewater mitigation, such as infiltration and inflow removal.

III. Consistency

A. Describe measures that the proponent will take to comply with applicable state, regional, and local plans and policies related to wastewater management:

B. If the project requires a sewer extension permit, is that extension included in a comprehensive wastewater management plan? ___ Yes ___ No; if yes, indicate the EEA number for the plan and whether the project site is within a sewer service area recommended or approved in that plan:

TRANSPORTATION SECTION (TRAFFIC GENERATION)

I. Thresholds / Permit

A. Will the project meet or exceed any review thresholds related to **traffic generation** (see 301 CMR 11.03(6))? Yes ___ No _X_; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **state-controlled roadways**? Yes _X__ No __ ; if yes, specify which permit:

- State, Interstate Highway Right-of-Way Encroachment Permit
- State, Interstate Highway Crossing Permit (construction)

C. If you answered "No" to both questions A and B, proceed to the **Roadways and Other Transportation Facilities Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	Existing	Change	Total
Number of parking spaces	_____	_____	_____
Number of vehicle trips per day	_____	_____	_____
ITE Land Use Code(s):	_____	_____	_____

B. What is the estimated average daily traffic on roadways serving the site?

Roadway	Existing	Change	Total
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____

C. If applicable, describe proposed mitigation measures on state-controlled roadways that the project proponent will implement:

Intermittent construction-related traffic associated with construction will occur over the entire construction period. Typically, construction equipment will access the ROWs from public roadways, crossing the ROWs in various locations along the route. Because construction tasks will occur at different times and locations over the course of the construction, traffic will be intermittent at these entry roadways. Traffic will consist of vehicles ranging from pick-up trucks to heavy construction equipment to large trailers delivering poles.

MassDOT is responsible for the Permit to Access State Highway/Non-Municipal Utility for crossing over state roads with utility lines. The proposed AFRRP's impacts relative to MassDOT are associated with the installation of new overhead wires across state roadways by a non-municipal utility. The installation could temporarily affect traffic flow of the roadway, but does not involve physical modifications to the roadway or roadway ROW. Prior to the start of construction, a Traffic Management Plan with complete details of proposed work will be developed with MassDOT input and submitted for their review and approval. The Proponent will comply with all required measures to ensure a safe environment for traffic flow and construction crews in and around the roadways (refer to Section 12.0).

D. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?

C. Is there a Transportation Management Association (TMA) that provides transportation demand management (TDM) services in the area of the project site? Yes _____ No __X__; if yes, describe if and how will the project will participate in the TMA:

D. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation facilities? Yes __X__ No ____; if yes, generally describe: The AFRRP ROW crosses a railroad corridor in the City of New Bedford. Eversource holds an existing easement with the New York, New Haven, and Hartford Railroad Co. for the existing transmission line crossing at this location.

E. If the project will penetrate approach airspace of a nearby airport, has the proponent filed a Massachusetts Aeronautics Commission Airspace Review Form (780 CMR 111.7) and a Notice of Proposed Construction or Alteration with the Federal Aviation Administration (FAA) (CFR Title 14 Part 77.13, forms 7460-1 and 7460-2)?

III. Consistency

Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

Construction of the Bell Rock Substation Rebuild Project and AFRRP will primarily occur on existing utility ROWs not designated for public use, and therefore will not affect transit, pedestrian, or bicycle transportation facilities. The Bell Rock Substation Rebuild Project and AFRRP are consistent with federal, state, regional and local plans and policies; minimal, if any, impacts related to roadways or other transportation facilities are anticipated.

TRANSPORTATION SECTION (ROADWAYS AND OTHER TRANSPORTATION FACILITIES)

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **roadways or other transportation facilities** (see 301 CMR 11.03(6))? Yes ___ No _X_; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **roadways or other transportation facilities**? Yes _X__ No __; if yes, specify which permit:

MassDCR Construction and Access Permit (potential)
MassDOT State and Interstate Highway Right-of-Way Encroachment Permit and Crossing Permit

C. If you answered "No" to both questions A and B, proceed to the **Energy Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

II. Transportation Facility Impacts

A. Describe existing and proposed transportation facilities in the immediate vicinity of the project site:

The AFRRP impacts relative to MassDOT are associated with the installation of overhead wires across state roadways by a non-municipal utility. The Companies will comply with all required measures to ensure a safe environment for traffic flow and construction crews in and around the roadways.

B. Will the project involve any
1. Alteration of bank or terrain (in linear feet)? _____
2. Cutting of living public shade trees (number)? _____
3. Elimination of stone wall (in linear feet)? _____

III. Consistency -- Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **energy** (see 301 CMR 11.03(7))? Yes ___ No _X_; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **energy**? Yes ___ No _X_; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Air Quality Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	Existing	Change	Total
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

B. If the project involves construction or expansion of an electric generating facility, what are:

1. the facility's current and proposed fuel source(s)?
2. the facility's current and proposed cooling source(s)?

C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way? Yes ___ No ___; if yes, please describe:

D. Describe the project's other impacts on energy facilities and services:

III. Consistency

Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **air quality** (see 301 CMR 11.03(8))? Yes ___ No _X_; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **air quality**? Yes ___ No _X_; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Solid and Hazardous Waste Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Air Quality Section below.

II. Impacts and Permits

A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)? Yes ___ No ___; if yes, describe existing and proposed emissions (in tons per day) of:

	Existing	Change	Total
Particulate matter	_____	_____	_____
Carbon monoxide	_____	_____	_____
Sulfur dioxide	_____	_____	_____
Volatile organic compounds	_____	_____	_____
Oxides of nitrogen	_____	_____	_____
Lead	_____	_____	_____
Any hazardous air pollutant	_____	_____	_____
Carbon dioxide	_____	_____	_____

B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

A. Describe the project's consistency with the State Implementation Plan:

B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **solid or hazardous waste** (see 301 CMR 11.03(9))? Yes ___ No _X_; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **solid and hazardous waste**?
Yes ___ No _X_; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Historical and Archaeological Resources Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of solid waste? Yes ___ No ___; if yes, what is the volume (in tons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? Yes ___ No ___; if yes, what is the volume (in tons or gallons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Recycling	_____	_____	_____
Treatment	_____	_____	_____
Disposal	_____	_____	_____

C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:

D. If the project involves demolition, do any buildings to be demolished contain asbestos?
Yes ___ No ___

E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency

Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Have you consulted with the Massachusetts Historical Commission? Yes _X_ No ___; if yes, attach correspondence. For project sites involving lands under water, have you consulted with the Massachusetts Board of Underwater Archaeological Resources? ____Yes ____ No; if yes, attach correspondence

B. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? Yes ___ No _X_; if yes, does the project involve the demolition of all or any exterior part of such historic structure? Yes ___ No ___; if yes, please describe:

C. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? Yes __ No _X_; if yes, does the project involve the destruction of all or any part of such archaeological site? ___ Yes __ No; if yes, please describe:

Review of the Inventory of Historic and Archaeological Assets of the Commonwealth indicates that the AFRRP is in the vicinity of several previously-recorded archaeological sites. No destruction of any such site is anticipated at this time. Additional information regarding surveys to identify and evaluate historic and archaeological resources for the AFRRP can be found below.

D. If you answered "No" to all parts of both questions A, B and C, proceed to the **Attachments and Certifications** Sections. If you answered "Yes" to any part of either question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

II. Impacts

Describe and assess the project's impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

Bell Rock Substation

No direct effects to archaeological sites are expected as a result of ground disturbing activities during construction.

AFRRP

There are no historic (above-ground) resources within the APE for the AFRRP. The assessment of potential impacts to listed or inventoried archaeological resources is ongoing, but no impacts are anticipated at this time and, in the event there is a potential for impact, it will be addressed as part of the Section 106 consultation process.

III. Consistency

Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to preserving historical and archaeological resources:

Both the Bell Rock Substation Rebuild Project and the AFRRP are subject to review under Section 106 of the National Historic Preservation Act (36 CFR Part 800) (Section 106) as they require permits from the USACE. The projects are also subject to review by the MHC under G.L. c. 9 §§ 26–27C and the MHC's implementing regulations at 950 CMR 71.00 et seq. NEP and Eversource are coordinating with both the USACE and MHC to avoid adverse effects to historic and archaeological resources eligible for listing in the NRHP, to the extent required by law. As part of its Section 404 permit review, pursuant to Section 106, the USACE will also consult with Native American Tribes that express an interest in the historic resources that may be affected by portions of the projects within

USACE jurisdiction.

Bell Rock Substation

NEP has contracted archaeologists from POWER to carry out background research, MHC file review, and an archaeological survey in order to identify eligible properties and to make recommendations about potential effects and how to resolve those that are adverse.

AFRRP

NEP and Eversource have contracted PAL to address the Section 106 concerns of the USACE and seek the comments of the MHC and Native American Tribes. PAL conducted background research and a physical inspection of the AFRRP area. Background research involved a review of existing cultural resource reports on file at PAL and at MHC, correspondence, and previously-recorded historic and archaeological site files on file at MHC. PAL also conducted an intensive (locational) archaeological survey for the NEP portion of the AFRRP to identify archaeological resources along the AFRRP corridor. PAL conducted the survey in June/July 2018 and submitted a report to the MHC on October 10, 2018 for review. PAL plans to conduct an intensive (locational) archaeological survey for the Eversource portion of the AFRRP in October and November of 2018, and will report on the results of the investigations to the MHC. PAL will also conduct an historic architectural reconnaissance survey for both the NEP and Eversource portions of the AFRRP once design plans are further refined. NEP and Eversource will continue to consult with the MHC and Native American Tribes throughout the AFRRP permitting process.

CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

   (Name) Fall River Herald News (Date) November 15
   (Name) The Standard Times (Date) November 15
   (South Coast Today)

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

Signatures:

11/14/18	11/14/18	11/14/18
Date Signature /Date	Signature /Date	Signature /Date
Erin Whoriskey	Michael Zylich	James Durand
Name (print or type)	Name (print or type)	Name (print or type)
New England Power Company	Eversource Energy	POWER Engineers, Inc.
Firm/Agency	Firm/Agency	Firm/Agency
40 Sylvan Road	247 Station Drive	100 John L. Dietsch Square
Street	Street	Street
Waltham, MA 02451	Westwood, MA 02090	North Attleboro, MA 02763
Municipality/State/Zip	Municipality/State/Zip	Municipality/State/Zip
781-907-3598	781-441-3804	774-643-1829 or 401-439-3020
Phone	Phone	Phone

ENF Circulation List

Secretary Matthew A. Beaton (2 copies)
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office
100 Cambridge Street, Suite 900 (9th Floor)
Boston, MA 02114

Department of Environmental Protection **Boston Office** Attn: MEPA Coordinator One Winter Street Boston, MA 02108	**MassDEP Southeast Region Main Office** Attn: MEPA Coordinator 20 Riverside Drive Lakeville, MA 02347	**Massachusetts Natural Heritage and Endangered Species Program** Massachusetts Division of Fisheries & Wildlife 1 Rabbit Hill Road Westborough, MA 01581
Massachusetts Department of Conservation & Recreation Attn: MEPA Coordinator 251 Causeway St. Suite 600 Boston, MA 02114	**Massachusetts Department of Public Health** 250 Washington Street Boston, Massachusetts 02108	**Massachusetts Energy Facilities Siting Board** 1 South Station Boston, MA 02110
Massachusetts Department of Transportation Public/ Private Development Unit 10 Park Plaza, Suite 4160 Boston, MA 02116	**Massachusetts Department of Transportation** District Office #5 Attn: MEPA Coordinator 1000 County St. Taunton, MA 02780	**Massachusetts Historical Commission** The MA Archives Building 220 Morrissey Boulevard Boston, MA 02125
Southeastern Regional Planning & Economic Development District 88 Broadway Taunton, MA 02780	**Fall River Planning Board** One Government Center, Room 535 Fall River, MA 02722	**Fall River Conservation Commission** One Government Center, Room 535 Fall River, MA 02722
Fall River Board of Health One Government Center, Room 431 Fall River, MA 02722	**Fall River City Council** One Government Center, Room 221 Fall River, MA 02722	**Fall River Water Division** One Government Center, Room 308 Fall River, MA 02722
Acushnet Planning Board Acushnet Town Hall 122 Main Street Acushnet, MA 02743	**Acushnet Conservation Commission** Acushnet Town Hall 122 Main Street Acushnet, MA 02743	**Acushnet Board of Health** 130 Main Street Parting Ways Bldg Acushnet, MA 02743
Acushnet Board of Selectmen Acushnet Town Hall 122 Main Street Acushnet, MA 02743	**New Bedford Planning Department** 133 William Street, Room 303 New Bedford, MA 02740	**New Bedford Conservation Commission** 133 William Street, Room 304 New Bedford, MA 02740
New Bedford Board of Health 1213 Purchase Street New Bedford, MA 02740	**New Bedford City Council** 133 William Street, Room 215 New Bedford, MA 02740	**Dartmouth Planning Board** Town Hall 400 Slocum Road, Room 317 Dartmouth, MA 02747
Dartmouth Conservation Commission Town Hall 400 Slocum Road, Room 119 Dartmouth, MA 02747	**Dartmouth Board of Health** Town Hall 400 Slocum Road, Room 119 Dartmouth, MA 02747	**Dartmouth Select Board** Town Hall 400 Slocum Road Dartmouth, MA 02747
Coastal Zone Management Attn: Project Review Coordinator 251 Causeway Street, Suite 800 Boston, MA 02114	**Division of Marine Fisheries** Attn: Environmental Reviewer 836 South Rodney French Blvd. New Bedford, MA 02744	

November 15, 2018

NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY

AND NEW ENGLAND POWER COMPANY d/b/a NATIONAL GRID

Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project

Expanded Environmental Notification Form

Filed in Accordance with the Massachusetts Environmental Policy Act 301 CMR 11.00

PROJECT NUMBER:
146770, 146784 and 151783

PROJECT CONTACT:
Karen Hanecak
EMAIL:
karen.hanecak@powereng.com
PHONE:
774-643-1821

POWER ENGINEERS CONSULTING, PC

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Expanded Environmental Notification Form

PREPARED FOR:

NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY
AND NEW ENGLAND POWER COMPANY d/b/a NATIONAL GRID

PREPARED BY:

POWER ENGINEERS, INC.
100 JOHN L. DIETSCH SQUARE
NORTH ATTLEBORO, MA 02763

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ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
AFRRP	Acushnet to Fall River Reliability Project
AIS	Air-Insulated Switchgear
APE	Area of Potential Effect
BLSF	Bordering Land Subject to Flooding
BMP	Best Management Practice
BMP Manual	Eversource's Construction & Maintenance Environmental Requirements: Best Management Practices Manual for Massachusetts and Connecticut.
BVW	Bordering Vegetated Wetland
CELT	2015 Capacity, Energy, Loads and Transmission Report
CFR	Code of Federal Regulations
cm	centimeter(s)
CMP	Conservation and Management Permit
CMR	Code of Massachusetts Regulations
Companies	Eversource and NEP
CVP	Certified Vernal Pool
CWA	Federal Clean Water Act
DCT	Double Circuit Transmission
dm	decimeter(s)
EENF	Expanded Environmental Notification Form
EIR	Environmental Impact Report
EFI	Environmental Field Issue
EFSB	Energy Facilities Siting Board
EG303NE	National Grid's Environmental Guidance on Access, Maintenance and Construction Best Management Practices
ENF	Environmental Notification Form
EOEEA	Executive Office of Energy and Environmental Affairs
Eversource	NSTAR Electric Company d/b/a Eversource Energy
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GCB	gas circuit breakers
GI	General Industrial District
GIS	Geographic Information System
HDD	horizontal direction drill
HUC	Hydrologic Unit Code
IB	Inland Bank
IC	Industrial District
ILSF	Isolated Land Subject to Flooding
ISO-NE	ISO New England Inc., the Independent System Operator for New England
IVM	Integrated Vegetation Management
IVW	Isolated Vegetated Wetland
kV	Kilovolt
lf	linear feet
LUB	Lacustrine Unconsolidated Bottom
LUW	Land Under Water
m	meter(s)
mm	millimeters(s)
M.G.L.	Massachusetts General Law
MA DCR	Massachusetts Department of Conservation Recreation

MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassGIS	Massachusetts Geographic Information System
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MHC	Massachusetts Historical Commission
Montaup	Electric Company
MW	Megawatt
N-1	A first contingency; the largest impact on the system when a first power element (generation or transmission facility) of a system is lost.
N-1-1	A second contingency; the loss of the facility that would have the largest impact on the system after the first facility is lost.
NEP	New England Power Company d/b/a National Grid New England Power Company
NERC	North American Electric Reliability Corporation
NHD	National Hydrography Dataset
NHESP	Natural Heritage and Endangered Species Program
NHPA	National Historic Preservation Act
Non-IPT	non-individual pole tripping
NPCC	Northeast Power Coordinating Council
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O&M	Operation and Maintenance
OHWM	Ordinary High Water Mark
OPGW	Optical Ground Wire
ORW	Outstanding Resource Water
PAL	Public Archaeological Laboratory
PEM	Palustrine Emergent
PFO	Palustrine Forested
PNF	Project Notification Form
POWER	POWER Engineers, Inc.
PSS	Palustrine Scrub-Shrub
PUB	Palustrine Unconsolidated Bottom
PVP	Potential Vernal Pool
R-80	Single Family Residential District
RA	Residential Area
RAO	Response Action Outcome
RFA	Riverfront Area
RIDOT	Rhode Island Department of Transportation
ROW	Right-of-Way
SEMA-RI	Southeastern Massachusetts - Rhode Island
sf	square feet
SF_6	sulfur hexafluoride
SR-B	Single Residence B District
Study Area	300-foot study area buffer
SWPPP	Stormwater Pollution Prevention Plan
URAM	Utility Related Abatement Measure
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture

USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMP	Vegetation Management Plan
WISCP	Wetland Invasive Species Control Plan
WPA	Wetlands Protection Act
WR	Water Resource
WWD	Watershed and Water Supply Protection District

1.0 INTRODUCTION

1.1 Brief Description of the Proposed Project and Massachusetts Environmental Policy Act Jurisdiction

1.1.1 Overview

The New England Power Company d/b/a National Grid ("NEP") and NSTAR Electric Company d/b/a Eversource Energy ("Eversource") (together, the "Companies") are proposing system upgrade projects to improve reliability in the southeastern Massachusetts area. The first project consists of an electric substation improvement project proposed by NEP at their existing Bell Rock Substation located at 181 Bell Rock Road in Fall River, Massachusetts (the "Bell Rock Substation Rebuild Project" or "Substation Project") (Figure 1-1 in Appendix A). The second project is a joint endeavor by the Companies and consists of the installation of a new electric transmission line extending from Eversource's Industrial Park Tap in Acushnet west to the Bell Rock Substation (the "Acushnet to Fall River Reliability Project" or "AFRRP"). The AFRRP includes the installation of approximately 12.1 miles of new overhead electric transmission line traversing the municipalities of Acushnet, New Bedford, Dartmouth, and Fall River in Bristol County, Massachusetts (Figure 1-2 in Appendix A). The AFRRP will be located within existing rights-of-way ("ROW") currently occupied by several other electric transmission lines. Of the 12.1 miles, approximately 7.9 miles are in Eversource service territory traversing Acushnet, New Bedford and Dartmouth, and approximately 4.2 miles are in NEP service territory traversing Fall River.

While the Companies believe that the two projects are independent undertakings addressing separate needs, with separate schedules and distinct, separable environmental impacts, the Massachusetts Environmental Policy Act ("MEPA") Office has requested that the Companies include both projects in this joint Expanded Environmental Notification Form ("EENF"). The Companies are concerned that combining the review of two different projects with two different schedules could result in delays for these critical reliability projects. To address this concern, while ensuring the full and appropriate review of both projects under MEPA, the Companies are requesting a phase one waiver under 301 CMR 11.11(4) or, in the alternative, a Special Review Procedure under 301 CMR 11.09. The specifics of this Request for Waiver or Special Review Procedure are set forth in Section 1.2.

1.1.2 Bell Rock Substation Rebuild Project

NEP is planning substation upgrades at the existing Bell Rock Substation. The Bell Rock Substation lies within NEP's existing 2.75-acre substation easement (the "Substation Site"). Eversource holds a 1.06-acre easement adjacent (south) to the NEP easement. All substation improvements will be made within the existing substation and adjacent transmission line ROW easements. The purpose of the Bell Rock Substation Rebuild Project is to improve the reliability and operability of the substation, and to rebuild and expand the substation to accommodate the termination of the existing M13 Line at the substation. The Bell Rock Substation Rebuild Project involves the rebuild and expansion of certain facilities at the substation, and will primarily include the following elements (refer to Figure 2-2 in Appendix A):

1) Expand the existing substation footprint by approximately 0.51 acre (22,000 square feet).
2) Expand the existing substation perimeter security fence line.
3) Install a new control building to replace the existing control building.
4) Install new substation-related equipment.

5) Upgrade the stormwater management system.
6) Temporarily reroute the existing M13 transmission line to bypass the existing substation to the south for the purposes of facilitating the rebuild of the substation.
7) Complete additional minor transmission line reconfigurations to connect the lines back into the rebuilt substation.

The Bell Rock Substation Rebuild Project and related M13 transmission line bypass is subject to review under the MEPA as it requires one or more state permits and exceeds the review thresholds listed in Table 1-1 below. A summary of the anticipated Substation Project impacts is included in Table 1-2 and discussed further in Sections 4 through 8.

TABLE 1-1 BELL ROCK SUBSTATION REBUILD PROJECT MEPA REVIEW THRESHOLDS

MEPA ENVIRONMENTAL NOTIFICATION FORM THRESHOLDS
Wetlands, Waterways and Tidelands: Alteration of 5,000 or more square feet of bordering or isolated vegetated wetlands. (301 CMR 11.03(3)(b)(1)(d))
Wetlands, Waterways and Tidelands: Alteration of 1,000 or more square feet of outstanding resource waters. (301 CMR 11.03(3)(b)(1)(c))

TABLE 1-2 BELL ROCK SUBSTATION REBUILD PROJECT ANTICIPATED PROJECT IMPACTS

RESOURCE AREA	TEMPORARY IMPACTS (IN SQUARE FEET)	PERMANENT IMPACTS (IN SQUARE FEET)
New Land Altered (Substation)	N/A[1]	42,898 (0.98 acre)
Bordering Vegetated Wetland (BVW) (Substation and Temporary M13 Line Bypass)[2]	6,611 sf (0.15 acre) – placement of temporary construction mats as a construction-phase mitigation measure	3,599 (0.08 acre) – substation expansion
Rare Species Impacts	Two Natural Heritage and Endangered Species Program (NHESP) state-listed species are located within the vicinity of the substation based on information received from the NHESP (Refer to redacted versions of the Agency Correspondence in Appendix B-2). NEP will implement the Operations and Maintenance (O&M) procedures outlined in *National Grid's 2018 Operation and Maintenance Plan* for Project activities located in designated habitat in addition to implementing any additional conditions that the NHESP recommends for the substation rebuild and expansion.	
Historical/Archaeological Impacts	There is very low potential for impacts of construction-related activities within the substation footprint, based on archaeological testing completed on the substation easements. The Massachusetts Historical Commission (MHC) concurred with the recommendation of no further testing of this site (letter dated May 12, 2017). Additional archaeological testing was completed along the alignment of the M13 Line Bypass. The results of the field testing indicated a very low potential for impacts and the MHC's anticipated concurrence is pending (refer to Agency Correspondence in Appendix B-1). No adverse effects are anticipated.	

Notes:
[1] Temporary impacts are not considered an alteration of land, but are included in the reported alterations to bordering vegetated wetlands. Area will be restored to pre-existing conditions after the construction activity is completed.
[2] All BVW impacts are located with Outstanding Resource Waters (ORW).

1.1.3 Acushnet to Fall River Reliability Project

The Companies are proposing to undertake the AFRRP to improve the electric transmission reliability in the southeastern Massachusetts area. The AFRRP is approximately 12.1 miles and traverses the municipalities of Acushnet, New Bedford, Dartmouth, and Fall River in Bristol County, Massachusetts (Figure 1-2 in Appendix A).[1] New transmission line structures and overhead conductors and wires will be installed along the southern portion of the ROWs parallel to the existing overhead transmission lines. Optical ground wire (OPGW) will be installed as part of the wire installation.

New capacitor banks will be installed at Eversource's Wing Lane and High Hill Substations in Acushnet and Dartmouth, respectively. The capacitor banks at Wing Lane will be located entirely within the existing fenced in substation site. A minor fence line expansion at High Hill Substation (approximately 2,285 square feet) within Eversource's existing transmission line ROW will be required to make room for the new capacitor bank. Since installation of the new capacitor banks at the Wing Lane and High Hill Substations will not impact resource areas as recognized by MEPA, they are not further discussed herein.

The AFRRP is subject to review under MEPA as it requires one or more state permits and exceeds the review thresholds listed in Table 1-3 below. A summary of the anticipated AFRRP impacts are included in Table 1-4.

TABLE 1-3 ACUSHNET TO FALL RIVER RELIABILITY PROJECT MEPA REVIEW THRESHOLDS

MEPA ENVIRONMENTAL IMPACT REPORT THRESHOLDS
Wetlands, Waterways and Tidelands: Alteration of one or more acres of bordering vegetated wetlands. (301 CMR 11.03(3)(a)(1)(a))
MEPA ENVIRONMENTAL NOTIFICATION FORM THRESHOLDS
State-listed Species under M.G.L c. 131A: Greater than two acres of disturbance of designated priority habitat, as defined in 321 CMR 10.02, that results in a take of a state-listed endangered or threatened species or species of special concern. (301 CMR 11.03(2)(b)(2))
Wetlands, Waterways and Tidelands: Alteration of 5,000 or more square feet of bordering or isolated vegetated wetlands. (301 CMR 11.03(3)(b)(1)(d))

[1] Two short sections of underground cable (limited to the installation of approximately 800 linear feet of underground cable) will be installed in upland areas to avoid utility congestion at High Hill Substation and the Industrial Park Tap.

TABLE 1-4 ACUSHNET TO FALL RIVER RELIABILITY PROJECT ANTICIPATED PROJECT IMPACTS

RESOURCE AREA	TEMPORARY IMPACTS (IN SQUARE FEET)	PERMANENT IMPACTS (IN SQUARE FEET)
New Land Altered	N/A[1]	1,108,861 (25.46 acres) of tree clearing in upland
Bordering Vegetated Wetland (BVW)	306,817 (7.04 acres) – placement of temporary construction mats as a construction-phase mitigation measure	37,352 (0.86 acre) of permanent fill 91,589 (2.10 acres) of tree clearing and conversion of forested wetland to scrub-shrub wetland
Other Wetland Resource Areas		
Riverfront Area (RFA)	49,309 (1.13 acre) of which 17,239 (0.40 acre) are accounted for in the BVW temporary impacts listed above.	7,226 (0.17 acre) of which 2,304 (0.05 acre) are accounted for in the BVW permanent impacts listed above. 4,362 (0.10 acre) of tree clearing.
Bordering Land Subject to Flooding (BLSF)	91,707 (2.11 acre) of which 28,208 (0.65 acre) are accounted for in the BVW temporary impacts listed above. The work involves placement of temporary construction mats as a construction-phase mitigation measure.	285 (0.01 acre) of which 47 square feet are accounted for in the BVW permanent impacts listed above. The work involves structure installation where BLSF could not be avoided.
Inland Bank (IB)	202 linear feet – placement of temporary construction mat bridge(s)	625 square feet for the installation of one culvert in a stream
Land Under Water (LUW)	0	0
Rare Species Impacts	Seven NHESP state-listed species area located within the vicinity of the Project based upon letters from NHESP dated April 9, 2018 (Refer to redacted versions of the Agency Correspondence in Appendix B-2). The Companies will adhere to Best Management Practices to avoid harm to state-listed species and their habitats. Project-specific mitigation measures will be determined through continued consultation with the NHESP Program.	
Historical/ Archaeological Impacts	The Companies are coordinating with both the USACE and MHC to avoid adverse effects to historic and archaeological resources eligible for listing in the National Register of Historic Places (NRHP). As part of its USACE Section 404 permit review, pursuant to Section 106, the USACE will also consult with Native American tribes and local municipal historical commissions that express an interest in the historic resources that may be affected by portions of the Project within USACE jurisdiction.	

Notes:
[1] Temporary impacts are not considered an alteration of land, but are included in the reported alterations to bordering vegetated wetlands. Area will be restored to pre-existing conditions after the construction activity is completed.

1.2 Request for a Phase One Waiver or Special Review Procedure

Pursuant to 301 CMR 11.11, *Waivers*, which allows the Secretary to, among other things, grant phasing of a project, the Companies respectfully request a phase one waiver to allow the Bell Rock Substation Rebuild Project to proceed in advance of filing an Environmental Impact Report ("EIR") for the AFRRP in order to avoid delaying the Bell Rock Substation Rebuild Project, a critical reliability project.

301 CMR 11.11 provides that the Secretary may grant a waiver of MEPA requirements and impose appropriate conditions or restrictions, if the Secretary finds that strict compliance with MEPA would: "(a) result in an undue hardship for the Proponent," and "(b) not serve to avoid or minimize Damage to the Environment." 301 CMR 11.11(1). Specifically, in the case of a partial waiver of a mandatory EIR review threshold that will allow a proponent to proceed with an initial phase of a project before preparing an EIR, (a "phase one" waiver) the Secretary should base the finding on a determination that:

(a) The potential environmental impacts of phase one, taken alone, are insignificant;
(b) ample and unconstrained infrastructure facilities and services exist to support phase one;
(c) the Project is severable, such that phase one does not require the implementation of any other future phase of the Project or restrict the means by which potential environmental impacts from any other phase of the Project may be avoided, minimized or mitigated; and
(d) the Agency Action on phase one will contain terms such as a condition or restriction in a Permit, contract or other relevant document approving or allowing the Agency Action, or other evidence satisfactory to the Secretary, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to Commencement of any other phase of the Project.

301 CMR 11.11(4). The following summarizes the Bell Rock Substation Rebuild Project's and AFRRP's distinct purposes and needs and why requiring them to be reviewed without a phase one waiver could create an undue hardship without serving to avoid or minimize Damage to the Environment. It then addresses each of the specific criteria for a phase one waiver.

In the event that the Secretary determines that the requirements for a phase one waiver are not met, the Companies request that the Secretary grant a Special Review Procedure under 301 CMR 11.09 and treat the two projects as an Area-Wide Review or Other Special Review that will allow the Bell Rock Substation Rebuild Project to proceed after the EENF Certificate is issued. Granting the special review would avoid the undue hardship described below without compromising the review of either project. Since these projects are undertaken by a Person, and not an Agency, and the potential environmental impacts are not complex or unusual for these types of projects, a Citizens Advisory Committee would not be necessary or appropriate.

Distinct Project Purposes and Needs

The Bell Rock Substation Rebuild Project has a separate purpose and need distinct from that of the AFRRP. The main purpose of the Bell Rock Substation Rebuild Project is to accommodate two line connections from the existing M13 Line into the substation. The existing M13 Line currently crosses over, but does not electrically connect into, the substation. As determined by the Independent System Operator, New England ISO New England Inc. ("ISO-NE") the Bell Rock Substation Rebuild Project is needed in order to split the M13 Line into the M13N and M13S Lines, and terminate both lines at the substation. In order to accommodate the two M13N and M13S transmission line terminations, the Bell Rock Substation needs to be rebuilt and expanded into a breaker and a half configuration.

The AFFRP addresses certain critical transmission system needs identified in the ISO-NE Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study, Revision 1 - March 2017, including: 1) certain N-1 and N-1-1 contingencies which result in voltage collapse and the loss of service to regional customer; and 2) certain N-1-1 contingencies which have the potential to result in consequential loss of service. The AFRRP eliminates the potential widespread voltage collapse and loss of load across 17 municipalities following a single (N-1) transmission contingency by providing an additional transmission source into the load pocket and additional voltage support at the existing NEP Bell Rock Substation and several of Eversource's existing substations including the Wing Lane and High Hill Substations. The AFRRP ensures continued compliance with applicable federal and regional transmission reliability

standards and criteria and maintains reliable electric service to the Southeastern Massachusetts and Rhode Island ("SEMA-RI") area.

Undue Hardship: The Bell Rock Substation Work Must Be Completed Before the AFRRP

Proceeding with the Bell Rock Substation Rebuild Project before the construction of the AFRRP is necessary to maintain a project schedule that requires the Bell Rock Substation construction to commence in 2020 – a year before the construction start date for the AFRRP. Allowing environmental permitting for the Bell Rock Substation Rebuild Project to proceed after the EENF Certificate will help to ensure that this schedule is met. Because the potential environmental impacts of each project is entirely distinct from the other and the impacts from the Bell Rock Substation Rebuild Project alone trigger an ENF and not a mandatory EIR, denying the phase one waiver will not serve to avoid or minimize Damage to the Environment. However, it could serve to delay critical reliability improvements.

The ability to separate the substation from the transmission line construction will provide the necessary construction clearances and work areas required for each of the two construction activities to occur, as opposed to having both construction activities occurring simultaneously in the same area. Temporarily repositioning the existing M13 Line will allow construction personnel to construct within the substation without risk of potentially encountering or fouling the existing overhead M13 transmission line. This transmission relocation will provide a safer work environment for all personnel. The Bell Rock Substation Rebuild Project schedule is also driven by planned outages, which must be approved by the ISO-NE months in advance of planned construction. Missing a scheduled outage can severely impact the project schedule because a "contingency" outage is not easily granted nor is it necessarily granted in a timely fashion, if it is not already placed into the ISO-NE outage queue.

Further, a waiver will facilitate quicker resolution of the public infrastructure reliability issues identified by the ISO-NE. Construction of the AFRRP will not commence until the EFSB issues a Final Decision allowing the construction of the transmission line to proceed. Because the Bell Rock Substation Rebuild Project has a separate purpose and need distinct from that of the AFRRP, and because the Rebuild Project, by itself, does not trigger the jurisdiction of the EFSB, the Rebuild Project will not be included in the Companies' petition to the EFSB seeking approval to construct the AFRRP. Thus, for MEPA to require that MEPA review for the two projects remain combined could hinder the resolution of the reliability issues identified by the ISO-NE.

If the Bell Rock Substation Rebuild Project is not constructed before other system reliability upgrades (i.e., construction of the AFRRP), then the in-service date as identified by the ISO-NE is at risk of not being met and the 17 communities serviced by the existing facilities will continue to remain vulnerable to transmission contingency voltage collapse. In order to meet the in-service date identified by the ISO-NE, construction activities for the Bell Rock Substation Rebuild Project need to commence in the first quarter 2020, while construction activities related to the AFRRP do not need to begin until the first quarter 2021.

Consistency with the Phase One Waiver Standards

A phase one waiver is appropriate for this project, as all of the criteria enumerated in 301 CMR 11.11(4) are met.

301 CMR 11.11(4)(a): The potential impacts of the Substation Project, taken alone, are insignificant.[2]

The anticipated environmental impacts from the Bell Rock Substation Rebuild Project exceed two ENF review thresholds provided in 301 CMR 11.03(3)(b)(1): alteration of 1,000 or more square feet of ORW and alteration of 5,000 or more square feet of BVW. They do not, however, trigger a mandatory EIR. Therefore, the impacts can be adequately evaluated through the ENF. Several substation design configurations have been evaluated in an attempt to minimize wetland impacts and reduce overall environmental impacts to the maximum extent possible, as described in Section 3.0 below. The majority of the impacts are temporary due to the use of swamp mats – a best management practice – that is used to minimize disturbances to the wetlands. Moreover, by working with the relevant state, local and federal agencies with jurisdiction over wetlands, the impacts will be mitigated. Thus, allowing the Bell Rock Substation Rebuild Project to proceed after the EENF Certificate will not result in any significant impacts that will not be adequately reviewed under MEPA.

301 CMR 11.11(4)(b): Ample and unconstrained infrastructure facilities and services exist to support the Substation Project

Existing infrastructure can support the expansion of the Bell Rock Substation Rebuild Project before the AFRRP. The Bell Rock Substation is an existing two-breaker substation located at the junction of the existing D21, L14, N12 and M13 transmission lines. The existing substation has been in operation since the 1960s. The Bell Rock Substation houses equipment for NEP and Eversource, as both companies hold easement rights for the station. The station is accessed from a public road in Fall River. NEP and Eversource are able to plan and schedule line outages or non-re-closure assurances, as necessary, to de-energize certain equipment at the station to allow for construction to proceed within the station yard.

301 CMR 11.11(4)(c) The Bell Rock Substation Rebuild Project is severable from the AFRRP, such that the Bell Rock Substation Rebuild Project does not require the implementation of the AFRRP or restrict the means by which potential environmental impacts from the AFRRP may be avoided, minimized or mitigated.

The Companies understand that the reason that the MEPA Office has requested a single filing for both of these projects is because the AFRRP will ultimately terminate at the Bell Rock Substation, which creates a geographic nexus between the projects. However, the Bell Rock Substation Rebuild Project is entirely severable from the AFRRP. From construction and facilities perspectives, the Bell Rock Substation Rebuild Project does not require the implementation of the AFRRP. If the AFRRP is not constructed, the purpose and need of the Bell Rock Substation Rebuild Project will be entirely achieved. The Bell Rock Substation Rebuild Project will be completed by NEP's Substation Construction Group and its contractor that will be solely contracted to complete the work at the substation. Separate NEP and Eversource Transmission Line Services teams and their contractors will perform the AFRRP construction.

The anticipated environmental impacts of the Bell Rock Substation Rebuild Project are entirely separate from the impacts anticipated for the AFRRP. They are geographically distinct and the feasible alternatives between the two projects are also separate and independent: The selection of any feasible Bell Rock Substation Rebuild Project alternative will have no bearing on the feasible alternatives for the AFRRP or the environmental impacts of the AFRRP. Mitigation for the Bell Rock Substation Rebuild Project impacts can be implemented separate from the mitigation and ROW restoration for the AFRRP. As a

[2] Each project is discussed in much greater detail throughout this EENF. For the purposes of this phase one waiver request, the Companies have included a high level summary here.

result, moving forward with the Bell Rock Substation Rebuild Project will not restrict the means by which the potential environmental impacts from the AFRRP may be avoided, minimized or mitigated.

301 CMR 11.11(4)(d): The Agency Actions on the Bell Rock Substation Rebuild Project will contain terms such as a condition or restriction in a Permit, contract or other relevant document approving or allowing the Agency Action, or other evidence satisfactory to the Secretary, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to Commencement of the AFRRP.

The feedback received during the pre-application meetings that NEP held with the MassDEP, the Natural Heritage and Endangered Species Program ("NHESP"), the Massachusetts Department of Conservation and Recreation ("MA DCR"), the City of Fall River officials, and the United Sates Army Corps of Engineers ("USACE") indicate that the Bell Rock Substation Rebuild Project could be approved and separately permitted in advance of the review and approval of the AFRRP permits. Because the Companies will be seeking separate permits, there is no risk that the Companies would be able to start work on the AFRRP using permits issued for the Bell Rock Substation Rebuild Project prior to completing MEPA review for the AFRRP. Accordingly, NEP will accept conditions on permits issued for the Bell Rock Substation Rebuild Project stating that the permit cannot be used for any work on the AFRRP until MEPA review of the AFRRP is complete and the AFRRP is approved by the EFSB.

Conclusion

A phase one waiver for the Bell Rock Substation Rebuild Project is needed to avoid a hardship to NEP's customers, which could be negatively impacted if the Bell Rock Substation Rebuild Project is not advanced ahead of the review and construction of the new AFRRP. NEP's customers in the South Coast region could be faced with the continued risk of thermal overloading and transmission contingency voltage collapse affecting the reliable energy source on which many depend. As demonstrated above, the requirements for a waiver have been met. In the alternative, if the Secretary determines that the requirements for a waiver have not been met, the Secretary should grant the same relief under the special review procedures in 301 CMR 11.09, since allowing the Bell Rock Substation Rebuild Project to proceed to permitting after the issuance of the ENF is consistent with the scope of that project and its environmental impacts and it will have no impact on the review of the AFRRP. As noted above, for projects like these that do not have complex environmental issues, the use of a Citizens Advisory Committee in conjunction with the special review procedure would not be necessary.

1.3 Request for Single Environmental Impact Report (EIR)

This EENF is being filed in accordance with 301 CMR 11.05(7) in order to provide more extensive and detailed information as part of a request for approval for submission of a single EIR. As detailed in Table 1-3 above, the AFRRP exceeds the review thresholds provided in 301 CMR 11.03 requiring the filing of an EIR for the alteration of one or more acres of BVW.

The Companies respectfully request approval to prepare and submit a single EIR for the AFRRP. Based on the analysis of potential environmental impacts, the AFRRP will use all feasible means to avoid and minimize potential environmental impacts. Mitigation measures will address the remaining potential environmental impacts. Allowing a single EIR is considered appropriate for a number of reasons, including:

- The EENF meets all of the requirements in 301 CMR 11.06(8) to provide detailed information on the AFRRP, its environmental baseline, alternatives, and avoidance, minimization and mitigation measures.

- The Companies conducted an extensive alternatives analysis to review and compare environmental and human impacts, cost, and feasibility to determine the preferred Project.
- The AFRRP exceeds only one EIR threshold: alteration of one or more acres of BVW where a permit is required.
- The majority of wetland impacts are the result of the temporary placement of construction mats within existing transmission line ROWs. The construction mats will be removed after the Project is complete and the BVWs will be restored.
- The area converted from forested wetland to scrub-shrub wetland (approximately 2.10 acres) will remain BVW with no net loss of wetlands; and with a benefit to successional wildlife species from the habitat conversion.
- Permanent BVW impacts associated with the AFRRP, where they could not be avoided, are limited to approximately 0.86 acre.
- Mitigation will be implemented to address federal, state and local wetlands impacts.
- The AFRRP requires comprehensive federal, state, and local regulatory review by environmental agencies that will provide sufficient oversight and require implementation of appropriate mitigation measures (as described in Section 1.5 below).
- In addition to the extensive public review necessary for permitting, the Companies are also implementing a comprehensive public outreach program to establish and maintain communications with stakeholders.

The review period for the EENF requesting a phase one waiver and Single EIR lasts for 37 Days, and Notice of the Project will be published in the Environmental Monitor.

1.4 Purpose and Need

Background: SEMA-RI Needs Assessment and Solutions Study

In May 2016, the ISO-NE issued its final SEMA-RI 2026 Needs Assessment Report ("Needs Assessment"), which studied and identified transmission system needs across a broad geographic area encompassing those parts of Massachusetts located south of Boston as well as the entire state of Rhode Island. The Report's objective was to document identified reliability-based transmission needs in the SEMA-RI area for 2026 projected system conditions (10-year, 2026 planning horizon), based on the 2015 Capacity, Energy, Loads and Transmission ("CELT") Report[3] while considering the following:

- Future load growth in the SEMA-RI area through 2026.
- Reliability over a range of generation patterns and transfer levels.
- Limited short-circuit margin in the SEMA-RI area.
- Coordination with plans for Boston, Northeastern Massachusetts and Eastern Connecticut.

[3] Since the time of the 2016 Needs Assessment, additional CELT forecasts have been published, including, most recently, the 2018 CELT forecast. In general, the newer forecasts project lower load growth and greater energy efficiency and distributed generation than did the 2015 CELT Report. However, even in consideration of the 2018 CELT Report forecast, the need for the Project remains.

- Existing and Forward Capacity Market-cleared supply resources.
- All applicable North American Electric Reliability Corporation ("NERC"), Northeast Power Coordinating Council, Inc. ("NPCC") and ISO-NE transmission planning reliability standards.

The Needs Assessment included the evaluation of the long-term reliability of the transmission system serving the SEMA-RI study area for the projected system conditions in 2026. The system was tested under N-0 (all-facilities-in service), N-1[4] (all-facilities-in service, first contingency), and N-1-1[5] (first contingency after a facility is out-of-service) conditions for a number of possible operating scenarios with respect to related interface transfer levels and generating unit unavailability conditions.

The Needs Assessment identified numerous operating risks on the existing network in the SEMA-RI area, a number of which would result in thermal overloads and low voltage to potential voltage collapse and significant loss of customer load. Thermal overloads and low voltages could result in a power outage and/or loss of service for the Companies' customers. Other violations occurred due to lack of sufficient transmission capacity to serve load under multiple line and critical unit outage scenarios.

After the Needs Assessment was completed, ISO-NE formed a SEMA-RI solution study working group that included participating transmission owners, NEP, and Eversource, resulting in the March 2017 *Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study Report* (Solutions Study). The purpose of the Solutions Study was to investigate system reinforcement options to determine feasible long-range transmission alternative solutions to remedy the time-sensitive SEMA-RI study area criteria violations. The study engaged in a variety of analyses and was based on 2026 system conditions that included planned system upgrades expected to be in-service by December 31, 2021. The Solutions Study was conducted in accordance with the AFRRP and the Bell Rock Substation Rebuild Project among the projects identified in the Solutions Study as necessary to ensure the reliability of the transmission system serving SEMA-RI. After the Solution Study, the ISO-NE Second Addendum Analysis Report to the Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment was issued in June 2018 and confirmed that the system needs, which prompted the need for the AFRRP and the Bell Rock Substation Rebuild Project remain.

Bell Rock Substation Rebuild Project

The Bell Rock Substation Rebuild Project addresses the load growth served by the substation by increasing the substation's operability and reliability. Under existing conditions, three transmission lines loop into and out of the substation, including the D21, L14 and N12 transmission lines. The M13 Line crosses over the Bell Rock Substation but does not electrically connect into the substation. To solve operability and reliability concerns at the substation, the existing M13 Line will be split and designated in the future as the M13N and M13S Lines and both lines will be electrically connected into the substation. Splitting the M13 Line into the M13N and M13S Lines and terminating both lines at the Bell Rock Substation results in increased reliability, adds redundancy to the system and eliminates loop flows between the existing Bell Rock and Tiverton Substations.

[4] N-1 Single Contingencies includes: Loss of one transmission circuit, transformer, generator, bus section or shunt device, opening of a line section without a fault, loss of two transmission components (circuit, transformer or generator) sharing a common circuit breaker, and loss of two transmission circuits on a multiple circuit transmission tower.
[5] N-1-1 Double Contingencies includes the loss of one major generating unit, transmission circuit or transformer followed by an N-1 contingency as defined above.

With the addition of these two elements (the M13N and M13S Lines) into the substation, the Bell Rock Substation needs to be reconfigured and expanded into breaker-and-a-half configuration.[6] This rebuild and expansion to the Bell Rock Substation on account of the M13 Line has the added benefit of partially preparing it to connect the new AFRRP transmission line. This is because some of the equipment installed for the M13 Line is also needed for the adjacent line position. Although one of the benefits of the rebuild of the Bell Rock Substation is to create space and install an underground duct bank that is also needed to connect the new AFRRP, the rebuild of the station addresses other separate and distinct needs within the system, as summarized above. It is identified in the SEMA-RI Solutions Study as a necessary project regardless of the choice of solution to the voltage collapse and consequential load loss needs.

Acushnet to Fall River Reliability Project

The AFRRP addresses certain critical transmission system needs identified in a subarea designated "Group 2" which includes portions of Industrial Park in Acushnet, the Somerset area and Newport, Rhode Island subareas, as defined in the ISO-NE Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study, Revision 1 – March 2017.

Within this subarea:

- Certain N-1 and N-1-1 contingencies would result in voltage collapse and the loss of service to approximately 144,000 customers and more than 500 megawatt ("MW") of load in all or parts of Fall River, Assonet, Freetown, Westport, Dartmouth, New Bedford, Acushnet, Fairhaven, Mattapoisett, Marion, Rochester, and Wareham, Massachusetts, as well as Jamestown, Newport, Middletown, Portsmouth, Tiverton, and Little Compton, Rhode Island.
- Additionally, certain N-1-1 contingencies have the potential to result in consequential loss of service to approximately 102,000 customers and 360 MW of load in 12 Massachusetts and Rhode Island municipalities.

As part of the SEMA-RI Solutions Study, alternative solutions were developed to address these issues. A description of the alternative solutions is found in Section 3.0 *Alternatives Analysis* of this EENF. All of the alternative solutions were evaluated to ensure that the solution components resolve the identified time-sensitive criteria violations identified in the Needs Assessment, and compared based on cost, constructability, environmental impacts, delivery timeframe and several other system performance criteria.

The AFRRP eliminates the potential widespread voltage collapse and loss of load across 17 municipalities following a single (N-1) transmission contingency by providing an additional transmission source into the load pocket and additional voltage support at the existing NEP Bell Rock Substation and several of Eversource's existing substations including the Wing Lane and High Hill Substations. The AFRRP thereby ensures continued compliance with applicable federal and regional transmission reliability standards and criteria and maintains reliable electric service to the SEMA-RI area.

[6] As configured, any new substation bay will contain at least three breakers and two lines. The name originates from how the breakers are associated within the bay. Each line has its own breaker (between the line tap and the bus) and each line shares a breaker with the other line. Thusly, the configuration allows a line to have a breaker and a half of a breaker to perform any necessary switching.

1.5 Permitting and Regulatory Approvals

Table 1-5 below provides a listing of anticipated state agency environmental permits and approvals for both the Bell Rock Substation Rebuild Project and the AFRRP.

TABLE 1-5 STATE AGENCY PERMITS, REVIEWS, AND APPROVALS

PROJECT	AGENCY/ REGULATORY AUTHORITY	PERMIT AND/OR PURPOSE OF APPROVAL
Bell Rock Substation Rebuild Project	Massachusetts Department of Environmental Protection (MassDEP)	Individual Section 401 Water Quality Certification
	MassDEP	Massachusetts Wetlands Protection Act (WPA) – Superseding Order of Conditions (potential)
	MA Natural Heritage and Endangered Species Program (NHESP)	Massachusetts Endangered Species Act (MESA) Review
	Massachusetts Historical Commission (MHC)	Massachusetts Historical Commission and Protection of Properties Included in the State Register of Historic Places (950 CMR 70 and 71) – Project Notification Form (PNF)
	Massachusetts Department of Conservation and Recreation (MA DCR)	Construction and Access Permit (potential)
Acushnet to Fall River Reliability Project	Massachusetts Energy Facilities Siting Board (EFSB)	Approval to construct and operate the project pursuant to G.L. c. 164, § 69J
	Massachusetts Department of Public Utilities (DPU)	Approval to construct and operate the project pursuant to G.L. c. 164, § 72
	MassDEP	Individual Section 401 Water Quality Certification
	MassDEP	Massachusetts WPA – Superseding Order of Conditions (potential)
	NHESP	MESA Review and approval of a Conservation Management Plan
	MHC	MHC and Protection of Properties Included in the State Register of Historic Places (950 CMR 70 and 71) –PNF
	MA DCR	Construction and Access Permit (potential)
	Massachusetts Department of Transportation (MassDOT)	State and Interstate Highway Right-of-Way Encroachment Permit and Crossing Permit

1.6 Outreach

The Companies have established community and public outreach processes for both the Bell Rock Substation Rebuild Project and the AFRRP to maintain communications with stakeholders (e.g., abutting property owners, residents, community groups and local and state officials). This process includes opportunities for public education and input regarding the need for the projects, the permitting process, the dissemination of construction updates and outreach during construction, and follow-up outreach after project completion. The process is designed to engage the communities, facilitate transparency throughout the projects, foster public participation, and solicit feedback from stakeholders.

2.0 PROJECT DESCRIPTION

The major components of the proposed Bell Rock Substation Rebuild Project and AFRRP are provided separately below.

2.1 Bell Rock Substation Rebuild Project

The proposed Bell Rock Substation Rebuild Project involves the rebuild and expansion of the existing Bell Rock Substation located in Fall River, Massachusetts, the bifurcation of the existing M13 line, and the termination of the resulting M13N and M13S Lines. The major components of the Project are described in more detail below.

2.1.1 Existing Conditions

The Bell Rock Substation is an existing two-breaker substation located on a 2.75-acre NEP easement on the east side of Bell Rock Road in Fall River. The substation is located at the junction of the existing N12 and M13; M13 and L14 Lines; and the D21 transmission line ROWs to the west, south, and east, respectively (refer to Figure 2-1 in Appendix A).

2.1.2 Proposed Conditions

The proposed rebuild/expansion of the Bell Rock Substation will provide 11 breakers in a breaker-and-a-half configuration that will continue to connect the N12, L14 and D21 Lines and provide new line positions in order to connect M13N and M13S Lines. Since some of the M13S equipment is shared with the adjacent line positions, this expansion will also partially equip a future line position for the AFRRP (Line 114) from Eversource territory.

The Bell Rock Substation Rebuild Project involves improvements and upgrades to certain equipment and facilities at the substation, and will primarily involve the following work:

- Approximately 0.51-acre (22,000 square feet) expansion of the perimeter security fence line.
- Installation of a replacement control building with the dimensions of approximately 64-feet by 36-feet.
- Installation of various substation-related equipment, including, but not limited to, a standby generator, a substation service transformer, disconnect switches, gas circuit breakers, switches and buses.
- Installation of two A-frame structures.
- Installation of lightning masts.
- Installation of various underground systems, including ground grid, conduits and cable trenches.
- Installation of associated foundations and supports.
- Replacement and expansion of the existing 6-foot fence with an 8-foot-tall perimeter security fence plus 1-foot of barbed wire, including swing gates.
- Installation of new lighting on existing and new structures.
- Reconfiguration of certain transmission line facilities that loop into and out of the substation.

- Upgrades to the stormwater management system.

The layout of the existing and expanded substation facilities is shown in Figures 2-1 through 2-3 in Appendix A.

The temporary bypass of the existing M13 transmission line will involve shifting the line to the immediate south of the substation fence line to facilitate the substation rebuild and temporarily remove an energized overhead line from the work footprint. The work involved in the M13 Line temporary bypass generally involves the following work activities:

- Establish a corridor for the temporary overhead lines to include a cleared width of approximately 50 feet.
- Construction of an approximately 20-foot-wide gravel access road along the south side of the substation fence line to provide access to the temporary M13 Line bypass structures.
- Installation of two permanent steel, single pole dead-end structures on concrete foundations. One structure will be located to the west of the substation fence, and the second structure will be located to the southeast.
- Installation of one temporary-guyed single dead-end wood pole structure that will be a direct-embed structure located to the south of the substation fence.
- Replacement of one existing wood H-frame dead-end structure with a new permanent steel H-frame, dead-end structure on concrete foundations south of the substation site within the existing M13 and L14 transmission ROW easement.

All work associated with the M13 bypass will occur within the existing substation and transmission line easements established for the Bell Rock Substation.

2.1.3 Construction Methods, Schedule, and Estimated Cost

The proposed Bell Rock Substation Rebuild Project was designed to avoid and/or minimize adverse environmental impacts to the extent practicable. Mitigation techniques are employed where these impacts are unavoidable. NEP's policies and procedures for construction methods are summarized in Section 12: Construction-Period Considerations. For additional information, please refer to Appendix C: *National Grid's Environmental Guidance - Access, Maintenance and Construction Best Management Practices (EG-303NE)*, which contains the general procedures and policies implemented during construction to identify, avoid, minimize and mitigate environmental impacts.

The conceptual grade (-25% / +50%) cost estimate for the Bell Rock Substation Project is $16 million. A detailed discussion of the natural and social environmental impacts associated with the Bell Rock Substation Project is included in Sections 4.0 through 11.0 of this document. The development and planning of the Bell Rock Substation Rebuild Project required coordination of planners, Project managers, engineers and consultants and ISO-NE. NEP anticipates starting construction of the Substation Project in the first quarter 2020 and anticipates the station to be commissioned by the second quarter of 2021.

2.2 Acushnet to Fall River Reliability Project

The proposed AFRRP involves the installation of a new overhead electric 115 kV transmission line. The major components of the proposed Project are described in detail below.

2.2.1 Existing Conditions

The existing transmission line ROW within which the new AFRRP will be installed extends from the Industrial Park Tap to the existing Bell Rock Substation (approximately 12.1 miles) traversing the towns of Acushnet, New Bedford, Dartmouth, and Fall River (refer to Figure 2-4 in Appendix A). From the Industrial Park Tap to the Industrial Park Substation (approximately 4.2 miles), the existing transmission line is located on single circuit H-frame structures and co-located with an existing distribution line within an approximately 150- to 210-foot-wide ROW. The transmission line continues from the Industrial Park Substation to the High Hill Substation (approximately 2.4 miles) on single circuit H-frame structures and co-located with an existing distribution line within an approximately 150-foot-wide ROW. From the High Hill Substation to the Bell Rock Substation (approximately 5.4 miles), the existing transmission line is located on single circuit H-frame structures within an approximately 150-foot-wide ROW.

2.2.2 Proposed Conditions

The addition of the new AFRRP transmission line will be consistent with the current use of the existing utility ROW. Based on preliminary engineering, of the 118 new structures required for the overhead transmission line, 79 will be direct embed steel pole H frame structures, four will be steel pole H frame structures on concrete foundations, 25 will be direct embed steel single-pole (also referred to as monopole), supplemented by seven monopole and three triple-pole (dead-end and angle) structures requiring reinforced concrete foundations to support heavy loads (refer to Figure 2-5 in Appendix A).

The new structures will range in height from approximately 55 to 110 feet. The structures will support aluminum steel reinforced conductors both in horizontal and vertical configurations. One 3/8-inch extra high strength steel shield wire and one optical ground wire ("OPGW") will be installed to support high speed relaying and communications requirements. Typical cross-sections of the ROW showing existing and proposed structure size and placement are provided in the Figure 2-6 in Appendix A.

Clearing will be required within the NEP ROW for a distance of approximately 4.2 miles to expand the cleared ROW width approximately 60 feet to the south side of the ROW, and within one span (between Structures 7-8) on the Eversource ROW in order to accommodate the new line. All tree clearing and vegetation removal is to occur within the boundaries of the existing ROWs.

2.2.3 Construction Methods, Schedule and Estimated Cost

The proposed AFRRP was designed to avoid and/or minimize adverse environmental impacts to the extent practicable. Mitigation techniques are employed where these impacts are unavoidable. Additional detail regarding the Companies policies and procedures for construction methods are summarized in Section 12 and provided in the following documents:

- *National Grid's Environmental Guidance - Access, Maintenance and Construction Best Management Practices (EG-303NE)* (Appendix C).
- *Eversource's Construction & Maintenance Environmental Requirements. Best Management Practices Manual for Massachusetts & Connecticut* (Appendix D).

The conceptual grade (-25% / +50%) cost estimate for the AFRRP is $33.8 million. A detailed discussion of the natural and social environmental impacts associated with the AFRRP is included in Sections 4.0 through 11.0 of this document. The development and planning of the AFRRP required coordination of planners, Project managers, engineers and consultants and the ISO-NE. The Companies anticipate starting construction of the AFRRP in the first quarter 2021 to facilitate the facilities being in-service by the fourth quarter of 2021.

3.0 ALTERNATIVES ANALYSIS

This section describes alternatives to the proposed Bell Rock Substation Rebuild Project and the AFRRP and identifies why the Companies did not select those alternatives. This section also describes the process used to evaluate alternative means of addressing Group 2 needs in the SEMA-RI region. The Companies evaluated a "No-Action Alternative," and assessed substation alternatives, transmission alternatives and routing alternatives. The Companies' assessment demonstrates that the Bell Rock Substation Rebuild Project and the AFRRP are the alternatives that best meet the identified system needs; and that best address the various reliability, regulatory and permitting objectives, including minimizing environmental impacts and providing a cost-effective solution to customers.

The potential Project alternatives discussed below include:

- The No-Action Alternative
- Bell Rock Substation Rebuild Project Alternatives:
    - Construction of a New Substation at a Different Location
    - Substation Configuration and Equipment Alternatives
- Acushnet to Fall River Reliability Project Alternatives:
    - Transmission Line Project Alternatives
    - Routing Alternatives

3.1 No-Action Alternative

The No-Action Alternative would not address the reliability and operability concerns at the substation and would not resolve the regional electric reliability problems that ISO-NE has identified on the transmission system, as discussed above in Section 1.4, *Purpose and Need*. If no action is taken, the existing electric system reliability issues will remain unresolved and components of the existing system will remain at risk for failure under certain contingencies studied by ISO-NE.

Because it does not meet the need identified in Section 1.4 of this Report and would not satisfy applicable transmission planning reliability criteria, the No-Action Alternative was not considered a feasible option for either the Bell Rock Substation Rebuild Project or the AFRRP.

3.2 Bell Rock Substation Rebuild Project

3.2.1 Construction of a New Substation at a Different Location

NEP evaluated the feasibility of constructing a new substation at a different location, as opposed to rebuilding and expanding the existing Bell Rock Substation. The new substation would need to be sited to accommodate transmission line connections of the existing D21, L14, N12 and M13 transmission lines, in order to continue to serve the load in the area. If a new site were selected for a new substation, all of the existing transmission lines would need to be significantly extended to connect into and out of the substation, requiring expanded and/or new property rights and easements, and the development of a new cleared ROW. NEP did not identify any company-owned land or other available corridors in the general vicinity of the interconnection with the existing transmission lines.

The Bell Rock Substation is largely surrounded by open space and conservation land held by the City of Fall River and the MA DCR. These properties consist of lands under a conservation restriction within the Watuppa Reservation and the Southeastern Massachusetts Bioreserve. Proposing a new substation within the limits of these conservation lands would require approval of the Massachusetts Legislature and the MA DCR under the Article 97 process, which would significantly impact the schedule and in-service date for addressing the reliability needs of the Bell Rock Substation Rebuild Project and the public need identified by ISO-NE. Constructing a new substation on a new parcel of land and installing new and/or expanded transmission lines would result in increased impacts to the natural and built environments. For these reasons, construction of a new substation at a new location was determined to be an infeasible alternative.

3.2.2 Substation Configuration and Equipment Alternatives

Substation Equipment Alternatives

NEP evaluated different substation configurations and equipment alternatives to reduce the footprint of the substation rebuild and expansion, as follows:

Air Insulated Switchgear - Non-Individual Pole Tripping Breakers Alternative (Preferred Alternative)

This alternative uses air-insulated switchgear ("AIS") and non-individual pole tripping ("Non-IPT") gas circuit breakers ("GCBs"). Stability studies confirmed that individual pole tripping ("IPT") breakers would not be necessary now or in the future planning timeframe. This option also uses gas rather than oil; therefore, there will be no change in the oil quantity on site. Building the Bell Rock Station with Non-IPT breakers is the preferred alternative.

AIS - IPT Breakers Alternative

This alternative uses a standard equipment layout to construct three breaker-and-a-half arrangement bays utilizing six new IPT GCBs and two existing Non-IPT GCBs. Stability studies confirmed IPT breakers are not necessary now or in the future. Therefore, rebuilding the Bell Rock Station with AIS IPT breakers is not the recommended alternative.

Substation Configuration Alternatives

Three alternative layouts for the rebuild of the Bell Rock Substation were considered during the design phase of the Project. These layouts are depicted in Figures 3-1, 3-2 and 3-3 in Appendix A. For each of the alternative substation configurations, maintaining a clear zone of 10 feet along the perimeter security fence is required to: 1) protect the perimeter fence from downed trees or falling limbs; and 2) maintain a clear security zone around the perimeter of the substation for visual monitoring. Each layout was considered based on the engineering requirements for the substation as well as reliability considerations, environmental impacts, and costs. The Bell Rock Substation is located on an easement granted by the City of Fall River in the 1960s. NEP became the successor-in-interest to the substation easement in May 2000. The substation abuts the following land designations: City of Fall River Water Resource, and Watershed and Water Supply Districts; Watuppa Reservation; within the headwaters of the North Watuppa Pond, a Class A public water supply with contributing wetlands designated as ORW; Southeastern Massachusetts Bioreserve; and Massachusetts NHESP Priority Habitats for state-listed rare species.

Alternative Number 1 (Preferred Layout)

Alternative Number 1 applies the AIS - Non-IPT breakers alternative into the design and incorporates additional measures to reduce the substation expansion. NEP incorporated the following design measures into the station design to minimize impacts to the surrounding wetlands:

- The new control building was shifted closer to Bell Rock Road to reduce the amount of grading required to construct the building.
- The northern fence line expansion was reduced to the minimum distance to maintain vehicular access within the substation.
- The proposed capacitor bank was sited at the western end of the existing yard toward Bell Rock Road.
- An underground conduit/cable connection will be used to connect the bus to the capacitor bank. The underground conduit/cable system reduces the number of above-ground structures thereby reducing overhead clearance constraints and allowing the substation footprint to be slightly reduced.

The new control building will require NEP to obtain a dimensional variance from the Fall River Zoning Board of Appeals because the building will not comply with the 75-foot-minimum front yard setback requirements (as measured from the unimproved Bell Rock Road).

Alternative Number 2

Alternative Number 2 incorporates the AIS - Non-IPT breakers alternative into a typical substation engineering design.

This alternative design sites the new control building and all equipment within the yard, in accordance with the City's zoning setback requirements. Meeting the setback distance for the control building also results in increased wetland and ORW impacts. The proposed access drive on the north side of the substation includes an improved 20-foot-wide corridor to provide greater clearance between the substation equipment and the fence line. The proposed capacitor bank is located in the northeastern corner of the yard resulting in increased impacts to wetlands and ORW.

Alternative Number 2 was dismissed from further consideration because the layout results in greater wetland and ORW impacts and would require additional tree clearing.

Alternative Number 3

Alternative Number 3 incorporates the AIS - Non-IPT breakers alternative into a typical substation design. Alternative Number 3 applies some of the same mitigation and footprint reduction measures as Alternative Number 1, with the exception of siting the proposed capacitor bank within one of the existing transmission line corridors located to the east of the substation. Constructing the capacitor bank in this location would result in impacts to a field-identified vernal pool, adjacent wetlands, and ORW. For these reasons Alternative Number 3 was dismissed from further consideration.

3.2.3 Conclusion

After consideration of the alternatives discussed above, NEP determined that the preferred design for the Bell Rock Substation Rebuild Project was the utilization of AIS Non-IPT Breakers and the substation configuration Alternative Number 1. This determination was based on consideration of engineering requirements, facility reliability and security, minimization of environmental impacts, and overall project costs, all while addressing the ISO-NE identified need.

3.3 Acushnet to Fall River Reliability Project

This section of the Report describes the alternatives evaluated by the Companies to avoid, minimize and mitigate impacts to those resources listed in the MEPA regulations at 301 CMR 11.03. The AFRRP is subject to review by the EFSB under G.L c. 164 § 69J because the AFRRP involves the construction of a "new electric transmission line having a design rating of 115 kilovolts or more which is 10 miles or more in length on an existing transmission corridor…" G.L c. 164 § 69G. For purposes of the EFSB's review of the AFRRP, the Companies will provide an extensive analysis of potential alternatives to assess potential candidate routes, select a Preferred Route, and identify a Noticed Alternative Route.

The alternatives analysis for the AFRRP was conducted in two consecutive phases. The first phase of the alternatives analysis determined the necessary improvements to the existing transmission network to address the system needs identified above in Section 1.4, *Purpose and Need*. Under this phase, transmission line alternatives were evaluated by ISO-NE and the SEMA-RI solution study working group, as further described below. The next phase was undertaken by the Companies, as the transmission line owners, and involved evaluating various routes to determine the selected preferred alternative. The Companies' overriding goal throughout the planning and design phases of the AFRRP was to select the alternative that best meets the identified need for transmission reliability; addresses the various regulatory and permitting requirements, including minimizing environmental impacts; and provides a cost-effective solution to customers. This process served to identify feasible alternatives in accordance with 301 CMR 11.07(6)(f).

3.3.1 Transmission Line Project Alternatives

As discussed above in Section 1.4, *Purpose and Need*, solutions to meet the identified need were studied for many years by ISO-NE. Part of ISO-NE's responsibility is to conduct regional planning and to direct transmission owners to operate their facilities in a manner that improves system reliability, including the requirement to upgrade existing transmission lines or build new ones to assure reliability. The 2016 SEMA-RI solution study identifies four transmission line solutions to address the N-1 voltage collapse contingency and the N-1-1 consequential load loss and voltage collapse contingencies identified in the Needs Assessment.The ISO-NE study identified the need to bring two new sources of transmission into the load pocket to avoid voltage collapse and consequential load loss. The Companies compared the four potential transmission alternatives outlined below on the basis of cost, reliability, potential environmental impacts and delivery timeframes. This comparison is described below and seeks to provide a solution for one of the two new transmission sources needed.

These alternatives include:

- Alternative 1: The installation of a new underground cable extending approximately five miles from Bristol Substation in Bristol, Rhode Island to a new proposed switching station (Boyd's Lane Switching Station) in Portsmouth, Rhode Island. This alternative would require the installation of an undersea cable via a horizontal directional drill ("HDD") beneath Mount Hope

Bay adjacent to the Mount Hope Bridge. There is currently no transmission circuit between these two locations. This alternative would also require reconductoring of 5.1 miles of the existing F-184 Line and replacement of transmission line structures from the Merriman Junction Tap to the Warren Substation to Bristol Substation.

- Alternative 2: Separation of the N12 and M13 double circuit transmission ("DCT") lines between the Somerset Substation and the Sykes Road Switching Station (approximately 1.75 miles) via construction of a new primarily underground M13 Line. The existing M13 Line crossing over the Taunton River would be replaced with a new overhead crossing adjacent to the existing N12 and M13 DCT Lines Taunton River crossing beginning at NEP's Somerset Substation.[7] From its new landing point on the east side of the Taunton River, the new M13 line would travel overhead or underground across private property, and then within city streets to NEP's Sykes Road Switching Station. New permanent land rights would be required both for access and for the line itself. Additionally, the existing N12 and M13 Lines would be reconductored between the Sykes Road Switching Station and the Bell Rock Substation.

- Alternative 3: Install a new line extending approximately 3.5 miles (underground for 1.7 miles and overhead for 1.8 miles) from the Somerset Substation in Somerset, Massachusetts to the Bell Rock Substation in Fall River, Massachusetts. This transmission line alignment would predominantly be constructed underground due to the lack of available space and real estate along the existing N12 and M13 Lines ROW.

- Alternative 4 (the AFRRP): Install a new line (approximately 12 miles long) to extend the Line 114 from the Industrial Park Tap in Acushnet, Massachusetts to the existing Bell Rock Substation in Fall River, Massachusetts. Capacitor banks would need to be installed at the Bell Rock, High Hill and Wing Lane Substations to support voltages under contingency conditions.

Cost

Conceptual grade cost estimates (-25% / +50%) for each of the four alternatives were developed and are presented in Table 3-1 below.

TABLE 3-1 ACUSHNET TO FALL RIVER RELIABILITY PROJECT TRANSMISSION LINE ALTERNATIVES CONCEPTUAL GRADE ESTIMATES

	CONCEPTUAL GRADE ESTIMATE (IN $M AT -25 / +50% ACCURACY)
Alternative 1	$102.3M
Alternative 2	$39.0M
Alternative 3	$47.0M
Alternative 4	$33.8M

[7] NEP is in the process of constructing a new substation to replace the existing, aging Somerset Substation. The new replacement substation, which is named the "Pottersville Substation," will be located across the street from the existing Somerset Substation. For consistency with the 2016 Solutions Study, the term "Somerset Substation" will be used throughout this EENF.

When comparing the costs of all four alternatives identified above, Alternative 4 is the lowest cost of the four transmission line alternatives.

Reliability

Each of the four transmission line alternatives has the ability to address the N-1 contingency voltage collapse need. In addition, each of the four transmission line alternatives, when combined with a second transmission line alternative, meaning the construction of a separate project, would resolve the remaining N-1-1 contingencies.

However, Alternative 4 is the least complex from siting and engineering design perspectives of the four transmission line alternatives, and could be permitted and constructed relatively quickly to address the N-1 contingency of concern. Alternative 4 can be constructed entirely within an open position in an existing and maintained transmission line ROW. The Companies possess all the property rights needed to construct the proposed overhead transmission line, with two short sections of an underground cable (approximately 800 linear feet) that will be installed to avoid utility congestion at High Hill Substation and the Industrial Park Tap. In contrast:

- Alternative 1 requires the permitting and construction of 4.4 miles of underground cable through relatively densely developed roadways, installation of approximately 0.6 mile of undersea cable, construction of a new switching station, and reconductoring of approximately 5 miles of existing overhead transmission lines.

- Alternative 2 requires the acquisition of new property rights, construction of a new major overhead crossing of the Taunton River, and construction of a new underground cable within city roadways.

- Alternative 3 requires both the construction of approximately 3.5 miles of predominantly underground cable within city streets, and if feasible, the reconfiguration and reconstruction of two existing overhead transmission lines and structures from the Sykes Road Switching Station to the Bell Rock Substation, in an attempt to accommodate a third overhead transmission line within the same congested ROW.

Alternative 4 is preferable to the other three alternatives with respect to its ability to meet the ISO-NE identified need with less risk in terms of engineering feasibility, constructability and reducing the amount of construction required on existing infrastructure.

Delivery Timeframe

The Companies' gauged the transmission line alternatives on their ability to meet the Project delivery timeframe and in-service date identified by ISO-NE to reinforce the reliability of the transmission system, including addressing the N-1 contingency.

- Alternative 1 – The major constraint with this alternative is the need to cross Mount Hope Bay. Preliminary engineering studies were performed to determine if a new cable could either be attached to the underside of the Mount Hope Bridge or laid as a submarine cable along the bottom of the bay. Both alternatives were deemed infeasible and therefore HDD would be required. To complete an HDD, permanent and temporary easements would be required as well as extensive geophysical and marine surveys. A successful HDD would also add to the duration of

construction. For these reasons the Companies' deemed that Alternative 1 could not feasibly meet the Project delivery timeframe.

- Alternative 2 – The need to acquire permanent and temporary easements to support the proposed aerial crossing of the Taunton River was viewed as a major constraint in terms of the timeframe needed to negotiate and acquire rights. Further, this route alternative presents multiple difficulties with overhead and underground crossings of a rail corridor, state highway and congested city streets. For these reasons, the Companies' deemed that Alternative 2 could not feasibly meet the Project delivery timeframe.

- Alternative 3 – Construction of a predominantly underground cable within the congested city streets of Fall River was considered to require significantly more time than installing an overhead line within an established electric transmission ROW. Additionally, the preliminary engineering design performed on Alternative 3 concluded that installing a third overhead line within the existing N12 and M13 Lines ROW between the Sykes Road Switching Station and Bell Rock Substation would require that both circuits be entirely reconfigured and rebuilt in vertical configurations. The majority of the new conductors and transmission line structures would need to be in a vertical configuration constructed on steel monopoles with concrete caisson foundations or require significant anchoring and guying. The existing ROW is 150 feet wide and further engineering would need to be performed to confirm whether all three circuits could be accommodated within the same ROW, and if the construction of three parallel circuits in this area introduced another potential contingency. The need to rebuild and reconfigure two existing transmission line circuits combined with constructing a third transmission line was viewed as not favorable to meeting the Project delivery timeframe.

- Alternative 4 (the AFRRP) – This route alternative makes use of existing and maintained transmission line ROWs that are wide enough to support the construction of a new parallel transmission line. No new easements or land rights are required to install the new facilities. The existing transmission lines can remain energized throughout much of the duration of construction, as the new line would be constructed along an open position in the ROW. Reconfiguration and reconstruction of existing facilities is minimized. For these reasons, Alternative 4 was selected as the alternative that best meets the Project delivery timeframe and in-service date of 4th Quarter 2021.

Constructability, Natural and Human Environmental Criteria

A set of consistent constructability assumptions, and, natural and social environmental criteria were applied to assess the merits of each of the four alternatives. These criteria have been applied to previous transmission line projects and they incorporate lessons learned from past construction activities. Table 3-2 summarizes the characteristics and potential impacts of the four alternatives. The initial criteria applied to the four transmission alternatives consists of the following:

- Engineering, construction feasibility and safety considerations.

- Real estate and easement acquisition requirements.

- Access constraints and availability of existing access.

- Potential impacts to the social / built environment.

- Potential impacts to the natural environment.
- Delivery timeframe and schedule conflicts.
- Cost implications.

TABLE 3-2 ACUSHNET TO FALL RIVER RELIABILITY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT TRANSMISSION LINE ALTERNATIVES

SOLUTIONS	TYPE AND APPROXIMATE LENGTH	DESCRIPTION OF ROUTE	ENGINEERING / CONSTRUCTION FEASIBILITY & SAFETY CONSIDERATIONS	REAL ESTATE/ EASEMENT ACQUISITION REQUIREMENTS	ACCESS CONSTRAINTS	POTENTIAL IMPACTS TO SOCIAL/ BUILT ENVIRONMENT	POTENTIAL IMPACTS TO NATURAL ENVIRONMENT	DELIVERY TIMEFRAME / SCHEDULE CONFLICTS	COST IMPLICATIONS
Alternative 1	Mixed (underground and overhead) 5 miles	Bristol Substation to Dexter Substation/ Old Boyd's Lane Switching Station	Requires construction easements for HDD entry and exit pits. Requires geotechnical surveys, HDD contingency plan, frac-out plan. Length of HDD crossing requires special oversized and overweight reel handling.	Requires new easement. Requires temporary easements from Roger Williams University and Rhode Island Department of Transportation (RIDOT) for HDD entry and exit pits.	Underground transmission line installed in local streets, requiring traffic management plans and possible construction detours.	Underground line to be installed in medium density residential area.	Requires HDD crossing under 80-foot deep navigation channel of Mount Hope Bay. Requires development of a new substation on currently undeveloped land.	Seasonal restrictions on construction likely due to proximity to Roger Williams University and high traffic areas during the tourist season. Work hour restrictions likely to be imposed by the RIDOT for construction on state roadways. HDD construction may be lengthy in duration depending on soil conditions Cable length limits suppliers to Asian factories. Negotiations with private property owners can lead to schedule implications and delays.	Increased costs for HDD installation beneath Mount Hope Bay. Increased costs for underground utility installation.
Alternative 2	Mixed (underground and overhead) 1.75 miles	Somerset Substation to Sykes Road Switching Station	Underground line to be installed under railroad, oil pipeline, communication line, sewer line, and two state roadways.	Requires new easement from Massachusetts Department of Transportation (MassDOT) for railroad crossing, and easement from private landowner for river crossing tower foundation/footings	Construction access would be required from MassDOT. Agreement with MassDOT would be required for emergency access across the tracks. Underground transmission line installed in local streets, requiring traffic management plans and possible construction detours.	Underground line to be installed in medium density residential area.	Crossing of the Taunton River.	Negotiations with private property owners can lead to schedule implications and delays.	Increased costs for underground utility installation.
Alternative 3	Mixed (underground and overhead) 3.5 miles	Somerset Substation to Bell Rock Substation	Underground line to be installed under railroad, oil pipeline, communication line, sewer line, and two state roadways. Installing a third overhead line within the route corridor is possible however two existing circuits (N12 and M13) would need to be entirely reconfigured and rebuilt in vertical configurations.	Requires new easement from MassDOT for railroad crossing, and easement from private landowner for river crossing tower foundation/footing.	Construction access would be required from MassDOT. Agreement with MassDOT would be required for emergency access across the tracks.	Underground line to be installed in medium density residential area.	Would require steel monopoles in a vertical configuration would on concrete caisson foundations or require significant anchoring and guying for the new structures. Potential for greater impacts to state-listed rare species and outstanding resource waters. Larger diameter foundations, increased work space requirements.	Negotiations with private property owners can lead to schedule implications and delays. Greater safety concerns involved in reconfiguring the existing transmission lines and drilling and concrete pours under energized lines; and more extensive scheduling of outage and limitations on available outages.	Increased costs for underground utility installation. Increased cost for material and construction for steel monopole with caisson foundations.
Alternative 4	Overhead 12 miles	Industrial Park Tap to Bell Rock Substation	Use of available space on an existing electric transmission line ROW simplifies construction.	No new easements or land rights required.	Access rights are established along an existing overhead transmission corridor.	Route is located predominantly in undeveloped or low density residential areas.	Entirely overhead construction which can span existing natural resources to the greatest extent practicable. Through tree clearing is required, it will be completed within an existing overhead transmission line easement.	Construction entirely within an open position in an existing transmission line ROW minimizes schedule constraints.	Most cost-effective solution aligning with the Companies standards installation practices within existing utility easements.

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Engineering / Construction Feasibility and Safety Considerations

In evaluating potential alternative routes, preference was given to routes that would minimize constructability constraints. For example, road crossings or working within other utility corridors can result in access restrictions, working space constraints, safety concerns, traffic disruptions, and restrictive work hours. Alternatives 1 and 2 require underground utility installation within existing roadway ROWs; while Alternative 3 requires underground utility installation within existing overhead transmission line ROW traversing former industrial properties. Alternative 1 requires a long HDD beneath Mount Hope Bay requiring special oversized and overweight reel handling and construction equipment. Alternatives 2 and 3 would require underground installation traversing railroad, oil pipeline, communication and sewer lines, and two state roadways. During underground construction, the potential to encounter subsurface soil and groundwater contamination is greater than with a purely overhead route.

In addition, the overhead portion of Alternative 3 would require two existing transmission lines to be reconfigured and rebuilt in a vertical configuration to accommodate a new overhead transmission line within the existing ROW.

Due to these factors, Alternative 4 is the preferred solution in terms of engineering / construction feasibility and safety considerations.

Real Estate / Easement Acquisition Requirements

Acquiring land or easements for transmission purposes, either by condemnation or by voluntary agreement, is a lengthy and costly process. Accordingly, identifying alternatives with manageable land acquisition requirements, and to minimize the need to expand existing ROW is a key consideration. The potential to upgrade an existing transmission line or substation, or to co-locate a new transmission line within an existing ROW is typically a primary routing consideration because it often minimizes environmental impacts and costs, and reduces delays caused by the need to acquire property/access rights, among other benefits. Alternative 4 is the only solution where additional land rights are not required and is therefore more preferable than the other solutions.

Access Constraints

Alternatives 1, 2, and 3 would require new access rights to be negotiated for portions of the transmission line not located within existing easements. Since Alternative 4 is located entirely within an existing overhead transmission ROW where access rights currently exist, Alternative 4 is preferable over the others.

Impacts to the Natural and Human Environment

Preference was given to the alternatives that would minimize impacts to the natural and human environment. Alternatives 1 through 3 include a combination of underground and overhead transmission installation. Construction techniques for underground transmission lines create different environmental impacts than overhead transmission line construction. In the case of Alternatives 1 and 2, the underground transmission installation along existing roadways would result in impacts mostly to the manmade environment and would primarily occur during the construction of the line. These would include temporary impacts to traffic and construction noise impacts to homes and businesses. The underground routes associated with Alternatives 1 and 2 are primarily located within two-lane roadways where lane closures and alternating traffic patterns would be required during construction. Alternative 3 requires underground utility installation within existing overhead transmission line ROW where avoidance of

natural resource areas would not be possible. A continuous permanent access road and an open cut trench would need to be established along the entire length of the underground portion of the route to facilitate installation of the underground cable. This continuous access and trench would result in more significant impacts to natural resource areas than a purely overhead installation that could span these areas to the greatest extent practicable.

In addition to these impacts, an underground line would also require a transition station where the proposed facilities transition from overhead to underground and/or equipment installed above-ground at the terminal station. This additional above-ground equipment could potentially increase the environmental impact of an underground project as additional space would be needed for these facilities. Alternative 1 also includes construction of a new substation on a currently undeveloped site resulting in permanent land use impacts.

Due to its location entirely within an existing overhead transmission line ROW, Alternative 4 was considered preferable in terms of minimizing impacts to the natural and human environment. With overhead construction, it is frequently possible to span wetlands and other sensitive resource areas. This has been demonstrated along the existing transmission lines located within the Alternative 4 ROW and is proposed for installation of a new overhead transmission line within this corridor.

3.3.2 Routing Alternatives

Since a connection between the Industrial Tap and Bell Rock Substation was identified by ISO-NE as the preferred solution to provide a transmission source to the Fall River area, the Companies also examined the general vicinity of the Project and orientation of potential west-to-east Routing Alternatives to the proposed transmission line focusing on existing utility and transportation corridors. Each of the routes was evaluated to determine their feasibility and potential for environmental impact for the installation and operation of a transmission line using the following siting criteria:

1. **Maximize use of existing linear corridors.** Locating the proposed transmission line along existing ROWs (e.g., transmission lines, highways, railroads, and pipelines) where linear uses are already established, was a primary routing consideration.
2. **Minimize the need to acquire land or land rights.** Acquiring additional land or land rights to construct the line will impact project cost and schedule, especially if the land rights need to be acquired along the length of the entire line. Acquisition of these rights from unwilling landowners by condemnation or even by voluntary agreement, can be a lengthy and costly process.
3. **Minimize impacts to densely developed areas.** The placement of transmission facilities in densely developed areas typically creates additional complexity both during initial construction and when maintenance is required. The potential for construction and maintenance work hour restrictions, need for additional ROW, temporary work space, and limited access availability are more prevalent in densely populated areas.
4. **Minimize impacts to environmental resources.** The Companies sought to identify route alternatives that would minimize impacts to environmental resources such as wetlands, wildlife habitats, watercourses, conservation lands, historic sites, archaeologically sensitive areas, and other designated resources.
5. **Limit construction feasibility constraints.** In evaluating potential alternative routes, preference was given to routes that would minimize constructability constraints. For example, highway crossings or working within other utility corridors can result in access restrictions, working space constraints, safety concerns, traffic disruptions, and restrictive work hours.

6. **Maintain system operability.** Route alternatives must allow general accessibility for future maintenance or repair.
7. **Minimize cost.** The Companies sought to develop route alternatives that would avoid costly remediation or construction requirements or, alternatively, that would provide some opportunity for securing cost reductions.

As a result of this analysis, the Companies identified seven route alternatives connecting the Industrial Park Tap and Bell Rock Substation as shown on Figure 3-4. These routes were evaluated to determine their feasibility and potential for environmental impact for installation and operation of a transmission line.

Alternative Routes Evaluated for the AFRRP

ISO Route

The ISO Route (the proposed Project) follows an existing transmission corridor from Industrial Park Tap to the Bell Rock Substation. This route is approximately 12.1 miles in length passing through the towns of Acushnet, New Bedford, Dartmouth, and Fall River. The new transmission line would be located within ROW that varies in width from 210 to 150 feet wide and is currently occupied by existing transmission lines. This route is the most direct route between the Industrial Park Tap and Bell Rock Substation, and is the route selected by the ISO-NE SEMA-RI Solution Study working group.

Central Underground Route

The Central Underground Route runs for 18.4 miles along existing transmission ROW and roadway ROWs. For 0.4 mile, the route would consist of an overhead installation within existing electric transmission ROW. At Mendall Road, the line would transition to an underground installation following Mendall Road, Perry Hill Road, Main Street, Lake Street, Peckham Road, Acushnet Avenue, Braley Road, Phillips Road, Chippaway Road, Bullock Road, Slab Ridge Road, Hathaway Road, Bent Rim Trail, Makepeace Road, Cedar Swamp Road, Copicut Road, Gated Fire Lane, Grinnell Path, Gated Fire Lane, and Bell Rock Road for a total distance of 18 miles.

Southern Underground Route

The Southern Underground Route runs for 14.1 miles along existing transmission ROW and roadway ROWs. For 0.7 mile, the route would consist of an overhead installation within existing electric transmission ROW. At Hathaway Road, the line would transition to an underground installation following Hathaway Road, Wing Road, Main Street, Tarklin Hill Road, New Plainville Road, Old Plainville Road, Old Fall River Road, North Hixville Road, Yellow Hill Road, Blossom Road, and Bell Rock Road for a total distance of 13.4 miles.

North – South Underground Crossover

The North – South Underground Crossover Route runs for 15.7 miles along existing electric transmission ROW and roadway ROWs. For 0.7 mile, the route would consist of an overhead installation within existing electric transmission ROW. At Hathaway Road, the line would transition to an underground installation following Hathaway Road, Wing Road, Main Street, Tarklin Hill Road, New Plainville Road, Shawmut Avenue, High Hill Road, Pine Island Road, Flag Swamp Road, Quanapoag Road, Copicut

Road, Gated Fire Lane, Grinnell Path, Gate Fire Lane, and Bell Rock Road for a total distance of 14.9 miles.

Hybrid Route 1

Hybrid Route 1 runs for approximately 15.1 miles along existing electric transmission ROW and roadway ROWs. For 6.5 miles, the route would consist of an overhead installation within the same electric transmission ROW as the proposed Project, through the towns of Acushnet, New Bedford, and Dartmouth. At the High Hill Substation in Dartmouth, the route would transition to an underground installation following High Hill Road, Bullock Road, Quanapoag Road, Copicut Road Gated Fire Lane, Grinnell Path, Gate Fire Lane, and Bell Rock Road for a total distance of 8.6 miles.

Hybrid Route 2

Hybrid Route 2 runs for approximately 15.5 miles along existing electric transmission ROW and roadway ROWs. For 7.5 miles, the route would consist of an overhead installation within the same electric transmission ROW as the proposed Project, through the towns of Acushnet, New Bedford, and Dartmouth. At Collins Corner Road, the route would transition to an underground installation following Collins Corner Road, Old Fall River Road, North Hixville Road, Yellow Hill Road, Blossom Road, and Bell Rock Road for a total distance of 8.0 miles.

Hybrid Route 3

Hybrid Route 3 runs for approximately 12.8 miles along existing electric transmission ROW and roadway ROWs. For approximately 0.7 mile, the route would consist of an overhead installation within the same electric transmission ROW as the proposed Project in Acushnet. At Hathaway Road, the route would transition to an underground installation following, Hathaway Road, Wing Road, Main Street, Tarklin Hill Road, New Plainville Road, Shawmut Avenue, and High Hill Road for a total distance of 6.6 miles. At the High Hill Substation, the route would transition to an overhead configuration and follow the same electric transmission ROW as the proposed Project, through the towns of Dartmouth and Fall River for approximately 5.5 miles.

Criteria Evaluated

The seven routing alternatives were evaluated against natural and social environmental criteria listed in Table 3-3. Table 3-4 summarizes natural and social environmental characteristics, and potential impacts of the route options based on a desktop assessment of GIS data.

TABLE 3-3 ENVIRONMENTAL SCORING CRITERIA AND WEIGHTING

	CRITERION	DESCRIPTION
Natural Environment	MA DCR Conservation Land	Length of route in miles requiring Article 97 approval
	Archaeological Sensitivity	Percentage of ROW
	Wetlands	Acres within 25 feet of ROW
	Chapter 91 Jurisdictional Waterway Crossings	Number within ROW
	Outstanding Resource Waters / Areas of Critical Environmental Concern	Number of crossings
	Rare Species Habitats (Priority Habitat)	Acres within ROW
	Tree Clearing Requirements	Acres of forested land within ROW
Social/ Developed Environment	Commercial Buildings	Number directly abutting ROW
	Residences and Dwellings	Number directly abutting ROW
	Sensitive Receptors	Number directly abutting ROW
	Potential Traffic Congestion	Length of route in miles within roadway ROW
	Potential for Land Acquisition	Acres of additional land required
	Historic Sites	Number directly abutting ROW
	Potential Encounters w/Contamination	Number within ROW
Constructability Features	Complex Crossings (trenchless technology, overhead crossings of other transmission lines, and railroads)	Number within ROW
	Congestion w/ existing infrastructure (overhead and underground utilities)	Length of significant utility congestion within ROW
	Hard Angles (>30 degrees) along the route alignment	Number within ROW

DCR Conservation Land

This criterion involved reviewing the Massachusetts Geographic Information System ("MassGIS") Protected and Recreational Open Space data to determine the length of each route (in miles) located along unimproved DCR roads and trails or along improved DCR roads subject to a Conservation Restriction.

Archaeological Sensitivity

Areas identified as sensitive in terms of archaeological resources potentially could be affected by project construction with impacts due to earth movement, construction traffic, tree removal operations and the placement of transmission facilities in or near cultural resources. Archaeological sensitivity was assessed to determine the percentage of archaeological sensitive areas along each route.

Wetlands

Project construction could directly impact wetland resource areas located along a route either temporarily or permanently. This criterion involved reviewing the MassGIS MassDEP Wetlands Original (1:12,000) data to determine the number of wetland acres within 25 feet of each route.

Chapter 91 Jurisdictional Crossings

Project construction could directly impact resources protected under the Massachusetts Public Waterfront Act, Chapter 91, which is the primary tool for protecting and promoting public use and interests in tidelands and other waterways. This criterion involved reviewing the MassGIS Tidelands Jurisdiction (G.L. c. 91) data to determine the number of jurisdictional crossings along each route. Areas that may be subject to Chapter 91 jurisdiction include Flowed Tidelands, Filled Tidelands, Great Ponds and Non-Tidal Rivers and Streams.

Outstanding Resource Waters (ORW) / Areas of Critical Environmental Concern

Project construction could directly impact ORW and/or Areas of Critical Environmental Concern ("ACECs"). This criterion evaluated the number of crossings of Certified Vernal Pools and ACECs based on MassGIS datalayers, and the number of crossings of surface waterbody resources that are listed in the State of Massachusetts Surface Water Quality Standards as ORW (314 CMR 4.00) within each route ROW. Additionally, public drinking water supplies were reviewed to determine whether they constituted ORW.

Rare Species Habitat (Priority Habitat)

Project construction could directly impact areas protected as habitat for state-listed rare species. This criterion was based on a review of the MassGIS NHESP Priority Habitats of Rare Species data to determine the acres of priority habitat within each route ROW.

Tree Clearing

To accommodate the construction, reliability and safe operation of transmission lines, tree clearing is often required to meet clearance requirements. This criterion was evaluated using the MassGIS Land Use data to identify the total acreage of forested land within each route ROW. Both forested upland and forested wetland categories were included in this analysis.

Commercial Buildings

Businesses along a route could be subject to temporary traffic disruption, street closings, construction noise, dust, and/or other temporary construction impacts, as well as the potential for visual impacts from the permanent removal of trees and the placement of structures along certain routes. The number of commercial buildings was counted based on aerial photographic interpretation and Google street imagery to determine the number of commercial buildings directly abutting each route.

Residences and Dwellings

Residents along a route could be subject to temporary traffic disruption, street closings, construction noise, dust, and/or other temporary impacts due to project construction, as well as the potential for visual impacts from the permanent removal of trees along certain routes. The routes analyzed pass through areas with varying degrees of residential land uses (high, medium, low and very low density and multi-family residential). Residences were counted based on aerial photographic interpretation and Google street imagery to determine the number of homes directly abutting each route.

Sensitive Receptors

Sensitive receptor land uses include hospitals, elder care facilities, public and private schools, cemeteries, licensed daycares, district courts, nursing homes, police stations, fire stations, and churches. Sensitive receptors could be subject to temporary traffic disruption, street closings, construction noise, and/or other temporary impacts due to project construction. The number of sensitive receptors was counted based on MassGIS, United States Geologic Survey ("USGS") Geographic Names Information System ("GNIS"), and the Massachusetts Department of Early Education and Care location data to determine the number of sensitive receptors directly abutting each route.

Potential Traffic Congestion

The installation of a new transmission line within public roadways could result in temporary increased traffic density and congestion, traffic disruption, street closings, construction noise, and/or other temporary impacts due to project construction. This criterion was evaluated by determine the length (in miles) that each route would be installed within a public roadway ROW.

Potential for Land Acquisition

The installation of a new transmission line along routes where additional land or easement rights are necessary would result in increased time to successfully acquire and will increase cost. The routes were analyzed for potential land acquisition requirements that would be needed outside of existing company-owned land and easements.

Historic Architectural Properties and Districts/Areas

Historic architectural properties and districts/areas (historic architectural resources) potentially could be affected by construction impacts due to earth movement, traffic disruptions, the permanent removal of trees and the placement of transmission facilities in or near cultural resources. Historic architectural resources were assessed using MHC data from the Massachusetts Cultural Resources Information System ("MACRIS"). The number of historic resources directly abutting each route was counted based on the number of buildings, local historic districts, and National Register of Historic Places ("NRHP)" -listed individual buildings and districts included in the Inventory of Historic and Archaeological Assets of the Commonwealth or listed in the State and National Registers of Historic Places.

Potential Encounters with Contamination

The presence of subsurface contamination adds complexities to project construction. Underground excavation and/or other construction activities in urban areas may expose contaminated soil that can affect worker safety and require special soil management procedures and disposal requirements under federal and state hazardous material and/ or other regulations. This adds complexities and costs and may significantly affect schedule. The potential to encounter subsurface contamination was assessed based on the number of sites within the route ROW including Active Tier I and Tier II sites, Activity and Use Limitation ("AUL") sites closed with ongoing maintenance conditions, Utility Related Abatement Measure ("URAM") sites, and those sites with a Response Action Outcome ("RAO") Class C. This criterion was evaluated using the MassGIS MassDEP Tier Classified Oil and/or Hazardous Material Sites datalayer and the MassDEP Oil and/or Hazardous Material Sites with AULs to determine the number of sites within the ROW.

Complex Crossings (Trenchless Crossings, Overhead Transmission Line Crossings, and Railroads)

All of the routes evaluated require the crossing of certain features (e.g., railroad ROWs, highways, etc.) that require additional consideration and effort to design, permit and/or construct. Crossings included in this category include trenchless crossings, crossings of existing overhead transmission lines; and railroad crossings. These crossings are generally more complex and require logistical coordination, additional expense (design and material) and may have schedule implications due to longer permitting or easement approval timelines. This criterion involved: (1) a preliminary review of where trenchless installations would be required along the underground route locations; (2) reviewing the MassGIS existing infrastructure (transmission line and railroad) datalayers; and (3) aerial photographic interpretation to determine the number of complex crossings along the routes.

Congestion with Existing Utility Infrastructure

The number of existing utilities located along and within a ROW corridor can affect the available space above and below grade to physically construct transmission lines. Overhead and underground electric facilities (both transmission and distribution), underground pipelines, municipal water, sewer, and gas facilities, and features such as manholes and catch basins can significantly constrain available space. Such constraints complicate the construction process, and increase construction duration, traffic disruption, and costs. The utility density along each route was assessed using aerial photographic interpretation, available subsurface utility records, known facility locations obtained from the municipalities traversed by the routes, and existing ROW configuration mapping provided by the Companies. The length of significant utility congestion was evaluated for each route. Congestion was determined to be significant if existing utilities would need to be rebuilt and/or reconfigured to accommodate the installation of a new transmission line, or if the presence of existing utilities would appreciably complicate the construction process. Generally, the areas of significant utility congestion are located in the more densely populated areas along the routes including Somerset, Swansea, Fall River, New Bedford, and Acushnet. This is expected due to the amount of heavy commercial and industrial uses in these areas.

Hard Angles (>30 degrees) and Implications on Overhead and Underground Designs

For above-ground transmission lines, sharp angles may require specialized structures and additional material and design costs. For underground cables, sharp bends may also increase construction difficulty and the risk of cable damage during installation and operation; sharp turns also necessitate installation of additional manholes to minimize side wall pressure on the cables. This criterion was evaluated in ArcGIS to determine the number of bends greater than 30 degrees along each route ROW. For overhead transmission routes the ROW centerline was reviewed; for underground transmission routes the center of each road was reviewed.

TABLE 3-4 ACUSHNET TO FALL RIVER RELIABILITY PROJECT ROUTING ALTERNATIVES

ROUTE NAME	LENGTH (MILES)	ROUTE SCREENING CRITERIA																	
		NATURAL ENVIRONMENT							DEVELOPED ENVIRONMENT						CONSTRUCTABILITY				
		MA DCR CONSERVATION LAND (LENGTH IN MILES REQUIRING ARTICLE 97 APPROVAL)[1]	ARCHAEOLOGICAL SENSITIVITY (PERCENTAGE OF ROW)	WETLANDS (ACRES WITHIN 25 FT BUFFER)	CHAPTER 91 JURISDICTIONAL CROSSINGS (NO. WITHIN ROW)	ORW OR ACEC CROSSINGS (NO. OF CROSSINGS)	RARE SPECIES HABITAT (ACRES PRIORITY HABITAT WITHIN ROW)	TREE CLEARING (ACRES OF FORESTED LAND WITHIN ROW)	COMMERCIAL (NO. OF COMMERCIAL BUILDINGS DIRECTLY ABUTTING ROW)[2]	RESIDENCES (NO. DIRECTLY ABUTTING ROW)[2]	SENSITIVE RECEPTORS (NO. DIRECTLY ABUTTING ROW)[2,3]	POTENTIAL FOR LAND ACQUISITION (ACRES)[4]	HISTORIC ARCHITECTURAL PROPERTIES/DISTRICTS (NO. DIRECTLY ABUTTING ROW)[2]	POTENTIAL FOR SUBSURFACE CONTAMINATION (NO. OF SITES WITHIN ROW)	COMPLEX CROSSINGS (TRENCHLESS TECHNOLOGY, OVERHEAD TRANSMISSION LINE CROSSINGS, AND RAILROAD CROSSINGS)	CONGESTION WITH EXISTING UTILITY INFRASTRUCTURE (LENGTH OF SIGNIFICANT UTILITY CONGESTION WITHIN ROW)	POTENTIAL TRAFFIC CONGESTION IMPACTS (LENGTH WITHIN ROADWAY ROW)	HARD ANGLES (>30 DEGREES) (NO. WITHIN ROW)	COST (SCREENING LEVEL ESTIMATE)[5]
ISO Route (Project)	12 miles (OH)	0	50	44	0	1	106	100	2	36	0	0	0	0	3	0	0	3	$28M
Central Underground	18.4 miles 0.4 (OH) 18.0 (UG)	5	50	4	0	0	22	27	26	483	5	0.06	49	0	1	1	18	25	$307M
Southern Underground	14.1 miles 0.7 (OH) 13.4 (UG)	3	80	6	1	0	36	22	69	360	5	0.06	90	0	3	1	13.4	7	$229M
North South Underground Cross over	15.7 miles 0.7 (OH) 14.9 (UG)	6	77	7	1	0	38	27	67	340	5	0.06	77	0	4	1	14.9	18	$255M
Hybrid Route 1	15.1 miles 6.5 (OH) 8.5 (UG)	6	66	32	0	1	39	57	5	95	0	0.06	4	0	2	0	8.5	13	$160M
Hybrid Route 2	15.5 miles 7.5 (OH) 8.0 (UG)	3	65	39	0	0	40	60	2	148	0	0.06	17	0	3	0	8	7	$153M
Hybrid Route 3	12.8 miles 6.2 (OH) 6.6 (UG)	0	51	18	2	1	105	55	67	285	4	0.12	73	0	5	1	6.6	8	$126M

Notes: OH = Overhead; UG = Underground; ORW = Outstanding Resource Water; ACEC = Area of Critical Environmental Concern.
1 - This category includes length of route along unimproved MA DCR roads and trails and along improved MA DCR roads subject to a Conservation Restriction.
2 - This category includes resources identified within 150 feet of the edge of ROW.
3 - This category includes hospitals, elder care facilities, public and private schools, cemeteries, licensed daycares, district courts, nursing homes, police stations, fire stations, and churches.
4 - This category identifies needs for potential land acquisition requirements outside of existing company owned land and easements.
5 - The ISO Route cost is presented at the -25/+50%, estimate. All other route cost estimates are -50%/+100% and are based on a generic per mile cost for overhead versus underground construction (overhead $2.3M per mile / underground $17M per mile).

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Based on an evaluation using the 17 criteria described in Table 3-3, the ISO Route was found to have less potential for environmental impact while balancing system reliability, cost and delivery timeframe considerations, as compared to those impacts anticipated from the other route alternatives evaluated.

Due to the geographic setting of the Bell Rock Substation, all routing alternatives outside of the proposed AFRRP would consist of underground cable installation within roads and trails listed as MA DCR roads, necessitating Article 97 legislative approval, and MA DCR review and approval. In addition, all the routes outside of the proposed AFRRP would require land acquisition and/or new negotiated easement rights to accommodate the installation of an overhead to underground transition station which would need to be located outside of roadway ROW and overhead transmission ROW to avoid conflicts with the existing infrastructure. The substantial additional cost of underground utility installation would most likely be borne by Massachusetts ratepayers, and it is unlikely that ISO-NE would agree given the availability of a much more cost-effective alternative.

3.4 Conclusion

The Companies' alternatives analyses demonstrate that the AFRRP as proposed will best address the identified need and will improve transmission system reliability. Relative to the other transmission line alternatives and route alternatives studied, the AFRRP is the best solution when balancing considerations of system reliability, costs to customers, potential environmental impacts, and delivery timeframe to meet the forecasted in-service date. Following an evaluation of the relative merits and disadvantages of the various alternatives, the overhead alternative (Alternative 4) as proposed is superior to the other alternatives considered because the preferred alternative offers the following advantages:

- Uses existing ROWs dedicated to overhead transmission lines where wetlands and other sensitive resource areas will be spanned to the greatest extent practicable.
- Uses a network of existing access roads and access routes.
- Avoids acquisition of new ROW and/or easements.
- Provides the lowest reasonable Project cost and is substantially less expensive than any of the other alternatives considered.
- Meets the identified energy needs by providing a new source into the load pocket to meet the Project delivery timeframe and in-service date of the 4th Quarter 2021.

4.0 LAND USE

This section describes existing land use within the vicinity of the Bell Rock Substation Rebuild Project and the AFRRP and presents potential project-related impacts during construction and operation. Existing land use conditions in the area were assessed based on publicly available MassGIS land use data layers.[8] A 300-foot study area buffer ("Study Area") was established for both the Bell Rock Substation Rebuild Project and the AFRRP to document dominant land uses in the area. Table 4-1 identifies the land uses within the 300-foot Study Area buffer for each project.

TABLE 4-1 LAND USE WITHIN THE (300-FOOT RADIUS) STUDY AREA (BELL ROCK SUBSTATION REBUILD PROJECT AND AFRRP)

PROJECT	LAND USE DESCRIPTION	PERCENTAGE WITHIN 300-FOOT STUDY AREA
Bell Rock Substation Rebuild Project	Forest	69.4%
	Forested Wetland	11.9%
	Non-Forested Wetland	0.14%
	Water	0.13%
	Powerline/Utility	18.2%
Acushnet to Fall River Reliability Project	Pasture	1.9%
	Forest	61.5%
	Non-Forested Wetland	2.6%
	Open Land	0.2%
	Multi-Family Residential	0.1%
	High Density Residential	0.9%
	Medium Density Residential	0.7%
	Low Density Residential	2.4%
	Industrial	1.3%
	Transportation	0.5%
	Water	1.2%
	Cranberry Bog	0.4%
	Powerline/Utility	14.5%
	Urban Public/Institutional	0.1%
	Nursery	0.8%
	Forested Wetland	10.6%
	Very Low Density Residential	0.4%

[8] Sanborn. 2005. MassGIS Data – Land Use. Retrieved May 3, 2018 from http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html.

4.1 Bell Rock Substation Project

4.1.1 Existing Conditions

The existing Bell Rock No. 118 Substation is located on an approximately 2.75-acre portion of property by virtue of an easement originally granted by the current owner of the property, the City of Fall River. NEP's existing adjacent N12 and M13, L14 and M13, and D21 transmission line ROWs are located on easements similarly granted by the City of Fall River.

Land use was assessed within the Study Area buffer established on all sides of the Bell Rock Substation. As identified in Table 4-1, several dominant land uses are evident surrounding the Study Area. These general land uses, which essentially are all undeveloped, include forest, wetlands, trails, and transmission line ROWs associated with the existing Bell Rock Substation and associated maintained utility ROWs. Field surveys were also performed to confirm and map the natural resources around the substation.

Open Space and Recreational Resources

The Bell Rock Substation is located on a parcel of land adjacent to lands that comprise the Watuppa Reservation. The Watuppa Reservation is the public portion of approximately 8,500 acres of land located within the watersheds of the North Watuppa Reservoir (Fall River's primary source of public water supply) and the Copicut Reservoir (a secondary public water supply for the City of Fall River).

The Southeastern Massachusetts Bioreserve is located to the north and east of the substation property and consists of approximately 13,600 acres of protected open space. The 5,150-acre Freetown-Fall River State Forest is part of the Bioreserve. The Bioreserve is jointly managed by the City of Fall River Water Division, the MA DCR, the Massachusetts Division of Fisheries and Wildlife, and the Trustees of Reservations. For background informational purposes, the Montaup Electric Company (Montaup) obtained property rights, in the form of an easement, from the City of Fall River by deed in June 1960. NEP is the successor in interest to Montaup pursuant to Articles of Merger filed with the Massachusetts Secretary of State's office in May 2000. NEP is now the legal holder of the property easement granted by the City of Fall River.

In March 2009, the City of Fall River granted a conservation restriction to the MA DCR and the Massachusetts Department of Fish and Game (prior to transferring their rights to the MA DCR) by way of a conservation easement. The substation easement predates the conservation restriction and therefore NEP maintains the rights "…to construct, maintain, renew, replace and operate a switching station on that portion of said easement heretofore described bounded westerly on Bell Rock Road…"

4.1.2 Potential Impacts

Permanent Impacts

Construction of the Bell Rock Substation Rebuild Project will result in permanent impacts to land within NEP's existing utility easements as identified in Table 4-2. This is a result of grading and alterations to accommodate the expansion of the Bell Rock Substation. In addition to the expanded substation footprint, a new paved access driveway will be installed from Bell Rock Road into the substation. The slopes surrounding the substation will be graded and stabilized to match the existing topography.

TABLE 4-2 BELL ROCK SUBSTATION REBUILD PROJECT ANTICIPATED LAND USE IMPACTS

RESOURCE AREA	PERMANENT IMPACTS
New Land Altered	Approximately 42,898 sf (0.98 acre) • Grading and alterations required for the Bell Rock Substation and M13 Temporary Bypass.

Vegetation Maintenance

Once tree clearing has been performed to expand the substation site, vegetation maintenance will continue to occur in this area and along the adjacent transmission line ROWs in accordance to NEP's Vegetation Management Plan ("VMP"). NEP's VMP is prepared in compliance with the Massachusetts Rights-of-Way Management regulations (333 CMR 11.00) administered by the Massachusetts Department of Agricultural Resources.[9]

Potential Land Use Impacts

Land use impacts can be separated into short-term and long-term impacts. Short-term land use impacts lasting little more than a year may occur during the construction phase of the Substation Project. Impacts associated with the construction phase of the Bell Rock Substation Rebuild Project will be temporary, and a majority of the existing land uses will resume following construction. NEP will provide notification of the intended construction plan and schedule to any affected abutters so that the effect of any temporary disruptions may be minimized.

The Bell Rock Substation Rebuild Project is located on land occupied by the existing substation and related transmission line facilities. Construction will occur within NEP's existing easements and will be consistent with the surrounding utility infrastructure. Mostly existing upland access roads will be used to gain access to the work locations and will not cause additional long-term impacts. NEP will also construct a temporary construction road to facilitate access to the M13 bypass and to provide future access to the existing D21, L14 and M13 Lines. Where these access roads traverse wetland resource areas, construction matting will be installed. The mats will be removed after construction and affected areas will be restored to preconstruction conditions. Vegetation on the existing ROW is currently managed in accordance with the NEP VMP; accordingly, vegetation is routinely cleared within the ROW and trees along the edges are periodically pruned or cleared. Vegetation will be maintained as low-growth shrubs, grasses and herbs. Minimal and localized tree removal will be required for the station expansion; however, it will not interfere with wildlife around the Project.

The Bell Rock Substation Rebuild Project is not anticipated to interfere with any residential, business or other public facilities. Normal operation at all facilities will continue and existing land uses will be allowed to continue following construction.

[9] National Grid. 2013. Five Year Vegetation Management Plan 2014-2018. Retrieved November 28, 2016 from https://www.nationalgridus.com/transmission/c3-8_standocs.asp.

Consistency with Local Planning

Since the Project is located entirely within existing substation and transmission line easements, permanent impacts to adjacent land uses will be minimized, despite minimal/localized tree clearing activities that are a component of the Bell Rock Substation Rebuild Project. Overall, the Substation Project is not expected to change or significantly affect land uses because no acquisition of additional land or easements is required and there will be no changes to the present use of the site. Therefore, the Substation Project is consistent with the existing public utility presence in the area.

Fall River Community Preservation Plan

In terms of regional and local land use planning, the Bell Rock Substation Rebuild Project is anticipated to remain consistent with the *City of Fall River Draft Community Preservation Plan* (2014).[10] The plan discusses community preservation goals and projects specific to preservation within each of the four designated purposes of the Community Preservation Act (these include open space, recreation, historic preservation, and community housing). These plans do not specifically address energy or electrical transmission lines.

The goals of the *City of Fall River Community Preservation Plan* are to provide affordable housing and recreational facilities, and preserve historic and open space resources. The Bell Rock Substation Rebuild Project is consistent with implementation of Fall River's Historic Preservation goals. There are few historical records for East Fall River, but prior inhabitants' knowledge suggests that there is the potential for significant historic sites in East Fall River. While the Bell Rock Substation Rebuild Project location is considered previously disturbed, NEP will ensure that if ground disturbance (such as small-scale improvements to access routes or placement of new work pads) is required for previously undisturbed areas, NEP will consult with the Massachusetts Historical Commission ("MHC:) and other interested parties to avoid impacts to known or unknown archaeological resources in Fall River, as required by the National Historic Preservation Act ("NHPA") Section 106 process. Any archaeological survey brought to a data recovery level will involve a public outreach and education component.

Fall River Master Plan

The purpose of the *Fall River Master Plan* is to summarize the vision and goals developed for the future of Fall River, and then outline steps, responsible parties, and recommended timing in order to achieve that desired vision of the future. While the *Master Plan* does address utilities and infrastructure, the focus of the plan and recommendations centers on water, sewer, road, and gas infrastructure projects. Transmission line utilities are not explicitly addressed in the *Master Plan*.

The Bell Rock Substation Rebuild Project is proposed to be constructed on land held by NEP in easement and is not expected to have any impact on existing and future land uses. Local permits will be obtained to the extent required in order to comply with the local zoning code.

The Bell Rock Substation Rebuild Project is not anticipated to have any impacts on Land Use, Housing and Neighborhoods; Economic Development, Historic and Cultural Resources; Natural Resources, Open Space, and Recreation; Circulation and Transportation; Utilities and Infrastructure; or Public Facilities and Services within the meaning of the *Master Plan*.

[10] The City of Fall River is currently working on revising the Community Preservation Plan and an updated version will be publicly available in Fall of 2018.

Open Space and Recreation Plan

The purpose of the Fall River Open Space and Recreation Plan is to provide strategies to protect and maintain natural resources, expand and maintain recreational facilities, create greenways and the Bioreserve to encircle the City, and to develop tools to make the City's vision achievable.

The Bell Rock Substation Rebuild Project is not anticipated to have any impact on Open Space or Recreation. The Bell Rock Substation Rebuild Project is proposed to be constructed within existing NEP utility easements and is not expected to have any impact on existing and future land uses. Temporary impacts may occur during construction; however, NEP will implement mitigation measures to minimize any impacts on recreational use of the surrounding lands, maintain signage about the ongoing construction, and otherwise maintain a safe work zone to protect the general public.

4.1.3 Land Use Mitigation Measures

NEP has located the Bell Rock Substation Rebuild Project entirely within existing easements containing the existing Bell Rock Substation and associated transmission lines. The surrounding area is predominantly forested and uninhabited and, as a result, no visual impacts are anticipated as a result of tree clearing for the Substation Project.

Construction generated noise will be limited by the use of mufflers on all construction equipment. Dust will be controlled by wetting and stabilizing access road surfaces, as necessary, and by maintaining crushed stone aprons at the intersections of access roads with paved public roadways.

NEP will develop a construction communication plan for the Bell Rock Substation Rebuild Project that will provide a consistent point of contact with Fall River residents and officials. NEP's communication plan includes outreach during construction to inform residents, fire, police, other emergency personnel, and municipal officials about work schedules, work locations, and construction activities.

Some improvements to existing public roads may be required to provide a level and safe access route to the Substation. Sections of Bell Rock Road for example are unimproved gravel road. To gain access to the Substation, NEP or its contractor may need to make minor improvements to the road such as surface grading and adding material to fill in deep potholes. No work or associated impacts are anticipated outside of the existing roadway footprint. NEP would coordinate with the City of Fall River and notify the MA DCR of any proposed roadway improvement.

Construction will generally take place during normal working hours from Monday to Saturday during daylight hours (7:00 a.m. to 5:00 p.m.). Certain work activities, including work requiring scheduled transmission line outages, may need to be performed on a limited basis outside of normal working hours. Prior to the start of construction, NEP will notify any landowners, municipal officials, the Fall River Department of Public Works, and Fall River Police and Fire Chiefs of the details of planned construction including the normal work hours and extended work hours and will obtain written approval from relevant municipal officials for extended work hours.

4.2 Acushnet to Fall River Reliability Project

4.2.1 Existing Conditions

The AFRRP ROW consists of approximately 292 acres along approximately 12.1 miles of existing transmission line corridor traversing the towns of Acushnet, New Bedford, Dartmouth, and Fall River.

The existing corridor crosses State Routes 18 and 140 in the City of New Bedford, a New Bedford Water Board water supply conduit ROW in the town of Dartmouth, and an existing Algonquin Gas Transmission Pipeline ROW in the City of Fall River. Land Use has been evaluated within a 300-foot-wide study area buffer ("Study Area") established on all sides of the AFRRP ROW. As identified in Table 4-1, above, and depicted on Figure 2-4 in Appendix A, several dominant land uses are evident surrounding the AFRRP ROW. These general land uses include forest, forested wetland and power utility. The existing ROW is routinely managed by the Companies to be consistent with mandatory vegetation standards for overhead electric transmission lines.

Open Space and Recreational Resources

The AFRRP traverses areas identified as public open space and recreational areas including:

- Wheldon Woods Conservation Area;
- Acushnet Cedar Swamp State Reservation;
- Southeastern Massachusetts Bioreserve; and
- Watuppa Reservation.

The Weldon Woods Conservation Area is crossed by the AFRRP east of Middle Road in Acushnet. The Weldon Woods Conservation Area consists of approximately 25.6 acres of protected open space owned and managed by the Fairhaven-Acushnet Land Preservation Trust.

The Acushnet Cedar Swamp State Reservation is crossed by the AFRRP in Dartmouth between the Dartmouth/New Bedford municipal boundary and High Hill Road. The Cedar Swamp State Reservation consists of approximately 1,800 acres of protected open space owned by the Commonwealth of Massachusetts and managed by the MA DCR.

The AFRRP traverses portions of the Southeastern Massachusetts Bioreserve and areas where the adjacent lands comprise the Watuppa Reservation (both described in detail above).

4.2.2 Potential Impacts

Permanent Impacts

Construction of the AFRRP will result in permanent impacts to land within the Companies' existing transmission line corridor and easements, as identified in Table 4-3. This is a result of tree removal along the NEP portion of the ROW, and within one span (between proposed Structures 7-8) along the Eversource portion of the ROW, to open up a position for the new overhead transmission line.

TABLE 4-3 ACUSHNET TO FALL RIVER RELIABILITY PROJECT ANTICIPATED LAND USE IMPACTS

RESOURCE AREA	PERMANENT IMPACTS
New Land Altered	1,108,861 (25.46 acres) of tree clearing in upland

Vegetation Maintenance

The Companies have long followed established plans and procedures for applying an Integrated Vegetation Management ("IVM") approach to manage vegetation within existing utility corridors in accordance with transmission line clearance standards. The vegetation maintenance cycle follows a five-year timeline and encourages the growth of low-growing shrubs and other vegetation which provide a degree of natural vegetation control. Vegetation management is necessary to ensure the reliable and safe delivery of electric services to the Companies' customers. This is accomplished by allowing for the proper clearance between vegetation and electrical conductors. Once tree clearing has been performed in order to expand the cleared width of the NEP portion of the existing ROW, vegetation maintenance will continue to occur in this area and along the remainder of the transmission line ROW in accordance with the Companies' respective VMPs (National Grid's 2014-2018 VMP; Eversource's 2018-2022 VMP for Central, Eastern, and Southeastern Massachusetts). The Companies' VMPs are prepared in compliance with the Massachusetts Rights-of-Way Management regulations (333 CMR 11.00) administered by the Massachusetts Department of Agricultural Resources.

Potential Land Use Impacts

As mentioned above, land use impacts can be separated into short-term and long-term impacts. Short-term land use impacts are anticipated to last a little less than a year and will be temporary in nature. The majority of the existing land uses will resume following construction. The Companies will provide notification of the intended construction plan and schedule to any affected abutters so that the effect of any temporary disruptions may be minimized.

The AFRRP is located within existing transmission line ROW corridor held in fee or easement by the Companies. The AFRRP will be consistent with the surrounding utility infrastructure and is not anticipated to interfere with any residential, business or other public facilities. Normal operation at all facilities will continue and existing land uses will be allowed to continue following construction.

Existing upland access roads will be used to gain access to the work locations, to the extent practicable. Additional temporary and permanent access will be installed along portions of the AFRRP during construction.

4.2.3 Consistency with Local Planning

Since the AFRRP is located entirely within existing transmission line ROW, permanent impacts to adjacent land uses will be minimized, despite tree clearing activities which are required to expand the cleared width of the existing ROW. Overall, the AFRRP is not expected to change or significantly impact land uses within the ROW or the adjacent lands since no acquisition of additional ROW is required. Therefore, the AFRRP is consistent with the existing public utility presence within and around the existing ROW.

Community Preservation Plans

In terms of regional and local land use planning, the AFRRP is anticipated to remain consistent with the Community Preservation Plans or guidelines for the affected jurisdictions (see the Table 4-4 below for the list of plans reviewed). Consistent with the Community Needs Assessment Act, the goals of these plans and guidelines are to provide affordable housing and recreational facilities, and preserve historic and open space resources. These plans do not specifically address energy or electrical transmission lines. The AFRRP is consistent with these goals because it minimizes impacts to existing resources and uses in the area.

TABLE 4-4 ACUSHNET TO FALL RIVER RELIABILITY PROJECT COMMUNITY PRESERVATION PLANS

COMMUNITY	PLAN OR GUIDELINE REFERENCE
City of New Bedford	Community Preservation Plan (2017)
City of Fall River	City of Fall River Draft Community Preservation Plan (2014)

The AFRRP is consistent with community preservation activities, as there will be little to no change to open space, recreation, and historic resources.

Master Plans

In all the affected jurisdictions, the AFRRP is proposed to be constructed on existing transmission line ROWs and is not expected to have any impact on existing and future land uses described in the Master Plans.

The purpose of local Master Plans generally is to summarize the vision and goals developed for the future and then outline steps, responsible parties, and/or recommended timing in order to achieve it (see Table 4-5 below for the list of plans reviewed). The Master Plans for the affected jurisdictions do address utilities and infrastructure in that the focus of the plans center on land use and infrastructure-type or development projects, however they do not explicitly address transmission line utilities.

TABLE 4-5 ACUSHNET TO FALL RIVER RELIABILITY PROJECT MASTER PLANS

COMMUNITY	PLAN OR GUIDELINE REFERENCE
Town of Acushnet	Master Plan 2010
City of New Bedford	Master Plan New Bedford 2020 (2010)
Town of Dartmouth	Master Plan 2007
City of Fall River	Master Plan 2009-2030

Open Space and Recreation Plans

The AFRRP is not anticipated to have any impact on affected jurisdictions' existing Open Space or Recreation, given that it is proposed to be constructed within existing transmission line ROW and it is not expected have any impact on existing and future land uses.

Local Open Space and Recreation Plans help jurisdictions to protect, preserve and increase its open space and recreation assets and resources, and to provide citizens with a plan regarding future policies and

actions necessary to meet the needs of the town's changing physical, cultural, and social needs. The Plans reviewed are listed in the Table 4-6 below.

TABLE 4-6 ACUSHNET TO FALL RIVER RELIABILITY PROJECT OPEN SPACE AND RECREATION PLANS

COMMUNITY	PLAN OR GUIDELINE REFERENCE
City of New Bedford	City of New Bedford Open Space and Recreation Plan (2014)
Town of Dartmouth	Town of Dartmouth Open Space and Recreation Plan (2009)
City of Fall River	Fall River Open Space and Recreation Plan (2010)

4.2.4 Mitigation Measures

The Companies have located the AFRRP entirely within existing transmission line ROW. New pole structures are proposed to be located adjacent to existing structures, where feasible, to minimize the potential for visual impact. Where new tree clearing is required, minimal visual impact to abutting property owners is anticipated due to the remote nature of the ROW.

Construction-generated noise will be limited by the use of mufflers on all construction equipment. Dust will be controlled by wetting and stabilizing access road surfaces, as necessary, and by maintaining crushed stone aprons at the intersections of access roads with paved public roadways. A construction communication plan will be developed for the AFRRP that will provide outreach during construction and will provide a consistent point of contact for the public. Recognizing the varying needs of its stakeholders, the Companies are developing various communication methods to inform stakeholders throughout construction, including as needed: work area signage; advance notification of scheduled construction; personal contact with residents, community groups and businesses; and regular e-mail updates to residents (upon request) and local officials that will include information on upcoming construction activity.

Traffic control and/or management plans will also be prepared, where required, which will minimize impacts associated with increased construction traffic on local roadways.

5.0 WETLANDS AND WILDLIFE

This section describes wetlands and wildlife resources within the vicinity of the Bell Rock Substation Rebuild Project and the AFRRP and presents potential project-related impacts during construction and operation. Field investigations were conducted for each project, detailed results of these investigations are provided in the following Appendices:

- Appendix E – Bell Rock Substation Rebuild Project Wetland and Stream Delineation Report
- Appendix F – Bell Rock Substation Rebuild Project Wildlife Habitat Evaluation
- Appendix G – Bell Rock Substation Rebuild Project Wetland Invasive Species Control Plan
- Appendix H – Acushnet to Fall River Reliability Project Wetland and Stream Delineation Report
- Appendix I – Acushnet to Fall River Reliability Project Vernal Pool Inventory (NEP)
- Appendix J – Acushnet to Fall River Reliability Project Wildlife Habitat Evaluation (NEP)
- Appendix K – Acushnet to Fall River Reliability Project Wetland Invasive Species Control Plan

5.1 Analysis of Existing Data

Before beginning the wetland field investigation/delineation, existing information was reviewed to determine the potential extent of wetlands within the limit of work activities associated with each project. These source materials included:

- USGS 7.5-minute Topographic Quadrangle Map - Fall River, Massachusetts[11] and New Bedford, Massachusetts [12]
- MassDEP Wetland Data[13]
- NHESP Certified Vernal Pool Maps[14]
- NHESP Potential Vernal Pool Maps[15]
- United States Department of Agriculture ("USDA") Natural Resources Conservation Service ("NRCS") 2015 - 2016 Web Soil Survey[16]
- USDA NRCS Hydrologic Unit Code ("HUC") Basins (8,10,12) [17]

[11] United States Geologic Survey (USGS). 1985. 7.5-minute Topographic Quadrangle Map, Fall River, MA.
[12] United States Geologic Survey (USGS). 1979. 7.5-minute Topographic Quadrangle Map, New Bedford North, MA.
[13] Massachusetts Department of Environmental Protection (MassDEP). 2009. MADEP Wetland Data. Retrieved April 20, 2015–July 09, 2018 from https://docs.digital.mass.gov/dataset/massgis-data-massdep-wetlands-original-112000.
[14] Natural Heritage and Endangered Species Program (NHESP). 2015-2018. MassGIS Data – Certified Vernal Pools. Retrieved July 09, 2018 from http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/cvp.html.
[15] Natural Heritage and Endangered Species Program (NHESP). 2000. MassGIS Data – Potential Vernal Pools. Retrieved July 09, 2018 from http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/pvp.html.
[16] United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2015-2016. Web Soil Survey. Retrieved April 20, 2015-July 09, 2018 from http://websoilsurvey.nrcs.usda.gov/.

- USGS National Agriculture Imagery Program[18]
- United States Fish and Wildlife Service ("USFWS") National Wetland Inventory ("NWI") Wetlands Mapper[19]
- USGS National Hydrography Dataset ("NHD") Viewer[20]
- Federal Emergency Management Agency ("FEMA") Flood Insurance Rate Map ("FIRM") Bristol County, Massachusetts Map No. 25005C[21]
- MassDEP ORW[22]

The information was compiled and synthesized into a geographic information system ("GIS") geo-referenced database and used in the field to assist wetland scientists in the location and identification of wetland systems in the Bell Rock Substation Rebuild Project and the AFRRP Survey Areas, respectively.

5.2 Wetland Delineation Methodology

During the field surveys, wetlands were identified and delineated in accordance with requirements of the following jurisdictions:

- Clean Water Act ("CWA") (33 U.S.C. §§ 1251 et seq., Section 404 and Section 401)
- Massachusetts Wetland Protection Act ("WPA") (M.G.L. c. 131, § 40) and associated Regulations (310 CMR 10.00)

Most wetlands, including isolated wetlands and waterbodies are considered "waters of the United States" and are subject to the federal CWA. Evidence indicative of wetland from three parameters – predominance of wetland vegetation, hydric soils, and hydrology – was used to identify and delineate the wetlands in accordance with the 1987 *United States Army Corps of Engineers Wetland Delineation Manual*[23] and the subsequent *Regional Supplement to the United States Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012).[24] With the exception of unusual or atypical situations, evidence of wetland must be exhibited by all three parameters for an area or position to be designated as wetland.

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[17] United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2005. NRCS Hydrologic Unit Code (HUC) Basins (8,10,12). Retrieved April 20, 2015-July 09, 2018 from https://docs.digital.mass.gov/dataset/massgis-data-nrcs-huc-basins-81012.
[18] United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2016. National Agriculture Imagery Program. Retrieved April 20, 2015-July 09, 2018 from https://viewer.nationalmap.gov/basic/#productSearch.
[19] United States Fish and Wildlife Service (USFWS). 2017. National Wetland Inventory (NWI) Wetlands Mapper. Retrieved April 20, 2015-July 09, 2018 from http://www.fws.gov/wetlands/data/mapper.HTML.
[20] United States Geologic Survey (USGS). 2016. National Hydrography Dataset (NHD) Viewer. Retrieved April 20, 2015-July 09, 2018 from https://nhd.usgs.gov/NHD_High_Resolution.html.
[21] Federal Emergency Management Agency (FEMA). 2009. Flood Insurance Rate Map Bristol County, Massachusetts Map Nos. 25005C_2493, 25005C_2135, and 25005C_1339.
[22] Massachusetts Department of Environmental Protection (MassDEP). 2010. MassGIS Data – Outstanding Resource Waters. Available at: https://docs.digital.mass.gov/dataset/massgis-data-outstanding-resource-waters. Accessed April 20, 2015-July 09, 2018.
[23] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.
[24] United States Army Corps of Engineers. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Each wetland was numbered and classified by USFWS NWI codes[25] that make use of the *Classification of Wetlands and Deepwater Habitats of the United States* to differentiate wetland cover types.[26] Five wetland community types were identified in the Survey Area: Palustrine Emergent (PEM), Palustrine Scrub-Shrub ("PSS"), Palustrine Forested ("PFO"), Palustrine Unconsolidated Bottom ("PUB"), and Lacustrine Unconsolidated Bottom ("LUB"). The wetland cover types are described below.

- **Palustrine Forested, Broad-leaved Deciduous (PFO)** wetlands are forested wetlands dominated by broad-leaved deciduous trees. Red maple (*Acer rubrum*) was the dominant tree species encountered. The red maple forests had an understory commonly comprised of highbush blueberry (*Vaccinium corymbosum*) and sweet pepperbush (*Clethra alnifolia*).
- **Palustrine Scrub-Shrub (PSS)** wetlands are dominated by woody deciduous vegetation (shrubs and small trees) less than six meters (20 feet) tall. Wetland vegetation common to the PSS wetlands included highbush blueberry, sweet pepperbush, maleberry (*Lyonia ligustrina*) white meadowsweet (*Spiraea alba*), and steeplebush (*Spiraea tomentosa*).
- **Palustrine Emergent, Persistent (PEM)** wetlands are dominated by non-woody herbaceous vegetation. Common emergent vegetation includes bluejoint (*Calamagrostis canadensis*), sensitive fern (*Onoclea sensibilis*), soft rush (*Juncus effusus*), a variety of sedges (*Carex* spp.), and the invasive common reed (*Phragmites australis*).
- **Palustrine Unconsolidated Bottom (PUB)** areas are deepwater habitats less than 20 acres in size with less than an eight-foot water depth. PUBs are inundated by water for most of the year and have less than 30 percent plant cover. These areas are commonly referred to as ponds.
- **Lacustrine Unconsolidated Bottom (LUB)** is a deepwater habitat which is at least 20 acres in size. These areas are commonly referred to as lakes.

The field teams also used established delineation procedures as outlined in MassDEP's *Handbook on Delineating Bordering Vegetated Wetlands.* [27] Five Resource Areas subject to the WPA were identified and delineated in the field, including: Inland Bank ("IB"), Bordering Vegetated Wetlands ("BVW"), Land Under Water Bodies and Waterways ("LUW"), Bordering Land Subject to Flooding ("BLSF"), and Riverfront Area ("RFA"). An additional Resource Area, Isolated Subject to Flooding ("ILSF"), was evaluated but was not identified in the Survey Area. Each type of wetland has an associated set of regulatory performance standards and the Project's approach to meeting these standards is addressed in Section 13.0, Regulatory Compliance. The five Resource Areas subject to the WPA are further defined below.

- **Inland Bank (IB)** is defined as the portion of the land surface which normally abuts and confines a water body (310 CMR 10.54(2)(a)(c)). IB occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, the IB occurs between a water body and upland. An IB may be partially or totally vegetated, or it may be comprised of exposed soil, gravel, or stone. The upper boundary of an IB is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of an IB is the mean annual low flow level. A 100-foot-wide buffer zone extends from the upper boundary of an IB and therefore is typically encompassed within RFA as described below.

[25] https://www.fws.gov/wetlands/data/wetland-codes.html
[26] Cowardin, L M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. United States Fish and Wildlife Service. Biological Services Program. Washington, D.C. FWS/OBS-79/31.
[27] Jackson, S. 1995. Delineating Bordering Vegetated Wetlands under the Massachusetts Wetlands Protection Act. Massachusetts Department of Environmental Protection, Division of Wetlands and Waterways.

- **Bordering Vegetated Wetlands (BVW)** are defined as freshwater wetlands which border on creeks, rivers, streams, ponds, and lakes (310 CMR 10.55(2)(a)). BVWs are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The ground and surface water regime and the vegetation community which occur in each type of freshwater wetland (wet meadows, marshes, swamps and bogs) area are specified in the WPA.
- **Land Under Water Bodies and Waterways (LUW)** are defined as the land beneath any creek, river, stream, pond, or lake and the boundary of an LUW is the mean annual low water level. LUW may be composed of muck or peat, fine sediments, rocks, or bedrock (310 CMR 10.56(2)). LUW does not have a buffer zone.
- **Bordering Land Subject to Flooding (BLSF)** is defined as an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds, or lakes (310 CMR 10.57(2)(a)). BLSF extends from the banks (IB) of these waterways and water bodies; where a BVW occurs, it extends from said wetland. Flood profile data displayed on FIRMs prepared by FEMA identifies the boundary of BLSF which represents the estimated maximum lateral extent of flood water to theoretically result from the statistical 100-year frequency storm. BLSF does not have a buffer zone.
- **Riverfront Area (RFA)** is defined as the area of land between a river's mean annual high-water line and a parallel line measured horizontally (310 CMR 10.58(2)). "Rivers" are any natural flowing body of water that empty to any ocean, lake, pond, or other river and which flows throughout the year (310 CMR 10.58(1)). Rivers include streams that are perennial because surface water flows within them throughout the year. Intermittent streams are therefore not rivers because surface water does not flow throughout the year. The RFA may include or overlap other resource areas or their buffer zones. The RFA does not have a buffer zone.

In addition to state wetland regulations, wetlands are subject to local regulations. The specific city or town Conservation Commission(s) that the project area lies within regulate activities in and adjacent to wetlands under the provisions of the WPA administered by MassDEP. Locally, Acushnet and Fall River have not adopted local wetland protection bylaws and therefore local jurisdiction of activities in or adjacent to wetlands in these municipalities is limited to the WPA. The Town of Dartmouth and City of New Bedford have adopted local wetland protection bylaws/ordinances regulating activities within wetland resource areas and the 100-foot buffer zone.[28,29]

Photographs were taken of each wetland, with other additional observations and descriptive information recorded from representative wetlands including: location, wetland classification, vegetative community, wetland functions and values, and general wildlife use. Detailed information was collected at paired data plots in the wetland and upland along each side of the boundary from representative wetlands to document the vegetation, soils and hydrology criteria used to establish wetland boundaries. This information appears on USACE Wetland data sheets and MassDEP Bordering Vegetated Wetlands field data forms completed for delineated wetlands and watercourses. Consecutively numbered pink flagging hung on vegetation at approximately 15- to 30-foot intervals was used to mark the wetland boundaries.

[28] Town of Dartmouth Conservation Commission Wetlands Protection Bylaw and Wetland Protection Regulations. April 1990 and Revised August 25, 2015. Retrieved October 4, 2018 from https://www.town.dartmouth.ma.us/sites/dartmouthma/files/uploads/wetlands_protection_bylaw_and_wetlands_protection_regulations_revised_august_25_2015.pdf.
[29] City of New Bedford Wetlands Ordinance. April 20, 2011. Retrieved October 4, 2018 from http://newbedford.wpengine.netdna-cdn.com/environmental-stewardship/wp-content/uploads/sites/39/City-of-New-Bedford-Wetlands-Ordinance.pdf.

Streams and drainage ways were examined for the presence/absence of an Ordinary High Water Mark ("OHWM") and defined bed (refer to "LUW" above) and bank (refer to "IB" above). Generally, if these characteristics were observed along a waterway, it was determined to be a regulated stream but if absent, or atypical circumstances existed, these areas were determined to be a drainage way, swale, ditch, or other erosional feature, and likely not a CWA-regulated feature (i.e., not a "water of the United States"). Any streams encountered were classified based on the observed flow and channel characteristics at the time of the field review. Watercourses were delineated with blue flagging.

5.3 Vernal Pool Survey Methodology

The WPA defines vernal pool habitat as confined basin depressions that typically hold water for two continuous months during the spring and are free of adult fish populations. These areas provide essential breeding habitat for a variety of amphibian species such as wood frogs (*Lithobates sylvatica*) and spotted salamanders (*Ambystoma maculatum*). Certified vernal pools ("CVPs") are those that have been certified by NHESP according to the Guidelines for Certification of Vernal Pool Habitat[30] and are protected if they fall under the jurisdiction of the WPA. CVPs are also afforded protection under Section 401 of the federal CWA, the Massachusetts Surface Water Quality Standards that relate to Section 401, and the Massachusetts Forest Cutting Practices Act. Potential vernal pools ("PVPs") have also been mapped by NHESP but do not receive protection under the WPA or under any other state or federal wetlands protection laws.[31] The identification of PVPs by the NHESP is to be used as a tool to guide the field investigations in determining the presence of a vernal pool.

Vernal pool habitat is defined in 310 CMR 10.04 as confined basin depressions that, at least in most years, holds water for a minimum of two continuous months during the spring and/or summer, and that are free of adult fish populations. These areas provide essential breeding habitat for a variety of amphibian species such as wood frogs and spotted salamanders. The USACE, New England District, Vernal Pool Assessment Draft (2013)[32] defines vernal pools as the following:

> "Vernal pools are depressional aquatic resource basins that typically go dry in most years and may contain inlets or outlets, typically of intermittent flow. Vernal pools range in both size and depth depending upon landscape position and parent material(s). Pools usually support one or more indicator species, including: wood frog, spotted salamander, blue-spotted salamander (*Ambystoma laterale*), marbled salamander, Jefferson salamander (*Ambystoma jeffersonianum*), and species of fairy shrimp (*Eubranchipus* spp.*)*; however, they should preclude sustainable populations of predatory fish."

Vernal pool surveys were conducted during the breeding season from spring 2015 to spring 2018 for the NEP portion of the AFRRP. To satisfy both the USACE and the state of Massachusetts requirements for the identification of vernal pools and for the purpose of the NEP vernal pool investigations, a field identified vernal pool is defined as: an area that held standing water and exhibited obligate breeding species during the breeding season and met the state and federal vernal pool criteria discussed above.

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[30] 2018. MassGIS Data – Certified Vernal Pools. Available at: http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/cvp.html. Accessed April 06, 2018.
[31] Massachusetts Natural History and Endangered Species Program. 2013. MassGIS Data – NHESP Potential Vernal Pools. Retrieved April 6, 2016 from http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/pvp.html.
[32] US Army Corps of Engineers (USACE). 2013. US Army Corps of Engineers – New England District Vernal Pool Assessment Draft. Available at: http://www.nae.usace.army.mil/Portals/74/docs/regulatory/StateGeneralPermits/NEGP/VPAssessmentDRAFT.pdf. Accessed August 22, 2018.

Tables 5-1 through 5-3 document the wetlands, watercourses, and vernal pools identified during the field investigations, respectively.

TABLE 5-1 WETLANDS WITHIN THE PROJECT AREA

PROJECT	WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	WETLAND BUFFER AREA
		NWI	STATE		
Bell Rock Substation Rebuild Project	M1	PFO/PSS	BVW	Federal and State	100 feet
	M2	PSS	BVW	Federal and State	100 feet
	L1	PFO/PSS	BVW	Federal and State	100 feet
	L1A	PFO/PSS	BVW	Federal and State	100 feet
	L2	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	L3	PSS/PEM/ PFO	BVW	Federal and State	100 feet
Acushnet to Fall River Reliability Project	Wetlands within the Eversource ROW				
	D66	PSS	IVW	Federal	NA
	D65	PEM	IVW	Federal	NA
	D64	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D63	PSS	IVW	Federal	NA
	D62	PSS/PFO	BVW	Federal and State	100 feet
	D61	PSS	BVW	Federal and State	100 feet
	D60	PSS/PFO	BVW	Federal and State	100 feet
	D59	PSS/PEM/ PUB	BVW	Federal and State	100 feet
	D58	PEM/PSS/ PFO	BVW	Federal and State	100 feet
	D57	PEM	BVW	Federal and State	100 feet
	D56	PEM	BVW	Federal and State	100 feet
	D55	PSS/PEM	BVW	Federal and State	100 feet
	D54	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D53	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D52	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D51	PSS/PFO	BVW	Federal and State	100 feet
	D50	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D49	PSS/PEM	BVW	Federal and State	100 feet
	D48	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D47	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D46	PSS	BVW	Federal and State	100 feet
	D45	PSS/PEM	BVW	Federal and State	100 feet
	D44	PSS/PEM	BVW	Federal and State	100 feet

PROJECT	WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	WETLAND BUFFER AREA
		NWI	STATE		
	D43	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D42	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D41	PSS/PFO	BVW	Federal and State	100 feet
	D40	PSS	BVW	Federal and State	100 feet
	D39	PSS	BVW	Federal and State	100 feet
	D38	PSS/PFO	BVW	Federal and State	100 feet
	D37	PSS/PFO	BVW	Federal and State	100 feet
	D36	PSS	BVW	Federal and State	100 feet
	D35	PSS/PFO	BVW	Federal and State	100 feet
	D34	PSS/PFO	BVW	Federal and State	100 feet
	D33	PSS	BVW	Federal and State	100 feet
	D32	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D31	PSS/PEM	BVW	Federal and State	100 feet
	D30	PSS/PFO	BVW	Federal and State	100 feet
	D29	PSS	BVW	Federal and State	100 feet
	D28	PSS	BVW	Federal and State	100 feet
	D27	PSS	BVW	Federal and State	100 feet
	D26	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D25	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D24	PEM/PSS/ PUB	BVW	Federal and State	100 feet
	D23	PSS/PFO	BVW	Federal and State	100 feet
	D22	PSS/PEM/ PFO	BVW	Federal and State	100 feet
	D21	PSS/PEM/ PUB	BVW	Federal and State	100 feet
	D20*	PSS/PFO/ PEM	BVW	Federal and State	100 feet
	Wetlands within the NEP ROW				
	D19A	PFO	BVW	Federal and State	100 feet
	D19	PSS	BVW	Federal and State	100 feet
	D18	PFO	BVW	Federal and State	100 feet
	D17	PSS	BVW	Federal and State	100 feet
	D16A	PFO	BVW	Federal and State	100 feet
	D16	PSS	BVW	Federal and State	100 feet
	D15	PFO	BVW	Federal and State	100 feet
	D14	PSS/PFO	BVW	Federal and State	100 feet
	D13	PEM	IVW	Federal	NA
	D12	PSS/PEM/ PFO	BVW	Federal and State	100 feet

PROJECT	WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	WETLAND BUFFER AREA
		NWI	STATE		
	D11	PSS/PFO/ PEM	BVW	Federal and State	100 feet
	D10	PSS	IVW	Federal	NA
	D9	PSS	IVW	Federal	NA
	D8	PFO	BVW	Federal and State	100 feet
	D7A	PSS	IVW	Federal	NA
	D7	PFO/PSS	BVW	Federal and State	100 feet
	D6	PFO	BVW	Federal and State	100 feet
	D5	PSS	BVW	Federal and State	100 feet
	D4	PSS	BVW	Federal and State	100 feet
	D3	PSS	BVW	Federal and State	100 feet
	D2	PFO/PSS	BVW	Federal and State	100 feet
	D1	PSS/PFO	BVW	Federal and State	100 feet
	M1	PFO/PSS	BVW	Federal and State	100 feet
	L1	PFO/PSS	BVW	Federal and State	100 feet

[1]Wetlands were classified according to Cowardin et al. (1979). PSS = palustrine scrub-shrub wetland; PFO = palustrine forested wetland. https://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States.pdf

[2] Please note that the determination of each wetland's isolated or connected status represents the professional opinion of POWER Engineers, Inc. Final determination of jurisdictional status is under the purview of the USACE.

***** Wetland D20 is located in both the Eversource and NEP Survey Areas.

TABLE 5-2 WATERCOURSES WITHIN PROJECT AREA

PROJECT	STREAM ID	WATERCOURSE HYDRO-PERIOD	RIVERFRONT AREA (200 FT)	100-YR FLOODPLAIN (BLSF)
Bell Rock Substation Rebuild Project	SL3	Intermittent	NA	No
Acushnet to Fall River Reliability Project	**Watercourses within the Eversource ROW**			
	SD62	Intermittent	NA	No
	SD59	Intermittent	NA	No
	SD56	Intermittent	NA	No
	SD54 (Acushnet River)	Perennial	Yes	Associated with the Acushnet River
	SD53	Perennial	Yes	No
	SD38	Intermittent	NA	No
	SD38A	Perennial	Yes	No
	SD35	Perennial	Yes	No
	SD27	Intermittent	NA	No
	SD25A	Perennial	Yes	Associated with Shingle Island Swamp
	SD25	Perennial	Yes	Associated with Shingle Island Swamp
	SD23	Intermittent	NA	No
	SD23A	Perennial	Yes	No

PROJECT	STREAM ID	WATERCOURSE HYDRO-PERIOD	RIVERFRONT AREA (200 FT)	100-YR FLOODPLAIN (BLSF)
	SD22 (Shingle Island River)	Perennial	Yes	No
	SD21	Perennial	Yes	No
	SD20*	Intermittent	NA	No
	Watercourses within the NEP ROW			
	SD19A	Intermittent	NA	No
	SD11 (Copicut River)	Perennial	Yes	Associated with the Copicut Reservoir
	SD8	Intermittent	NA	No
	SD5	Intermittent	NA	No

* Stream SD20 is located in both the Eversource and NEP Survey Areas.

TABLE 5-3 VERNAL POOL HABITAT WITHIN THE NEP PROJECT AREA

PROJECT	POOL ID NUMBER	OBLIGATE SPECIES OBSERVED	FACULTATIVE SPECIES OBSERVED	ADDITIONAL SPECIES OBSERVED	TOWN
Bell Rock Substation Rebuild Project	LP-1	2 wood frog egg masses (one hatching) (2016) ~50 wood frog tadpoles (2018) 2 old wood frog egg masses (2018)			Fall River
Acushnet to Fall River Reliability Project	**Vernal Pools Identified in NEP ROW**				
	DP-12	2 wood frog egg masses (2018) ~50 wood frog tadpoles (2018)			Fall River
	DP-7	~50 fairy shrimp (2018)	1 American toad (2018)		Fall River
	DP-6	8 wood frog egg masses (2018) ~100 wood frog tadpoles (2018) 12 spotted salamander egg masses (2018) ~1,000 fairy shrimp (2018)			Fall River
	DP-5	3 wood frog egg masses (2018) ~hundreds of wood frog tadpoles (2018) ~55 spotted salamander egg masses (2018)			Fall River
	DP-4	~30 spotted salamander egg masses (2017) 2 wood frog egg masses (2018) 8 spotted salamander egg masses (2018)			Fall River
	DP-2	5 spotted salamander egg masses (2017) ~20 spotted salamander larvae (2017) 2 wood frog egg masses (2018) 7 spotted salamander egg masses (2018) ~100 fairy shrimp (2018)	American toad calling (2018)		Fall River
	DP-1	20 wood frog tadpoles (2017) 1 spotted salamander egg mass (2017) 10 spotted salamander larvae (2017) 3 spotted salamander egg masses (2018)			Fall River

PROJECT	POOL ID NUMBER	OBLIGATE SPECIES OBSERVED	FACULTATIVE SPECIES OBSERVED	ADDITIONAL SPECIES OBSERVED	TOWN
	LP-1	2 wood frog egg masses (one hatching) (2016) ~50 wood frog tadpoles (2018) 2 old wood frog egg masses (2018)			Fall River

TABLE 5-4 GENERAL LIST OF SUBURBAN WILDLIFE SPECIES WITHIN THE PROJECT AREA[33]

WETLAND TYPE	COMMON BIRDS	SMALL MAMMALS	LARGE SIZE WILDLIFE	AMPHIBIANS
PSS Wetlands	Yellow Warbler *(Dendroica petechia)* Common Yellowthroat *(Dendroica dominica)* American Goldfinch *(Carduelis tristis)* Song Sparrow *(Melospiza melodia)* Common Grackle *(Quiscalus quiscula)*	Meadow Vole *(Microtus pennsylvanicus)* White-Footed Mouse *(Peromyscus leucopus)* Eastern Cottontail *(Sylvilagus floridanus)*	Racoon *(Procyon lotor)* Virginia Opossum *(Didelphis virginiana)* Eastern Skunk *(Mephitis mephitis)* White-Tailed Deer *(Odocoileus virginianus)* Eastern Coyote *(Canis latrans)*	
PFO Wetlands	Red-Tailed Hawk *(Buteo jamaicensis)* Downy Woodpecker *(Dryobates pubescens)* Hairy Woodpecker *(Picoides villosus*) Eastern Towhee *(Pipilo erythrophthalmus)*		White-Tailed Deer Virginia Opossum Racoon	
PEM Wetlands	Marsh Wren *(Cistothorus palustris)* Red-Winged Blackbird *(Agelaius phoeniceus)* Tree Swallow *(Tachycineta bicolor)*			Wood Frog *(Lithobates sylvatica)* American Toad *(Anaxyrus americanus)* Northern Spring Peeper *(Pseudacris crucifer)*

[33] DeGraaf, R.M. and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. 2nd Edition. Hanover, NH: University Press of New England. 482 p.

WETLAND TYPE	COMMON BIRDS	SMALL MAMMALS	LARGE SIZE WILDLIFE	AMPHIBIANS
PUB Wetlands	Mallard *(Anas platyrhynchos)* Canada Goose *(Branta canadensis)* Great Blue Heron *(Ardea herodias)* Great Egret *(Ardea alba)*			Green Frog *(Lithobates clamitans melanota)* Bullfrog *(Lithobatescatesbeianus)* Northern Leopard Frog *(Lithobates pipens)* Painted Turtle *(Chrysemys picta)* Snapping Turtle *(Chelydra serpentina)*
LUB Wetlands	Common Loon *(Gavia immer)* Common Merganser *(Mergus Merganser)* Canada goose			

5.4 Bell Rock Substation Rebuild Project

5.4.1 Existing Conditions

The Bell Rock Substation Rebuild Project is located within the major basin of Buzzards Bay.[34] Watersheds within the Buzzards Bay basin are further delineated into smaller watersheds identified by a unique six level, HUC. The Bell Rock Substation Rebuild Project is located within the Quequechan River (HUC 12 #010900040803) sub watershed.

The Bell Rock Substation Rebuild Project is also located in an area designated as Class A public water supply associated with North Watuppa Pond/Reservoir and the wetlands and streams that are tributary to the reservoir are classified as ORW (refer to Appendix A Figure 2-2).[35] The six wetlands identified in the Bell Rock Substation Rebuild Project area (Table 5-1) continue off the NEP ROW and are associated with Queen Gutter Brook or North Watuppa Pond, thereby establishing the "bordering" connection requirement of BVWs. No portion of the Bell Rock Substation Rebuild Project will occur within or adjacent to Queen Gutter Brook or North Watuppa Pond and therefore, no impacts to these resources are anticipated.

One intermittent stream was identified in the Bell Rock Substation Rebuild Project area (Table 5-2). This intermittent stream flows through wetland system L3 which crosses the historical access road to the

[34] United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). NRCS Hydrologic Unit Code (HUC) Basins (8,10,12). Retrieved April 20, 2015-July 09, 2018 from https://docs.digital.mass.gov/dataset/massgis-data-nrcs-huc-basins-81012.
[35] Massachusetts Department of Environmental Protection (MassDEP). 2010. MassGIS Data – Outstanding Resource Waters. Retrieved April 20, 2015-July 09, 2018 from https://docs.digital.mass.gov/dataset/massgis-data-outstanding-resource-waters.

transmission line facilities off Blossom Road. The stream flows to the south through a culvert beneath the historical access route to North Watuppa Pond. The culverted, shallow, narrow, and intermittent channel, and dense vegetation prevent the stream from being navigable by canoes, kayaks, or other watercraft.

Vernal Pool Habitat

One pool (LP-1) in Wetland L1 met the specific vernal pool criteria during the spring 2016 and 2018 surveys (Table 5-3). LP-1 is located in a depression around a steel pylon associated with D21 Structure #29 to the east of Bell Rock Substation. Refer to Table 5-3 above for LP-1 details.

Wildlife

The predominant wetland habitat in the Bell Rock Substation area is scrub-shrub wetland within the existing transmission line ROWs and deciduous wetland forest communities adjacent to the line. A variety of rural wetland wildlife species uses these habitats including an assemblage of large and small mammals, songbirds, reptiles, amphibians, and invertebrates. These wetland habitats provide feeding, nesting, breeding, and cover opportunities for wildlife which otherwise in Fall River are surrounded by highly residential areas with sections of commercial and industrial zones. Characteristics of the forest and shrub wetlands which provide wildlife necessary resources include: berry-producing shrubs for food sources, dense shrubs and emergent plants for cover, and localized areas of surface water in the form of depressions. Table 5-4 provides a general list of suburban wildlife species expected to occur in wetlands identified in the Bell Rock Substation Rebuild Project area. The wildlife assemblages present within the Bell Rock Substation Rebuild Project ROW vary according to habitat characteristics. For more site-specific information on wildlife and habitat please refer to the Bell Rock Substation Rebuild Project Wildlife Habitat Evaluation in Appendix F.

5.4.2 Potential Impacts

Throughout the planning and design process for the Bell Rock Substation Rebuild Project, wetland impacts have been minimized to the greatest extent practicable by using an existing substation site (Bell Rock Substation) and existing access roads. However, given the landscape setting of the Bell Rock Substation Rebuild Project, certain wetland impacts associated with the expansion of the existing substation cannot be avoided. Construction of the Bell Rock Substation Rebuild Project will result in temporary, permanent, and secondary impacts to wetland resources. Secondary impacts generally involve the conversion of forested wetland habitat to scrub-shrub or emergent wetland habitat, whereby the cover type changes but results in no net-loss of wetlands and with a benefit to successional wildlife species from the habitat conversion. There are no anticipated impacts to vernal pools due to the construction of the Bell Rock Substation Rebuild Project.

The following section describes the impacts associated with construction of the Bell Rock Substation Rebuild Project. Table 5-5 summarizes the potential impacts of the Bell Rock Substation Rebuild Project on wetlands based upon preliminary design data. Impacts have been calculated in square feet and acres.

TABLE 5-5 BELL ROCK SUBSTATION REBUILD PROJECT SUMMARY OF WETLAND IMPACTS

RESOURCE AREA	TEMPORARY IMPACTS	PERMANENT IMPACTS
Bordering Vegetated Wetland (BVW)	6,611 sf (0.15 acre) – placement of temporary construction mats as a construction-phase mitigation measure	Approximately 3,599 sf (0.08 acre) – substation expansion

Temporary Wetland Impacts

Bordering Vegetated Wetlands

Temporary impacts to BVWs are anticipated due to the placement of temporary construction mats used for temporary equipment access for construction areas. Refer to Appendix C for construction mat details. Construction mats will be used in areas where permanent access is not required, and access is only needed for such activities as tree clearing, vegetation removal, and for upgrades or maintenance. After work has been completed, the mats will be removed and the temporarily impacted areas restored to their pre-existing conditions. Additional restorative measures may be used (e.g., seeding, mulching, restoration of soil compaction) depending on the condition of the site once the construction mats are removed.

Access Roads

Access roads were designed to avoid BVWs, where feasible. Existing access roads will be improved to allow for construction vehicle access; a new temporary construction road will be constructed to the immediate south of the Bell Rock Substation to facilitate access to the M13 bypass. This area will be left to restore upon completion of construction. A new upland access road will be required on the M13 ROW for access to Structure 31. Where access routes traverse wetland resource areas, temporary construction matting will be installed. The disturbance area within wetlands for the use of temporary matting has been conservatively estimated to be 20 feet wide for construction mats, with the actual mat having a 16-foot width. The mats will be removed after construction and any impacted areas will be restored, stabilized and revegetated.

Construction Areas

Construction mats will be used for temporary work pad areas needed for structure installation along the M13 temporary bypass. Work pads generally have a footprint of 100 feet by 150 feet, while pull pad areas, used for wire installation, generally have a footprint of 150 feet by 50 feet. However, several work pads have smaller impact areas depending upon the type of activity which will be conducted and additional environmental constraints in the vicinity of the work pad. The actual area required will be determined by the type of equipment and site-specific activities required. Refer to Figure 2-2 and Figure 2-3 in Appendix A.

BVW L1A is the only wetland that will be temporarily impacted by construction work pads and pull pad areas. A description and photo of BVW L1A is provided in Appendix E.

Permanent Wetland Impacts

The following section describes the anticipated permanent wetland impacts of the Project including vegetation removal, and the expansion of the proposed Bell Rock Substation including stormwater management and grading. Table 5-6 summarizes the impacts numbers.

TABLE 5-6 BELL ROCK SUBSTATION REBUILD PROJECT SUMMARY OF PERMANENT WETLAND IMPACTS

RESOURCE AREA	WETLAND/STREAM ID	AREA PERMANENTLY AFFECTED (IN SQUARE FEET)	AREA PERMANENTLY AFFECTED (IN ACRES)
Bordering Vegetated Wetlands	**Grading and Alterations for the Bell Rock Substation Expansion**		
	M1	2,554	0.06
	L1A	1,045	0.02
	Total	**3,599**	**0.08**
	Tree Removal[1]		
	M1	2,559	0.06
	L1A	562	0.01
	Total	**3,121**	**0.07**

[1] Approximately 2,906 square feet of tree removal impacts overlap with the grading and alterations required for the Bell Rock Substation expansion.

Bordering Vegetated Wetlands

A limited amount of permanent fill in BVW will be required for the expansion of the Bell Rock Substation. The Bell Rock Substation permanent impacts to BVW include the actual footprint of the Station including required grading resulting in permanent contour changes.

Secondary Impacts

Tree removal will result in the conversion of forested wetlands to either scrub-shrub or emergent BVW in several locations. Areas of tree removal are indicated on Figure 2-2 in Appendix A and in Table 5-6 above. Forested area in Wetland M1 and L1A will be cleared to accommodate the expansion of Bell Rock Substation and the temporary M13 bypass.

Wildlife Impacts

Wildlife currently using forested areas adjacent to the substation will be temporarily impacted by construction of the Bell Rock Substation Rebuild Project, but large blocks of intact woodland will continue to remain along both sides of the substation easement. Larger, more mobile and ubiquitous species such as white-tailed deer and Eastern coyote are expected to temporarily relocate from the construction area, but are unlikely to be permanently impacted by the displacement. Small mammals such as gray squirrels (*Sciurus carolinensis*), woodchucks (*Marmota monax*), skunks, and raccoons, as well as herpetofauna are also likely to move away from areas of construction activity. Depending upon the time of year, some avifauna may also be temporarily displaced, possibly impacting breeding and nesting activities, but are otherwise likely to return after construction and in subsequent years. In wetlands that will have temporary work pads or temporary construction access, the disturbed areas will be restored to pre-existing grade where necessary and allowed to revegetate and/or supplemental seeding with an approved "WetMix" seed mixture will be applied.

The removal of mature trees in forested areas as a result of the Bell Rock Substation Rebuild Project is unlikely to impact local wildlife populations utilizing these mature trees due to the availability and

abundant extent of forest habitats in the area. Vegetation on the existing ROW is managed in accordance with the NEP VMP.[36] Accordingly, trees that could interfere with the operation of the substation or associated transmission lines are routinely cleared from the ROW and trees along the edges are periodically pruned or cleared. Vegetation will be maintained as low-growth shrubs or grasses and herbs. NEP designed the Bell Rock Substation Rebuild Project to first avoid and then minimize permanent impacts to wetlands to the extent practicable, but unavoidable permanent fill will be required for the substation expansion. With respect to the surrounding available wetland wildlife habitat resources associated with the transmission line ROWs and the Bioreserve, it is not expected that this small area of permanent fill would result in a long-term negative impact on the ability of the area to provide valuable wildlife habitat for the existing assemblage of wetland-dependent species.

In areas where trees will be cleared there are several mitigation activities which can be performed to enhance wildlife habitat resulting from tree loss. Such activities may include: seeding disturbed areas with a conservation seed mix, leaving woody debris to create cover for wildlife, and leaving snag trees as potential wildlife habitat.

5.4.3 Wetland Mitigation Measures

Mitigation plans are currently in the preliminary phases of development, NEP is committed to working with the USACE, MassDEP, and the City of Fall River Conservation Commission to develop an appropriate mitigation package so there is no net loss of wetland functions and values as a result of the Bell Rock Substation Rebuild Project. Examples of possible wetland mitigation strategies include wetland restoration, targeted property acquisition for land preservation and participation in the USACE Massachusetts in-lieu fee program.

The 401 Water Quality Certification Regulations at 314 CMR 9.06(2)(a) requires "For discharges to bordering or isolated vegetated wetlands, such steps shall include a minimum of 1:1 restoration or replication." NEP and its representatives have had preliminary discussions with representatives of the Watuppa Reservation to identify and inventory potential wetland restoration and enhancement opportunities. Mitigation for impacts to wetlands and ORW will be finalized through permitting with the Fall River Conservation Commission, the Superintendent of the Watuppa Reservation and MassDEP.

Best Management Practices

Throughout all phases of construction, NEP and their contractors will follow the policies and procedures as outlined in National Grid's *EG-303NE* to identify, avoid, minimize and mitigate environmental impacts. For additional information refer to Appendix C.

The boundaries of the wetlands and watercourses will be clearly demarcated by a qualified wetland scientist prior to the commencement of work. Any federal-listed or Massachusetts state-listed, and/or proposed, endangered, or threatened species or critical habitats will be flagged or fenced-off. In addition, boundaries of other sensitive environmental resources such as vernal pool or cultural resources sites will also be flagged, or fenced-off, as necessary. Measures will be implemented on a site-specific basis as necessary to facilitate unencumbered amphibian access to and from vernal pools. These measures will be identified after taking into consideration site specific conditions, including the type of construction

[36] National Grid. 2013. Five Year Vegetation Management Plan 2014-2018. Retrieved April 16, 2018 from https://www9nationalgridus.com/transmission/c3-8_standocs.asp.

activity in proximity to a vernal pool, the amphibian species known to occur in the vernal pool, and season conditions. NEP will implement a Wetland Invasive Species Control Plan ("WISCP") during the construction of the Bell Rock Substation Rebuild Project to minimize the spread of invasive plan species in wetland resource areas (Appendix G).

NEP will comply with all applicable wetland regulatory permit requirements and conditions, as well as the associated Bell Rock Substation Rebuild Project plans and specifications submitted in support of these permit applications.

Typical BMPs during construction include:

- Installation of sediment control barriers in all work areas adjacent to wetlands which will be routinely inspected to insure they are functioning properly.
- Temporary placement of construction mats for access and work pads where wetlands cannot be avoided.
- Upon removal of construction mats wetlands will be allowed to revegetate naturally or will be seed as needed.
- Equipment refueling and equipment/material storage will not be permitted within 100 feet of any wetland or waterbody, with the exception of equipment that cannot be feasibly moved from its working location (e.g., drilling equipment, dewatering pumps). Secondary containment will be used at these refueling locations.
- Contractor staging areas and contractor yards typically will be located at existing developed areas (parking lots, existing yards).
- Dewatering discharge water will be pumped into an approved basin or filter bag which will be located in approved areas outside of biological wetland resource areas.
- Excavated soil which will not be reused on site will be properly contained until it can be transported to an approved disposal location or spread into an approved upland area.
- Along the M13 temporary bypass, woody species with a mature height greater than 10 feet will be cleared; low-growing tree species, shrubs, and grasses will only be removed/mowed along access roads and at pole locations.
- An Environmental Field Issue ("EFI") will be developed for the project. At a minimum, the EFI will include the location of sensitive areas to be avoided, a summary of all permit requirements, detailed erosion and sediment control plans, and training requirements/documentation. All contractors and environmental monitors will be required to participate in EFI training before beginning work on site. Regular construction progress meetings will provide the opportunity to reinforce the contractor's awareness of these matters.
- Throughout the entire construction process, NEP will retain the services of an environmental monitor. The primary responsibility of the monitor will be to oversee construction activities including the installation and maintenance of soil erosion and sediment controls on a routine basis to ensure compliance with all federal, state, and local permit commitments.
- When work within the breeding season cannot be avoided in the vicinity of amphibian breeding habitats, the NEP-designated Environmental Monitor will perform daily sweeps of the area to remove amphibian species from the work area. Any amphibians encountered during these sweeps will be removed and additional sweeps will be conducted throughout the day as needed.

5.5 Acushnet to Fall River Reliability Project

5.5.1 Existing Conditions

The AFRRP is located within the major basin of Buzzards Bay.[37] Watersheds within the Buzzards Bay basin are further delineated into smaller watersheds identified by a unique, six level HUC. The AFRRP is located within the following sub watersheds:

- Buzzards Bay-Point Connett to Sconticut Neck (HUC 12 #010900020306).
- Buzzards Bay-Sconticut Neck to Mishaum Point (HUC 12 #010900020401).
- Buzzards Bay-Mishaum Point to Gooseberry Neck (HUC12 #010900020402).
- Noquochoke Lake (HUC 12 #010900020501).
- Assonet River (HUC 12 #010900040802).
- Quequechan River (HUC 12 #010900040803) watershed.

As discussed further in Section 7.2, within the City of Fall River, the AFRRP traverses wetlands and streams that are designated as tributaries to Class A Public Water Supplies (North Watuppa Pond and Copicut Reservoir) and as a result, the wetland and stream tributaries to these public water supplies are classified as ORW.[38] The AFRRP ROW traverses open water areas along the northern boundary of Copicut Reservoir. North Watuppa Pond is located 2,000 feet west of the Project ROW and is not traversed directly by the AFRRP.

As summarized in Tables 5-1 and 5-2, 71 wetlands and 20 watercourses were identified in the AFRRP ROW. The predominant wetland habitat in the AFRRP area is scrub-shrub wetland within the existing transmission line ROW and deciduous wetland forest communities adjacent to the line. The watercourses identified include 10 perennial and 10 intermittent streams. Perennial streams crossed by the AFRRP ROW include the Acushnet River (SD54), Shingle Island River (SD22), and the Copicut River (SD11).

Vernal Pool Habitat

Eight field-identified vernal pools are located in the NEP ROW. Refer to Table 5-3 above and Appendix I for details of species identified within each pool. No NHESP CVPs or PVPs were inventoried or mapped to occur within the NEP ROW portion of the AFRRP.

Within the Eversource ROW portion of the AFRRP, one NHESP CVP was inventoried and mapped within approximately 30 feet to the south of the AFRRP ROW, in the vicinity of the New Bedford Industrial Park. Due to its proximity to the ROW, the CVP habitat may extend into the AFRRP ROW within the boundaries of BVW Wetland No. D37. One NHESP PVP is cataloged and mapped west of Collins Corner Road in Dartmouth. Based on field investigations, this PVP does not meet the

[37] United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2005. NRCS Hydrologic Unit Code (HUC) Basins (8,10,12). Retrieved April 20, 2015-July 09, 2018 from https://docs.digital.mass.gov/dataset/massgis-data-nrcs-huc-basins-81012.
[38] Massachusetts Department of Environmental Protection (MassDEP). 2010. MassGIS Data – Outstanding Resource Waters. Retrieved April 20, 2015-July 09, 2018 from https://docs.digital.mass.gov/dataset/massgis-data-outstanding-resource-waters.

requirements of vernal pool habitat because it is a permanently inundated pond associated with a perennial watercourse (SD21).

Wildlife

A variety of rural wetland wildlife species use these habitats including an assemblage of large and small mammals, songbirds, reptiles, amphibians, and invertebrates. These wetland habitats provide feeding, nesting, breeding, and cover opportunities for wildlife which otherwise are surrounded by highly residential areas with sections of commercial and industrial zones. Characteristics of the forest and shrub wetlands which provide wildlife necessary resources include: berry-producing shrubs for food sources, dense shrubs and emergent plants for cover, and localized areas of surface water in the form of depressions.

Table 5-4 provides a general list of suburban wildlife species expected to occur in wetlands identified in the AFRRP area. This information is based on geographical distribution and habitat preferences as described in *New England Wildlife: Habitat, Natural History and Distribution*.[39] The wildlife assemblages present within the AFRRP ROW vary according to habitat characteristics. Due to the amount of tree clearing required along the 4.2 miles of the AFRRP within NEP's service territory, NEP has elected to proactively undertake a detailed Wildlife Habitat Evaluation for those areas of the AFRRP. Site specific information on wildlife and habitat within the NEP corridor are contained in the AFRRP Wildlife Habitat Evaluation in Appendix J. A Wildlife Habitat Evaluation for the Eversource ROW will be completed in fall 2018.

5.5.2 Potential Impacts

Throughout the planning and design process for the AFRRP, wetland impacts have been minimized to the greatest extent practicable by utilizing existing transmission line corridors and existing access roads. However, given the scale and landscape setting of the AFRRP, certain wetland impacts associated with the development of the AFRRP cannot be avoided. Construction will result in temporary, permanent, and secondary impacts to wetland resources. Secondary impacts generally involve the conversion of forested wetland habitat to scrub-shrub or emergent wetland habitat, whereby the cover type changes but results in a no net-loss of wetlands. The following section describes the impacts associated with construction of the AFRRP including vegetation removal, excavation for pole structures, work pads and access road construction. Table 5-7 summarizes the potential impacts of the AFRRP on wetlands based upon preliminary design data. Impacts have been calculated in square feet (sf) or linear feet (lf) and acres.

[39] DeGraaf, R.M. and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. 2nd Edition. Hanover, NH: University Press of New England. 482 p.

TABLE 5-7 ACUSHNET TO FALL RIVER RELIABILITY PROJECT SUMMARY OF ANTICIPATED WETLAND IMPACTS

RESOURCE AREA	TEMPORARY IMPACTS	PERMANENT IMPACTS
Bordering Vegetated Wetland (BVW)	Approximately 306,817 square feet (sf) (7.04 acres) • Construction mats for access routes where BVW crossings could not be avoided. • Construction mats where work pads for construction and pull pads overlap with BVW.	Approximately 128,941 sf (2.96) • Structure foundations and access roads where BVW could not be avoided (37,352 sf (0.86 acre)). • Conversion of forested wetlands to scrub-shrub wetlands due to tree removal (91,589 sf (2.10 acres)).
Inland Bank (IB)	Approximately 202 lf • Construction mats where access roads cross IB.	625 square feet for the installation of one culvert in a stream
Riverfront Area (RFA)	Approximately 49,309 sf (1.13 acre), where approximately 0.31 acre of these impacts are accounted for as BVW impacts above. • Temporary routes for access routes where RFA crossings could not be avoided. • Temporary work space where work pads for construction and pull pads overlap with RFA.	Approximately 7,226 sf (0.17 acre), where approximately 0.05 acre of these impacts are accounted for as BVW impacts above.
Bordering Land Subject to Flooding (BLSF)	Approximately 91,707 sf (2.11 acre) where approximately 0.65 acre of these impacts are accounted for as BVW impacts above. • Construction mats for access routes where BLSF could not be avoided. • Construction mats where work pads for construction and pull pads overlap with BLSF	Approximately 285 sf (0.01 acre) where approximately 47 square feet of these impacts are accounted for as BVW impacts above. • Structure foundations where BLSF could not be avoided.

Description of Temporary Wetland and Watercourse Impacts

Temporary impacts are anticipated for the placement of construction mats used for equipment access and staging during construction. Construction mats will be used in areas where permanent access is not required and access is only needed for such activities as tree clearing, vegetation removal, and for structure installation and wire pulling. After work has been completed, the mats will be removed and the temporarily impacted areas will be restored to their pre-existing conditions, where necessary, and allowed to revegetate and/or supplemental seeding with an approved "WetMix" seed mixture will be applied. Refer to Appendix C (NEP) and Appendix D (Eversource) for construction map details.

Access Roads

Temporary access roads through wetlands will be accomplished by the installation of construction matting. The disturbance area for the temporary matting has been conservatively estimated to be 20 feet wide, with the actual mat travel surface having a 16-foot width. As shown in Appendix A, Figure 2-5, 10 BVWs will be temporarily impacted for construction access. Descriptions and photos of each BVW are provided in Appendix H.

Temporary impacts to upland BLSF and RFA will occur as a result of the AFRRP from the installation of construction mats associated with temporary access roads. Temporary construction mat roads will also span the IB of two intermittent streams (SD-5 and SD-8). However, no in-stream impacts are anticipated since construction mats will span bank to bank across the stream. Temporary impacts to upland BLSF are anticipated due to construction mats that will be used for temporary access to mobilize construction equipment onto the ROWs.

All mats will be removed after construction and impacted areas will be restored to pre-existing conditions.

Construction Areas

In wetland areas, construction mats will be used for temporary work pad areas needed for structure installation and wire pulling activities. Work pad dimensions for the AFRRP vary by structure type with monopole and H-frame structure work pads generally having a footprint of 100 feet by 100 feet, and 3-pole structure work pads generally having a footprint of 150 feet by 100 feet. Pull pad areas, used for wire installation, generally have a footprint of 150 feet by 50 feet. However, several work pads have smaller impact areas depending upon the type of activity which will be conducted and additional environmental constraints in the vicinity of the work pad. The actual area required will be determined by the type of equipment and site-specific activities as well as depending on any Company safety requirements. Temporary impacts for the installation of ground wire (counterpoise) will also occur at each structure location with the impacts anticipated to be contained within the limits of the structure work pad. As shown in Appendix A, Figure 2-5, 34 wetlands will be temporarily impacted by construction work pads and pull pad areas. Descriptions of each wetland and photos of each wetland are provided in Appendix H.

Description of Permanent Wetland and Watercourse Impacts

Permanent impacts are anticipated for the installation of new permanent access roads, proposed new transmission line structures, and the removal of trees (secondary impacts).

Access roads

Where feasible and available, existing access roads will be upgraded and used for access to the proposed structure locations. Where existing access roads are not available, new access roads traversing wetland areas will be installed. To the extent possible, new access roads have been carefully sited outside wetlands and other sensitive areas. However, in certain locations along the AFRRP, permanent access across wetland resource areas will be required to perform the necessary structure installations and for future reliable maintenance of the transmission line facilities. The permanent access roads will be constructed with trap rock underlain by geotextile fabric. In general, the access roads will not cross larger watercourses, except with the use of temporary timber bridges, however crossing of smaller streams and drainage-ways will be accomplished by installing rock fords or culverts. These crossing methods will be installed to cross streams so as not to impede or interrupt the ambient flow(s). The width of the travelled way on the access roads will be approximately 14 feet to accommodate the size of construction vehicles

and equipment deliveries including pole deliveries. Rock fords, and new or replacement culverts will be installed to maintain a hydraulic connection and will be engineered and sized to accommodate the 10-year storm flows, to the extent feasible.

Construction of new access routes through wetlands will entail removal of the underlying organic soil and importing suitable material, such as stone and gravel, to safely support construction vehicles and equipment. Rock fords or appropriately-sized culverts will be installed to maintain a hydrologic connection to the bisected wetland and to avoid adversely impacting the water level within the wetland(s). Where necessary, the new access routes will be slightly elevated to avoid being routinely flooded and unpassable.

Where permanent access roads will be installed in upland floodplain, the roads will be over excavated and installed to match the existing grade and excess soils will be removed from the floodplain, resulting in no net loss.

Structures

Proposed structures have been sited outside wetlands and other sensitive areas to the maximum extent practicable. However, unavoidable, permanent fill in wetland areas will be required for the installation of some new structures. Depending on the structure type, the pole diameter can range from 5.5 feet per pole (direct embed H-frame structure) to a 10-foot-diameter (monopole with concrete caisson foundation) with a total of 48 to 150 square foot impact area. Refer to Table 5-7 for permanent impacts in BVW.

Structure installation will result in permanent fill in upland BLSF associated with the Acushnet River, Hathaway Swamp, Shingle Island Swamp, and the Copicut Reservoir. The filling of BLSF will be mitigated by providing compensatory flood storage, as discussed in Section 5.5.3.

No permanent impacts for the installation of structures are proposed within streams, streambanks or vernal pools.

Tree Removal

A majority of the Eversource portion of the ROW has already been cleared of trees. However, new tree clearing will be required along the NEP ROW in Fall River and within one span (between proposed Structures 7-8) on the Eversource ROW in Dartmouth. Tree removal will result in the conversion of forested wetlands to either scrub-shrub or emergent BVW in these locations. Once the trees are removed, these once forested sections will be maintained as scrub-shrub or emergent wetlands.

Areas of tree removal are indicated on Figure 2-5 in Appendix A. Tree trimming and “danger” tree removal will be performed, as necessary, as well as mowing of low-growth vegetation along the ROW, in conjunction with the AFRRP.

Wildlife Impacts

Temporary impacts to wildlife are anticipated in association with the clearing of forested areas for the new transmission line. However, large blocks of intact woodland will continue to remain along both sides of the ROW corridor which is contiguous to the Bioreserve. Larger, more mobile species such as large mammals (white-tailed deer) are expected to temporarily relocate from the construction area, but are unlikely to be permanently impacted by the displacement. Small mammals such as gray squirrels (*Sciurus carolinensis*), woodchucks (*Marmota monax*), and possibly a few furbearers (skunks and raccoons), as

well as herpetofauna are also likely to be temporarily displaced however, upon the recovery of the habitat the increased availability of maintained, early seral stage habitat will enhance habitat diversity for herptiles and other cold-blooded fauna (insects and other invertebrates). Depending upon the time of year, some avifauna may also be temporarily displaced, possibly impacting breeding and nesting activities, but are otherwise likely to return after construction and in subsequent years. The removal of mature trees in forested areas as a result of AFRRP construction is unlikely to impact local wildlife populations utilizing these mature trees due to the availability and abundant extent of forest habitats in the AFRRP area.

The AFRRP was designed to first avoid and then minimize permanent impacts to wetlands to the extent practicable, however, unavoidable permanent fill will be required as a result of the Project. With respect to the surrounding available wetland wildlife habitat resources it is not expected that this small area of permanent fill would result in a long-term negative impact on the ability of the area to provide valuable wildlife habitat for the existing assemblage of wetland-dependent species. In wetlands which will have temporary work pads or temporary construction access, the disturbed areas will be restored to pre-existing grade where necessary and allowed to revegetate and/or supplemental seeding with an approved "WetMix" seed mixture will be applied.

Vegetation on the existing ROW is managed in accordance with the Companies' VMP.[40,41] Accordingly, trees that could interfere with the operation of the transmission lines are routinely cleared from the ROW and trees along the edges are periodically pruned or cleared. Vegetation will be maintained as low-growth shrubs or grasses and herbs.

Vernal Pool Impacts

Depending upon the time of construction, the amphibian migration to the vernal pools may be hindered and interrupted by construction vehicles, noise, and work personnel. Removal of the canopy over some of the vernal pools could influence the hydroperiod of the pool and some of the plant community composition surrounding the pools. No permanent impacts to vernal pools are proposed.

5.5.3 Wetland and Watercourses Mitigation Measures

To reduce the impacts associated with the construction and operation of the AFRRP, the Companies incorporated design measures to minimize impacts. These measures, which include using an existing ROW, utilizing existing access roads, and avoiding the placement and construction of structures and access roads in wetlands and watercourses wherever possible, have resulted in the avoidance and minimization of impacts to wetlands and wildlife to the greatest extent practicable.

For those wetlands having permanent impacts, the Companies will provide appropriate mitigation. While mitigation plans are currently in the preliminary phases of development, the Companies are committed to working with the USACE, MassDEP, NHESP, and the Acushnet, New Bedford, Dartmouth, and Fall River Conservation Commissions, and the Superintendent of the Watuppa Reservation to develop appropriate mitigation package so there is no net loss of wetland functions and values as a result of the AFRRP. Examples of possible wetland mitigation strategies include wetland restoration, targeted property

[40] Eversource 2017. Eversource Energy, Eastern MA Five Year Vegetation Management Plan for Central, Eastern, and Southeastern Massachusetts 2018-2022.Retrieved August 22, 2018 from https://www.eversource.com/content/docs/default-source/tranmission/veg-mgmt-5year-ema.pdf?sfvrsn=7a4cf562_5.
[41] National Grid. 2013. Five Year Vegetation Management Plan 2014-2018. Retrieved August 22, 2018 from https://www9nationalgridus.com/transmission/c3-8_standocs.asp.

acquisition for land preservation and participation in the USACE Massachusetts in-lieu fee program. To offset environmental impacts associated with the AFRRP, appropriate compensatory mitigation (in collaborative consultation with local, state, and federal resource agencies and other stakeholders) will be provided, as a component of the final AFRRP design.

Best Management Practices

Throughout all phases of construction, the Companies and their contractors will follow the policies and procedures as outlined in National Grid's *EG-303NE* and Eversource's Massachusetts Best Management Practices Manual to identify, avoid, minimize and mitigate environmental impacts. For additional information refer to Appendix C and Appendix D for these documents, respectively.

The boundaries of the wetlands and watercourses along the ROW will be clearly demarcated by a qualified wetland scientist prior to the commencement of work. Any federal-listed or Massachusetts state-listed, and/or proposed, endangered, or threatened species or critical habitats will be flagged or fenced-off. In addition, boundaries of other sensitive environmental resources such as vernal pool or cultural resources sites will also be flagged, or fenced-off, as necessary. Measures will be implemented on a site-specific basis as necessary to facilitate unencumbered amphibian access to and from vernal pools, or to exclude them from active work areas, as situationally appropriate. These measures will be identified after taking into consideration site specific conditions, including the type of construction activity in proximity to a vernal pool, the amphibian species known to occur in the vernal pool, and seasonal conditions. The Companies will implement a WISCP during the construction of the AFRRP to minimize the spread of invasive plan species in wetland resource areas (Appendix K).

The Companies will comply with all applicable wetland regulatory permit requirements and conditions, as well as the associated AFRRP plans and specifications submitted in support of these permit applications.

Typical BMPs during construction include:

- Sediment control barriers in all work areas adjacent to wetlands and will be routinely inspected to insure they are functioning properly.
- Grading in wetlands will be limited for structure foundations and access roads. Temporary construction mats will be used for access and works pads in areas where wetlands cannot be avoided.
- Upon removal of construction mats wetlands will be allowed to revegetate naturally or will be seeded as needed.
- Equipment refueling and equipment/material storage will not be permitted within 100 feet of any wetland or waterbody, with the exception of equipment that cannot be feasibly moved from its working location (e.g., drilling equipment, dewatering pumps). Secondary containment will be used at these refueling locations.
- Contractor staging areas and contractor yards typically will be located at existing developed areas (parking lots, existing yards).
- Dewatering discharge water will be pumped into an approved basin or filter bag which will be located in approved areas outside of biological wetland resource areas.
- Excavated soil which will not be reused on site will be properly contained until it can be transported to an approved disposal location or spread into an approved upland area.

- The Companies will develop and distribute Environmental Compliance Documents to all Project personnel on the project. At a minimum, these documents will include the location of sensitive areas to be avoided, a summary of all permit requirements, detailed erosion and sediment control plans, and training requirements/documentation. All contractors and environmental monitors will be required to participate in environmental training before beginning work on site. Regular construction progress meetings will provide the opportunity to reinforce the contractor's awareness of these matters.
- Throughout the entire construction process, the Companies will retain the services of an environmental monitor. The primary responsibility of the monitor will be to oversee construction activities including the installation and maintenance of soil erosion and sediment controls on a routine basis to ensure compliance with all federal, state, and local permit commitments.

Access Roads

Existing access roads will be used to the extent practicable during the construction phase of the AFRRP to minimize access through wetlands. Where access roads must be improved or developed in certain sections, the roads will be designed (where practical) so as not to interfere with surface water flow or the functions of the wetland. Temporary construction matting for access roads across wetlands will be installed to avoid safe passage through the wetlands. All temporary access roads through wetlands will be restored following the completion of installation activities by removing the construction mats, re-grading the area to pre-construction elevations to the extent practicable and allowing the wetlands to re-vegetate.

5.5.4 Wildlife Habitat Assessment and Wildlife Mitigation Measures

In areas where trees will be cleared there are several wildlife habitat mitigation activities which can be performed to enhance wildlife habitat. Such activities may include: planting native shrub species for cover and food, the seeding of wildlife food sources, placing woody debris, tree logs, and stone piles to create cover for wildlife, and leaving snag trees as potential wildlife habitat.

5.5.5 Vernal Pool Mitigation Measures

Measures will be implemented on a site-specific basis as necessary to facilitate unencumbered amphibian access to and from vernal pools. These measures will be implemented for the identified vernal pools along the NEP portion of the AFRRP and for any NHESP CVP or PVP cataloged along the Eversource portion of the AFRRP.

The placement of construction mats during active vernal pool season will be avoided to the extent practicable. If required, an environmental monitor will be onsite during the placement of construction mats to sweep the area for amphibians and egg masses. The Companies will implement general BMPs during construction to minimize potential impacts to amphibian species, including:

- Except in areas where access roads and work pads must be installed, existing scrub-shrub or emergent vegetation within 25 feet of wetlands will be maintained.
- If low growth (scrub-shrub) vegetation must be removed adjacent to wetlands, the cut vegetation (slash) will be left in place to serve as recruitment for leaf litter and coarse woody debris.
- Soil erosion and sediment controls will be installed and maintained along construction access roads and around work pads as necessary to protect water quality and to limit the potential for soil deposition into wetlands. Sediment built up behind these devices will periodically be removed

and placed in upland areas, in a manner that will preclude the potential for subsequent deposition into wetlands.

- Where proposed on-ROW access roads adjacent to or through wetlands must be installed, construction mats or clean materials will be used (e.g., clean riprap, gravel, stone or equivalent).

Specific measures will be identified after taking into consideration site specific conditions, including the type of construction activity in proximity to a vernal pool, the amphibian species known to occur in the vernal pool, and seasonal conditions.

6.0 RARE SPECIES

State agency data was evaluated to determine whether any Massachusetts state-listed, and/or proposed, endangered, or threatened species or critical habitats are known to occur within the vicinity of the Bell Rock Substation Rebuild Project or the AFRRP. The species identified in the vicinity of the Bell Rock Substation Rebuild Project and the AFRRP are listed in Table 6-1. These species are protected under the MESA (M.G.L. c. 131A) and it's implementing regulations (321 CMR 10.00). State-listed wildlife is also protected under the state's WPA (M.G.L. c. 131, s. 40) and it's implementing regulations (310 CMR 10.00). Projects and activities located within Priority and/or Estimated Habitat must be reviewed by the Massachusetts Division of Fisheries and Wildlife for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

This section addresses the consultation process with the Massachusetts NHESP, which is part of the Massachusetts Division of Fisheries and Wildlife. The discussions provided below are based on a review of the NHESP data, as well as consultation meetings with NHESP staff. Potential mitigation measures are also discussed.

TABLE 6-1 STATE-LISTED SPECIES IN THE VICINITY OF THE SUBSTATION REBUILD PROJECT AND AFRRP

PROJECT	SCIENTIFIC NAME	COMMON NAME	TAXONOMIC GROUP	STATE STATUS
Bell Rock Substation Rebuild Project	*Caprimulgus vociferus*	Eastern Whip-poor-will	Bird	Special Concern
	Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern
Acushnet to Fall River Reliability Project	*Panicum rigidulum* ssp *pubescens*	Long-leaved Panic-grass	Plant	Threatened
	Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
	Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern
	Linum medium var.*texanum*	Rigid Flax	Plant	Threatened
	Juncus debilis	Weak Rush	Plant	Endangered
	Panicum philadelphicum ssp. *philadelphicum*	Philadelphia Panic-Grass	Plant	Special Concern
	Ambystoma opacum	Marbled Salamander	Amphibian	Threatened

6.1 Bell Rock Substation Rebuild Project

6.1.1 State-Listed Species

Two NHESP state-listed species and priority habitats of rare species are located within the vicinity of the Bell Rock Substation Rebuild Project. The eastern whip-poor-will and eastern box turtle are the state-listed species of special concern (refer to Appendix B for Agency Consultation.) Based on the information

provided by NHESP, the Bell Rock Substation Rebuild Project site, or a portion thereof, is located within Priority Habitat 517 and Estimated Habitat 449 as indicated in the *Massachusetts Natural Heritage Atlas (14th Edition)*.

According to a March 27, 2018 meeting with the NHESP, the designated source for northern long-eared bat (*Myotis septentrionalis*) data for Massachusetts, there are no known roost trees or hibernacula for the northern long-eared bat located in the Project area.

Eastern Whip-poor-will

The eastern whip-poor-will is a medium-sized nocturnal bird in the *Caprimulgidae* family. They measure from 22 to 26 centimeters and weigh between 43 and 64 grams with a life expectancy of about four years. Their body shape is distinct, with small bodies, flat heads, large, dark eyes and a very small bill with a large mouth. The habitat needs of the whip-poor-will are complex and in general, they tend to seek dry, open woodlands adjacent to meadows and shrublands. They use the open woodlands for nesting and meadows and shrublands for foraging. They have been recorded arriving in Massachusetts from their wintering grounds as early as mid-April, with their mating pairs formed and their eggs laid directly on forested floors by mid-May. The whip-poor-wills primary diet consists of large moths and night-flying beetles and they will typically hunt during the night when there is adequate moonlight, apparently timing their broods to benefit from increased prey success during preferable moon phases. Threats to whip-poor-wills include a variety of factors including habitat loss both from development and habitat succession with the succession away from fire-adapted natural communities towards a more generalist species structure. Due to the declining populations, they are seen in few places in Massachusetts including: the Greater Myles Standish Pine Barrens, the Montague Plains Pine Barrens, the Fort Devens/Bolton Flats WMA complex, the Massachusetts Military Reservation/ Frances Crane WMA complex, Correllus State Forest and vicinity, and the eastern half of Nantucket.[42] The eastern whip-poor-will is a state listed species of "Special Concern" under MESA.

Eastern Box Turtle

The eastern box turtle is a small terrestrial turtle ranging in size from 11.4 to 16.5 centimeters with a life span of an average of 50 or more years. The adult box turtle has an oval, high-domed shell with a variation of colors and markings including a range of brown and black markings with numerous irregular yellow, orange or reddish blotches. The eastern box turtle is a terrestrial turtle with diverse habitat preferences. They can be found in both dry and moist woodlands, brushy fields, bogs, swales, fens, thickets, marsh edges, stream banks and well-drained bottomland. The range of eastern box turtle is from southeastern Maine; south to northern Florida; and Michigan, Tennessee and Illinois. They can occur throughout Massachusetts, excepting the Berkshire region, but are more heavily concentrated in the southeastern section of the state and the Connecticut Valley. They typically hibernate in the northern parts of the range from late October until mid-March/April depending on the weather. Hibernation is virtually exclusively within forested habitat where they tend to burrow under several layers of leaf litter or woody debris and burrow into the soft ground as the temperature drops. Some individuals use opportunistic features such as stump holes and abandoned animal burrows to avoid ground frost. In the summer, eastern box turtles are most active in the morning and early evening, particularly after rainfall. During the heat of the day they typically seek shelter "forms" within leaf litter and duff. The eastern box turtle is

[42] Massachusetts Division of Fisheries and Wildlife. Natural Heritage Endangered Species Program. 2012. Eastern Whip-poor-will. *Caprimulgus vociferus*. Retrieved May 14, 2018 from https://www.mass.gov/files/documents/2016/08/rx/caprimulgus-vociferus.pdf

omnivorous, feeding on animal matter such as slugs, insects, earthworms and snails and opportunistic carrion; also feeding on mushrooms, berries, fruits and leaves and shoots. The biggest threats to the eastern box turtle in Massachusetts include the following- habitat destruction from residential and industrial development; road mortality; collection by individuals for pets; mowing of fields during the active seasons; release of non-native turtles (pet store turtles) and related diseases from those species.[43] The eastern box turtle is also a state-listed species of "Special Concern."

6.1.2 Proposed Mitigation Measures and Conclusions

Specific mitigation measures recommended by the NHESP are still being evaluated through the consultation process. However, NEP is committed to minimizing impacts where possible and has committed to the measures discussed below.

Grassland and shrub land birds (the eastern whip-poor-will) are very sensitive to disturbance throughout their breeding season from the 1st of May through the 15th of August. All tree clearing for the Bell Rock Substation Rebuild Project will be completed outside of the breeding season. Work within the substation yard expansion area is expected to be ongoing from fall 2020 through April of 2021. Any work within the substation expansion area during the breeding season will be within limits of the perimeter sediment controls around the cleared and grubbed expansion area.

Before construction, work crews will receive turtle training to be educated on the visual characteristics of the eastern box turtle and reminded of the mitigation measures. Extra care will be used when using heavy machinery or traveling in vehicles through mapped areas, especially from the 1st of April through the 1st of November. NEP has an on-going radio telemetry program for the eastern box turtle. In advance of tree clearing and earth disturbance at the substation, the Bell Rock Substation Rebuild Project area will be monitored for turtles outfitted with a transmitter and any remaining turtles will be identified through turtle sweeps by trained biologists and removed from the proposed construction area. Silt fencing / turtle exclusion fencing will be installed, monitored and maintained throughout construction to reduce the risk of turtles entering into the active work site. Any silt fencing used in these areas will be removed as soon as site stabilization has occurred, as such fencing could be a barrier to turtle movements. Siltation control materials will not be mesh backed (fence) or enclosed in plastic/vinyl mesh (wattles). If turtles are encountered, they will be removed from the work zone and reported to the NHESP (with photos, locational information and documentation).

6.2 Acushnet to Fall River Reliability Project

6.2.1 State-Listed Species

Seven NHESP state-listed species and priority habitats of rare species are located within the vicinity of the AFRRP. Based on the information provided by NHESP, the AFRRP ROW, or a portion thereof, are located within Priority Habitat PH364 and PH517 and Estimated Habitat EH336 and EH449 as indicated in the *Massachusetts Natural Heritage Atlas (14th Edition)*. Table 6-1 identifies the state-listed species located in the vicinity of the Project. NHESP correspondence letters dated April 9, 2018 are included in Appendix B.

[43] Massachusetts Division of Fisheries and Wildlife. Natural Heritage Endangered Species Program. 2015. Eastern Box Turtle. *Terrapene carolina*. Retrieved May 14, 2018 from https://www.mass.gov/files/documents/2016/08/uw/terrapene-carolina.pdf

As stated above, according to a March 27, 2018 meeting with the NHESP, there are no known roost trees or hibernacula for the northern long-eared bat located in the Project area.

Species descriptions and habitat requirements for the NHESP are further described below. The eastern whip-poor-will and eastern box turtle species descriptions and habitat preferences are included in Section 6.1.1 above and have not been repeated herein.

Long-leaved Panic grass

Long-leaved panic-grass is a coarse, tufted perennial in the Grass family (*Poaceae*) that grows in clumps up to 1.5 meters (m) tall, with a pyramidal or narrow panicle 10 to 30 centimeters (cm) in height. It blooms from summer to fall and has distinctive dark red inflorescences that may be slightly branched or clumped (ascending). The lance-ovoid spikelets are 1.8 to 3.5 millimeters (mm) long and narrow leaf blades measuring 20 to 40 cm grow primarily from the base of the plant. Long-leaved panic-grass habitat is moist, sandy or peaty soil in full sun and includes coastal plain pond shores, bog edges, border of basin marshes, vernal pools, and in utility rights of way in moist or wet depressions. It flowers typically from July through September. Known populations exist in locations from Maine to Florida, west to Michigan, Illinois and Texas. In Massachusetts it is known to occur only in the southeastern portion of the state, in Bristol and Plymouth Counties; historically it is known to have occurred in Dukes County. Threats to this species include natural succession, especially where it occurs in isolated patches surrounded by woody vegetation and also activities which result in severe disturbance and soil compaction. The long-leaved panic grass is a state-listed "Threatened" species under the MESA.[44]

Rigid Flax

Rigid flax is a perennial herb of the flax family (*Linaceae*) growing 2 to 7 decimeters (dm) in height, with yellow five-petaled flowers 4 to 8 mm long on stiff ascending branches. The styles are distinct and the sepals are imbricate; leaves are entire, lance-shaped with the largest leaves (up to 2.5 cm) long towards the base of the plant. The upper leaves are alternate and usually have pointed tips, however the lowest nodes opposite and blunt-tipped. It flowers typically from mid-July through August, and fruits from mid-August through November; it is most often found growing in barren, disturbed areas on sterile soil. Known populations exist in all states east of the Mississippi except New Hampshire, and the western limit of its range extends from Texas and Oklahoma north to Iowa and Wisconsin. In Massachusetts the distribution is primarily eastern (Bristol and Plymouth counties) with a single outlier in Berkshire County; historically it is known to have occurred from Barnstable, Middlesex, Norfolk and Suffolk Counties. Rigid flax requires periodic disturbance (including anthropogenic disturbances such as mowing and cutting) to reduce competition and shading by woody plants for habitat creation and maintenance. Threats to this species include lack of periodic disturbance and activities that damage plants or compact soil such as recreational use of off-highway vehicle use. Rigid flax is a state-listed "Threatened" species under MESA.[45]

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[44] Excerpted from Massachusetts Division of Fisheries and Wildlife. Natural Heritage Endangered Species Program. 2012. Long-leaved Panic-grass (*Panicum rigidulum* ssp. *Pubescens*).

[45] Excerpted from Massachusetts Division of Fisheries and Wildlife. Natural Heritage Endangered Species Program. 2010. Rigid Flax (*Linum medium* Birtt.var. *texami,*). Retrieved May 14, 2018 from https://www.mass.gov/files/documents/2016/08/rx/caprimulgus-vociferus.pdf

Weak Rush

The weak rush (*Juncus debilis*) is a small, inconspicuous perennial herb that grows from about 10 to 25 cm tall. It produces tufts of round steams and dark green leaves, with small brownish flowers at the top in clusters or "glomerules" near the tops of the stems. Fruit is present from July through September. Weak rush habitat is open, unshaded areas in seasonally wet, sand, peaty or mucky substrates along the coastal plain, especially in boggy depressions that are wet in the spring but dry later in the season. The weak rush is an early-successional species and so is adapted to compete well after disturbance. Known populations are primarily found in southeastern North American, with a range extending from Massachusetts west to Missouri and south to Texas and Florida. Threats to this species include being overcrowded and shaded out by surrounding vegetation, alteration of site hydrology/loss of wet conditions, and out-competition by invasive exotic species. The weak rush is a state-listed "Endangered" species under MESA.[46]

Philadelphia Panic-grass

Philadelphia panic-grass is a slender, hairy, herbaceous annual grass in the family Poaceae that grows typically from 80 to 100 cm tall from a bundle of fibrous roots; it also can be found as tiny plants on receding pond shores. Philadelphia panic-grass consists of three subspecies, two of which occur in Massachusetts, however based on data from NHESP it is *Panicum philadelphicum* ssp. *philadelphicum* that is in the project area. Philadelphia panic-grass flowers from June through August, and fruits form from late August to October. It grows primarily on sandy shores of acidic streams, lakes and wetlands in open, full sun. Known populations exist in locations from Nova Scotia west to Ontario and south to Georgia, Alabama and Texas, and it is rare in Rhode Island, Ohio and Iowa. Threats to this species include activities that alter hydrologic regimes or promote overgrowth or shading by other plants through succession. The Philadelphia Panicgrass is a species of Special Concern under MESA.[47]

Marbled Salamander

The marbled salamander (*Ambystoma opacum*) is a stout 3- to 5-inch-long salamander with a stocky body, short limbs and a broad rounded snout. Dorsal coloration is black with bold, variably shaped grayish to whitish crossbands that create a "marbled" pattern from head to tail. Lateral and ventral coloration is uniformly dark gray to black. Banding on the mid- to upper-dorsum tends to be bright white in mature males and dull gray in mature females. Banding on the tail can be white in both sexes or gray in females. Marbled salamander habitat is variable. Adult and juvenile marbled salamanders inhabit relatively mature deciduous and mixed deciduous-coniferous forest and woodlands, with dry sites apparently preferred. Breeding/larval habitat consists of vernal pools, woodland ponds, shrub swamps, and forested swamps with three consistent characteristics: they almost always are fishless, occur within or adjacent to forests, and hold water continuously during a minimum period of January to May (often October to June). They spend the winters below ground, preferring conditions with an insulating layer of litter and duff within mature forest where ground frost is less pervasive. Food for adult and juvenile

[46] Excerpted from Massachusetts Division of Fisheries and Wildlife. Natural Heritage Endangered Species Program. 2015. Weak Rush (*Juncus debilis*). Retrieved May 14, 2018 from https://www.mass.gov/files/documents/2016/08/rx/caprimulgus-vociferus.pdf

[47] Excerpted from Massachusetts Division of Fisheries and Wildlife. Natural Heritage Endangered Species Program. 2015. Gattinger's and Philadelphia Panic-grasses (*Panicum philadelphicum* ssp. *Gattingeri, Panicum philadelphicum* ssp. *philadelphicum*). Retrieved May 14, 2018 from https://www.mass.gov/files/documents/2016/08/rx/caprimulgus-vociferus.pdf

marbled salamanders includes snails, earthworms, beetles, slugs and other small invertebrates. The marbled salamander is listed as "Threatened" under MESA.[48]

Based upon further coordination with the NHESP on June 21, 2018, the marbled salamander is documented from sites north and south of the AFRRP area. Nonetheless, the species typically avoids non-forested habitats such as found within the existing ROW. No species-specific surveys are required by the NHESP for the marbled salamander.[49] Prospective breeding areas already identified during wetland delineations adjacent to the ROW are being evaluated for potential to support breeding by the species in the vicinity of site work.

6.2.2 Potential Impacts

Impacts to rare species and rare species habitats could occur during the construction of the AFRRP from vegetation removal during critical breeding/nesting periods, installation of new and improvement to existing access roads, use of heavy machinery on access roads during critical breeding/nesting periods, improper or inadequate use of sediment and erosion controls, and/or through the temporary use of construction matting if not timed and implemented appropriately.

Botanical Species

Botanical surveys, under approved NHESP survey protocols, have recently been conducted for the AFRRP. The plant species associated with the ROW are inhabitants of open canopy early-successional environments. Work associated with widening of the NEP ROW will not impact any of the associated plant species. In that regard, the access and acute work associated with structure installation will be configured so as to avoid impacts to the areas of mapped (2018) plant occurrences to the extent possible. In the event that conflicts are not wholly avoidable, NEP will implement alternative measures that may include air-matting during dormant periods, temporary matting for short duration, translocation/ transplantation, or other measures as appropriate.

Eastern Whip-poor-will

The eastern whip-poor-will was found to have breeding territories established at two localities on the NEP ROW during the 2018 breeding season. Additional territorial calling from areas at considerable distance off the ROW were noted, in habitat where woodland succession is in progress. Based upon further coordination with the NHESP, the widening of the NEP ROW will ultimately expand and enhance the open canopy feeding habitat for eastern whip-poor-will. Measures to avoid disruption of breeding by established pairs will be implemented to avoid any acute conflicts during construction. Ultimately, the AFRRP will result in an area of greater suitability for the species.

Eastern Box Turtle

Surveys for eastern box turtle were initiated in the spring of 2018 and animals encountered have been affixed with two-stage micro-transmitters to allow both evaluation of habitat utilization and ultimately to

[48] Excerpted from Massachusetts Division of Fisheries and Wildlife. Natural Heritage Endangered Species Program. 2015. Marbled Salamander (*Ambystoma opacum*). Retrieved May 14, 2018 from https://www.mass.gov/files/documents/2016/08/rx/caprimulgus-vociferus.pdf

[49] Representatives from Eversource and NEP participated in an agency consultation meeting with NHESP representatives on June 21, 2018.

assure mortality avoidance during construction. This effort will be continued in 2019 to maximize the percentage of extant animals that can be accounted for on demand, preceding and during construction.

The creation of additional open canopy habitat by the widening of the NEP ROW will ultimately diversify the habitat for eastern box turtle. The most critical element is the avoidance of mortality to this extremely long-lived species since loss of even a *de minimis* component of the adult population can have ramifications toward population status and stability in the long term. In general, with a suitable mortality avoidance plan in place, the activities, particularly in the NEP ROW will ultimately diversify the habitat for eastern box turtle within the context of vast areas of intact and protected forest lands that provide hibernation and feeding habitats. The Companies anticipate a program in which the performance standards will be met or exceeded, and which will provide the local population a compelling long-term net benefit.

Long-term operation and maintenance of the AFRRP following its completion is not anticipated to have adverse impacts on eastern box turtle or other rare species, as long as the work is conducted in accordance with the Companies' Operation and Maintenance ("O&M") Plans as approved by the NHESP.

Marbled Salamander

Marbled salamanders are affiliated with mature forests and discrete breeding areas therein. The forest clearing proposed for the AFRRP is remote from documented breeding habitat. Impacts to marbled salamander are anticipated to be *de minimis* in nature and will not require special or elaborate measures beyond those implemented for eastern box turtle and other species to comply with applicable performance standards.

6.2.3 Proposed Mitigation Measures and Conclusions

The Companies are actively coordinating with the NHESP regarding the species listed above and will continue with this consultation in order to minimize or avoid potential adverse effects on rare species during design, construction, and operation of the AFRRP. As noted above, species specific surveys are being conducted for all state-listed species noted above with the exception of the marbled salamander which is located outside of the limits of the AFRRP ROW.

Due to the extent of tree clearing along the NEP ROW, the Companies anticipate that a Conservation Management Permit ("CMP") will be required under MESA for the eastern box turtle. Mortality avoidance measures will be implemented in other parts of the alignment. Pursuant to 321 CMR 10.23, the application for the CMP will need to demonstrate measures to avoid and minimize impacts to the eastern box turtles and habitat and provide for a "net benefit" for this species. In general, with a suitable mortality avoidance plan in place the activities, particularly in the NEP ROW, will ultimately diversify the habitat for eastern box turtle within the context of vast areas of intact and protected forest lands adjacent resulting in a compelling net benefit for this species.

In addition to avoiding and minimizing species habitat impacts to the maximum extent feasible, the Companies will continue to work closely with NHESP to develop mitigation measures for each species associated with the AFRRP ROW. At this time, proposed mitigation includes, but is not limited to, the following:

- Developing a mitigation program in consultation with the NHESP to allow for the issuance of a CMP.
- Training will be required for all construction personnel.

- Adhering to seasonal restrictions that may be placed by the NHESP for the tree clearing activities.
- Installing signage along the ROW alerting work crews to rare species habitats.
- Installing protective enclosures and exclusion fencing.
- Performing extensive sweeps prior to construction and monitoring during construction.
- Monitoring of animals in the vicinity of active construction via radio-telemetry.
- Implementing Species-specific protection plans.
- Conducting habitat restoration post-construction.

Long-term operation and maintenance of the AFRRP is not anticipated to have adverse impacts on rare species, as long as the work is completed in compliance with the CMP, and future activities on the ROWs are conducted in accordance with the Companies' O&M Plans as approved by the NHESP.

7.0 OUTSTANDING RESOURCE WATERS (ORW)

This section describes ORW within the vicinity of the Bell Rock Substation and the AFRRP and presents potential impacts associated with the Projects during construction and operation.

ORW are waters are designated as excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation, even if not allowed. According to the Massachusetts Surface Water Quality Standards (314 C.M.R. 4.00), wetlands bordering Class A ORW are designated Class A ORW and Certified Vernal pools are designated Class B ORW. There is a MassDEP prohibition to filling of ORW and wetlands within 400 feet of the ORW unless a variance is sought and obtained from the MassDEP (see Section 13.3.1 for more details). According to the 401 Water Quality Certification Regulations at 314 CMR 9.06(3), the discharge of dredged or fill material to a ROW may be permitted in association with activities listed in 314 CMR 9.06(3)(f) ("Construction of utilities….and facilities directly related to their operation"). Approval under this provision requires an alternatives analysis that demonstrates that another alternative is not practicable, would not have less adverse impact on the aquatic ecosystem, or would have other significant adverse environmental consequences.

7.1 Bell Rock Substation Rebuild Project

7.1.1 Existing Conditions

The Bell Rock Substation Rebuild Project area and adjacent transmission line ROWs are located adjacent to Queen Gutter Brook and associated wetlands that are designated as tributaries to a Class A public water supply (North Watuppa Pond/ Reservoir) and the wetlands and streams that are bordering the reservoir are classified as ORW (refer to Appendix A Figure 2-2). The substation is not located within 400 feet of the high-water mark of a Class A surface water (exclusive of tributaries).

7.1.2 Potential Impacts to ORW

The Bell Rock Substation Rebuild Project construction is anticipated to result in unavoidable temporary and permanent impacts to vegetated wetland resources within the North Watuppa Pond/Reservoir watershed. There are no streams within the Project area and the reservoir itself is not located within 400 feet of the Project.

7.1.3 Stormwater Management Design

The Bell Rock Substation Project post-construction stormwater management system has been designed for a low-use site incorporating the Stormwater Management Standards outlined in the Massachusetts Stormwater Handbook and in consultation with the City of Fall River Engineering Department. The substation drains to an ORW and NEP has taken into account this critical resource area in the substation design. The Substation yard will largely consist of a crushed stone surface underlain with structural fill. This surface treatment allows infiltration and greatly reduces site runoff. The only impervious surfaces within the substation yard include the roof area of the control building and the paved sections of the access drive. The extent of the paved access drive within the substation yard have been purposefully limited to only the area from the entrance of the substation to the control building and will see very low use after construction is complete. The access into the substation will be limited to routine inspections, and maintenance and repair, as necessary. This substation will be an unmanned substation and will be operated and monitored remotely by NEP with routine visual and operational inspections performed by

O&M personnel. The stormwater design will include the removal of total suspended solids from runoff, but as described above, the substation will not encounter the amount of vehicular oils, salt and sediment that a typical public road or large-scale development would encounter.

7.2 Acushnet to Fall River Reliability Project

7.2.1 Existing Conditions

The AFRRP ROW traverses wetlands that are designated as tributaries to Class A Public Water Supplies of the North Watuppa Pond and Copicut Reservoir, and as a result the wetland and streams tributary to these public water supplies are classified as ORW. The Copicut Reservoir is located in the City of Fall River. The Project ROW traverses open water areas along the northern boundary of Copicut Reservoir. North Watuppa Pond is located 2,000 feet west of the AFRRP ROW and is not traversed directly by the Project. One Certified Vernal Pools is located within in the Project ROWs.

7.2.2 Potential Impacts to ORW

Construction of the AFRRP is anticipated to result in unavoidable temporary impacts to vegetated wetland resources within the Copicut Reservoir and North Watuppa Pond watersheds. Temporary wetland impacts within 400 feet of the Copicut Reservoir are also unavoidable due to the proximity of the AFRRP ROW to the northern end of the reservoir. Although the placement of temporary construction mats is currently proposed within 400 feet of the Copicut Reservoir, the Companies are not currently anticipating that a variance will be required based on preliminary coordination with the MassDEP Office of Water Resources. The Companies will continue discussions with the MassDEP regarding the Project.

7.2.3 ORW Mitigation Measures

The proposed structures and work pads have been sited and will be constructed to avoid permanent impacts to ORW. In locations where ORW cannot be avoided, the work activities will consist of the placement of temporary construction mats to for access routes of temporary work space. The use of sediment and erosion controls will be implemented to minimize sediment migration outside of the limits of disturbance. The temporary construction matting will be removed immediately after the construction activities are complete. Any required restoration or stabilization, after the mat removal, will be completed as the equipment and vehicles de-mobilize from the ROW. All tree clearing and vegetation removal will be done mechanically or by hand, and no herbicides will be applied during the construction phase of the Project. The Project will comply with the National Pollutant Discharge Elimination System (“NPDES”) General Permit and Stormwater Pollution Prevention Plan (“SWPPP”) requirements, requirements of the WPA and implementing regulations, and other restrictions as may be applied by the local conservation commissions in accordance with the WPA. Appropriate sediment and erosion control and spill prevention and response measures will be implemented, and these controls will be closely monitored and managed as described in Section 5.5.3.

The Companies are currently in the preliminary phases of coordinating with the MassDEP and will incorporate design recommendations and mitigation measures, as set forth in permitting conditions, to protect the surface water resources.. The Companies have participated in meetings with the Superintendent of the Watuppa Reservation and will continue this collaboration to identify and implement the appropriate mitigation measures to address potential impacts to ORW.

8.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

The Bell Rock Substation Rebuild Project and the AFRRP are subject to review under Section 106 of the National Historic Preservation Act (36 CFR Part 800) (Section 106) as both projects require permits from the USACE. The Bell Rock Substation Rebuild Project and the AFRRP are also subject to review by the MHC under G.L. c. 9 §§ 26–27C and the MHC's implementing regulations at 950 CMR 71.00 et seq. Both NEP and Eversource will continue coordination efforts with the USACE and MHC to avoid adverse effects to historic and archaeological resources eligible for listing in the NRHP, to the extent required by law. As part of its Section 404 permit review, pursuant to Section 106, the USACE will also consult with Native American tribes that express an interest in the historic resources that may be affected by portions of the Bell Rock Substation Rebuild Project or the AFRRP within USACE jurisdiction.

8.1 Bell Rock Substation Rebuild Project

NEP has contracted archaeologists from POWER Engineers, Inc. ("POWER") to perform background research, MHC file review, and an archaeological field survey for the substation site and M13 Line bypass, in order to identify eligible properties and to make recommendations about potential effects and how to potential adverse effects.

8.1.1 Existing Conditions

Architectural Resources

The Area of Potential Effect ("APE") is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR Part 800.16[d]). An area extending one-half mile from the substation parcel was used to define the Bell Rock Substation Rebuild Project APE within which to identify NRHP-listed properties or Massachusetts above-ground historic inventory points that may be subject to direct or indirect effects from the Bell Rock Substation Rebuild Project. No known NRHP-listed or state-inventoried historic above-ground properties or districts are within the Bell Rock Substation Rebuild Project APE. Use of the area surrounding the substation parcel during the historical period was limited to peripheral agricultural activity. Stone walls associated with property lines and/or field clearing are extant within the Bell Rock Substation Rebuild Project APE. For more than two centuries, from the late 1600s to the early 1900s, the majority of the land east of the Watuppa Ponds complex in Fall River was designated as a Wampanoag Reservation. When the area was taken by the City of Fall River in 1907, protection of water resources was given as the reason, and thus no new development occurred. Some minor historic use of the area around the northern margin of the Copicut Reservoir adjacent to the Bell Rock Substation Rebuild Project APE has been documented, and mainly consists of small-scale damming and milling activity, as well as the development of a small campground area (MHC sites FLR.6-10).

Archaeological Resources

Site file searches at the MHC identified no archaeological sites within the Bell Rock Substation Rebuild Project APE, which for archaeological sites is limited to the areas of potential ground disturbance. Intensive (Locational) survey was carried out on the upland portion of the Substation Rebuild Project footprint in March of 2017, yielding no cultural materials of either an ancient or historical period origin. Significant levels of relatively modern land modification, such as filing and leveling, were observed in the soil profiles of every archaeological test pit. No further testing was recommended by POWER archaeologists. MHC concurred with this recommendation on May 12, 2017. POWER archaeologists

recommended to MHC in February 2018, that no testing be required in advance of a geotechnical boring program in and around the previously tested portion of the parcel. POWER archaeologists conducted additional subsurface survey in September, 2018, along a new access route proposed south of the substation footprint, at the locations of the temporary M13 bypass along the perimeter of the security fence, and along an extension of upland that will be used for stormwater management, within the substation and transmission line easements. No cultural materials other than modern refuse were recovered during this additional survey. POWER archaeologists submitted a report with a recommendation of no further testing to the MHC and are awaiting concurrence.

8.1.2 Potential Project-Related Impacts

Architectural Resources

No architectural above-ground resources have been identified within the Bell Rock Substation Rebuild Project APE.

Archaeological Resources

The ancient Eg and G5 site (19-BR-248) will not be impacted by the Bell Rock Substation Rebuild Project. No other direct effects to archaeological sites are likely to occur as a result of ground disturbing activities during construction. Intensive (Locational) testing has been carried out in upland portions of the Bell Rock Substation Rebuild Project area and yielded no cultural materials. The soils observed suggest significant modern land modification. That, combined with the historically peripheral location of the site and the generally poorly-drained nature of the setting, suggests a very low archaeological potential. A small area of higher archaeological potential is located along a proposed access road south of the substation. POWER archaeologists are in consultation with the MHC to subject this area to archaeological survey to seek NRHP eligible materials prior to construction ground impacts.

8.2 Acushnet to Fall River Reliability Project

The Companies have contracted The Public Archaeology Laboratory (“PAL”) to address the Section 106 concerns of the USACE and seek the comments of the MHC and Native American Tribes. PAL staff conducted background research and a physical inspection of the AFRRP area. Background research involved a review of existing cultural resource reports on file at PAL and the MHC, correspondence, and previously-recorded historic and archaeological site files on file at MHC.

8.2.1 Area of Potential Effects

For the NEP portion of the AFRRP, the APE includes the 60-foot-wide forested portion of the 150-foot-wide ROW immediately adjacent to, and south of, the cleared portion of the ROW and the existing D21 Line. Areas of vegetative clearing, laydown and staging areas, new pole and guywire locations, and any other temporary or permanent workspaces could also occur within the 60-foot workspace corridor. The APE may include all areas where ground disturbances are proposed, where land use may change, or any locations from which the undertaking may be visible.

For the Eversource portion of the AFRRP, the APE will be established once Project plans are further refined.

8.2.2 MHC and Tribal Communications

On behalf of the Companies, PAL submitted a project information package to the MHC on April 5, 2018, consisting of an initial outreach letter and Project Notification Form for the entire AFRRP, along with a cultural resources due diligence report and a technical proposal for an intensive (locational) archaeological survey for the NEP portion of the AFRRP in Fall River. The PAL letter to MHC indicated that the Eversource portion of the AFRRP was still in development and additional information would be submitted under separate cover. On May 5, 2018, the MHC issued Permit #3827 to PAL to conduct the archaeological survey. On May 5, 2018, the MHC also commented to the USACE, indicating that the AFRRP requires review by the USACE and is subject to Section 106; MHC requested scaled existing and proposed conditions plans for the complete AFRRP, showing proposed impact areas, including access routes, vehicle and equipment storage, staging/laydown areas, and work pull pads. MHC also recognized that the Eversource portion of the AFRRP in Acushnet, New Bedford, and Dartmouth are in development. PAL conducted the archaeological survey in June and July and submitted a technical report to the MHC on October 10, 2018 along with a State Archaeologist's permit application and technical proposal to conduct archaeological site examinations at 9 sites identified during the survey. On September 28, 2018, PAL submitted a cultural resources due diligence report and technical proposal for an intensive archaeological survey (if necessary) to the MHC for the Eversource portion of the Project; PAL will conduct fieldwork for the Eversource portion in October and November 2018.

PAL submitted the above-referenced documentation to the Mashpee Wampanoag Tribe and the Wampanoag Tribe of Gay Head (Aquinnah). Tribal Cultural Resource Monitors ("CRMs") from both Tribes accompanied the PAL field crew during the archaeological survey of the NEP portion of the AFRRP. PAL will continue to provide additional information to the Tribes as it becomes available. The USACE initiated the Section 106 consultation process for the AFRRP on October 17, 2018. On October 24, 2018, the Mashpee Wampanoag Tribe and that they will participate in the Section 106 consultation process.

The Companies will continue to communicate with the MHC and Native American Tribes during the Section 106 process to identify potentially significant historic and archaeological resources and avoid, minimize, or mitigate any potential Project impacts on those resources.

8.2.3 Cultural Resource Investigations

PAL conducted a cultural resources due diligence and archaeological sensitivity assessment of the NEP portion of the AFRRP ROW in February 2018. The cultural resources due diligence included a file review of previously recorded cultural resources in the AFRRP vicinity, a walkover survey, and an archaeological sensitivity assessment of the ROW to provide information about cultural resources that could be affected by the proposed AFRRP. The file review identified previous archaeological surveys conducted within a half-mile of the AFRRP ROW. The previous surveys identified five archaeological sites recorded near the NEP D21 Line and one previously unrecorded site was identified during the due diligence walkover survey. Portions of the AFRRP ROW were assessed with high, moderate, and low archaeological sensitivity.

Based on the results of cultural resources due diligence, PAL recommended consultation with the MHC on the potential for the AFRRP to affect potentially significant archaeological and historic architectural resources that may be potentially eligible, eligible for listing in, or previously listed in the State Register or NRHP. At Companies' request, PAL prepared a technical proposal and State Archaeologist's Permit Application to conduct an intensive (locational) archaeological intensive survey of the NEP portion of the AFRRP ROW in Fall River; PAL conducted the archaeological survey for the NEP portion of the AFRRP

in June and July 2018, resulting in the identification of 15 newly identified archaeological resources, 9 of which PAL recommended are potentially eligible for listing in the NRHP. PAL submitted a technical report to the MHC on October 10, 2018, presenting the results of the archaeological survey; the package also included a State Archaeologist's permit application to conduct archaeological site examinations of the 9 sites that are potentially eligible for listing in the National Register. On September 28, 2018, PAL also submitted a separate cultural resources due diligence report and archaeological permit application to the MHC to conduct an intensive archaeological survey along the Eversource portion of the Project; on October 11, 2018, the MHC issued a permit for PAL to conduct the survey along the Eversource portion. PAL will also conduct an historic architectural reconnaissance survey for the entire AFRRP once plans are further refined.

9.0 CUMULATIVE IMPACTS

Table 9-1 below provides a summary of the estimated cumulative impacts inclusive of the Bell Rock Substation Rebuild Project and the AFRRP. The cumulative impacts are presented to apprise MEPA of the resource area impacts associated with the proposed system reliability project(s). As discussed throughout this Expanded ENF, the Companies are committed to avoiding, minimizing and mitigating resource area impacts to the greatest extent practicable.

TABLE 9-1 CUMULATIVE IMPACT SUMMARY OF ANTICIPATED WETLAND EFFECTS BELL ROCK SUBSTATION REBUILD PROJECT AND ACUSHNET TO FALL RIVER RELIABILITY PROJECT

RESOURCE AREA	TOTAL SQUARE FEET OR LINEAR FEET OF IMPACT	IMPACT TYPE
Bank (lf)	202 lf 625 sf	Temporary Linear feet of construction mats where stream crossings could not be avoided. Permanent Square feet of impact associated with one culvert crossing in a stream.
Bordering Vegetated Wetlands (BVW)	449,089 sf	Temporary Approximately 313,427 sf (7.20 acres) for construction mats for access routes and work pads where BVW crossings could not be avoided. Permanent Approximately 40,952 sf (0.94 acres) of permanent fill for the Bell Rock Substation footprint and AFRRP structures. Approximately 94,710 sf (2.17 acres) of conversion of forested wetlands to scrub shrub wetlands due to tree clearing.
Land Under Water (LUW)	0	
Bordering Land Subject to Flooding (BLSF)	91,992 sf	Temporary Approximately 91,707 sf (2.11 acre) for temporary construction access for access routes and work pads where BLSF crossings could not be avoided. Permanent Approximately 285 sf (0.01 acre) of permanent fill for AFRRP Structures.
Riverfront Area (RFA)	56,535 sf	Temporary Approximately 49,309 sf (1.13 acre) for temporary construction access for access routes and work pads where RFA crossings could not be avoided. Permanent Approximately 7,226 sf (0.17 acre) of permanent fill for AFRRP Structures.

Notes: Impacts are based on preliminary design and represent a conservative estimate of Project-related disturbances.

10.0 CLIMATE CHANGE ADAPTATION AND RESILIENCY

The Executive Office of Energy and Environmental Affairs' ("EOEEA") Climate Change and Adaptation Report[50] documents that with increasing temperatures as a result of climate change, electricity demand in the Commonwealth could increase by 40 percent in 2030. A concern stated in the report in regard to energy service reliability is that without reliable energy service, the basic needs of residents, visitors, businesses, and governments cannot be met. The energy sector's three primary climate change concerns are flooding, extreme weather events, and increased temperature.

NEP and Eversource reviewed the Massachusetts Sea Level Rise and Coastal Flooding Viewer for the Bell Rock Substation Rebuild Project and AFRRP areas. The map viewer displays the National Ocean and Atmospheric Administration's January 2013 sea level rise data. The data indicates that both the Bell Rock Substation Rebuild Project and the AFRRP are located outside the inland extent of inundation projected from a 0 to 6 foot rise in sea level above current mean higher high water mark. The proposed Bell Rock Substation Rebuild Project and AFRRP will reinforce the system reliability in the SEMA-RI region and provide a more robust transmission system in the area of need. The new transmission line conductors are designed to operate at higher temperatures at a higher carrying capacity. The transmission line structures and substation equipment are designed to operate under extreme weather conditions and fluctuations in air temperatures.

An overarching theme of the EOEAA *Adaption Report* is the challenge, and potentially profound effects, climate change presents to resources including existing infrastructure and energy demand. The report documents the vulnerability of existing aging infrastructure with key strategies to alleviate these vulnerabilities being repair and upgrades, and reuse and timely maintenance, among others. The Bell Rock Substation Rebuild Project and the installation of the AFRRP transmission line are consistent with these reliability strategies in the following ways:

- Provides a new 115 kV source into the load pocket.
- Incorporates new design standards and the latest in design materials.
- Provides needed upgrades to existing electric transmission infrastructure.
- Provides the shortest project delivery time to meet the identified need.
- Minimizes impacts to the natural and social environments because the proposed improvements are located within existing utility substation sites and ROWs.
- Provides a stronger electrical transmission system that is vital to the area's safety, security and economic prosperity.
- Meets growing transmission needs identified by the ISO-NE and supports future growth and forecasted demand within the SEMA-RI area.
- Improves the capability of the existing transmission system to move power more reliably into load centers.
- Improves the efficiency of the transmission system by eliminating loop flows between the Bell Rock and Tiverton Substations.

[50] The Executive Office of Energy and Environmental Affairs. Climate Change and Adaptation Report. 2011. Retrieved May 14, 2018 from http://www.adaptationclearinghouse.org/resources/massachusetts-climate-change-adaptation-report.html

11.0 GREENHOUSE GAS ANALYSIS, NOISE AND AIR QUALITY

11.1 Greenhouse Gas Analysis

The Companies believe that the May 5, 2010 MEPA Greenhouse Gas Emission Policy and Protocol do not apply to the Bell Rock Substation Rebuild Project or the AFRRP as the projects will have little or no greenhouse gas emissions and thus falls within the Policy's *de minimis* exemption. There are no significant direct or indirect emissions associated with either of the projects. The MEPA regulations define *Damage to the Environment* as: "Any destruction or impairment (*not including insignificant damage or impairment*), actual or probable, to any of the natural resources of the Commonwealth including, but not limited to, air pollution…. " It is NEP and Eversource's opinion that neither the Bell Rock Substation Rebuild Project nor the AFRRP will be considered a damage to the environment with regards to air pollution, including greenhouse gas emissions. A detailed discussion on SF_6 associated with the Bell Rock Substation Rebuild Project is included in 11.2.2 below.

Typical construction equipment will be used for construction of the Bell Rock Substation Rebuild Project and the AFRRP. During both projects, the Companies will comply with state laws regulating the use of diesel powered equipment and vehicle idling times during construction. The Companies will also take measures to limit vehicle idling times and to reduce air emissions, including the following:

- In Massachusetts, any diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of construction will either be United States Environmental Protection Agency (USEPA) Tier 4-compliant or will be retrofitted with USEPA-verified (or equivalent) emission control devices such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine.
- The Companies require the use of ultra-low sulfur diesel fuel in its diesel-powered construction equipment and limits idling time to five minutes except when engine power is necessary for the delivery of materials or to operate accessories to the vehicle such as power lifts.
- Vehicle idling is to be minimized during construction activities, in compliance with the following:
    - Massachusetts Anti-idling Law, G.L. c. 90 § 16A, c. 111 §§ 142A – 142M, and 310 CMR 7.11.
- Exposed soils on access roads will be wetted and stabilized as necessary to suppress dust generation during construction (see Sections 11.2.2 and 11.3.2).

Construction activities for both the Bell Rock Substation Rebuild Project and the AFRRP will generally take place Monday to Saturday during daylight hours (7:00 a.m. to 5:00 p.m.). Certain work activities for each project, including work requiring scheduled transmission line outages, may need to be performed on a limited basis outside of normal working hours. Prior to the start of construction activities, notification will be provided to landowners, abutting property owners, municipal officials, the municipal Departments of Public Works and Police and Fire Chiefs in Acushnet, New Bedford, Dartmouth, and Fall River of the details of planned construction including the normal work hours and extended work hours and will obtain written approval from relevant municipal officials for extended work hours.

11.2 Bell Rock Substation Rebuild Project

11.2.1 Noise

NEP expects that the Bell Rock Substation Rebuild Project will not result in noise levels of concern to area residents, town officials, or other regulatory entities, either during construction or during operation. Construction will take place within a heavily forested area and within existing substation and transmission line easements and along public roads. NEP expects the Bell Rock Substation Rebuild Project construction to occur over a period of approximately 18 months, depending upon available outage windows. Noise generated by construction equipment, such as generators or air compressors, will be temporary and generally intermittent. All construction equipment will be kept in good working condition with appropriate mufflers to minimize noise impacts.

Noise associated with electric substations generally results from power transformers located within substations. No new power transformers are being added at the site as part of the Bell Rock Substation Rebuild Project. A new standby generator is proposed to replace an existing standby generator at the Bell Rock Substation site and will be used, as needed. An air permit associated with this generator will be filed in coordination with MassDEP. The site, however, is located in a densely forested area and the closest neighboring receptor is over 3,000 feet to the northeast.

11.2.2 Air Quality

Nine new circuit breakers and the replacement of the two existing circuit breakers will be installed during the Bell Rock Substation Rebuild Project. The new circuit breakers, which will contain SF_6, gas will be installed and maintained by trained technical staff and will be checked for integrity during regular inspections by NEP personnel. The new circuit breakers are expected to leak less SF_6 that the approximately 25-year old existing circuit breakers. NEP's procurement specifications require that all circuit breakers that it purchases have an SF_6 gas leak rate of less than 0.5 percent per year. NEP entered into an SF_6 Emissions Reduction Partnership Memorandum of Understanding with the USEPA in December 2003. NEP determines estimated SF_6 system emissions (SF_6 gas leakage) from its system based on a mass balance approach as required and specified in 40 CFR Part 98.303 (December 1, 2010) (USEPA Mandatory Greenhouse Gases Reporting, Electrical Transmission and Distribution Equipment Use). An emergency generator will also be installed at the Bell Rock Substation. As use of this generator will be limited to emergency situations, air emissions are anticipated to be negligible.

There are no anticipated long-term impacts on air quality from dust or vehicle emissions associated with the construction or operation of the Bell Rock Substation Rebuild Project.

11.3 Acushnet to Fall River Reliability Project

11.3.1 Noise

The Companies anticipate that the AFRRP will not result in noise levels of concern to area residents, town officials, or other regulatory entities, either during construction or during operation. AFRRP construction will take place along existing transmission line ROWs and along public roads. The Companies expect transmission line construction to occur over a period of approximately 15 months, depending upon outage windows. Noise generated by construction equipment, such as generators or air compressors, will be temporary and generally intermittent. All construction equipment will be kept in

good working condition with appropriate mufflers to minimize noise impacts. Appreciable noise will not be generated by the new transmission line during normal operations.

11.3.2 Air Quality

As described in Section 11.1, the Companies will take measures to limit vehicle idling times and to reduce air emissions during construction. The Companies will also implement construction best management practices to suppress dust generation and fugitive dust emissions. Due to the transitory nature of construction activities, air quality in the AFRRP area will not be significantly affected by construction along the ROW. Emissions produced by the operation of construction machinery (nitrogen-oxides [NOx], sulfur oxides [SOx], carbon monoxide [CO], Volatile Organic Compounds [VOCs], and particulate matter [PM]) are short-term and not generally considered significant.

There are no anticipated long-term impacts on air quality associated with the operation of the transmission line.

12.0 CONSTRUCTION-PERIOD CONSIDERATIONS

12.1 Construction Environmental Standards

The Companies have long established policies and procedures for minimizing construction related disturbances throughout all phases of construction. The Companies and their respective contractors will follow these procedures for the Bell Rock Substation Rebuild Project and the AFRRP. These policies and procedures are described below.

12.1.1 National Grid Environmental Standards

- National Grid's *ROW Access, Maintenance and Construction Best Management Practices* (EG-303NE).
- National Grid's *Right-of-Way Vegetation Management Plan* and subsequent updates.
- National Grid's *Excess Soil Management from Construction Projects on Rights-of-*Way (EG-1707).
- National Grid's *Projects at Existing Substations* (EG-1701).

12.1.2 Eversource Environmental Standards

- Eversource's *Construction & Maintenance Environmental Requirements: Best Management Practices Manual for Massachusetts and Connecticut*.
- Eversource's *Five Year Vegetation Management Plan for Central, Eastern, and Southeastern Massachusetts (2108-2022)*.

12.1.3 Construction Environmental Compliance Monitors

Throughout the entire construction process, the Companies will retain the services of environmental compliance monitors. The primary responsibility of the monitors will be to oversee construction activities including the installation and maintenance of soil erosion and sediment controls on a routine basis to ensure compliance with all federal, state, and local permit commitments. The environmental compliance monitors will be trained environmental scientists responsible for supervising construction activities relative to environmental issues. The environmental monitors will be experienced in soil erosion control techniques and will have an understanding of wetland resources to be protected.

During periods of prolonged precipitation, the monitors will inspect all locations to confirm that the environmental controls are functioning properly. In addition, the Companies will require the contractors to designate an individual to be responsible for the daily inspection and upkeep of environmental controls. This person will be responsible for providing direction to the other members of the construction crew regarding matters such as wetland access, appropriate work methods, and good house-keeping practices in the area. These construction supervisors also have "stop work" authority if there is an environmental or safety non-compliance issue. Additionally, all construction personnel will be briefed on environmental compliance issues and obligations prior to the start of construction on the Bell Rock Substation Rebuild Project and the AFRRP. Regular construction progress/environmental training meetings will provide the opportunity to reinforce the contractor's awareness of these environmental issues.

In addition, all personnel will be required to participate in environmental and safety training prior to the start of construction. Training topics will include environmental, stormwater management, cultural resources, and safety considerations. Refresher training will be conducted as necessary or as new crew members join the work force. The Companies will conduct regular construction progress meetings to reinforce contractors' awareness of these issues. Pre-construction meetings will take place in the field with appropriate personnel. The Companies' environmental monitors will attend these meetings to provide feedback on environmental compliance to construction personnel.

12.2 Safety and Public Health Considerations

Both projects will be designed, built, and maintained so that the health and safety of the public are protected. This will be accomplished through adherence to all federal, state and local regulations, and industry standards and guidelines established for protection of the public. Specifically, the Bell Rock Substation Rebuild Project and the AFRRP will be designed, built, and maintained in accordance with the National Electrical Safety Code and other applicable electrical safety codes. The facilities will be designed in accordance with sound engineering practices using established design codes and guides published by, among others, the Institute of Electrical and Electronic Engineers, the American Society of Civil Engineers, the American Concrete Institute, and the American National Standards Institute.

Practices that will be used to protect the public during construction will include, but not be limited to, contractor safety training, establishing traffic control plans for construction traffic to maintain safe driving conditions, restricting public access to potentially hazardous work areas, and using temporary guard structures at road and electric line crossings to prevent accidental contact with the conductor during installation.

Following construction, all transmission structures will be clearly marked with warning signs to alert the public to potential hazards if climbed. Trespassing on the ROWs will be inhibited by the installation of gates and/or barriers at entrances from public roads where approved by owners of properties upon which easements are located.

12.3 Bell Rock Substation Rebuild Project

12.3.1 Construction Sequencing

The Substation Project involves the maintenance, repair and upgrading of certain equipment and facilities at the Substation. The Bell Rock Substation expansion will occur in stages over an approximately 18-month period. The work will generally follow the order listed below.

- Site preparation;
- M13 Line Bypass;
- Yard construction;
- Yard equipment; and
- Site restoration.

Site Preparation

The limit of disturbance will be surveyed and staked in the field, and the wetland flagging will be refreshed. Tree removal will be required within the expanded substation yard area and for the temporary bypass of the M13 line to the south of the substation. Generally, trees to be removed will be cut close to the ground, leaving the stumps and roots in place, which will reduce soil disturbance and erosion potential. In locations where grading is required for access road improvements and at structure sites, stumps will be removed. Small trees and shrubs within the transmission line and substation easements will be mowed as necessary with the intent of preserving root systems and low-growing vegetation to the extent practical. Brush, limbs, and cleared trees will be chipped and removed from the site, or applied to upland areas as an erosion control measure, with prior approval. In certain environmentally sensitive areas such as wetlands, it may be necessary and desirable to leave felled trees and snags, and allow them to decompose in place rather than to disturb soft organic substrates while removing them.

The use of temporary mats will be required to gain access to and across forested wetlands, to minimize wetland disturbance, and to provide a stable platform for safe equipment operation. Construction mats distribute equipment loads and minimize impacts to the wetland and soil substrates. Temporary construction mat roads placed in wetlands for vegetation removal will be installed, used for vegetation removal, and then removed by the clearing contractor. Temporary corduroy (log) roads may be used on a limited basis to facilitate tree removal.

Once the vegetation removal is complete, soil erosion and sediment controls will be installed along the proposed limit of disturbance. Soil erosion control and other engineered stabilization measures will be provided along the down-gradient side of stockpiles created during grading operations to prevent sediment migration. The soil erosion and sediment control program for the Bell Rock Substation Rebuild Project will follow the procedures identified in the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas: A Guide for Planners, Designers, and Municipal Officials* (2003), the *Massachusetts Stormwater Handbook,* and *EG-303NE*.

The installation of sediment control devices will be supervised by NEP's environmental monitor. During construction, these devices will be periodically inspected and monitored by the environmental monitor, and the findings will be reported regularly to NEP's Construction Supervisor. The soil erosion and sediment controls will be installed between the work site and environmentally sensitive areas such as wetlands, streams, drainage courses, roads and adjacent properties when work activities will disturb soils and result in the potential for soil erosion and sedimentation. The devices will function to mitigate construction-related soil erosion and sedimentation and will also serve as a physical boundary to delineate resource areas and to contain construction activities within approved areas.

Excavation and processing of on-site material for use as structural fill and to establish sub-grade elevations will occur. Clean structural fill materials will be imported onto the site to establish the desired site grades and backfill for underground utilities, foundations and above-ground structures within the substation. Where dewatering is necessary during excavations within or adjacent to wetland areas, water will be pumped into appropriate dewatering basins or filter bags. At all times, dewatering will be performed in compliance with *EG-303NE*. The basin or filter bag and all accumulated sediment will be removed following dewatering operations and the area will be seeded and mulched if necessary. Soil erosion and sediment controls will be used to contain excess soils.

Staging areas and equipment storage, where feasible, will be situated outside environmentally sensitive areas. Equipment refueling (except for fixed equipment such as drill rigs) will occur outside of environmentally sensitive areas (such as waterways, wetlands, and drinking water sources). Where

transmission structures requiring concrete foundations at the substation are located near wetlands, proper soil erosion and sediment controls will be installed to prevent impacts to these areas.

In accordance with BMPs, construction mats, soil erosion and sediment controls, and other measures will be implemented, as appropriate, in resource areas temporarily disturbed by construction. Herbaceous vegetation in disturbed areas will be restored using a native wetland or conservation seed mix. Access roads are required to provide the ability to construct, inspect, and maintain the existing transmission line facilities and Bell Rock Substation. To get to the Bell Rock area, the existing access roads may require some improvements in certain locations to facilitate construction vehicular access. Any access road improvements and/or maintenance will be carried out in coordination with the City of Fall River.

M13 Line Bypass

The M13 Line Bypass scope of work involves the temporary relocation of the existing M13 transmission line to provide safe and adequate vertical and horizontal clearances to allow construction to proceed at the Bell Rock Substation away from the energized M13 Line. The overhead M13 Line will be temporarily re-routed to the immediate south of the substation, which will involve the installation of one temporary transmission line structure and two permanent transmission line structures within the limits of the substation easement. The work activities will consist of some vegetation removal on the south side of the substation to open up a position for the temporary overhead conductor; and the installation of temporary construction mats to provide construction access and work space to install the transmission line structures. The wetland impacts associated with the M13 Line Bypass are all temporary impacts within the existing substation easement and ROWs, and the impacts are due to the placement of temporary construction mats. There are no permanent wetland impacts associated with the M13 Line Bypass. Upon completion of the substation rebuild, the M13 Line will be terminated at the substation, the temporary re-routed conductor will be removed, and restoration and stabilization of the temporarily disturbed areas will be performed.

Yard Construction

An area of approximately 0.3 acre will be graded for the expansion of the substation. The grading and sloping along the perimeter of the substation yard will extend just beyond the limits of the proposed fence line. Earth work and grading will be necessary to create a level surface for equipment installation. Excavation, drilling, or pneumatic hammering would be the preferred methods to remove rock that may be encountered at the site.

The new area will be surfaced with crushed stone to a depth of six inches and to five feet outside the substation fence. The existing 6-foot-tall perimeter fence will be replaced with an 8-foot-tall perimeter fence plus one foot of barbed wire, including swing gates.

Yard Equipment

Within both the existing yard and the new expansion area, concrete foundations, ground grid, conduits and cable trenches will be installed to support the electrical equipment. The installation of various substation-related equipment, including, but not limited to, a pad mount standby (emergency) generator, a pad mount substation service transformer, battery racks within the control house, disconnect switches, gas circuit breakers and buses are proposed. Equipment containing mineral oil and diesel fuel (pad mount transformer and pad mount standby generator) will be equipped with primary and secondary containment. This containment will be designed in compliance with regulatory mandates. The Spill Control and Countermeasure Plan for the substation will be updated to reflect the specifications for the new equipment.

Additionally, the installation of a new approximately 64-foot by 36-foot control house is being proposed. The existing control building will be demolished and the control building will be installed in a new location in the northwest corner of the yard. Run-off from the building roof will be infiltrated into the stone surface of the substation yard. Upgrades to the stormwater management system will be made to include the additional impervious surfaces proposed for the Bell Rock Substation Rebuild Project.

Construction Staging Areas

Construction staging areas for the Bell Rock Substation Rebuild Project will be established on-site and within the limits of disturbance shown on the Project plans. All construction staging areas will be sited and designed in an effort to avoid additional tree removal and impacts to environmentally sensitive areas and cultural resource areas.

Upland work pads will be constructed at structure locations by grading or adding gravel or crushed stone to provide a level work surface for construction equipment and crews. Once construction is complete, the work pads in uplands will remain in place, and will be stabilized with topsoil and mulched to allow vegetation to re-establish. Stone work pads within the 100-foot buffer will be removed on a case by case basis in consultation with the conservation commission. If temporary work pads are required in wetlands, these work pads will be constructed with temporary mats and will be removed after the completion of construction activities.

Site Restoration

All areas affected by construction of the Bell Rock Substation Rebuild Project will be covered with crushed stone, seeded with grass, landscaped, mulched, or paved as appropriate. Topsoil stripped from initial site work activities will be stockpiled on the site and used appropriately in areas where vegetation is to be established. Impacted upland areas will be stabilized with a New England conservation/wildlife seed mixture, or equivalent. Areas temporarily impacted within wetlands will be re-graded to establish pre-construction contours if necessary and allowed to re-vegetate. If necessary, disturbed wetland areas will be treated with a New England “Wetmix” or equivalent.

12.3.2 Construction Details

The following sections describe logistics and protocols which NEP will require their contractors to adhere to during construction of the Project.

Construction Traffic

Improvements to sections of unimproved, gravel roads under the jurisdiction of the City of Fall River, such as sections of Bell Rock Road, may need to be made to provide level and safe access to the substation. These improvements would be coordinated with the City of Fall River with notification provided to the MA DCR. The Superintendent of the Watuppa Reservation and representatives of the MA DCR have requested NEP to assist them with implementing measures to reduce unwarranted access onto the Watuppa Reservation and Southeastern Massachusetts Bioreserve. NEP has committed to working with these two parties to implement a gates and guardrails program, in attempts to stop or reduce unauthorized access onto these lands.

Intermittent traffic associated with the Bell Rock Substation Rebuild Project construction will occur over the entire construction period. Construction equipment typically will gain access to the area from Bell Rock Road. Because each of the construction tasks will occur at different times and locations over the course of the construction, traffic will be intermittent at these entry roadways. Traffic will consist of vehicles ranging from pick-up trucks to heavy construction equipment to large trailers delivering materials and equipment.

NEP will coordinate with local authorities in Fall River for work on local streets and roads.

Construction Work Hours

NEP will coordinate with local authorities on approved work hours in advance of construction; however construction will generally take place Monday to Saturday during daylight hours (7:00 a.m. to 5:00 p.m.). Certain work activities, including work requiring scheduled transmission line outages, may need to be performed on a limited basis outside of normal working hours.

The nature of the Project construction requires line outages for certain procedures such as transmission line connections, equipment cutovers, or stringing under or over other transmission lines. These outages are dictated by the ISO-NE and can be very limited based on regional system load and weather conditions. Work requiring scheduled outages and crossings of certain transportation and utility corridors may need to be performed on a limited basis outside of normal work hours, including Sundays and holidays.

Prior to the start of construction, NEP will notify (via updates to the project website and emails), municipal officials, MA DCR, the Fall River City Public Works, and the Fall River Police and Fire Chiefs of the details of planned construction including the normal work hours and extended work hours and will obtain written approval from relevant municipal officials for extended work hours, if needed.

12.4 Acushnet to Fall River Reliability Project

The sections that follow describe the general construction stages related to the installation of a new overhead transmission line. Minor substation improvements are also proposed at Eversource's Wing Lane and High Hill Substations. The general sequencing of this substation work will follow those described in Section 12.3.1.

12.4.1 Construction Stages for Transmission Lines

Conventional overhead electric transmission line construction techniques will be used to construct the new transmission line. The work will be completed in a progression of activities that will generally proceed as follows:

1. Removal of vegetation and ROW mowing in advance of construction.
2. Installation of soil erosion and sediment controls.
3. Construction of access roads and access road improvements.
4. Construction of work pads and staging areas.
5. Installation of foundation and structures.

6. Installation of conductor, optical ground wire, and shield wire.
7. Restoration and stabilization of the ROWs.

Each stage of construction is further described below.

Removal of Vegetation and ROW Mowing in Advance of Construction

Mowing and maintenance of the ROW will take place prior to construction by using BMPs outlined in the Companies' VMPs. Along the NEP ROW in Fall River, approximately 60 feet of clearing will be required within NEP's existing easement in order to expand the cleared width of the ROW and accommodate the new transmission line. Clearing will also be required in one span (between proposed Structures 7-8) along the Eversource ROW. The locations of tree removal are shown in the plans provided in Appendix A. The most substantial contiguous area to be cleared is located between the Fall River / Dartmouth town line along the southern portion of the NEP ROW. There are no residential abutters in this area.

Prior to tree removal and mowing, the boundaries of wetlands will be clearly marked to prevent unauthorized vehicular encroachment into wetland areas. Appropriate forestry techniques will be implemented within wetlands to minimize ground disturbance. Other sensitive resources, such as cultural resource features and NHESP state-listed species or priority habitats of rare species, will be flagged and encompassed with protective fencing prior to removal of vegetation on the ROW. Construction mats may be used to gain access to and across forested wetlands, to minimize wetland disturbance, and to provide stable platforms for safe equipment operation.

Tree removal operations, where required, will include the removal of all tall-growing woody species within the targeted areas of the ROW. A danger tree is a tree located either on or off the ROW, which may contact electric lines if it failed or were cut. Hazard trees are danger trees that are structurally weak, broken, damaged, decaying or infested and that could contact the structures or conductors (or violate the conductor clearance zones) if they were to fail and fall towards the ROW. Tall growing trees just outside the maintained ROW edges will be assessed for their potential to damage the transmission lines. To ensure reliability, these "danger and hazard trees" may have to be pruned or removed.

Generally, trees to be removed will be cut close to the ground, leaving the stumps and roots in place, which will reduce soil disturbance and erosion. In locations where grading is required for access road improvements and at structure sites, stumps will be removed. Small trees and shrubs within the ROW will be mowed as necessary with the intent of preserving root systems and low-growing vegetation to the extent practical. Where the ROW crosses streams and brooks, vegetation along the stream bank will be selectively cut to minimize the disturbance of bank soils and the potential for construction-related erosion. Wood chips may be applied to the ground in certain upland areas to serve as a means for soil erosion and sediment control.

Brush, limbs, and cleared trees will be chipped and removed from the site or applied to upland areas as an erosion control measure, with prior approval. Temporary "landing areas" will be established along the ROW to serve as locations to load timber, temporarily stage a wood chipper, and to park tree clearing vehicles and equipment.

In certain environmentally sensitive areas such as wetlands, it may be necessary and desirable to leave felled trees and snags and allow them to decompose in place rather than to disturb soft organic substrates while removing them. Where appropriate, enhancements will be proposed as mitigation for important wildlife features that may be lost as a result of tree removal and construction activities. Potential

enhancement activities may include seeding, planting of native shrub species, and provision of snags, woody debris, and stone piles to create wildlife cover.

Installation of Soil Erosion and Sediment Controls

Following vegetation removal activities, erosion and sediment control devices such as straw bales, straw wattles, siltation fencing, and/or chip bales will be installed in accordance with the Companies' BMP Manuals, and with approved plans and permit requirements. The installation of these sediment control devices will be supervised by the Companies' contractors and will be reviewed by the Companies' respective Construction Supervisors and/or designated environmental monitors. The soil erosion and sediment controls will be installed between the work site and environmentally sensitive areas such as wetlands, streams, drainage courses, roads and adjacent properties when work activities will disturb soils and result in the potential for soil erosion and sedimentation. The devices will function to mitigate construction-related soil erosion and sedimentation and will also serve as a physical boundary to delineate resource areas and to contain construction activities within approved areas.

Construction of Access Roads and Access Road Improvements

Access roads are required along the ROWs to provide the ability to construct, inspect, and maintain the existing transmission line facilities. The Companies are planning to use the existing network of access roads to the greatest extent practicable. In some areas, new access roads are necessary. These roads will be located to avoid or minimize disturbance to water resources to the extent feasible, to follow the existing contours of the land as closely as possible, and where practicable, avoid severe slopes. In addition, access roads will be constructed to avoid significantly altering existing drainage patterns.

Along the ROW, the existing access roads may require some improvements in certain locations to facilitate construction. For example, clean gravel or trap rock may be necessary to stabilize and level the roads for construction vehicles; and stabilized construction entrances may need to be refreshed where the ROW crosses public roadways. Any access road improvements and/or maintenance will be carried out in compliance with the conditions and approvals of the appropriate federal and state regulatory agencies. Exposed soils on access roads will be wetted and stabilized as necessary to suppress dust generation during construction. Crushed stone aprons/tracking pads will be used at all access road entrances to public roadways to clean the tires of construction vehicles and minimize the migration of soils off-site.

To the extent possible, new access roads have been carefully sited outside wetlands and other sensitive areas. However, in certain locations along the AFRRP, permanent access across wetland resource areas will be required to perform the necessary structure installations and for future reliable maintenance of the transmission line facilities. New access roads will be established over native soils if practicable; unstable soils may be removed and replaced with imported clean fill material. The permanent access roads will be constructed with gravel or stone underlain by geotextile fabric.

Typical access roads vary in width from 20 to 16 feet wide with a travel lane approximately 16 to 12 feet wide to accommodate the vehicles and equipment needed for construction on the transmission lines. New access roads that are proposed within wetland areas will be reduced in width to 14-feet wide to minimize permanent fill.

Construction of Work Pads and Staging Areas

Work pads will be constructed to provide a safe and level work area for construction equipment to undertake foundation work and structure assembly. Removal of lower growing shrubs and minor grading

may be necessary to create a work pad of approximately 100 feet by 100 feet to 100 feet by 150 feet at each proposed structure location. The work pads may be slightly smaller or larger depending on terrain, equipment, and overall site conditions at each structure location. Upland work pads will be constructed by grading or adding gravel or crushed stone. Once construction is complete, upland work pads (except those located in floodplain and RFA) will remain in place and will be stabilized with topsoil and mulched to allow vegetation to re-establish. In wetlands, these work pads will be constructed with temporary construction mats and will be removed after the completion of construction activities.

Installation of Foundations and Structures

The proposed transmission line structures include a combination of structure types including steel H-frame and monopole structures. Excavation for direct embedment structures will be performed using a soil auger or standard excavation equipment depending on field conditions. Excavations will range from approximately 10 to 20 feet in depth, with diameters typically between five and a half and eight feet. A steel casing will be placed vertically into the hole and backfilled. The poles will be field assembled and inserted by cranes into the embedded steel casings. The annular space between the pole and the steel casing will then be backfilled with crushed stone.

Steep structures on concrete foundations will typically be drilled piers (also known as drilled caissons), 10 feet in diameter and 15 to 30 feet in depth, depending on the height and load conditions for the structure. Caissons will be constructed by drilling a vertical shaft, installing a steel reinforcing cage, placing steel anchor bolts, pouring concrete, and backfilling as needed. Structures will be lifted by a crane and placed onto the anchor bolts.

Excavated material will be temporarily stockpiled next to the excavation; however, this material will not be placed directly into resource areas. If the stockpile is in close proximity to wetlands, the excavated material will be enclosed by staked straw bales or other sediment controls. Additional controls, such as watertight mud boxes, will be used for saturated stockpile management in work areas in wetlands (i.e., construction mat platforms) where sediment-laden runoff would pose an issue for the surrounding wetland. Following the backfilling operations, excess soil will be spread over unregulated upland areas or removed from the site in accordance with the Companies' policies and procedures.

Dewatering may be required during the foundation installation. Groundwater pumped from an excavation would be discharged to an upland area if there is adequate vegetation to function as a filter medium. Where conditions are not adequate for infiltration, the dewatering waters would be pumped into a sediment filter bag within a straw bale/silt fence corral (basin) located within an upland area or a construction mat. The basin and all accumulated sediment would be removed following dewatering operations and the area would be restored, as needed.

Rock that is encountered during foundation excavation will generally be removed by means of drilling with rock coring augers rather than a standard soil auger. This method allows the same drill rig to be used and maintains a constant diameter hole. However, in some cases, rock hammering and excavation may be used to break up the rock.

Installation of Conductor, Optical Ground Wire, and Shield Wire

Following the construction of transmission line structures, insulators will be installed on the structures. The insulators isolate the energized power conductors from the structure. OPGW, shield wire, and power conductors will then be installed using stringing blocks and wire stringing equipment. The wire stringing equipment is used to pull the conductors from a wire reel on the ground through stringing blocks attached

to the structures to achieve the desired sag and tension condition. During the stringing operation, temporary guard structures or boom trucks will be placed at road and highway crossings and at crossings of existing utility lines. These guard structures are used to ensure public safety and uninterrupted operation of other utility equipment by keeping the wire away from other utility wires and clear of the traveled way at these crossing locations.

Construction of temporary wire stringing and pulling sites will be required to provide a level work space for equipment and personnel or to establish remote wire stringing set-up sites at angle points in the transmission line and at dead-end structures.

Restoration and Stabilization of the ROWs

Restoration efforts, including removal of construction debris, final grading, stabilization of disturbed soil, and installation of permanent sediment control devices (water bar/diversion channel/rock ford), will be completed following construction. All disturbed areas around structures and other graded locations will be seeded with an appropriate conservation seed mixture and/or mulched to stabilize the soils in accordance with applicable regulations. Temporary sediment control devices will be removed following the stabilization of disturbed areas. Existing walls and fences will be restored. Where authorized by property owners, permanent gates and access road blocks will be installed at key locations to restrict access onto the ROWs by unauthorized persons or vehicles. Regulated environmental resource areas that are temporarily disturbed by construction will be restored in accordance with applicable permit conditions to pre-construction conditions.

12.4.2 Construction Details

Details are described in the sections below about logistics that the Companies will require their contractors to adhere to during construction of the AFRRP.

Construction Traffic

Intermittent traffic associated with AFRRP construction will occur over the entire construction period. Construction equipment typically will gain access to the ROWs from public roadways crossing the ROWs in various locations along the route. Because each of the construction tasks will occur at different times and locations over the course of the construction, traffic will be intermittent at these entry roadways. Traffic will consist of vehicles ranging from pick-up trucks to heavy construction equipment to large trailers delivering poles.

The work over Route 140 will require a MassDOT access permit to work within the state highway roadways for the crossing of the state highway with utility lines. The Companies and their contractors will coordinate closely with MassDOT to develop acceptable traffic management plans for work within the state highway layout. The AFRRP's impacts relative to MassDOT are associated with the installation of overhead wires across state roadways. The installation could temporarily affect traffic flow of the roadway but does not involve physical modifications to the roadway or roadway ROW. Traffic Management Plans will be developed and submitted to MassDOT for review and approval prior to the start of construction. The Companies will comply with all required measures to ensure a safe environment for traffic flow and construction crews in and around the roadways.

The Companies will also coordinate with local authorities in the municipalities of Acushnet, New Bedford, Dartmouth and Fall River for work on local streets and roads and will file with the towns to the extent necessary for required grand of location applications for wire crossings across the town-owned

roads. At locations where construction equipment must be staged in a public way, the contractors will follow a pre-approved work zone traffic control plan with appropriate police details.

Construction Work Hours

Typical construction work hours for the AFRRP are proposed to be from 7:00 a.m. to 5:00 p.m. Monday through Friday and from 9:00 a.m. to 5:00 p.m. on Saturdays, when daylight and weather conditions allow. Some work tasks such as concrete pours and transmission line stringing, once started, must be continued through to completion and may go beyond normal work hours. If blasting is required for foundation construction, the hours for that operation are generally limited as dictated by the local Fire Marshall or other local officials. In addition, the nature of transmission line construction requires line outages for certain procedures such as transmission line connections, equipment cutovers, or stringing under or over other transmission lines. These outages are dictated by the system operator, ISO-NE, and can be very limited based on regional system load and weather conditions. Work requiring scheduled outages and crossings of certain transportation and utility corridors may need to be performed on a limited basis outside of normal work hours, including Sundays and holidays.

12.5 Typical Construction Equipment

Typical construction equipment that will be used for the Bell Rock Substation Rebuild Project and the AFRRP are identified in Table 12-1 by construction phase.

TABLE 12-1 TYPICAL CONSTRUCTION EQUIPMENT

CONSTRUCTION PHASE	TYPICAL EQUIPMENT REQUIRED	
Vegetation Removal and ROW Mowing	• Grapple trucks • Track-mounted mowers • Chippers • Log forwarders • Brush hogs, skidders • Bucket trucks	• Motorized tree shears • Chain saws • Box trailers • Low-bed trailers, flatbed trucks • Bulldozers, excavators • Pickup trucks
Soil Erosion/Sediment Controls	• Stake body trucks • Pickup and other small trucks	• Small excavators • Trencher
Access Roads Improvement and Maintenance	• Dump trucks • Bulldozers • Excavators • Backhoes • Front end loaders • Graders	• 10-wheel trucks with grapples • Cranes • Pick-up trucks • Low-bed trailers • Stake body trucks
Removal and Disposal of Existing Components	• Cranes • Flatbed trucks • Pullers with take-up reels • Excavators • Vacuum trucks	• Backhoes • Trucks with welding equipment • Dump truck • Storage containers

CONSTRUCTION PHASE	TYPICAL EQUIPMENT REQUIRED	
Installation of Structures and Foundations	• Backhoes • Bulldozers • Front-end loaders • ATVs • Tracked carriers or skidders • Concrete trucks • Excavators • Rock drills mounted on excavators or tracked equipment • Cranes	• Cluster drills with truck mounted compressors • Aerial lift equipment • Tractor trailers • Bucket trucks • Large-bore foundation drill rigs • Hand-held equipment such as shovels, pumps, and vibratory tampers • Dump trucks • Generators, air compressors
Conductor and Shield Wire Installation	• Bucket trucks • Puller-tensioners • Conductor reel stands	• Cranes • Flatbed trucks • Pickup trucks • Tracked carriers or skidders
Restoration	• Pickup and other small trucks • Excavators • Backhoes • Bulldozers	• Dump trucks • Tractor-mounted York rakes • Straw blowers • Hydro-seeders

13.0 REGULATORY COMPLIANCE

13.1 Introduction

Sections 13 and 14 describe the measures that have been incorporated into the Bell Rock Substation Rebuild Project and AFRRP design to avoid and minimize environmental impacts to the greatest extent practicable. Where impacts cannot be avoided, appropriate mitigation measures will be implemented. This section provides an overview of the approach to complying with the jurisdictional regulations of state regulatory review agencies. Specific impacts and mitigation measures are presented in previous Sections 4 through 12.

13.2 Bell Rock Substation Rebuild

13.2.1 State Regulations

Section 401 Water Quality Certification

In accordance with the provisions stated in the federal CWA (33 U.S.C. §1341), and the Massachusetts Clean Water Act (M.G.L. c. 21, §26-53) and its implementing regulations (314 CMR 9.00), the Bell Rock Substation Rebuild Project will require an Individual Section 401 Water Quality Certification, primarily due to impacts to wetland resource areas which are tributary to a Class A Public Water Supply and are therefore classified as ORW. An application will be filed with MassDEP for Water Quality Certification review under 314 CMR 9.00. The regulations require the incorporation of all practicable measures for avoiding and minimizing impacts to wetland resource areas. The design of the Bell Rock Substation Rebuild Project meets this standard by avoiding or minimizing adverse impacts as described in this section and Section 5.0. The Bell Rock Substation Rebuild Project's compensatory mitigation package will comply with the mitigation requirements in the Massachusetts CWA.

Massachusetts Wetlands Protection Act

The Bell Rock Substation Rebuild Project will require approvals under the WPA and the implementing regulations at 310 CMR 10.00. This regulatory statute asserts jurisdiction over state-wetland resource areas that include BVW. The Bell Rock Substation Rebuild Project impacts to BVW resource areas require the issuance of an Order of Conditions approving the Substation Project by the Fall River Conservation Commission. A Notice of Intent application will be filed with the Conservation Commission detailing the proposed work, the short-term and long-term impacts, and the proposed mitigation for those impacts. The wetlands review process is focused on how the Bell Rock Substation Rebuild Project and proposed mitigation conform to the performance standards for each affected resource area.

Under the WPA, construction, reconstruction, operation and maintenance of underground and overhead public utilities, the Bell Rock Substation Rebuild Project is permitted as a Limited Project (310 CMR 10.24). The Bell rock Substation Rebuild Project fits this description and will be permitted in accordance with the following conditions as well as any additional conditions deemed necessary by the issuing authoring:

- The issuing authority may require a reasonable alternative route with fewer adverse effects for a local distribution or connecting line not reviewed by the Energy Facilities Siting Council.

- Best available measures shall be used to minimize adverse effects during construction.
- The surface vegetation and contours of the area shall be substantially restored.

The Bell Rock Substation Rebuild Project alternatives are described in Section 3.0; Sections 4.0 through 12.0 address minimization and avoidance measures NEP will use to reduce overall impacts. NEP is committed to working with federal, state and local regulatory agencies and providing an appropriate range of mitigation measures, as discussed further in Section 14.0.

The section below summarizes the Bell Rock Substation Rebuild Project's compliance with the WPA's general performance standards for resource areas impacted by the Project.

Bordering Vegetated Wetland (310 CMR 10.55)

BVW is found throughout the Bell Rock Substation Rebuild Project area. Where BVW occurs, the following WPA general performance standards apply:

- *Where the presumption set forth in 310 CMR 10.55(3) is not overcome, any proposed work in a BVW shall not destroy or otherwise impair any portion of said area.*
- *Notwithstanding the provisions of 310 CMR 10.55(4) (a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of up to 5,000 square feet/ [0.11 acres] of BVW when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area will function in a manner similar to the area that will be lost:*
    - *the surface of the replacement area to be created ("the replacement area") shall be equal to that of the area that will be lost ("the lost area");*
    - *the ground water and surface elevation of the replacement area shall be approximately equal to that of the lost area;*
    - *the overall horizontal configuration and location of the replacement area with respect to the bank shall be similar to that of the lost area;*
    - *the replacement area shall have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area;*
    - *the replacement area shall be located within the same general area of the water body or reach of the waterway as the lost area;*
    - *at least 75% of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment any exposed soil in the replacement area shall be temporarily stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods; and*
    - *the replacement area shall be provided in a manner which is consistent with all other General Performance Standards for each resource area in Part III of 310 CMR 10.00.*

The Bell Rock Substation Rebuild Project was designed to avoid or minimize adverse impacts as much as possible. However, temporary and permanent impacts to BVW will occur. Unavoidable temporary impacts to BVW will occur in work areas and along access routes during construction. These impacts are primarily associated with the use of stabilization techniques (e.g., construction mats, stabilizing material) which minimize impacts while allowing necessary work within resource areas to occur. Unavoidable

permanent impacts to BVW from the construction of the proposed Bell Rock Substation Rebuild Project will be offset through compensatory mitigation determined in consultation with the City of Fall River Conservation Commission, MassDEP and the USACE.

Wildlife Habitat Evaluation (310 CMR 10.60)

A wildlife habitat evaluation was completed pursuant to 310 CMR 10.60 and the procedures and methods detailed in MassDEP's *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands*. Requirements for completing wildlife habitat evaluations depend on the type of wetland resource area impacted and the magnitude of impact. As part of the MassDEP Guidance document, two forms are typically used for Wildlife Habitat Evaluations – Attachment A and Attachment B. Attachment A is a "simplified" evaluation generally used for projects with limited resource area impacts. Attachment B is a more detailed evaluation generally used for evaluating projects with larger impacts, project locations within vernal pool habitat, mapped "Habitat of Potential or Statewide Importance" and/or other activities as specified on the Attachment A form. Attachment B evaluations were conducted for the Bell Rock Substation Rebuild Project due to the nature of the Project and the cumulative impacts to jurisdictional resource areas. The wildlife habitat evaluation is presented in Appendix F. The wildlife habitat evaluation acknowledges rare species are found within the Bell Rock Substation Rebuild Project Study Area but there are no adverse effects on wildlife habitat since resource areas will not be substantially reduced in their function to serve as valuable sources of wildlife habitat in an area. Some habitat functions associated with forested wetlands will be permanently altered (trees removed) as a result of the proposed Bell Rock Substation Rebuild Project, but they will be replaced by scrub-shrub habitat.

Massachusetts Stormwater Standards

The Massachusetts Stormwater Management Standards will be applied to the Bell Rock Substation Rebuild Project pursuant to the wetlands regulations (310 CMR 10.00) and the water quality regulations (314 CMR 9.00) relating to stormwater. The Stormwater Standards define performance management standards for development and redevelopment projects. Although minimized to the fullest extent possible, some impervious surfaces are proposed for the Bell Rock Substation Rebuild Project. The stormwater design will be performed in accordance with MassDEP stormwater regulations to accommodate the expanded substation yard, new paved access road within the substation, and new control building.

As discussed in Section 7.0, a post-construction stormwater management system has been designed for a low-use site incorporating the *Stormwater Management Standards* outlined in the *Massachusetts Stormwater Handbook*. Stormwater within the substation drains to an ORW and NEP has taken into account this critical resource area in the substation design. The access into the substation will be limited to routine inspections, and maintenance and repair, as necessary. This substation will be an unmanned substation and will be operated and monitored remotely by NEP with routine visual and operational inspections performed by O&M personnel. The stormwater design will include the removal of total suspended solids from runoff, but as described above the substation will not encounter the amount of vehicular oils, salt and sediment that a typical public road or large-scale development would encounter.

Massachusetts Endangered Species Act

NEP has held several pre-application meetings with representatives of the NHESP to review the Bell Rock Substation Rebuild Project. Discussions to date with the NHESP indicate that the Bell Rock Substation can be permitted under the MESA, M.G.L. c. 131A § 3, and 321 CMR 10.18 conditionally upon NEP complying with the mitigation measures established to avoid an incidental take of Eastern box turtles. The NHESP was informed that NEP is seeking approval to rebuild and expand the existing station

in advance of constructing the AFRRP. NEP and the NHESP discussed specific mitigation measures to avoid and minimize impacts to state-listed rare species. The primary mitigation measure is to develop a turtle protection plan to be reviewed and accepted by the NHESP. The preliminary turtle protection plan for the Bell Rock Substation includes: 1) seasonal restriction on tree clearing; 2) turtle training for all construction personnel; 3) radio-telemetry tracking; 3) routine turtle sweeps of the work zone; 4) installation of perimeter exclusion fencing; and 5) regularly scheduled environmental compliance monitoring. A completed MESA Checklist has been filed with the NHESP and is currently being reviewed by the NHESP Project Reviewer. NEP anticipates that the NHESP's approval of the Bell Rock Substation Rebuild Project will include a stipulation that a CMP application be developed for the AFRRP, as outlined in the MESA Checklist filed with the NHESP for that project.

Massachusetts Historical Commission

Any projects that require funding, licenses, or permits from any state agency must be reviewed by MHC in compliance with M.G.L. c. 9, §26-27C. This law provides for MHC review of state projects, State Archaeologist's Permits, the protection of archaeological sites on public land from unauthorized digging, and the protection of unmarked burials. The regulations that guide MHC review of state funded, licensed or permitted projects are contained at 950 CMR 70-71. As noted in 950 CMR 71.04, project review under Section 106 shall ordinarily fulfill the requirements of compliance with the Massachusetts project review requirements.

NEP provided project notification and consulted with the MHC related to potential adverse effects to historic resources, as outlined in M.G.L. c. 9, §26-27C. POWER archaeologists obtained a State Archaeologist's permit prior to conducting field surveys and notified the MHC and State Archaeologist of the results of those investigations. MHC's scope included the entire project APE as described in M.G.L Chapter 9 Section 27C. NEP recognizes the MHC's sole capacity (as stated in M.G.L c. 9 §27B) within the Commonwealth for the administration of the Federal Historic Preservation Act (Title 16, U.S.C., §§470-470N).

13.3 Acushnet to Fall River Reliability Project

13.3.1 State Regulations

Section 401 Water Quality Certification

In accordance with the provisions stated in the federal CWA (33 U.S.C. §1341) and the Massachusetts Clean Water Act (M.G.L. c. 21, §26-53) and its implementing regulations (314 CMR 9.00), the AFRRP will require an Individual Section 401 Water Quality Certification due to impacts to wetland resource areas which are tributary to a Class A Public Water Supply (Copicut Reservoir) and are therefore classified as ORW. Although the placement of temporary construction mats is currently proposed within 400 feet of the Copicut Reservoir, the Companies are not currently anticipating a variance will be required based on preliminary coordination with the MassDEP Office of Water Resources. The Companies will continue discussions with the MassDEP regarding the Project.

An application will be filed with MassDEP for Water Quality Certification review under 314 CMR 9.00. MassDEP evaluation criteria for applications are the incorporation of all practicable measures for avoiding and minimizing impacts to wetland resource areas. The design of the AFRRP avoids or minimizes adverse impacts, as described in this section and Section 5.5. The AFRRP's compensatory mitigation package will comply with the mitigation requirements in the Massachusetts CWA.

Chapter 91 Waterways

As identified above, the Project crosses 20 watercourses, 10 perennial and 10 intermittent. The Companies have evaluated each watercourse to determine suitability for navigation by a kayak or canoe.[51] Based on this evaluation, three watercourses (SD54 (Acushnet River), SD25, and SD25A) were identified as being potentially suitable for navigation.

The Companies performed a file review at the MassDEP Office of Water Resources to obtain any applicable Chapter 91 Licenses for the watercourses traversed by the AFRRP. Eversource has a Chapter 91 License for the existing transmission line (Line 112) crossing of the Acushnet River (License No. 4374, dated October 3, 1960). No other existing Chapter 91 Licenses were found. The Companies will consult with the MassDEP as the transmission line design is finalized and anticipate that, if the work is not exempt, notices of minor modifications will be sufficient to address the new Acushnet River crossing, and other waterways as determined to be navigable and jurisdictional by the MassDEP.

Massachusetts Wetlands Protection Act

The AFRRP will require approvals under the WPA and the implementing regulations at 310 CMR 10.00. This regulatory statute asserts jurisdiction over state-wetland resource areas that have been identified in the AFRRP area, including BVW, RFA, IB, LUW, and BLSF. Project-related impacts to these resource areas require the issuance of an Order of Conditions approving the AFRRP by the Acushnet, New Bedford, Dartmouth, and Fall River Conservation Commissions.. Notices of Intent will be filed with each Conservation Commission detailing the proposed work, the short-term and long-term impacts, and the proposed mitigation for those impacts. The wetlands review process is focused on how the Project and proposed mitigation conform to the performance standards for each affected resource area. In the communities with local wetland bylaws, New Bedford and Dartmouth, the application and hearing process will also address how the AFRRP elements and proposed mitigation measures conform to the requirements of those town bylaws.

In accordance with the limited project provisions of the WPA, as described above, the AFRRP alternatives are described in Section 3.0; Sections 4.0 through 12.0 address minimization and avoidance measures the Companies will use to reduce overall impacts. The Companies are committed to working with federal, state and local regulatory agencies and providing an appropriate range of mitigation measures, as discussed further in Section 14.0.

The sections below summarize the AFRRP's compliance with the WPA's general performance standards for resource areas impacted by the Project.

Inland Bank (310 CMR 10.54)

Where IB is encountered within the Project area, the following applicable WPA general performance standards apply:

- *Where the presumption set forth in 310 CMR 10.54(3) is not overcome, any proposed work on an IB shall not impair the following:*

[51] The determination of suitability for navigation is based rivers/streams meeting the criteria of 1 foot wide and 3 feet deep with a discernable bank, regardless of frequency.

- *the physical stability of the IB;*
- *the water carrying capacity of the existing channel within the IB;*
- *groundwater and surface water quality;*
- *the capacity of the IB to provide breeding habitat, escape cover and food for fisheries; and*
- *the capacity of the IB to provide important wildlife habitat functions.*

Temporary alteration of a small amount of IB will result from the placement of construction mats across stream banks in construction work areas. Using construction mats for this purpose is intended to minimize stream bank impacts by avoiding compaction, bank erosion, and loss of vegetation and will not result in permanent impact to the physical ability of the banks or the water carrying capacity of the existing channels. The use of construction mats will not impact groundwater or surface water or the capacity of the IBs to provide long-term breeding habitat, escape cover, and food for fisheries following construction. Construction mat use will not reduce the capacity of the IBs to provide important wildlife habitat functions, as these areas will be restored after construction is complete.

Bordering Vegetated Wetland (310 CMR 10.55)

BVW is found throughout the Project area. The BVW general performance standards are defined in Section 13.2.1, above.

The AFRRP was designed to avoid or minimize adverse impacts as much as possible. However, permanent fill of BVW will occur as a result of the AFRRP. Unavoidable temporary impacts to BVW will occur in work areas and along access routes during construction. These impacts are primarily associated with the use of stabilization techniques (e.g., construction mats, stabilizing material) which minimize impacts while allowing necessary work within resource areas to occur. Unavoidable impacts to BVW from the construction of the AFRRP will be offset through compensatory mitigation determined in consultation with the municipal Conservation Commissions and other applicable regulatory agencies.

Land Under Water Bodies and Waterways (310 CMR 10.56)

The Project crosses jurisdictional LUW at four locations along its length. LUW is associated with one perennial and two intermittent streams, and one pond within the Project area. Where LUW is encountered, the following applicable WPA general performance standards apply:

- *Where the presumption set forth in 310 CMR 10.56(3) is not overcome, any proposed work within LUW shall not impair the following:*
  - *The water carrying capacity within the defined channel, which is provided by said land in conjunction with the banks;*
  - *Ground and surface water quality;*
  - *The capacity of said land to provide breeding habitat, escape cover and food for fisheries; and*
  - *The capacity of said land to provide important wildlife habitat functions.*

Temporary impacts to LUW have been avoided through the use of construction mats designed to span smaller streams during construction. Therefore, no impacts to LUW are proposed for this Project.

Bordering Land Subject to Flooding (310 CMR 10.57)

Where BLSF is encountered, the following WPA general performance standards apply:

- *Compensatory storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within BLSF, when in the judgment of the issuing authority said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood waters during peak flows.*
- *Work within BLSF, including that work required to provide the above-specified compensatory storage, shall not restrict flows so as to cause an increase in flood stage or velocity.*
- *Work in those portions of BLSF found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Except for work which would adversely affect vernal pool habitat, a project or projects on a single lot, for which Notice(s) of Intent is filed or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 sf/ [0.11 acres] (whichever is less) or land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat function. Additional alternations beyond the above threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.*

Permanent impacts to BLSF are anticipated as a result of structure installation associated with the AFRRP. As stated above, the Companies will provide compensatory storage for all flood storage volume that will be lost as a result of the permanent fill within BLSF. Temporary impacts to BLSF will be removed at the end of the Project.

Riverfront Area (310 CMR 10.58)

As noted in *Section 5: Wetlands and Wildlife*, ten perennial streams were identified in the AFRRP area. These streams have a jurisdictional 200-foot RFA. Pursuant to 310 CMR 10.58(4), where this 200-foot RFA occurs within the Project area, the following WPA general performance standards apply:

- *Protection of Other Resource Area: The work shall meet the performance standards for all other resource areas within the riverfront area as identified in 310 CMR 10.30 (coastal bank), 10.32 (salt marsh), 10.55 (BVW), and 10.57 (Land Subject to Flooding).*
- *When work in riverfront area is also within the buffer zone to another resource area, the performance standards for the riverfront area shall contribute to the protection of the interests of G.L. c. 131, s. 40 in lieu of any additional requirements that might otherwise be imposed on work in the buffer zone within riverfront area (310 CMR 10.58(4)(a)).*
- *Protection of Rare Species: No project may be permitted within the riverfront area which will have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, as identified by the procedures established under 310 CMR 10.59 or 10.37, or which will have any adverse effect on vernal pool habitat certified prior to the filing of the Notice of Intent (310 CMR 10.58(4)(b)).*
- *Practicable and Substantially Equivalent Economic Alternatives: There must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests identified in G.L. c. 131, s. 40. 310 CMR 10.58(4)(c)).*

The AFRRP will result in temporary and approximately permanent impacts to RFA. Permanent impacts in RFA will result from the installation of structures and access roads. Temporary disturbance in RFA

will result from the placement of construction mats to establish stable work and access areas. Stone work pads within the construction work pad footprint will be removed within the RFA and will be loamed and seeded to allow vegetative cover to become reestablished. In this manner, impacts to the functions of the RFA will be minimal. The Companies recognize that maintaining/reestablishing the natural vegetation within the RFA is critical to protecting water supplies, providing flood control, preventing pollution, and protecting wildlife and fisheries habitat.

Portions of the existing Copicut River RFA is currently maintained as a working ROW, with vegetation management conducted routinely and in accordance with an approved Vegetation Management Plan and local, state, and federal law and regulation. However, a portion of the Copicut River RFA along the southern portion of the ROW in Fall River will need to be cleared to accommodate the new transmission line. Once the new line is installed, this area will be maintained in accordance an approved Vegetation Management Plan and local, state, and federal law and regulation.

The AFRRP has considered the RFA performance standards in the following ways:

Protection of Other Resource Areas within RFA: The Project has been designed to minimize impacts to all resource areas on the ROW. Temporary construction mats will be used for access and work space within wetland resource areas. These areas will be restored by removing the construction mats and allowing the area to revegetate.

Protection of Rare Species: Specific mitigation measures recommended by the NHESP are still being evaluated through the consultation process. However, the Companies are committed to minimizing impacts where possible and have committed to the measures discussed in Section 6.2.3.

Due to the extent of tree clearing along the NEP ROW, the Companies anticipate that a CMP will be required under MESA for the eastern box turtle. Mortality avoidance measures will be implemented in other parts of the alignment. Pursuant to 321 CMR 10.23, the application for the CMP will need to demonstrate measures to avoid and minimize impacts to the eastern box turtles and habitat and provide for a “net benefit” for this species. In general, with a suitable mortality avoidance plan in place the activities, particularly in the NEP ROW, will ultimately diversify the habitat for eastern box turtle within the context of vast areas of intact and protected forest lands adjacent resulting in a compelling net benefit for this species.

In addition to avoiding and minimizing species habitat impacts to the maximum extent feasible, the Companies will continue to work closely with NHESP to develop mitigation measures for each species associated with the AFRRP ROW. At this time, proposed mitigation includes, but is not limited to, the following:

- Developing a mitigation program in consultation with the NHESP to allow for the issuance of a CMP.
- Training will be required for all construction personnel.
- Adhering to seasonal restrictions that may be placed by the NHESP for the tree clearing activities.
- Installing signage along the ROW alerting work crews to rare species habitats.
- Installing protective enclosures and exclusion fencing.
- Performing extensive sweeps prior to construction, and monitoring during construction.
- Monitoring of certain species during construction via radio-telemetry.

- Implementing Species-specific protection plans.
- Conducting habitat restoration post-construction.

Long-term operation and maintenance of the AFRRP is not anticipated to have adverse impacts on rare species, as long as the work is completed in compliance with the CMP, and future activities on the ROWs are conducted in accordance with the Companies' Operation and Maintenance Plan as approved by the NHESP.

The plant species associated with the ROW are inhabitants of open canopy, early-successional environments. Work associated with widening of the NEP ROW will not impact any of the associated plant species. In that regard, the access and acute work associated with structure installation will be configured so as to avoid impacts to the areas of mapped (2018) plant occurrences to the extent possible. In the event conflicts are not wholly avoidable, NEP will implement alternative measures that may include air-matting during dormant periods, temporary matting for short duration, translocation/transplantation, or other measures as appropriate.

Practicable and Substantially Equivalent Economic Alternatives: As discussed in Section 3.0, the Companies considered multiple alternatives for the Project, and developed the preferred alternative, which has been designed to avoid and minimize impacts to sensitive resource areas. Unavoidable impacts to the RFA from the construction of the AFRRP will be offset through compensatory mitigation determined in consultation with the municipal Conservation Commissions and other applicable regulatory agencies.

No Significant Adverse Impact: The existing vegetative cover will be preserved to the maximum extent feasible. In accordance with 301 CMR 10.58(4)(d)1.a, temporary impacts where necessary for installation of linear site-related utilities are allowed, provided the area is restored to its natural conditions. The temporary disturbance to the RFA from the placement of construction mats to establish work areas and access routes will be removed and restored back to vegetated areas. Stone work pads within the RFA will also be removed upon completion of construction.

In accordance with 301 CMR 10.58(4)(d)1.b, stormwater will be managed according to standards established by MassDEP in its Stormwater Policy. All dewatering and stormwater management will be conducted in accordance with the Companies dewatering and stormwater policies regarding protected waters as well as site inspections and monitoring reports. Discharge and/or disposal of groundwater encountered during installation of structure supports will be in accordance with applicable local and state requirements, as necessary, and the USEPA Dewatering General Permit, as applicable. The Companies will submit SWPPPs for the Project for compliance with USEPA's NPDES program under the Stormwater Construction General Permit. The SWPPPs will establish construction contact lists, descriptions of the proposed work, and will identify stormwater controls, spill prevention, and inspection practices to be implemented for the management of construction-related stormwater discharges from the Project.

Wildlife Habitat Evaluation (310 CMR 10.60)

Wildlife habitat evaluation was completed pursuant to 310 CMR 10.60 and the procedures and methods detailed in MassDEP's *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands* for the Fall River portion of the AFRRP. Pursuant to the requirements for completing wildlife habitat evaluations depending on the type of wetland resource area impacted and the magnitude of impact, Attachment B evaluations were conducted for the Project due to the nature of the Project and the cumulative impacts to jurisdictional resource areas. The wildlife habitat evaluation is presented in Appendix J. Some habitat

functions associated with forested wetlands will be permanently altered as a result of tree clearing associated with the Project; however, they will be replaced by the increasingly scarce scrub-shrub habitat. Consequently, the proposed Project will not result in a significant adverse impact or impairment, or reduce the capacity of the RFA to provide important wildlife habitat functions.

Massachusetts Department of Transportation

The Companies will need to acquire an access Permit from MassDOT for the crossing over Route 140 with utility lines. The AFRRP impacts relative to MassDOT are associated with the installation of overhead wires across state roadways by a non-municipal utility. The installation could temporarily affect traffic flow of the roadway but does not involve physical modifications to the roadway or state highway layout. The Companies will work with MassDOT and develop a Traffic Management Plan with complete details of scope of work prior to the start of AFRRP construction. The Companies will comply with all required measures to ensure a safe environment for traffic flow and construction crews in and around the roadways.

Massachusetts Endangered Species Act

Eversource and NEP have attended multiple pre-application meetings with representatives of the NHESP to review the AFRRP. A completed MESA Checklist has been filed with the NHESP and is currently being reviewed by the NHESP Project Reviewer. The NHESP's preliminary determination is that this Project would result in a "take" of the Eastern Box Turtle and a potential "incidental take" of the Eastern Whip-Poor-Will primarily due to the extent of tree clearing and habitat conversion from forested habitat to scrub-shrub habitat; although it has been acknowledged that this type of habitat conversion can also provide habitat benefits for these two species. The Companies anticipate that the NHESP will be provided with the appropriate documentation to use their discretion to issue their approval in accordance with M.G.L. c. 131A § 3 and 321 CMR 10.23. whereby the Director may permit the taking of a state-listed species provided that there is a long-term Net Benefit to the conservation of the impacted species. Eversource and NEP will consult with the NHESP with respect to the development of a CMP that outlines the avoidance, minimization and mitigation measures taken to reduce impacts to state-listed species consistent with the CMP performance standards.

Massachusetts Historical Commission

Any projects that require funding, licenses, or permits from any state agency must be reviewed by MHC in compliance with G.L. c. 9, §26-27C. This law provides for MHC review of state projects, State Archaeologist's Permits, the protection of archaeological sites on public land from unauthorized digging, and the protection of unmarked burials. The regulations that guide MHC review of state funded, licensed or permitted projects are contained at 950 CMR 70-71. As noted in 950 CMR 71.04, project review under Section 106 shall ordinarily fulfill the requirements of compliance with the Massachusetts project review requirements.

The Companies provided project notification and consulted with the MHC related to potential adverse effects to historic resources, as outlined in M.G.L. c. 9, §26-27C. PAL obtained a State Archaeologist's permit prior to conducting field surveys and have, or will, notify the MHC and State Archaeologist of the results of those investigations. MHC's scope included the entire project APE as described in M.G.L Chapter 9 Section 27C. The Companies recognize the MHC's sole capacity (as stated in M.G.L c. 9 §27B) within the Commonwealth for the administration of the Federal Historic Preservation Act (Title 16, U.S.C., §§470-470N).

14.0 MITIGATION OVERVIEW

In accordance with G.L. c. 30, Section 61 and 301 CMR 11.12(5), any State Agency that takes Action on a project for which the Secretary requires an EIR shall determine whether the project is likely, directly or indirectly, to cause damage to the environment and shall make a finding describing these effects and confirming that all feasible measures have been taken to avoid or minimize the adverse effects of human activity on the environment.

The development of mitigation measures has become an integral part of the regulatory process and of conservation planning efforts. In general, most state regulations that require mitigation measures do not prescribe the specific mitigation activity that must take place, and mitigation can take many forms. The subsequent sections contain the Companies' proposed mitigation measures. See also the Summary of Impacts and Mitigation Measures for National Grid's portion of the projects including Bell Rock Substation Rebuild and the Fall River portion of AFRRP in Table 14-1 and Eversource's portion of AFRRP are outlined in Table 14-2.

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TABLE 14-1 SUMMARY OF NATIONAL GRID'S PROPOSED MITIGATION MEASURES FOR THE BELL ROCK SUBSTATION REBUILD PROJECT AND THE AFRRP (EXCEPT WHERE OTHERWISE NOTED)

ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTA-TION SCHEDULE / PHASE	RESPONSIBLE PARTY
General	NEP will hire qualified professional as an Environmental Compliance Monitors and require that the contractor designate Construction Supervisors. The Construction Supervisor(s) will supervise construction and operations and will be responsible for site compliance with permit conditions; monitoring on-site conditions; and maintenance of mitigation measures. The Environmental Monitor(s) will observe work within wetlands, rare species habitat and conduct restoration/replication monitoring. Per existing NEP Policy, Environmental Field Issue (EFI) guidelines are developed for all complex construction and maintenance projects. At a minimum, the EFI will include the locations of sensitive areas to be avoided, a summary of all permit requirements, detailed erosion and sediment control plans, and training requirements/documentation. All contractors and environmental monitors are required to participate in EFI training before beginning work on the Project. In accordance with a schedule specified in the EFI, regular construction progress meetings will provide the opportunity to reinforce the contractor's awareness of these matters.	Construction, Long-term	NEP
Vegetation Removal	NEP will implement standard industry forestry practices during tree clearing and vegetation removal. Site-specific forestry means and methods will be implemented where needed to minimize environmental impact. NEP will follow its approved Five-Year Vegetation Management Plan (2014-2018), and its policies for ROW access, maintenance and construction BMPs outlined in *EG-303NE.* Vegetation is maintained around the substation to ensure that it does not impede access or security, or have the potential to fall onto any substation equipment.	Construction, Long-term	NEP
	Creation of additional scrub-shrub wetland habitat along the maintained ROW will represent a long-term positive effect for an assemblage of native wildlife.	Long-Term	NEP

ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTATION SCHEDULE / PHASE	RESPONSIBLE PARTY
Grading, Excavation and Soil Erosion Control	Ground disturbance and site grading will occur in accordance with *Massachusetts Erosion Sediment Control Guidelines for Urban and Suburban Areas.*[1]	Construction	NEP / Contractor
	Prior to construction, a detailed erosion and sediment control plan will be developed and implemented in the field based on site-specific conditions with input from NEP, the designated contractor(s), and environmental consultants. Appropriate erosion and sediment controls will be installed according to the mutually agreed upon plan. All controls will be installed in accordance with *EG-303NE,* which contains guidance policies regarding ROW access, maintenance and construction best management practices. Examples of erosion and sediment controls commonly used for utility work include silt fence, straw bales, straw wattles, filter socks, mulch, water bars, temporary and/or permanent reseeding. Refer to *Appendix C.*	Construction	NEP / Contractor / POWER Engineers
Access Road Improvements	Contractors to comply with *EG-303NE*.	Construction	Contractor
	Install erosion controls, as identified in the erosion and sediment control plan and specified in *EG-303NE*.	Construction	Contractor
	Install stabilized construction entrances on the ROW at public road crossings. Place suitable crushed stone aprons/ramps on geotextile fabric at road entrances to minimize tracking soil onto public streets.	Construction	Contractor
	Use construction mats for access through BVW, across intermittent or small streams (if bridge spans are not viable) and other sensitive areas to minimize compression of soils, rutting, and disturbance of vegetation. Remove construction mats and restore areas, as appropriate, upon work completion.	Construction	Contractor
	Maintain adequate drainage patterns, if required, by installing temporary culverts and riprap lined drainage swales to accommodate equipment crossings of wetlands and watercourses. Remove and restore to previous conditions upon work completion.	Construction	Contractor
Soils Handling/ Management	If necessary, preparation of a plan for handling potentially contaminated soils in accordance with National Grid's *Environmental Guidance Documents (EG-1707 and 1701)* regarding projects at existing substations and excess soil management from construction projects on ROWs.	Construction	NEP
Dewatering/ Stormwater	Discharge and/or dispose of groundwater encountered during construction in accordance with EG303NE, applicable local and state requirements, as necessary, and the USEPA Dewatering General Permit, as applicable.	Construction	Contractor

ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTA-TION SCHEDULE / PHASE	RESPONSIBLE PARTY
	NEP will submit a Stormwater Pollution Prevention Plan (SWPPP) in compliance with USEPA's NPDES program under the Stormwater Construction General Permit. The SWPPP establishes a construction contact list, presents a description of the proposed work, and identifies stormwater controls, spill prevention, and inspection practices to be implemented for the management of construction-related stormwater discharges from the Project. The Bell Rock Substation Rebuild Project post-construction stormwater management system has been designed for a low-use site incorporating the Stormwater Management Standards outlined in the Massachusetts Stormwater Handbook. The substation drains to an ORW and NEP has taken into account this critical resource area in the substation design.	Construction	NEP/ POWER Engineers
Spill Prevention	If a spill occurs, control and minimize the potential effects in accordance with National Grid Environmental Guidance Documents (EG-501MA and EG-502MA) regarding release notification requirements and spill response procedures and notifications.	Construction	Contractor
Air Quality	Deploy dust mitigation measures as described in National Grid's *Environmental Guidance Document EG-303NE* (see *Appendix C),* (e.g., track pads at access points and controls during dry periods).	Construction	Contractor
	NEP requires the use of ultra-low sulfur diesel fuel exclusively in its diesel-powered construction equipment. Any diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction will either be USEPA Tier 4-compliant or will be retrofitted with USEPA-verified (or equivalent) emission control devices such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine. The Project will comply with MassDEP's Solid Waste and Air Pollution control regulations, pursuant to M.G.L. c.40, s.54.	Construction	Contractor
Streams and Rivers	Use of washed stone where existing access roads crossing stream beds must be improved, (e.g., clean rip-rap or equivalent, rock fords).	Construction	Contractor
	Bridge/span watercourses with temporary construction mats, as necessary, to allow equipment to cross without constraining water flow.	Construction	Contractor
	Maintain adequate separation from watercourses while mixing concrete for structure foundations to avoid impacts to waterbodies.	Construction	Contractor
Wetland Resource Areas	Contractors to comply with National Grid's *Environmental Guidance Document EG-303NE* for all work in or adjacent to wetland resource areas.	Construction	Contractor
	Install temporary construction mats on top of existing vegetation within BVW to establish safe and stable construction work areas/crane pads where necessary.	Construction	Contractor

ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTA-TION SCHEDULE / PHASE	RESPONSIBLE PARTY
	Restore temporarily impacted wetland resource areas to pre-construction configurations and contours to the extent practicable.	Construction	Contractor
	Compensatory mitigation for permanent BVW fill associated with the Project Final plans to be developed in consultation with local conservation commissions and USACE.	Construction, Long-Term	NEP
	Compensatory mitigation which will be determined in consultation with agencies to offset conversion of forested wetlands associated with tree removal.	Long-Term	NEP
Floodplain	Over-excavate with BLSF to maintain existing elevations, or provide compensatory flood storage as mitigation for fill within BLSF. Final plans to be developed in consultation with local conservation commission.	Permitting/Construction	NEP
Rare Species	Implement NHESP-accepted state-listed species mitigation plans to avoid and minimize impacts on rare species. Develop and implement species specific protection plans to be approved by the NHESP. File a Conservation and Management Permit Application with the NHESP seeking an approved Conservation and Management Permit. NEP is committed to minimizing impacts where possible and has committed to the measures discussed in Section 6.	Construction	NEP
	All tree clearing will be completed outside of the breeding season for NHESP identified species for the Bell Rock Substation Project.	Construction	NEP/Contractor
	Vegetation maintenance will be undertaken in accordance with the provisions of NEP's NHESP- approved long-term Operation and Maintenance Plan and National Grid's *Environmental Guidance Document EG-305.*	Construction/Long - Term	NEP
Cultural Resources	Mitigation to be determined in consultation with MHC and USACE, as appropriate.	Pre-Construction	NEP
Traffic	Consult with MassDOT to review proposed plans for overhead crossings (including the use of guard structures). Develop a Transportation Management Plan that addresses impacts and MassDOT concerns to ensure a safe working environment as well as safe passage for highway traffic.	Construction	NEP/POWER Engineers
Public Outreach	Continue to update Project website, submit news releases to local media and local public access channel, as available; establish a toll-free Project hotline; email construction updates; establish email inquiry process; direct mail and "leave behinds" (e.g., fliers, brochures, CDs).	Design & Construction	NEP/ POWER Engineers
	Municipal briefings, project website, toll-free project hotline and dedicated project email.	Design & Construction	NEP/ POWER Engineers
	Implement Construction Communication Plan.	Construction	NEP/ POWER Engineers

Note:
[1] MassDEP. 2003. Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas: A Guide for Planners, Designers, and Municipal Officials. Retrieved August 2, 2018 from http://www.mass.gov/eea/docs/dep/water/essec1.pdf.

TABLE 14-2 SUMMARY OF EVERSOURCES'S PROPOSED MITIGATION MEASURES

ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTATION SCHEDULE / PHASE	RESPONSIBLE PARTY
General	Eversource will hire qualified professionals as Environmental Compliance Monitors which will be conducted either internally or by consultants as well as require that the contractor(s) designate a Construction Supervisor. The Construction Supervisor will supervise construction and operations and will be responsible for site compliance with permit conditions; monitoring on-site conditions; and maintenance of mitigation measures. If work occurs in a wetland resource area or an area mapped or otherwise designated as a rare or endangered species habitat, permit conditions may dictate that construction be monitored by a qualified wetland or wildlife specialist. Construction permit documents and guidelines will be developed for the Project. These documents will include the locations of sensitive areas to be avoided, a summary of all permit requirements, detailed erosion and sediment control plans, and training requirements/documentation. All contractors and environmental monitors are required to participate in environmental training before beginning work on the Project. Regular construction progress meetings will be held and provide the opportunity to reinforce the contractor's awareness of these matters.	Construction, Long-term	Eversource
Vegetation Removal	Eversource will follow their approved Five-Year Vegetation Management Plan, current Operation and Maintenance Plan, and construction and maintenance BMPs as outlined in Eversource's *Best Management Practices Manual for Massachusetts and Connecticut (BMP Manual)*.	Construction, Long-term	Eversource
Soil Erosion Controls	Stabilization of ground disturbance and site grading activities will occur in accordance with *Massachusetts Erosion Sediment Control Guidelines for Urban and Suburban Areas.*[1]	Construction	Eversource/ Contractor
	The proper selection of BMPs should take into consideration the project goals, permit requirements, and site-specific information. Once the assessment of the area is made and requirements of the project have been established, all BMPs should be considered and implemented, as applicable. Appropriate erosion and sediment controls will be installed according to the mutually agreed upon plan and Eversource's *BMP Manual* regarding ROW access, maintenance and construction best management practices, examples of erosion and sediment controls commonly used for utility work include preserving existing vegetation, silt fence, straw wattles, hay/straw bales, filter socks, mulch, check dams, temporary and/or permanent reseeding/trench breakers/diversions. Any damage observed must be repaired in a timely matter, at least within 48 hours of observation.	Construction	Eversource/ Contractor/ POWER Engineers
Access Road Improvements	Contractors to comply with Eversource's *BMP Manual*.	Construction	Contractor
	Install erosion controls, as identified in the erosion and sediment control plan and specified in Eversource's *BMP Manual*.	Construction	Contractor

ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTATION SCHEDULE / PHASE	RESPONSIBLE PARTY
	Install stabilized construction entrances on the ROW at public road crossings. Place suitable crushed stone aprons/ramps on geotextile fabric at ROW road entrances to minimize tracking soil onto public streets.	Construction	Contractor
	Where permanent access is not required, use construction mats for access through wetlands, across intermittent or small streams (if bridge spans are not viable) and other sensitive areas to minimize compression of soils, rutting, and disturbance of vegetation (generally no wider than 16 feet when using construction mats). Install elevated construction mat road crossings or "bridges" in locations where the access road is greater than one mat thick. Gaps and/or bridges are to be placed along the access road at intervals no less than 50 feet. Remove construction mats and restore areas, as appropriate, upon work completion.	Construction	Contractor
	Maintain adequate drainage patterns, if required, by installing water bars and riprap lined drainage swales to accommodate equipment crossings of wetlands and watercourses. Remove and restore to previous conditions upon work completion.	Construction	Contractor
Soils Handling/ Management	When polluted/contaminated soil is encountered, it must be handled in accordance with the appropriate regulatory requirements. In addition to the measures discussed above, contaminated soils should be stockpiled on and covered by polyethylene sheeting. Sheeting used to cover the stockpile should be weighted down to prevent the wind migration of contaminated dust.	Construction	Contractor
Dewatering/ Stormwater	In accordance with dewatering and stormwater policies defined in Eversource's *BMP Manual* regarding protected waters as well as site inspections and monitoring reports.	Construction	Contractor
	Discharge and/or dispose of groundwater encountered during installation of structure supports in accordance with applicable local and state requirements, as necessary, and the USEPA Dewatering General Permit, as applicable.	Construction	Contractor
	Eversource will submit Stormwater Pollution Prevention Plan (SWPPP) in compliance with USEPA's NPDES program under the Stormwater Construction General Permit. The SWPPP will establish a construction contact list, present a description of the proposed work, and identify stormwater controls, spill prevention, and inspection practices to be implemented for the management of construction-related stormwater discharges from the Project.	Construction	Eversource/POWER Engineers
Spill Prevention	If a spill occurs, control and minimize the potential effects in accordance with Eversource's *BMP Manual* and Eversource Energy Contractor Rules regarding release notification requirements and spill response procedures and notifications.	Construction	Contractor
Air Quality	Deploy dust mitigation measures as described in Eversource's *BMP Manual,* (e.g., stone to cover soil surface and controls during dry periods).	Construction	Contractor

ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTATION SCHEDULE / PHASE	RESPONSIBLE PARTY
	Eversource will use ultra-low sulfur diesel fuel exclusively in its diesel-powered construction equipment. Any diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction will either be USEPA Tier 4-compliant or will be retrofitted with USEPA-verified (or equivalent) emission control devices such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine.	Construction	Eversource/Contractor
Streams and Rivers	Coordinate the timing of work to cause the least impacts during the regulatory low flow period under normal conditions or when water/ground is frozen. The United States Army Corps of Engineers defines the low-flow periods for streams which are outlined in Eversource's *BMP Manual.*	Construction	Contractor
	Use of washed stone where existing access roads crossing stream beds (for intermittent streams less than 2-feet wide or braided) must be improved, (e.g., 6-8-inch clean angular stone and clean rip-rap).	Construction	Contractor
	Bridge/span watercourses with temporary construction mats, as necessary, to allow equipment to cross without constraining water flow.	Construction	Contractor
Wetland Resource Areas	Contractors to comply with Eversource's *BMP Manual* for all work in or adjacent to wetland resource areas. Construction within and across wetlands and in proximity to vernal pools should be limited to the extent practicable to avoid working in the periods between April 1st and June 1st.	Construction	Contractor
	Install temporary construction mats on top of existing vegetation within wetlands to establish safe and stable construction work areas/crane pads where necessary and should be inspected daily to ensure that controls are in working order and repairs can occur in a timely manner. Restrict vegetation clearing to the extent possible especially in Vernal Pool areas and eastern box turtle habitats to that required for construction.	Construction	Eversource/Contractor
	Restore wetland resource areas to pre-construction configurations and contours to the extent practicable.	Construction	Contractor
	Compensatory mitigation for permanent BVW fill associated with the construction of the proposed Project and the installation of transmission line structures. Final plans to be developed in consultation with local conservation commissions and USACE.	Construction, Long-Term	Eversource

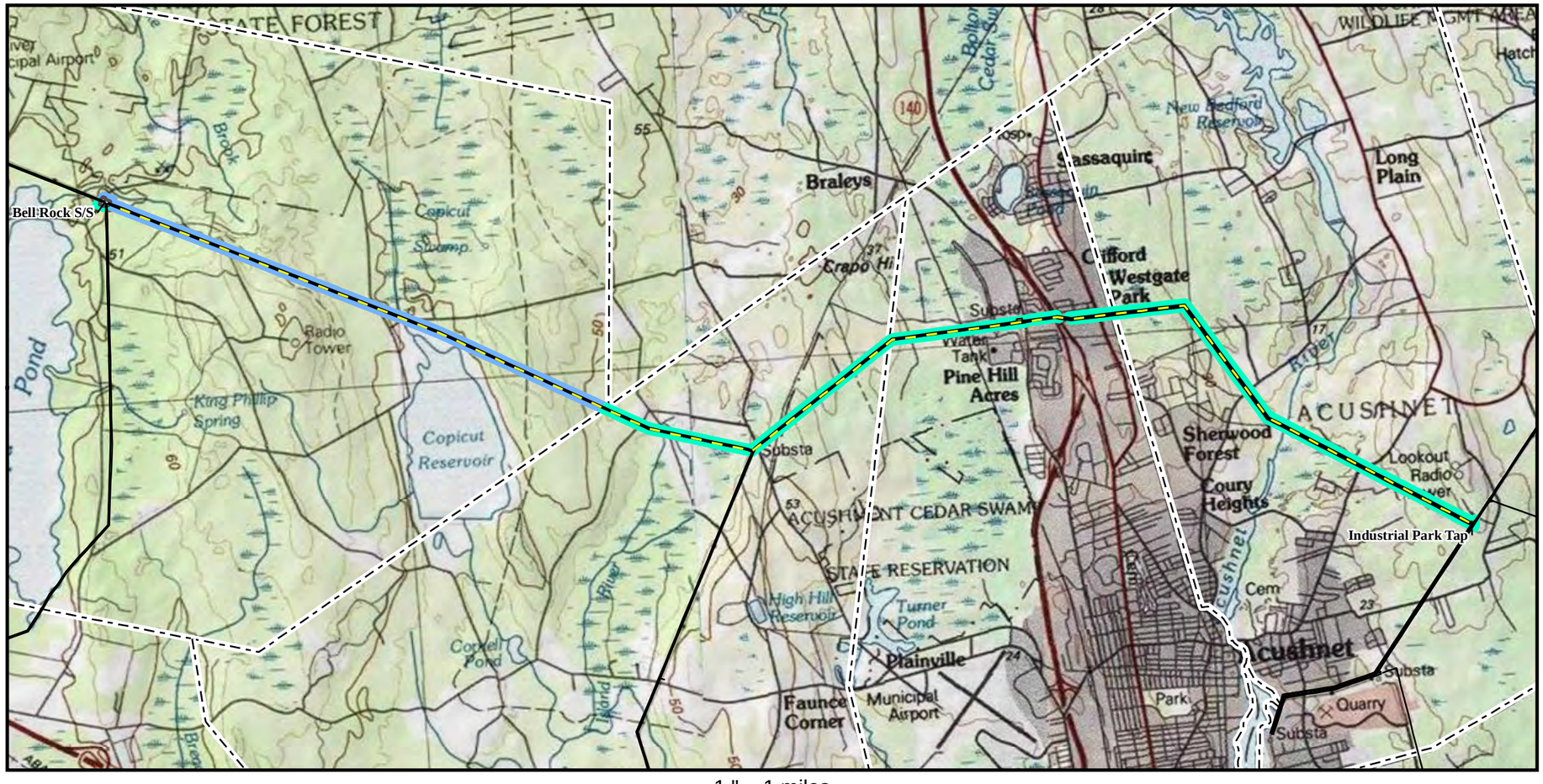
ENVIRONMENTAL PARAMETER / ACTIVITY	SUMMARY OF MITIGATION MEASURES	IMPLEMENTATION SCHEDULE / PHASE	RESPONSIBLE PARTY
Floodplain	Over-excavate with BLSF to maintain existing elevations, or provide compensatory flood storage as mitigation for fill within BLSF. Final plans to be developed in consultation with local conservation commission.	Permitting/Construction	Eversource
Rare Species	Implement NHESP-accepted state-listed species mitigation plans to avoid and minimize impacts on rare species. Develop and implement species specific protection plans to be approved by the NHESP. File a Conservation and Management Permit Application with the NHESP seeking an approved Conservation and Management Permit. Eversource is committed to minimizing impacts where possible and has committed to the measures discussed in Section 6.	Construction	Eversource
	Vegetation maintenance will be undertaken in accordance with the provisions of Eversource's approved long-term Operation and Maintenance Plan and Five-Year Vegetation Management Plan.	Construction/Long-Term	Eversource
Cultural Resources	Mitigation to be determined in consultation with MHC, Tribal Historic Preservation Officers, and Advisory Council on Historic Preservation, and USACE, as appropriate.	Pre-Construction	Eversource
Traffic	Consult with MassDOT to review proposed plans for overhead crossings (including the use of guard structures). Develop a Transportation Management Plan that addresses impacts and MassDOT concerns to ensure a safe working environment as well as safe passage for highway traffic.	Construction	Eversource
Public Outreach	Continue to update Project websites, submit news releases to local media and local public access channels, as available; establish toll-free Project hotlines; email construction updates; establish email inquiry process; direct mail and "leave behinds" (e.g., fliers, brochures, CDs).	Design & Construction	Eversource
	Abutter contact; Open House events; and municipal briefings.	Design	Eversource
	Implement Construction Communication Plan.	Construction	Eversource

Note:
[1] MassDEP. 2003. Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas: A Guide for Planners, Designers, and Municipal Officials. Retrieved August 2, 2018 from http://www.mass.gov/eea/docs/dep/water/essec1.pdf.

Bell Rock Substation Rebuild Project and the Acushnet to Fall River Reliability Project

Acushnet, New Bedford, Dartmouth, and Fall River, Massachusetts

Appendix A - Figures



1 " = 1 miles

Prepared For:

New England Power Company
40 Sylvan Road
Waltham, MA 02451

Eversource
247 Station Drive
Westwood, MA 02090

Compiled By:

POWER Engineers, Inc
100 John L. Dietsch Square
North Attleboro, MA 02763

November 2018

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This document has been reviewed for Critical Energy Infrastructure Information (CEII), November 2018)



N

1 inch = 1,000 feet

0 500 1,000

Feet

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 1-1: Project Locus Map

Commonwealth of Massachusetts
City of Fall River

NOT FOR CONSTRUCTION

Service Layer Credits:
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Bell Rock Substation

Industrial Park Substation

High Hill Substation

Industrial Park Tap

City of Fall River

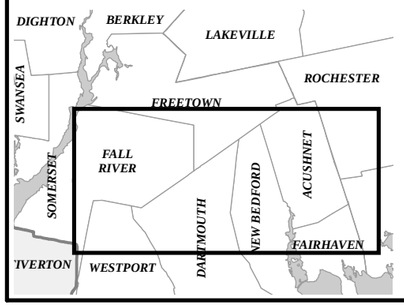
Town of Freetown

Town of Acushnet

City of New Bedford

Town of Dartmouth

Project Vicinity



Legend

- New 115 kV Transmission Line
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 1-2: Project Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N W E S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE nationalgrid

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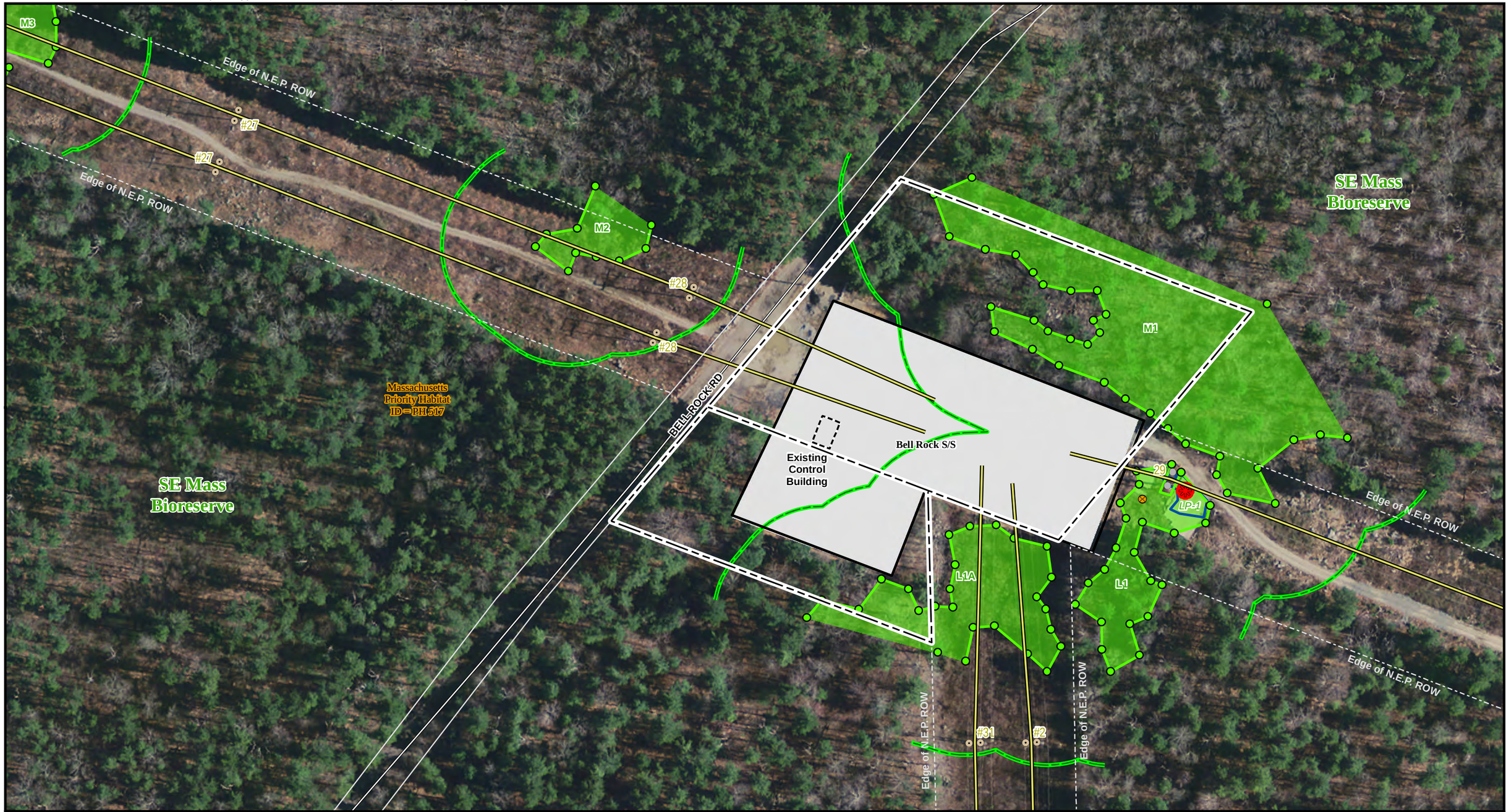
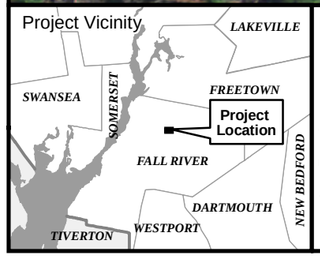


Project Vicinity



Legend

- Steel Pole
- Wood Pole
- NEP Substation Easement
- Existing Transmission Line
- Parcel Boundary
- Edge of ROW
- Existing Fence
- Existing Building
- Local Road
- Field Documented Vernal Pool
- Culvert
- Wetland Flag
- Observed Inundation
- Wetland Border
- 100 ft Buffer Wetland
- Field Delineated Wetland*
- Outstanding Resource Waters (All of view extent)
- MA-NHESP Priority Habitats Rare Species (All of view extent)

N

1 inch = 100 feet

0 50 100

Feet

Indicates Layers Set to Transparency

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 2-1: Existing Conditions

Commonwealth of Massachusetts
City of Fall River

NOT FOR CONSTRUCTION

Imagery Source: National Map Server 2013-2015 High Resolution Orthoimagery

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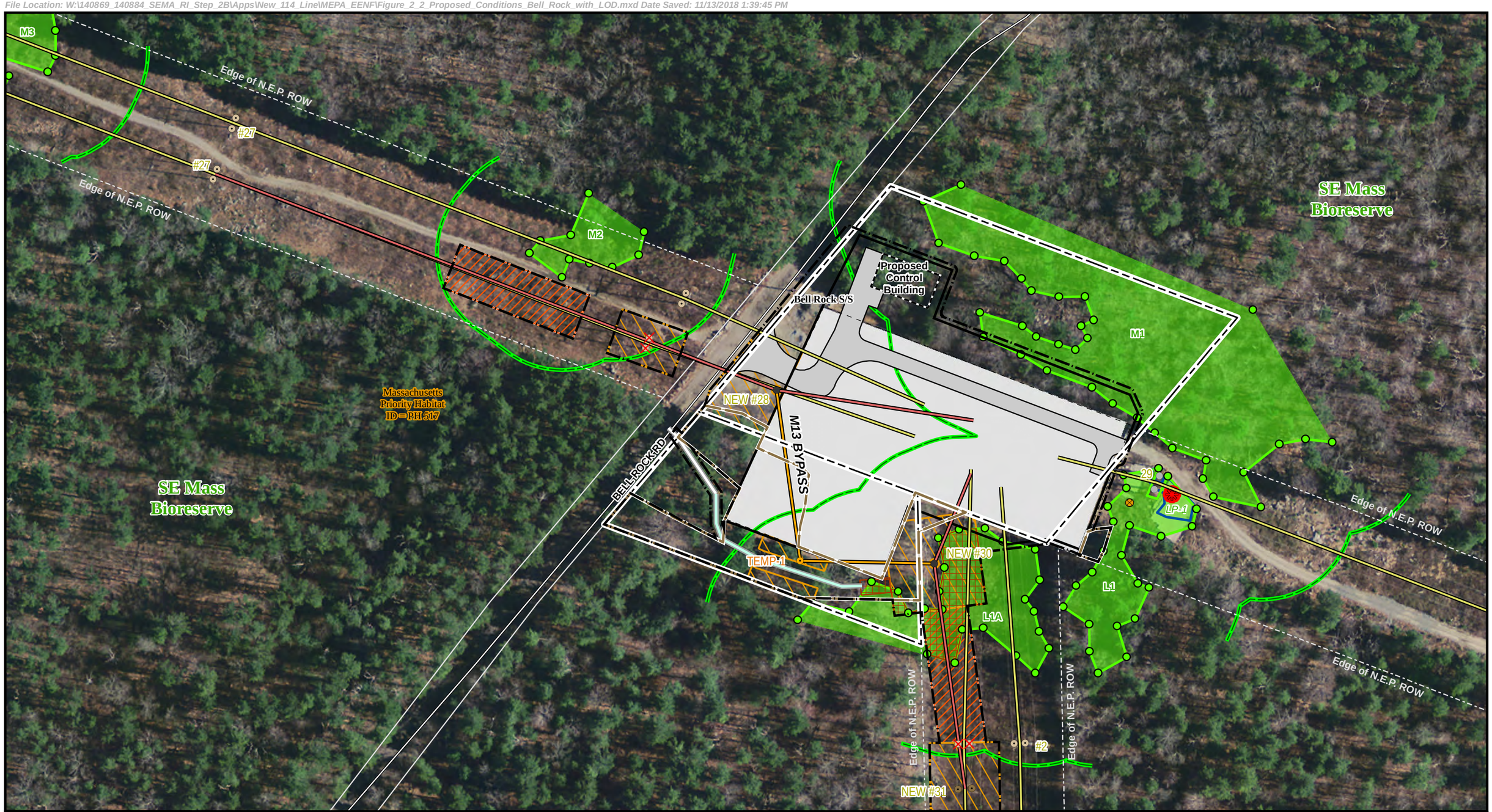

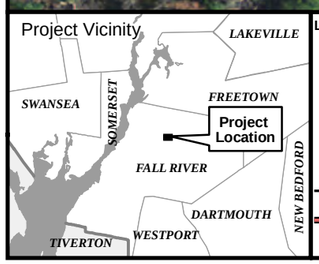

Legend

- Steel Pole
- Wood Pole
- Proposed Steel Pole
- Proposed Wood Pole
- Temporary Wood Pole
- Wood Pole to be Removed
- NEP Substation Easement
- Proposed Transmission Line
- Existing Transmission Line
- Temporary Transmission Line
- Parcel Boundary
- Edge of ROW
- Proposed ExpandedFence
- Proposed Building
- Existing Fence
- Use Existing Access Road
- Construct New Access Road
- Paved Access Drive
- Limit of Disturbance
- Local Road
- Field Documented Vernal Pool
- Culvert
- Wetland Flag
- Observed Inundation
- Wetland Border
- 100 ft Buffer Wetland
- Limit of Tree Clearing
- Swamp Mat (Construction)
- Proposed Pole Work
- Wire Pulling Station
- Work Pad / Area
- Field Delineated Wetland*
- Outstanding Resource Waters (All of view extent)
- MA-NHESP Priority Habitats Rare Species (All of view extent)

*Indicates Layers Set to Transparency

N

1 inch = 100 feet

0 50 100

Feet

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 2-2: Proposed Conditions

Commonwealth of Massachusetts
City of Fall River

NOT FOR CONSTRUCTION

Imagery Source: National Map Server 2013-2015 High Resolution Orthoimagery

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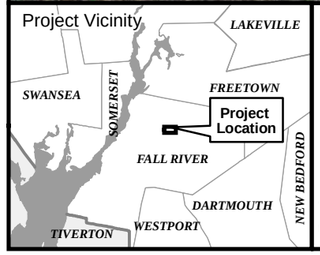
Project Vicinity



Legend

- Steel Pole
- Wood Pole
- Proposed Steel Pole
- Proposed Wood Pole
- Temporary Wood Pole
- Wood Pole to be Removed
- NEP Substation Easement
- Existing Transmission Line
- Temporary Transmission Line
- Parcel Boundary
- Edge of ROW
- Proposed ExpandedFence
- Proposed Building
- Existing Fence
- Use Existing Access Road
- Improve Existing Road
- Construct New Access Road
- Limit of Distubance
- Local Road
- Field Identified Vernal Pool
- Culvert
- Wetland Flag
- Area of Observed Inundation
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Riverfront Area
- 100 ft Buffer Wetland
- Limit of Tree Clearing
- Swamp Mat (Construction)
- Proposed Pole Work
- Wire Pulling Station
- Work Pad / Area
- Field Delineated Wetland*

***Indicates Layers Set to Transparency**

N

1 inch = 200 feet

0 100 200

Feet

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 2-3: Proposed Conditions Overview Map

Commonwealth of Massachusetts
City of Fall River

Imagery Source: National Map Server 2013-2015 High Resolution Orthoimagery

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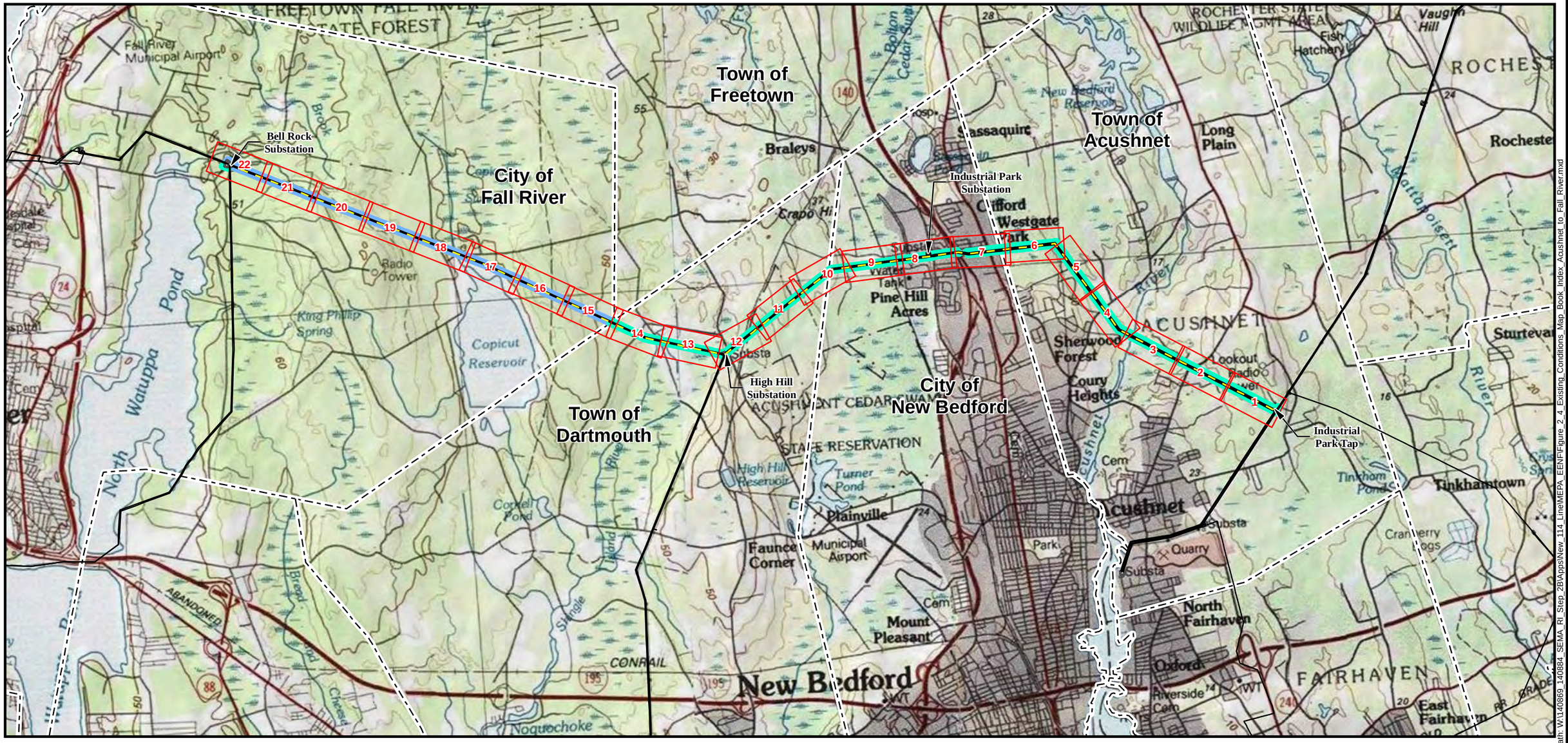

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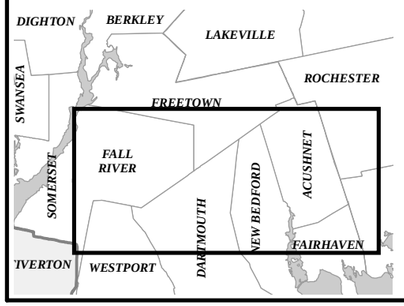

Legend

- New 115 kV Transmission Line
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions Index Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE
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Author: TDH

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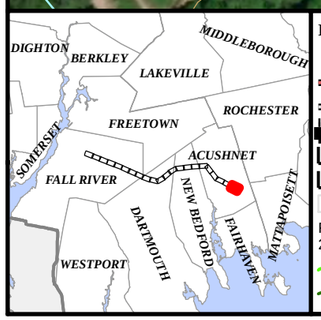

Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Isolated Wetland Border
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 1 of 22

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Date: 11/13/2018 Author: TDH

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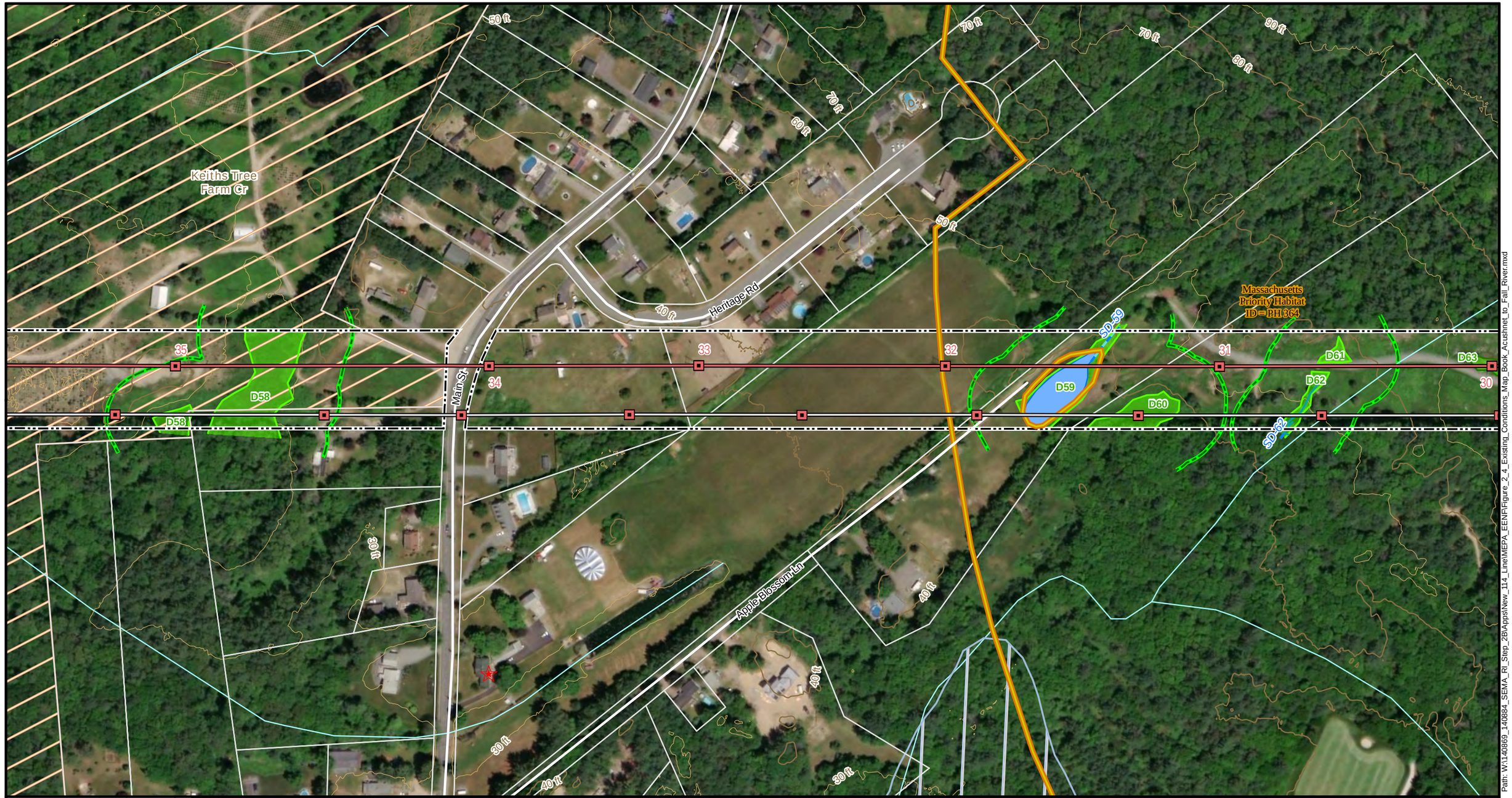

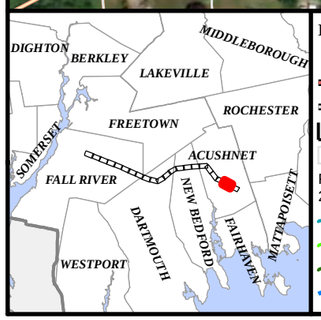

Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Isolated Wetland Border
- Intermittent Stream
- Delineated Open Water
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 2 of 22

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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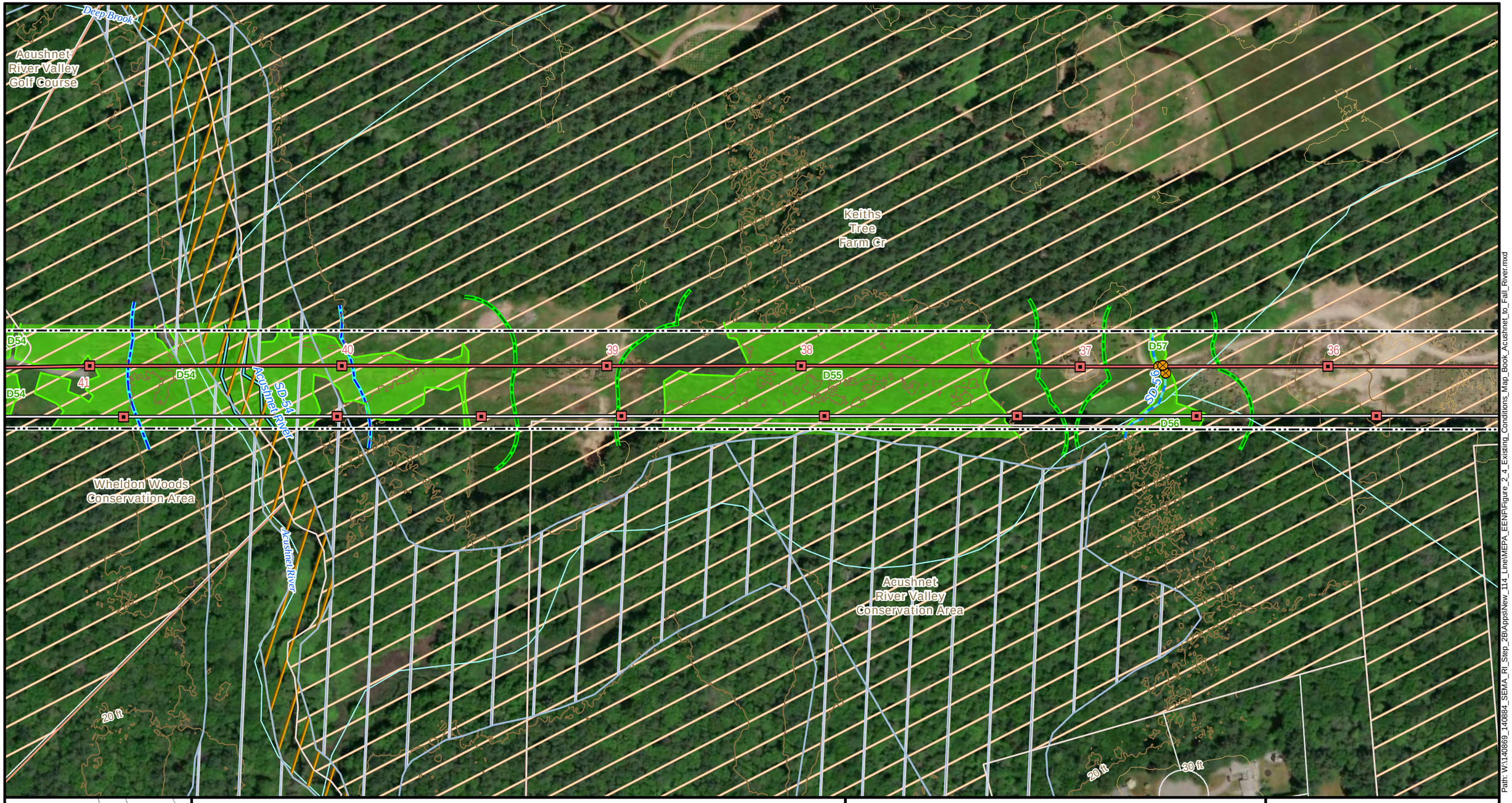

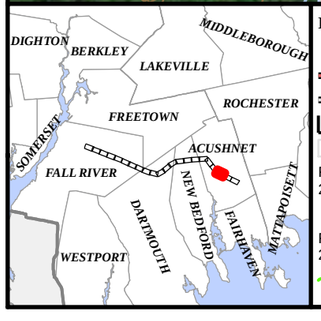

Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Floodway
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 3 of 22

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

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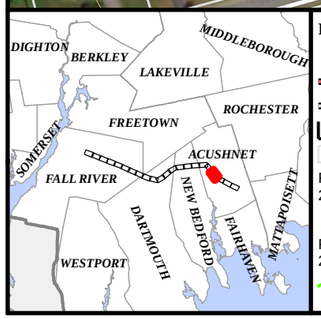

Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Field Delineated Wetland
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Floodway
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 4 of 22

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

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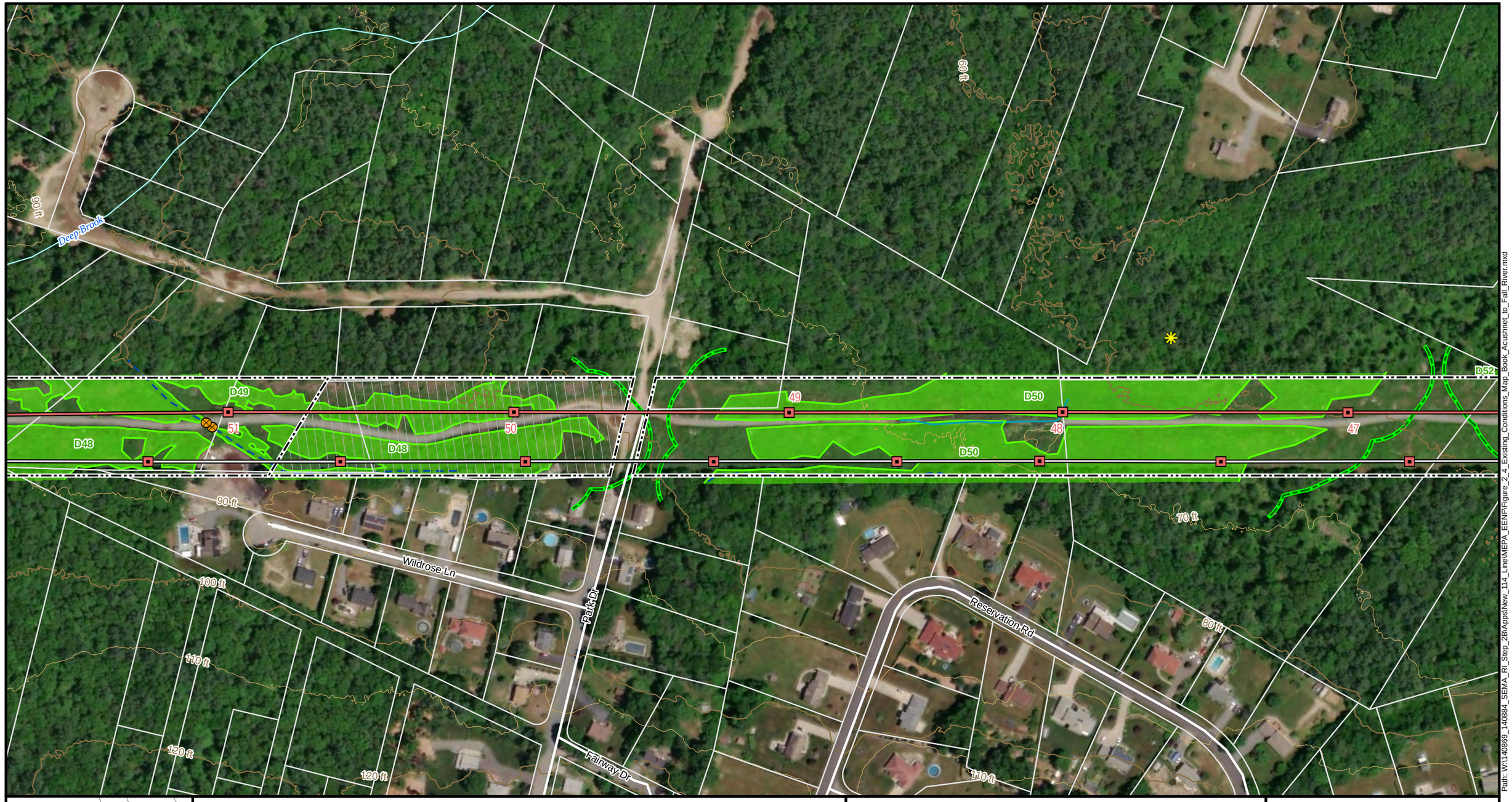



Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Ditch
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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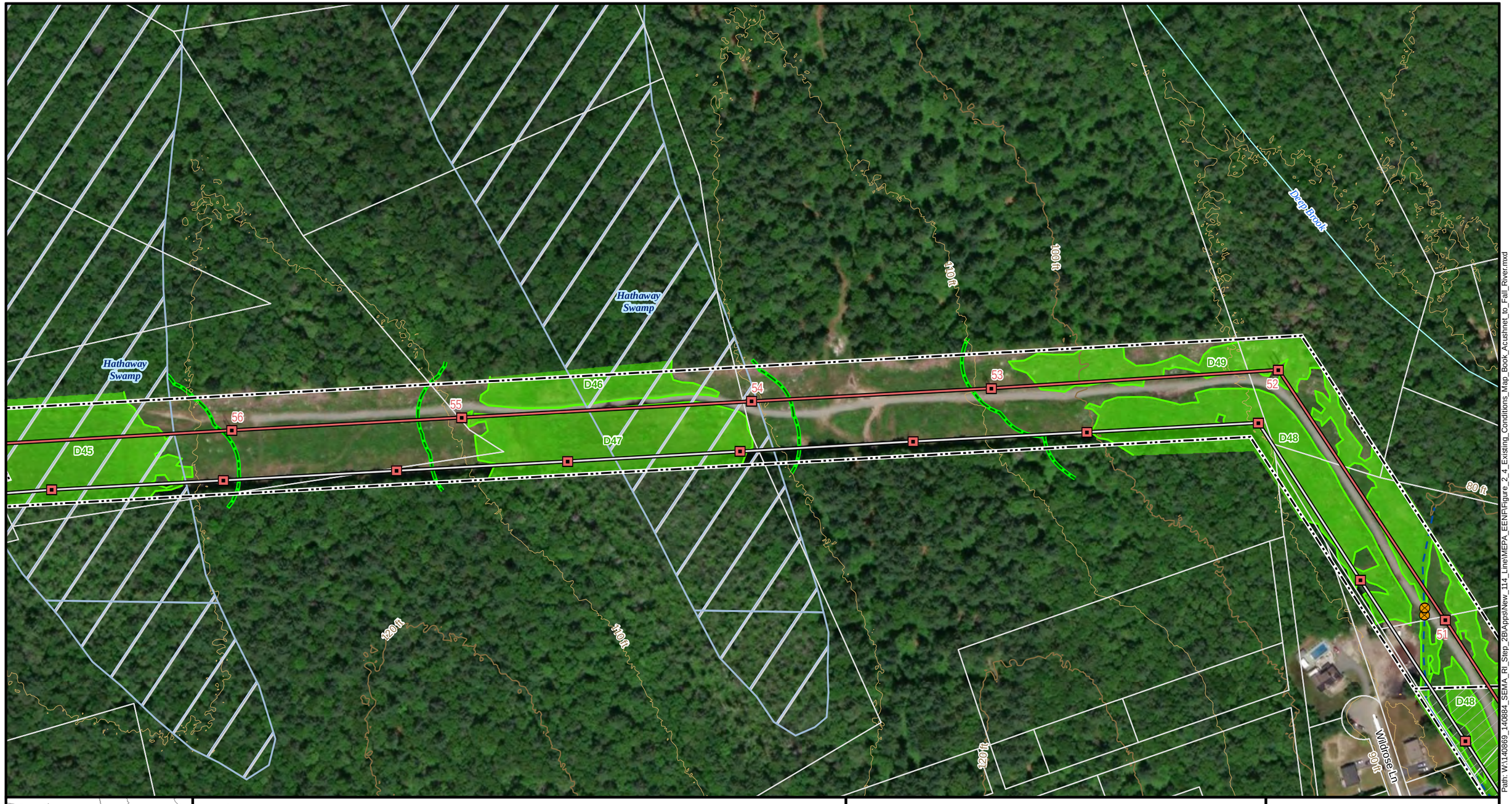



Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Ditch
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 6 of 22

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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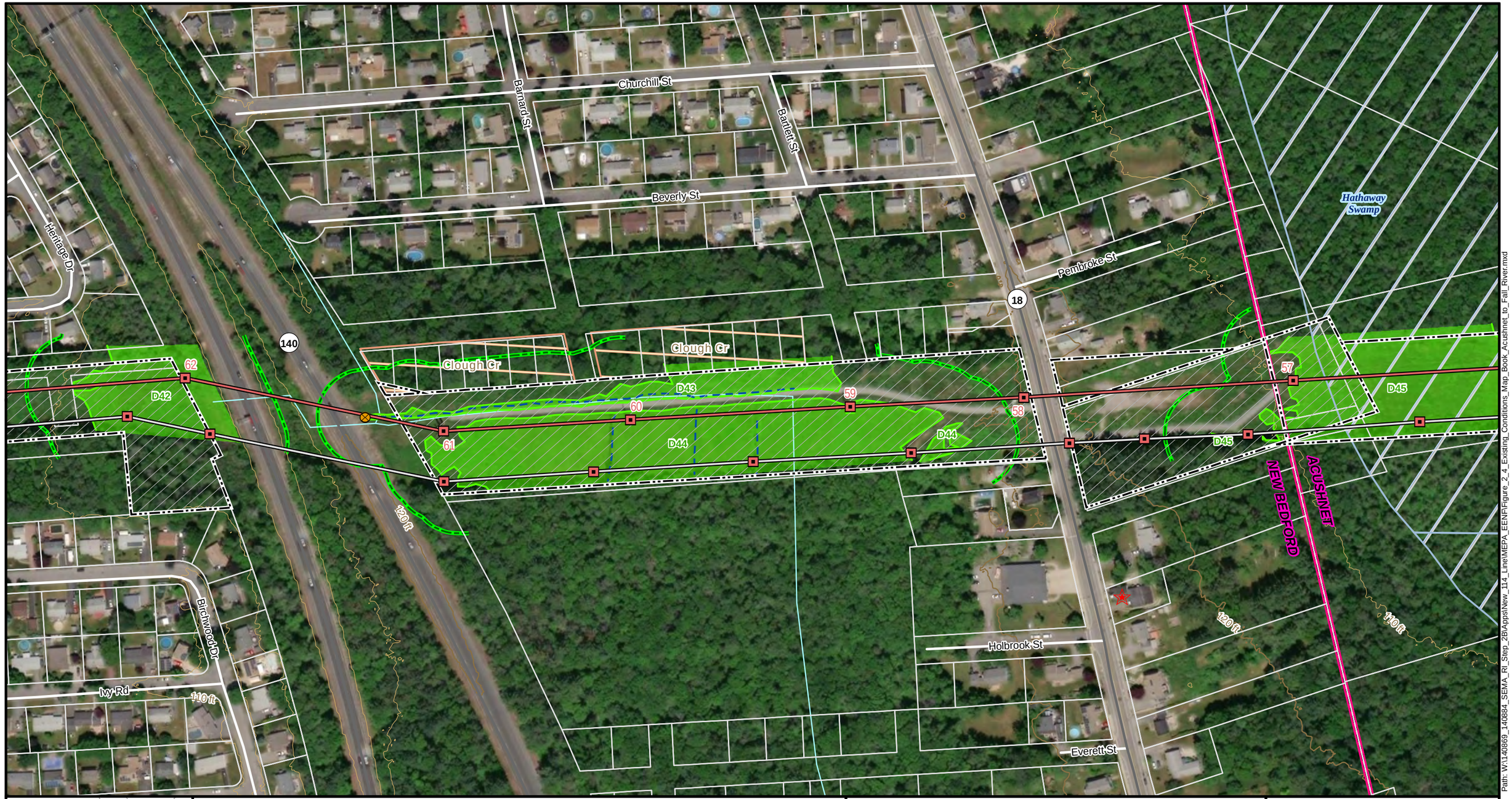



Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Culvert

Field GPS Survey Line (2015-2018)

- Wetland Border
- Ditch
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- State Highway
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet, City of New Bedford

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

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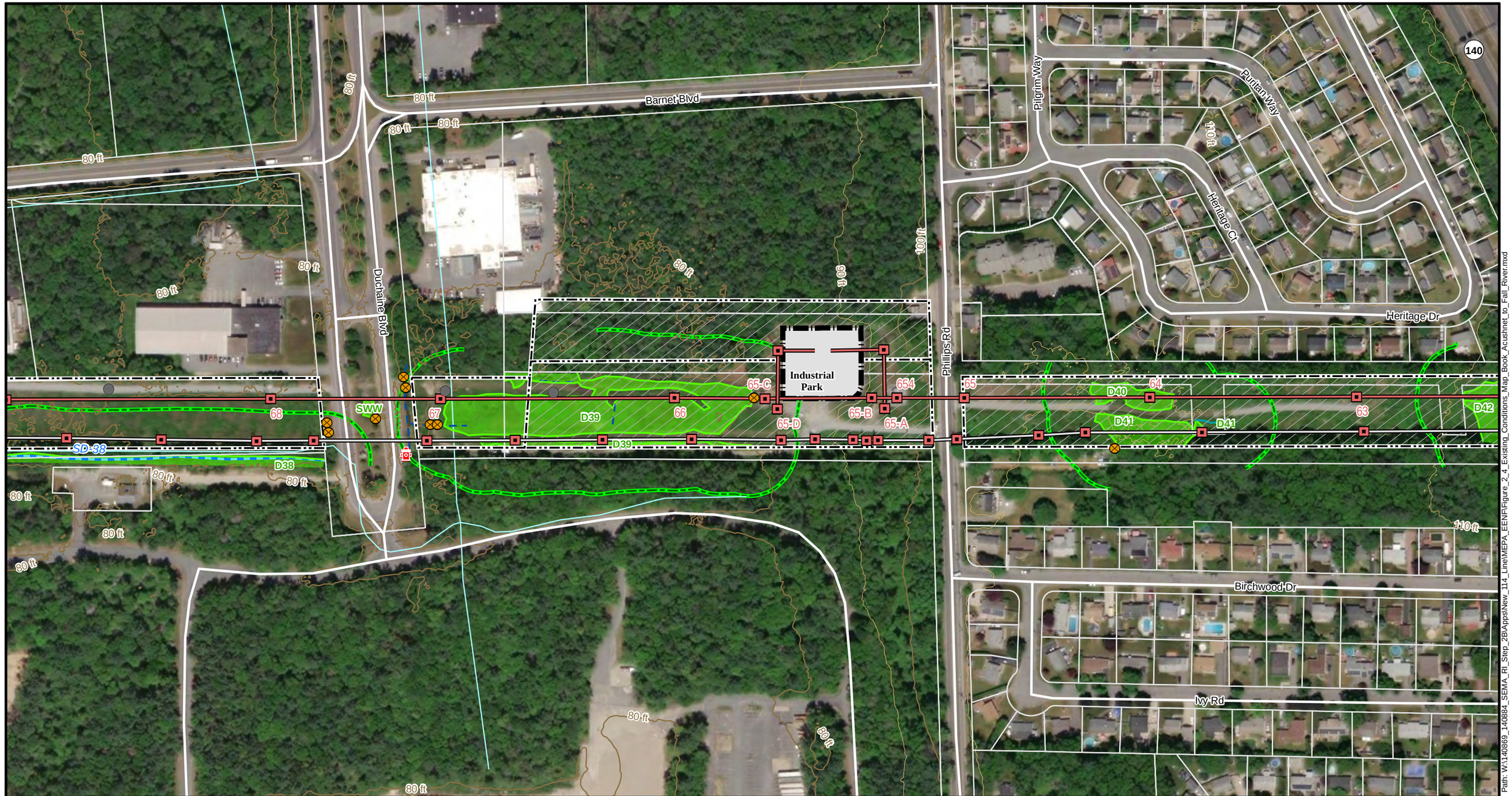



Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
  - Culvert
  - Man Hole
- Hydrant
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- State Highway
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
City of New Bedford

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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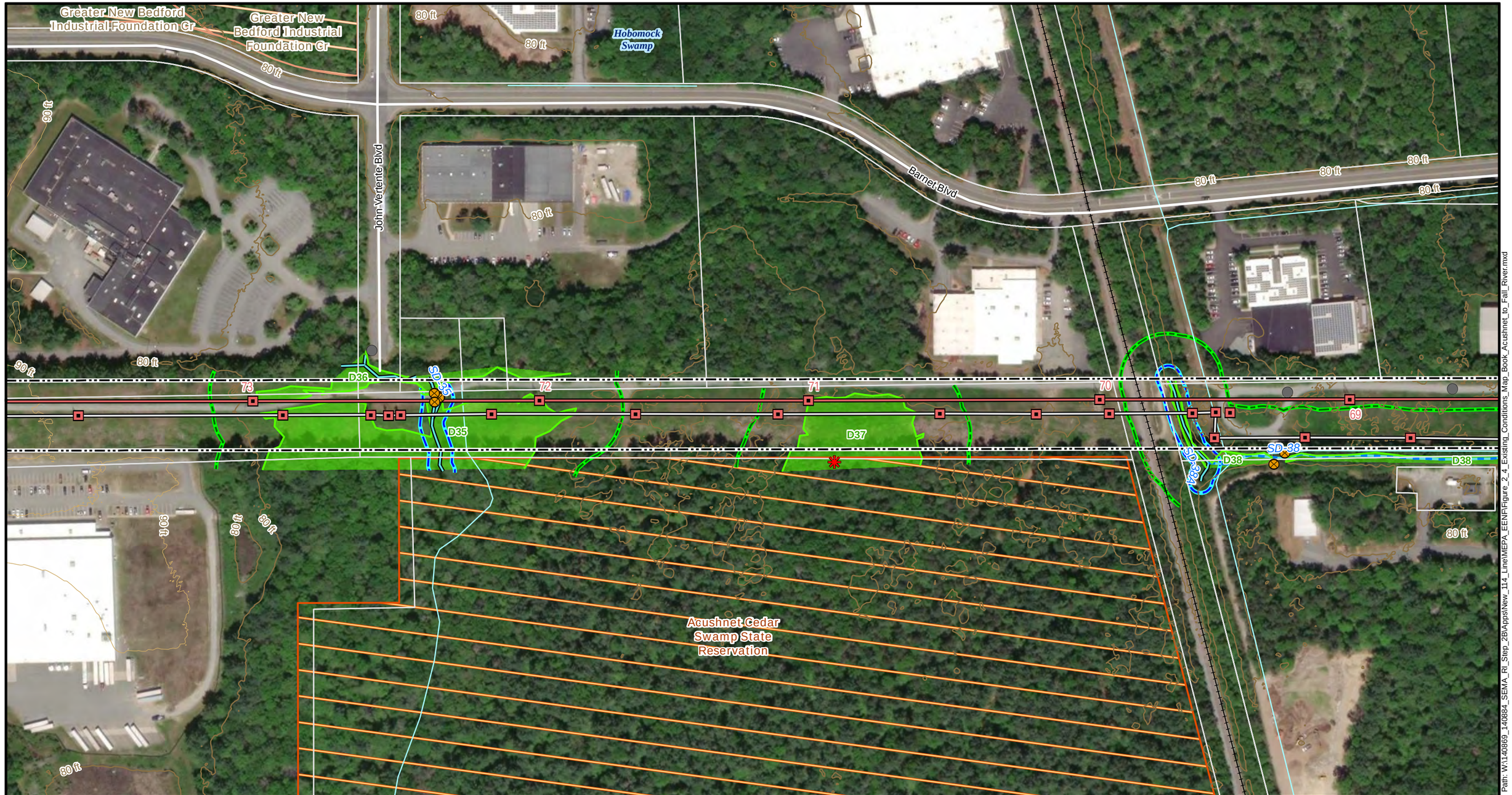



Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Culvert
- Man Hole

Field GPS Survey Line (2015-2018)

- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Railroad
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 9 of 22

Commonwealth of Massachusetts

Bristol County:
City of New Bedford

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

EVERSOURCE nationalgrid POWER ENGINEERS

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Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Pipeline
- Wetland Border
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
City of New Bedford, Town of Dartmouth

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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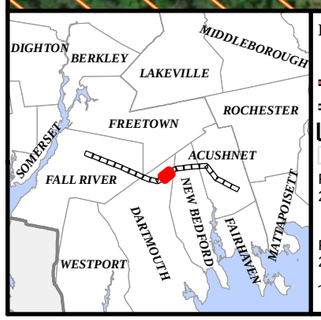
High Hill Reservoir

Acushnet Cedar Swamp State Reservation

Acushnet Cedar Swamp State Reservation

83 82 D28 81 80 79 D29 D30



Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Pipeline
- Wetland Border
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

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Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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Legend

- Utility Structure
- Existing Transmission Line
- Existing Distribution Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Culvert
- Man Hole

Field GPS Survey Line (2015-2018)

- Observed Inundation
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland

- FEMA Flood Hazard (DFIRM 100yr)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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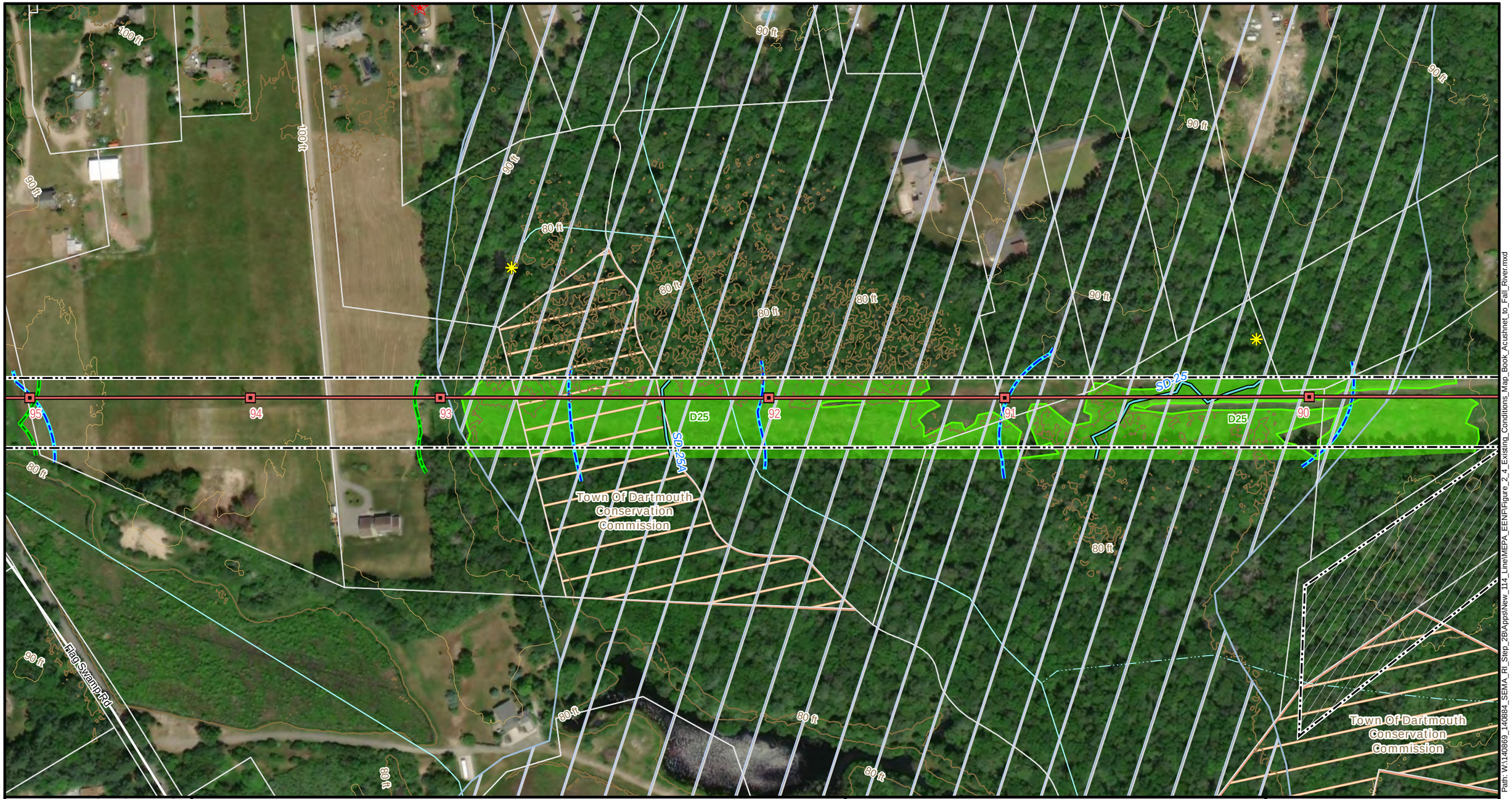



Legend

- Utility Structure
- Existing Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 13 of 22

Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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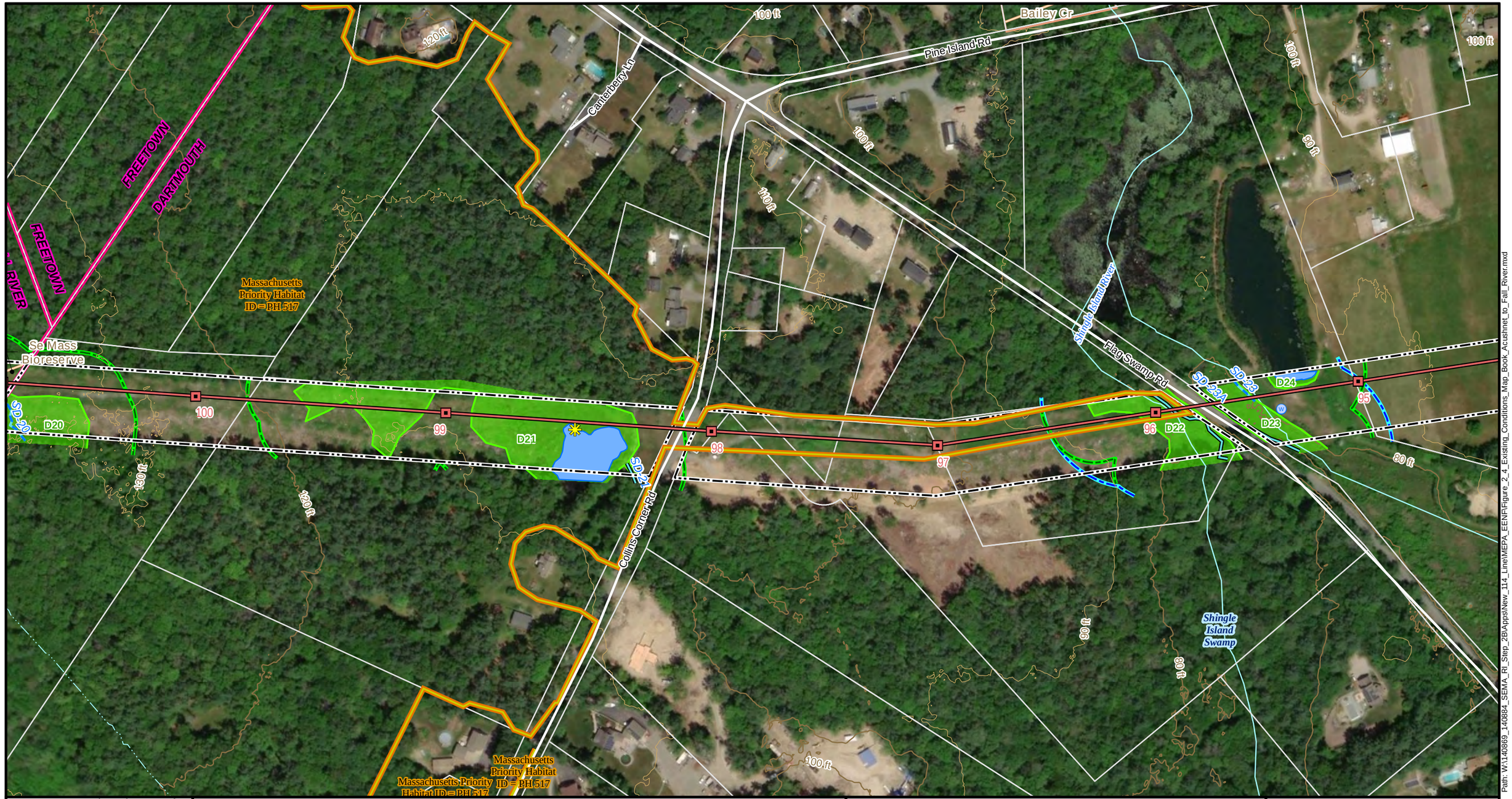



Legend

- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Well
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Delineated Open Water
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Se Mass Bioreserve

Se Mass Bioreserve

Se Mass Bioreserve

Massachusetts Priority Habitat ID = PH 517

470 ft
190 ft
180 ft
150 ft
200 ft
210 ft
160 ft
120 ft
130 ft

FALL RIVER
FREETOWN
FREETOWN
DARTMOUTH
FALL RIVER
DARTMOUTH
130 ft
140 ft

66
67
68
69
70
71

Erosion Control Diversion Ditch

SD_20
DP-12
D20

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Legend

- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- Intermittent Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 15 of 22

Commonwealth of Massachusetts

Bristol County:
Towns of Dartmouth & Freetown, City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Se Mass Bioreserve

Massachusetts Priority Habitat ID = PH 517

AR10

Gas Line Trail

61

62

63

64

65

66

D19

D19A

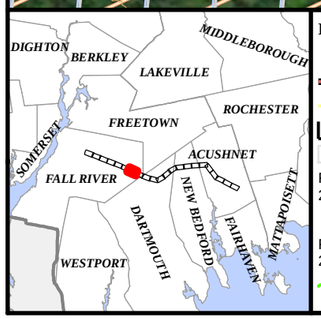
AGT 20"

AGT 10"

Se Mass Bioreserve

Se Mass Bioreserve

Se Mass Bioreserve



Legend

- Utility Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Isolated Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- 400 ft Buffer to Class A Public Water Supply
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Copicut Reservoir
Copicut Reservoir
Quanipaug Road
Se Mass Bioreserve
Massachusetts Priority Habitat ID = PH 517
Se Mass Bioreserve
DP-6
55
D13
D14
56
D15
DP-7
57
D16
58
D16A
59
D17
D18
60
Erosion Control Diversion Ditch
Copicut Reservoir
Copicut River

DIGHTON
BERKLEY
LAKEVILLE
MIDDLEBOROUGH
ROCHESTER
FREETOWN
SOMERSET
ACUSHNET
FALL RIVER
NEW BEDFORD
DARTMOUTH
FAIRHAVEN
MATTAPOISETT
WESTPORT

Legend

- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Field GPS Survey Line (2015-2018)
- Note Road Erosion
- Observed Inundation
- Wetland Border
- Isolated Wetland Border
- Mean Annual High Water Line
- Ditch
- Delineated Open Water
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 400 ft Buffer to Class A Public Water Supply
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Legend

- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Culvert
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Isolated Wetland Border
- Perennial Stream or River
- Mean Annual High Water Line
- Delineated Open Water
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 400 ft Buffer to Class A Public Water Supply
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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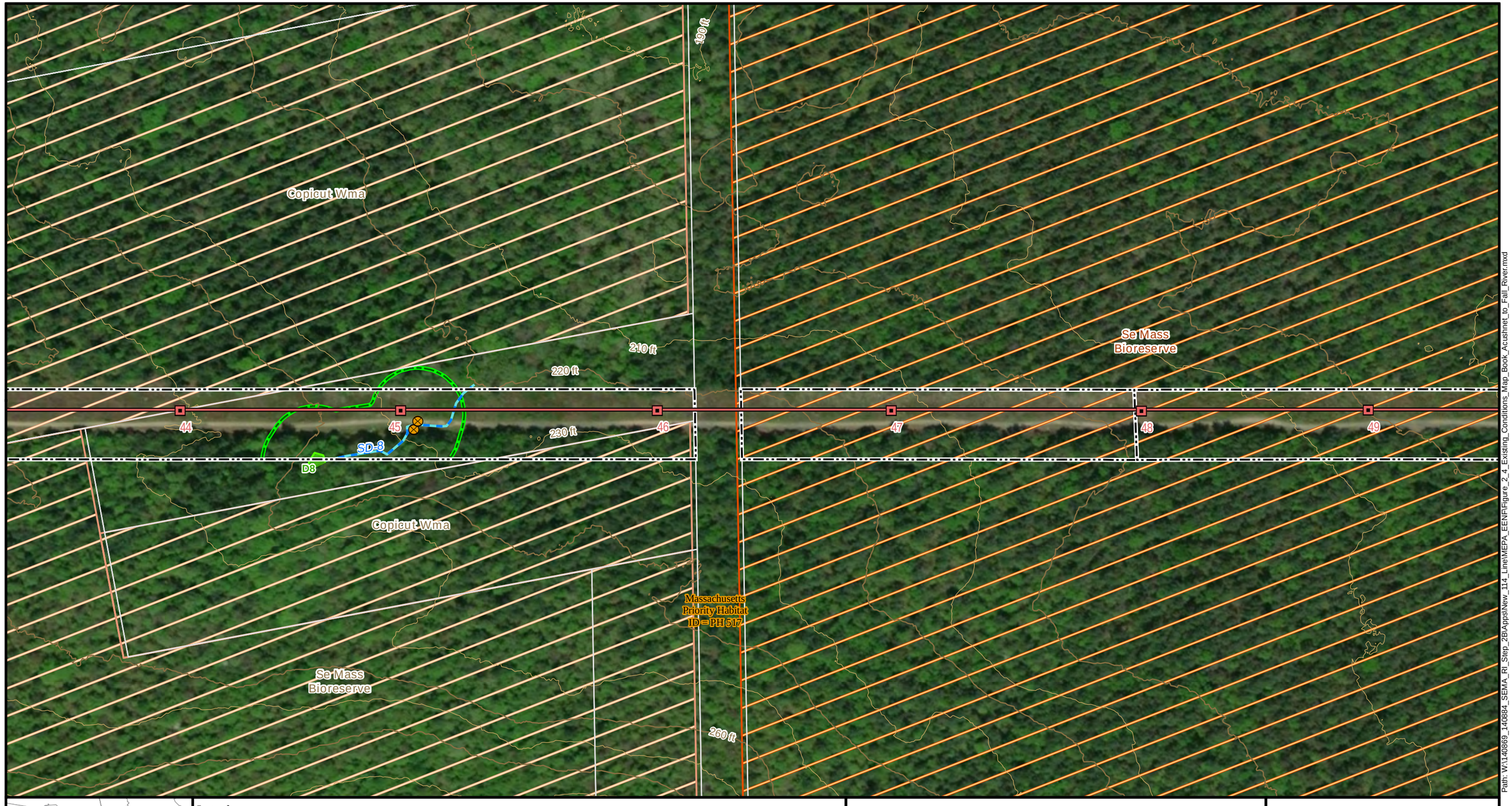



Legend

- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Intermittent Stream
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Legend

- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Isolated Wetland Border
- Field Delineated Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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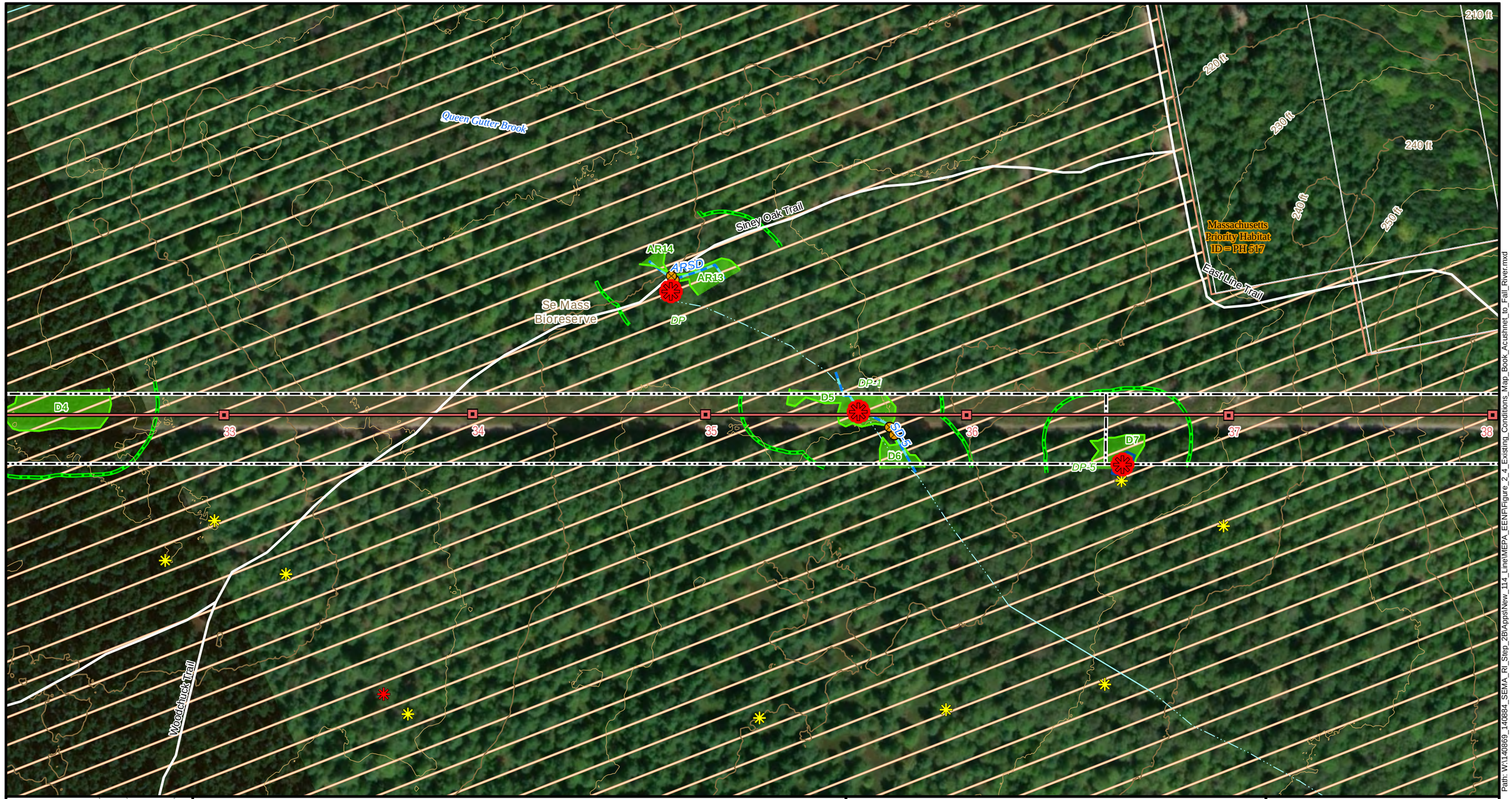



Legend

- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
  - Vernal Pool
  - Culvert
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Intermittent Stream
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

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Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Date: 11/13/2018 Author: TDH

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Freetown-fall River State Forest
Queen Cutter Brook
Canfield Trail
Bell Rock Rd
Se Mass Bioreserve
Se Mass Bioreserve
M1
M2
#27
#28
#28
#27
Bell Rock S/S
LP-1
L1
L1A
D1
D2
D3
D4
30
31
32
#2
#31
#32
#3
L2
Massachusetts Priority Habitat ID = PH 517
Mowry Path
Siney Oak Trail



Legend

- Utility Structure
- Existing Transmission Line
- Substation or Tap
- National Grid Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Culvert
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-4: Existing Conditions

Page 22 of 22

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

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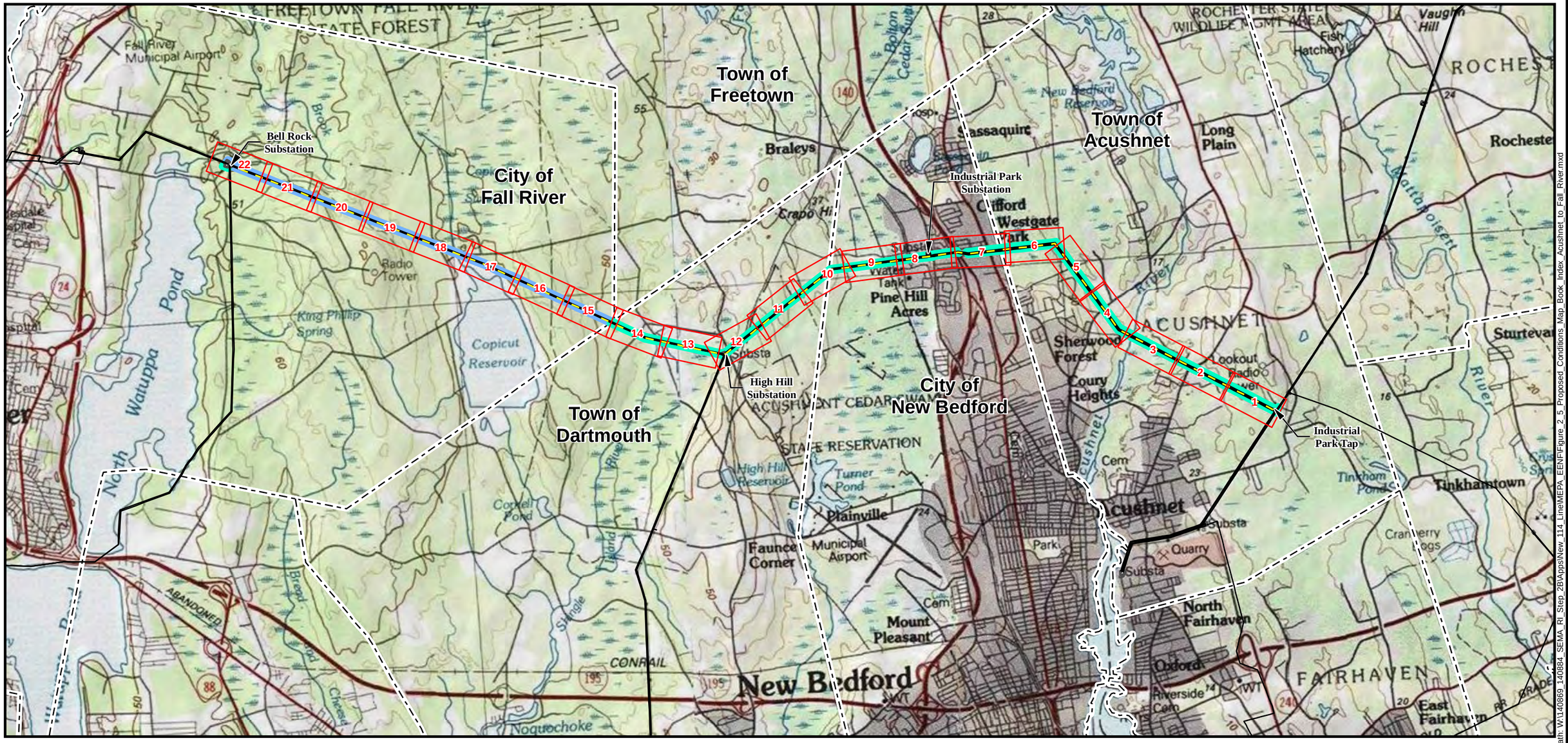
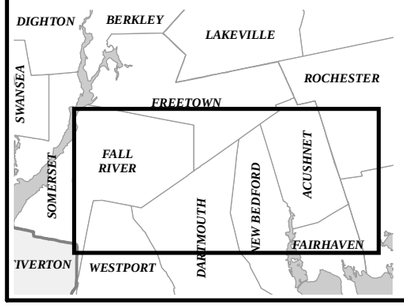


Project Vicinity



Legend

- New 115 kV Transmission Line
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions Index Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE
nationalgrid

NOT FOR CONSTRUCTION

Date: 11/13/2018

Author: TDH

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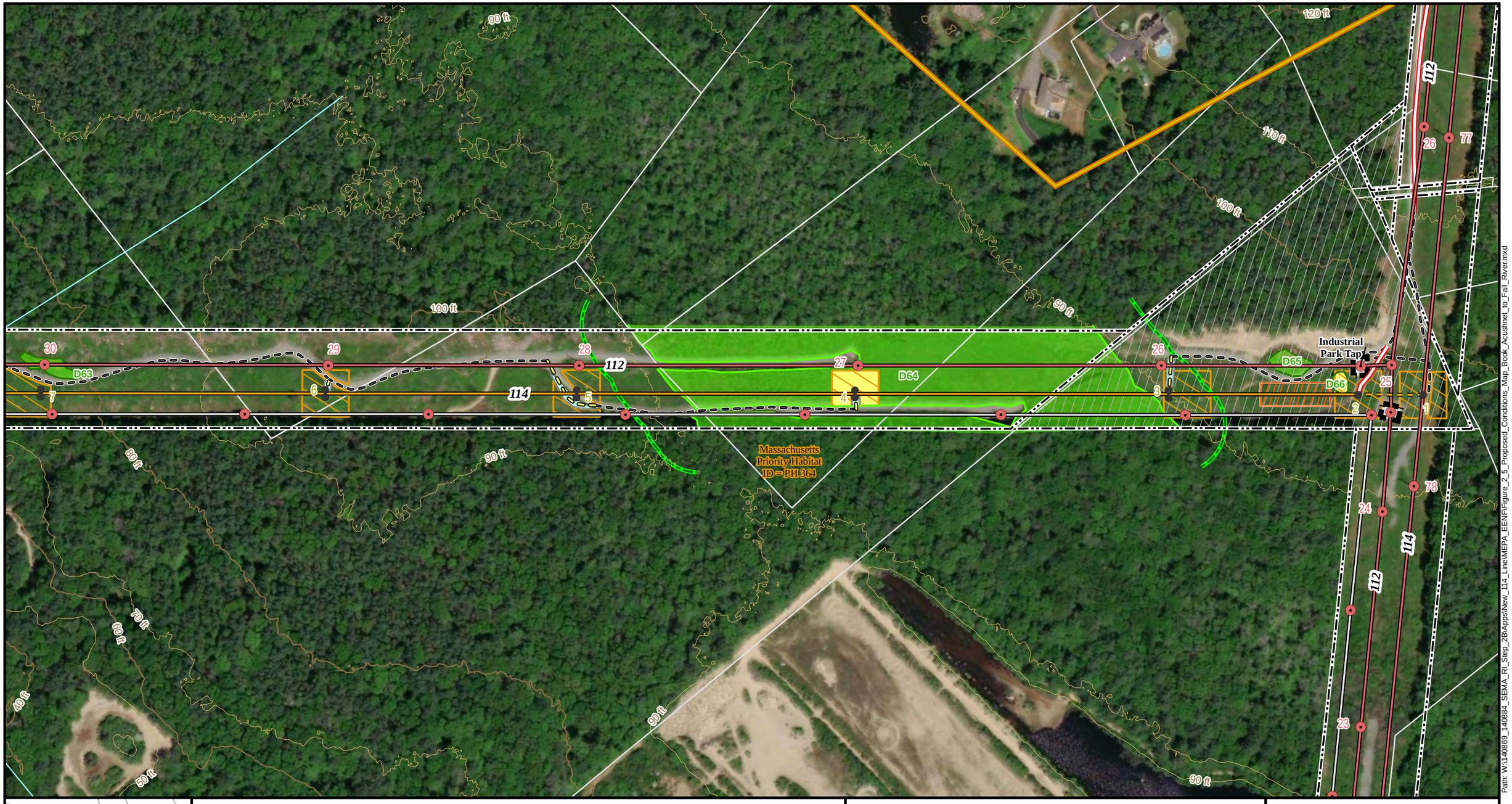



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Proposed Underground Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Isolated Wetland Border
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Date: 11/13/2018 Author: TDH

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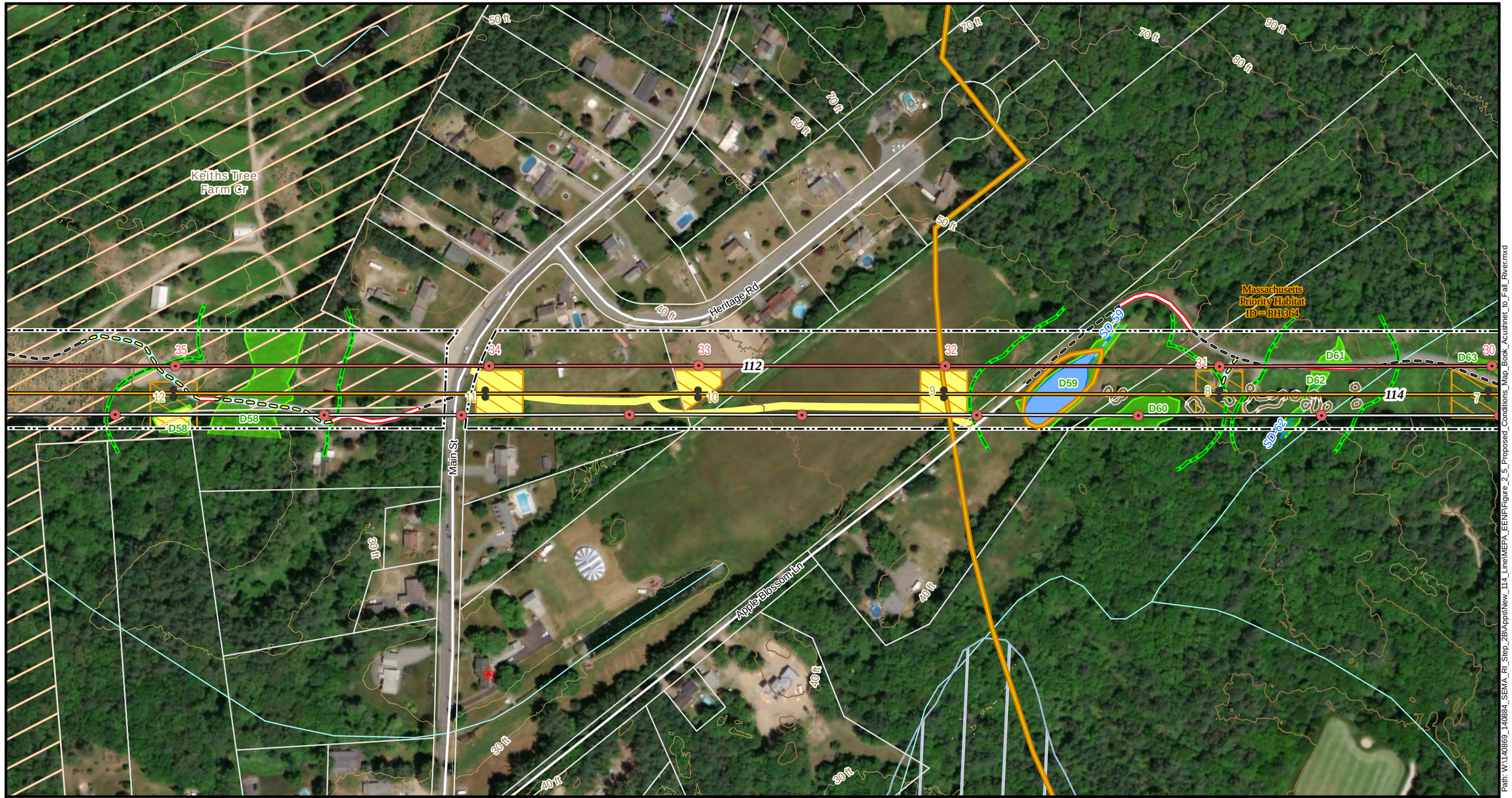



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Limit of Tree Clearing
- Construct New Access Road
- Improve Existing Access Road
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Isolated Wetland Border
- Intermittent Stream
- Delineated Open Water
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Page 2 of 22

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

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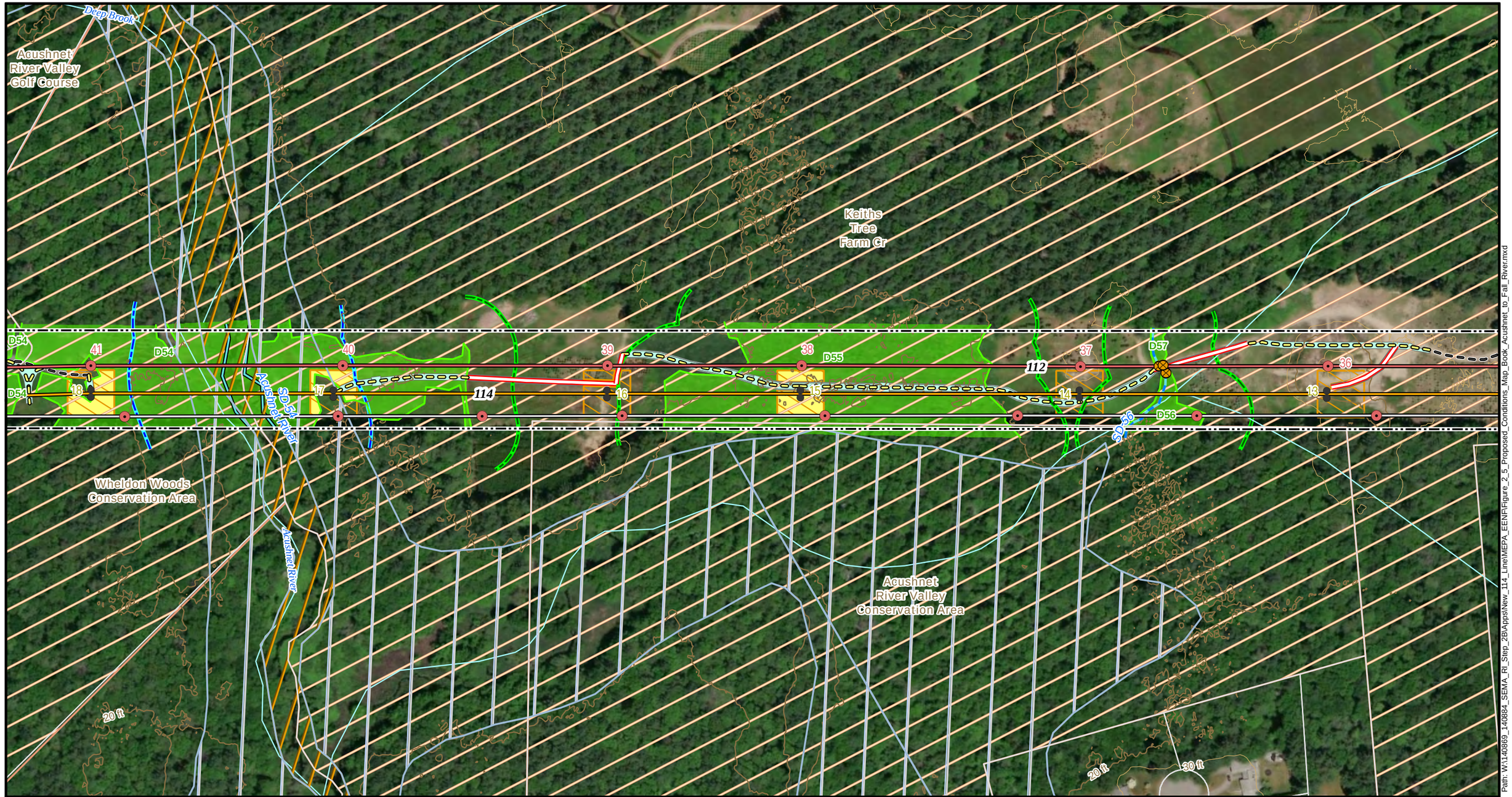



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Floodway
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

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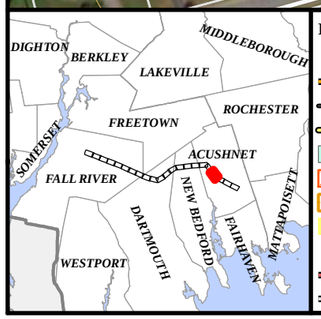

Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Field Delineated Wetland
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Floodway
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

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Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Ditch
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

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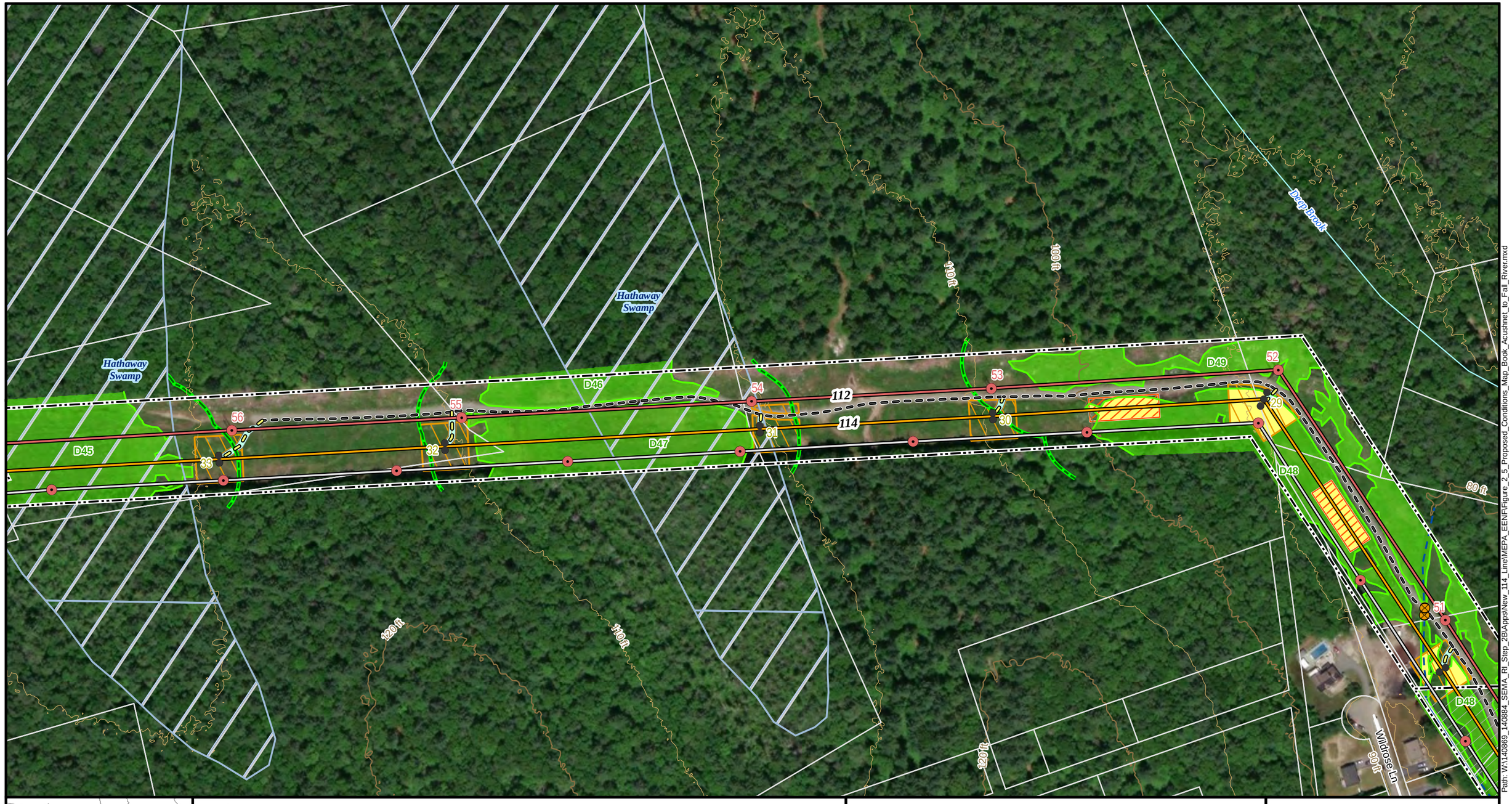



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Ditch
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

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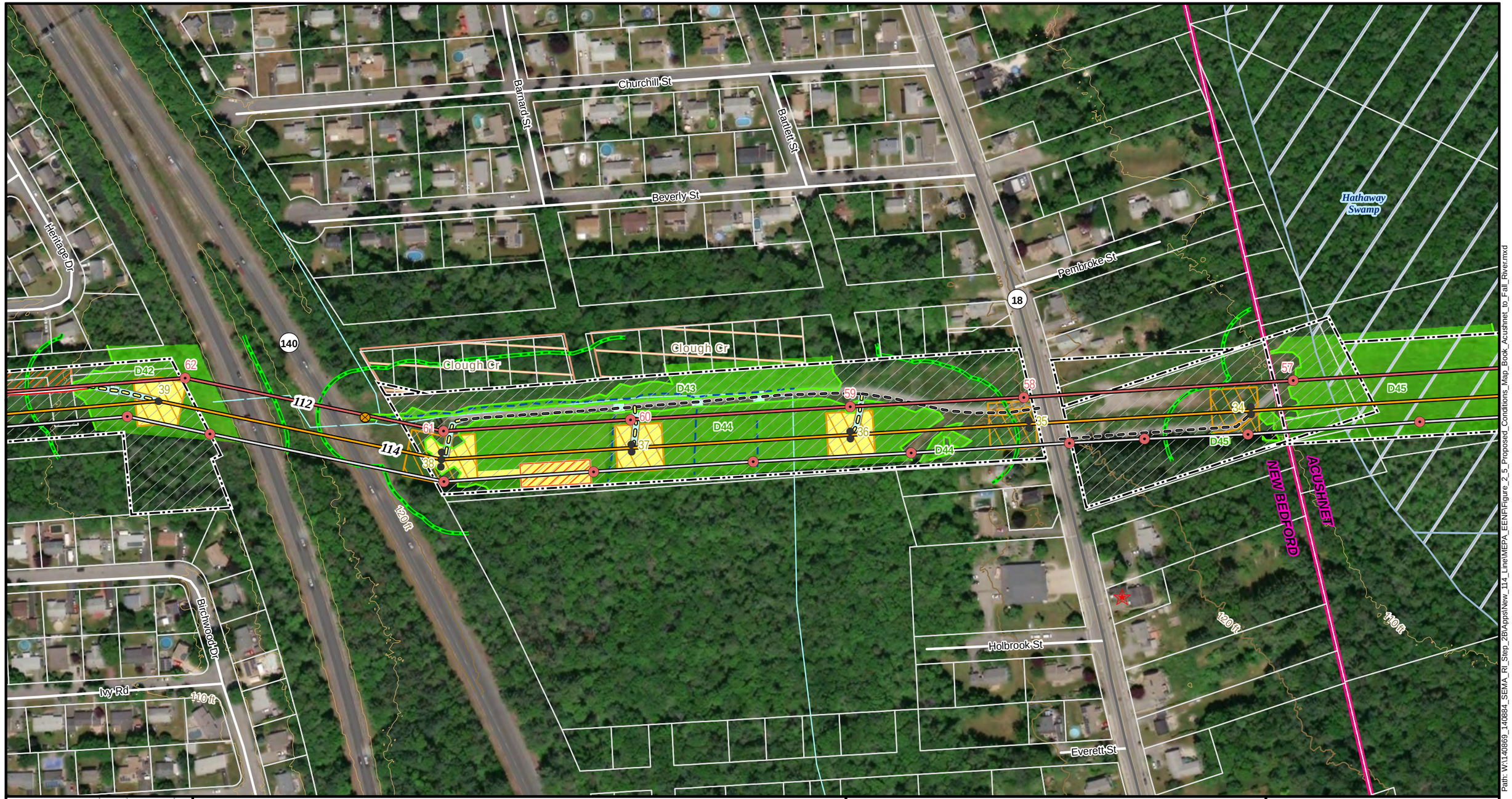



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Ditch
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- State Highway
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N
W E
S

1 " = 200 '

0 100 200 300
Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Acushnet, City of New Bedford

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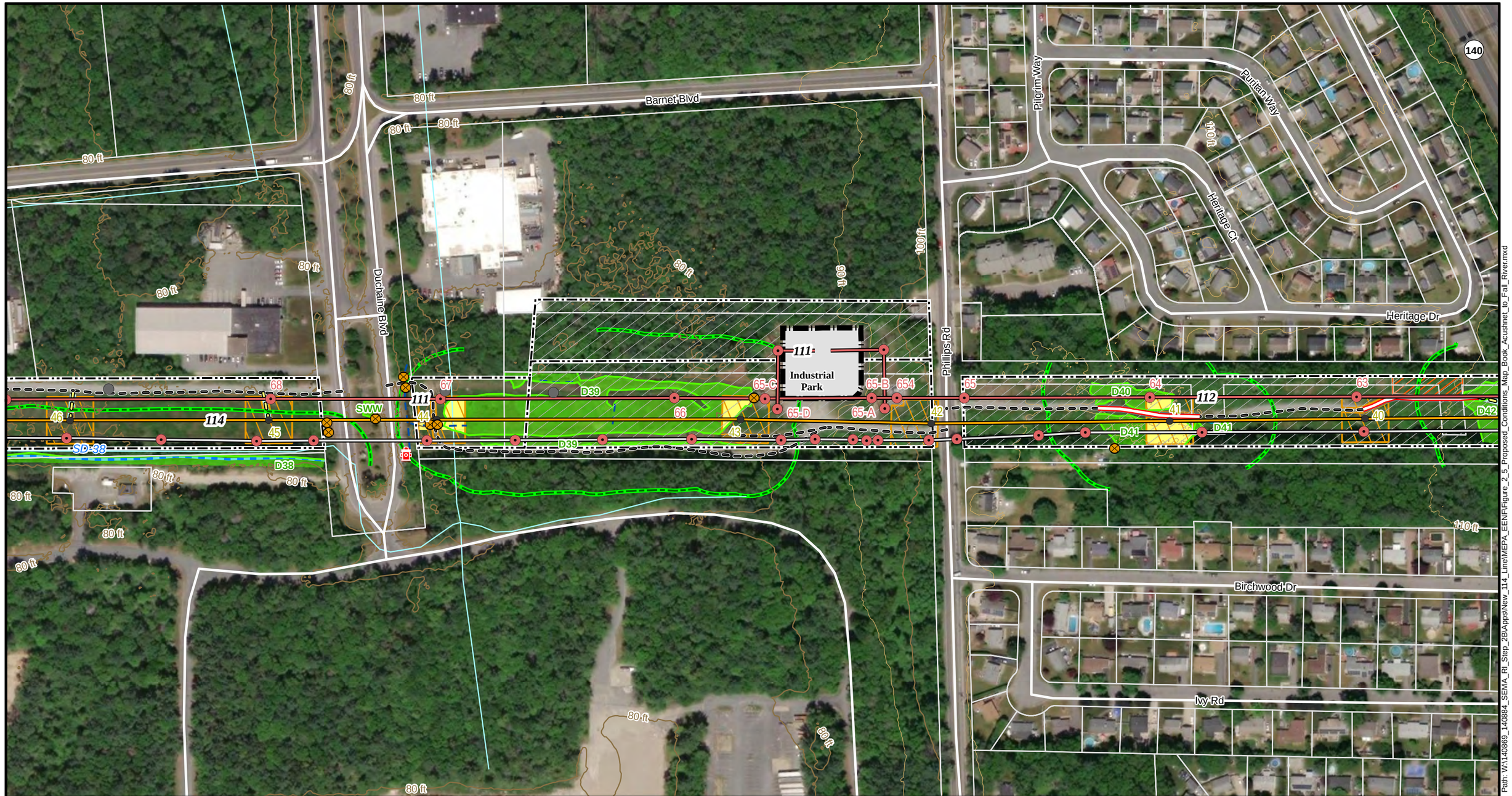



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Man Hole
- Hydrant
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- State Highway
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
City of New Bedford

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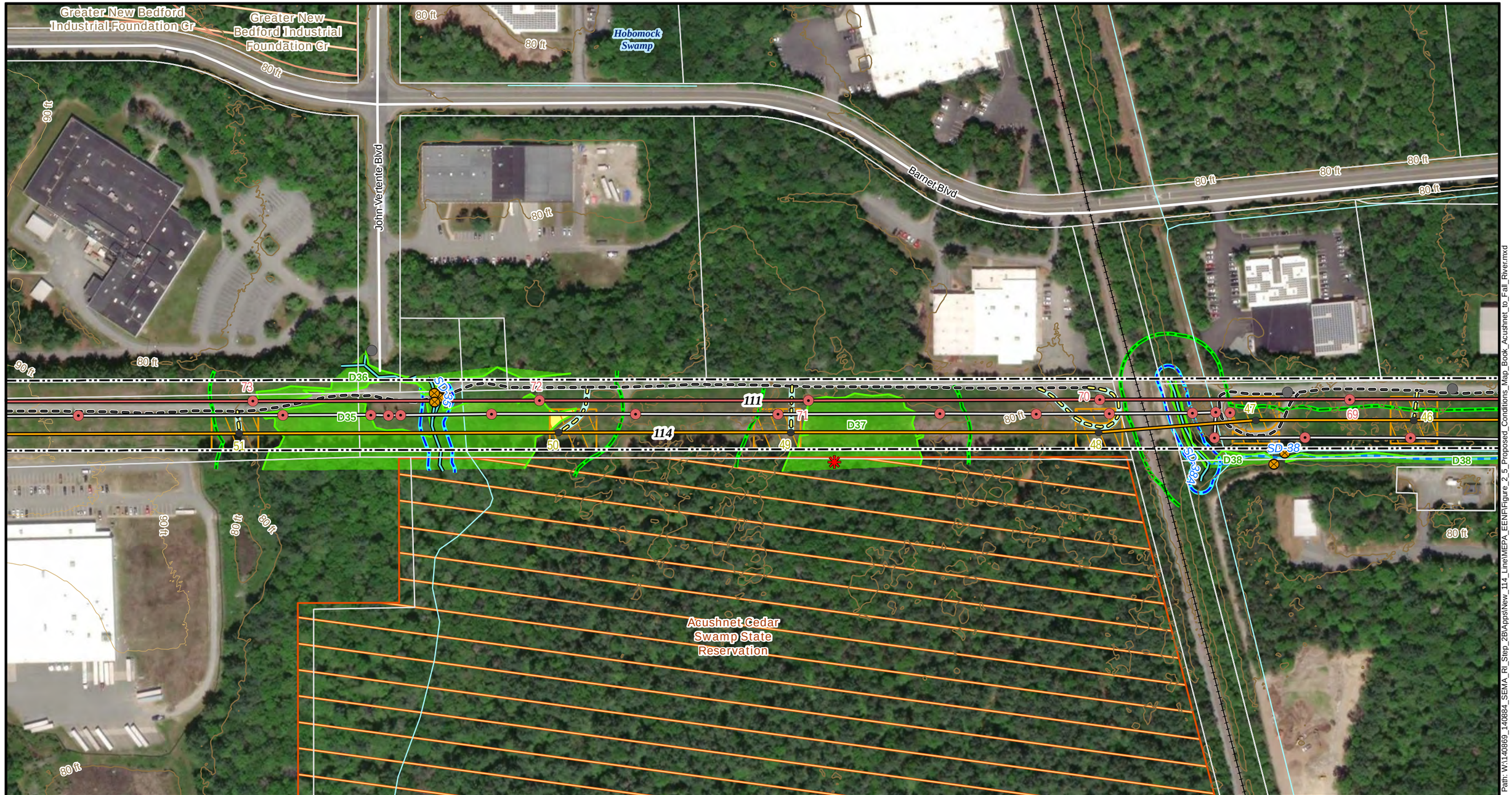



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Man Hole
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Railroad
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
City of New Bedford

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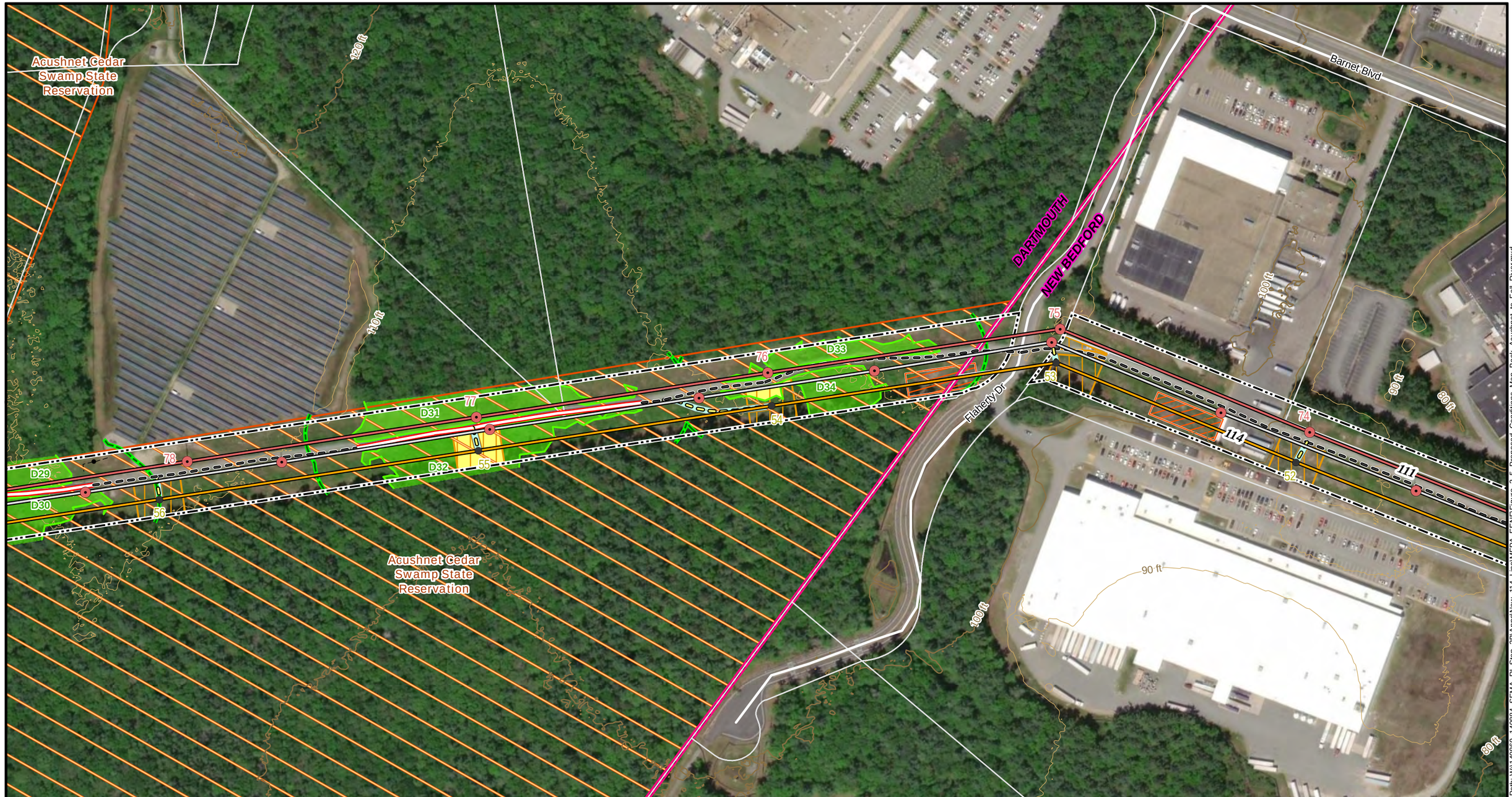



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Pipeline
- Wetland Border
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
City of New Bedford, Town of Dartmouth

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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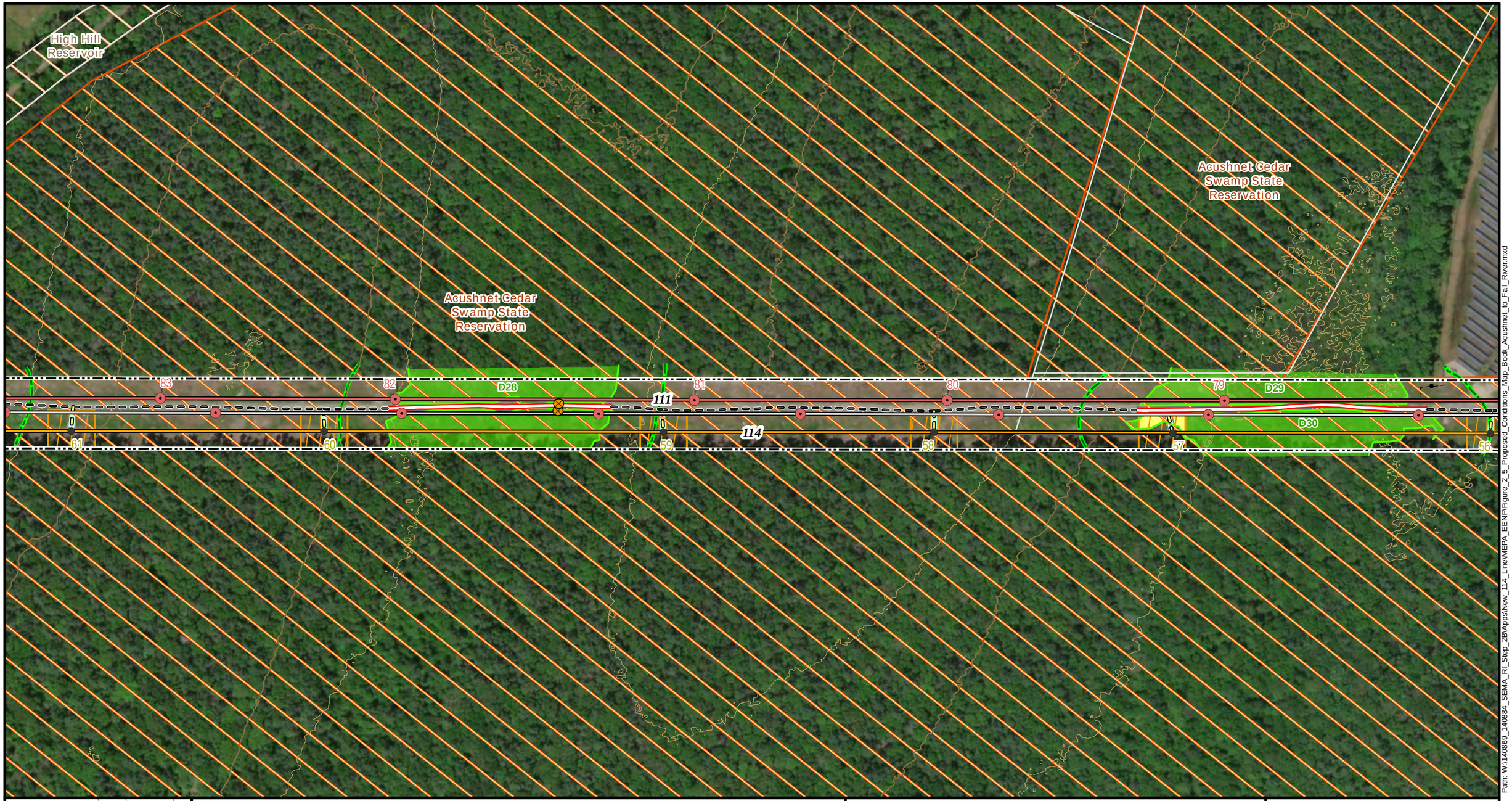



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Pipeline
- Wetland Border
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

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Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Proposed Underground Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Improve Existing Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Sub-Transmission Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Man Hole
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N W E S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

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Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

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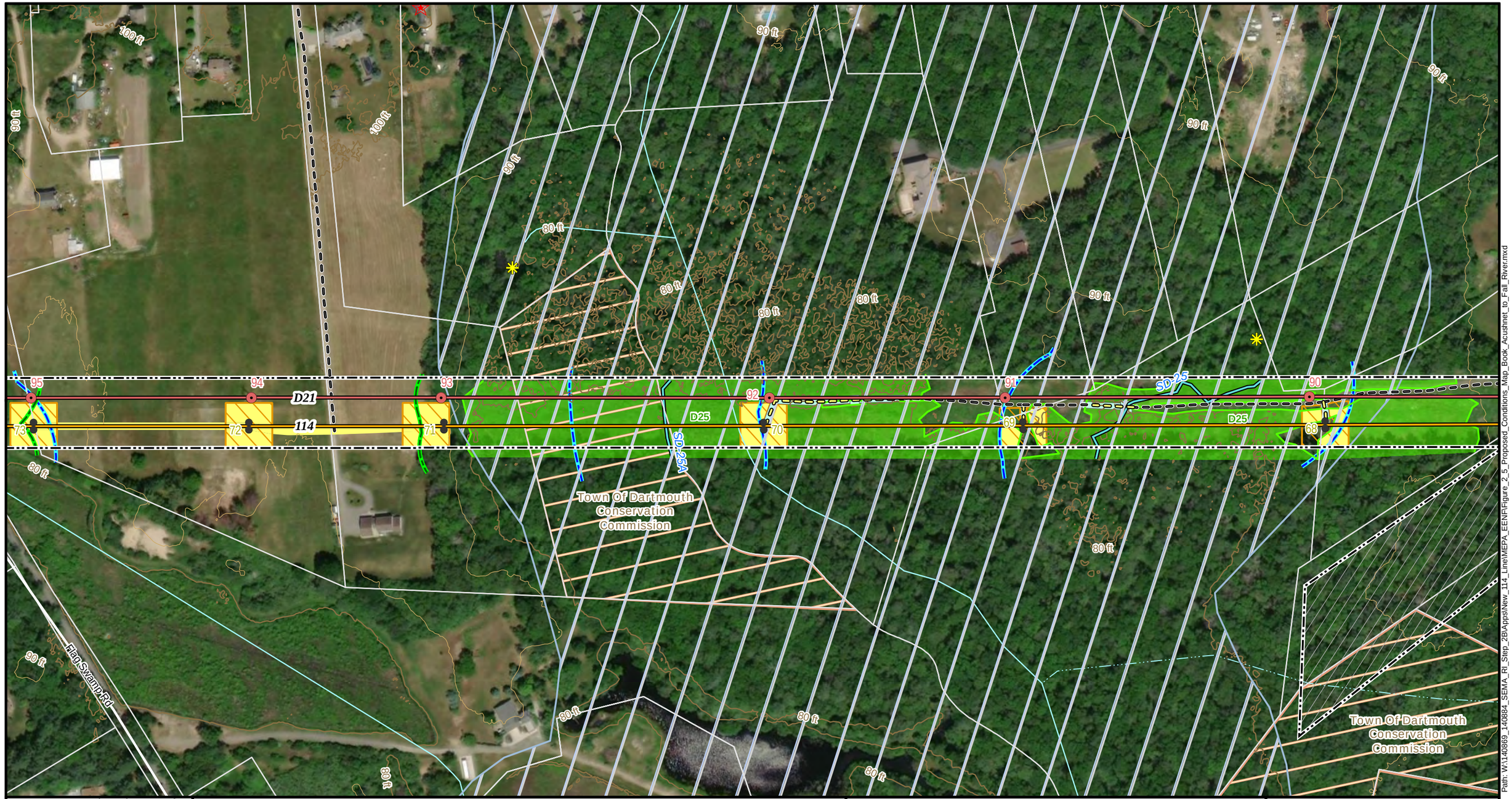



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N
W E
S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

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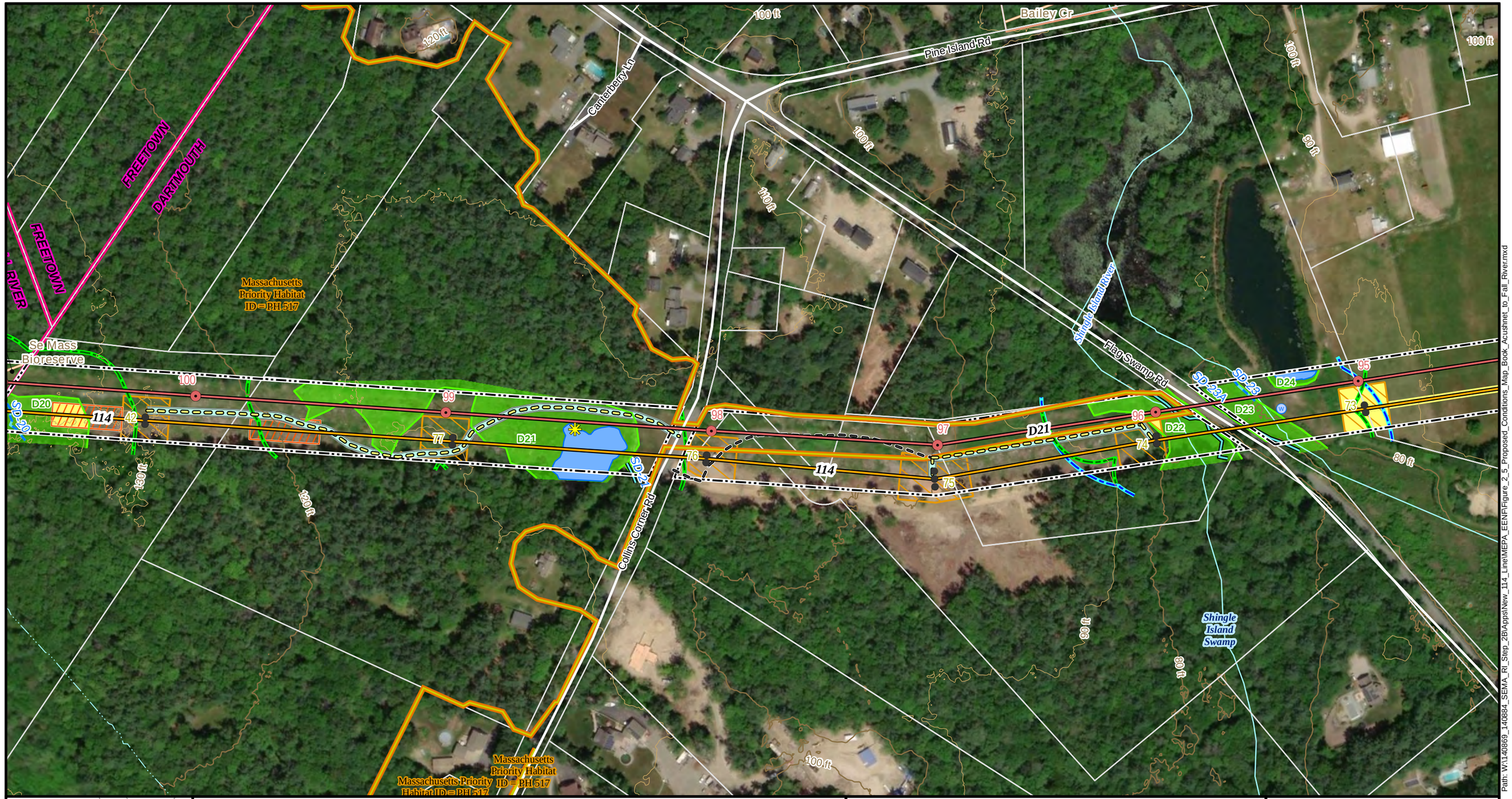

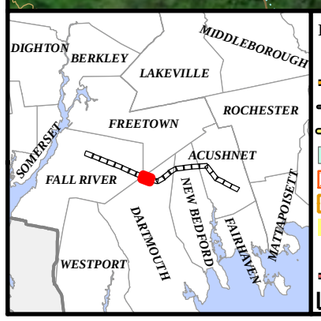

Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Construct New Access Road
- Construct New Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Well
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Delineated Open Water
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

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Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Construct New Access Road
- Limit of Tree Clearing
- Construct New Access Road
- Improve Existing Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- Intermittent Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Page 15 of 22

Commonwealth of Massachusetts

Bristol County:
Towns of Dartmouth & Freetown, City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

EVERSOURCE nationalgrid POWER ENGINEERS

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Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Improve Existing Access Road
- Limit of Tree Clearing
- Improve Existing Access Road
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Isolated Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- 400 ft Buffer to Class A Public Water Supply
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Page 16 of 22

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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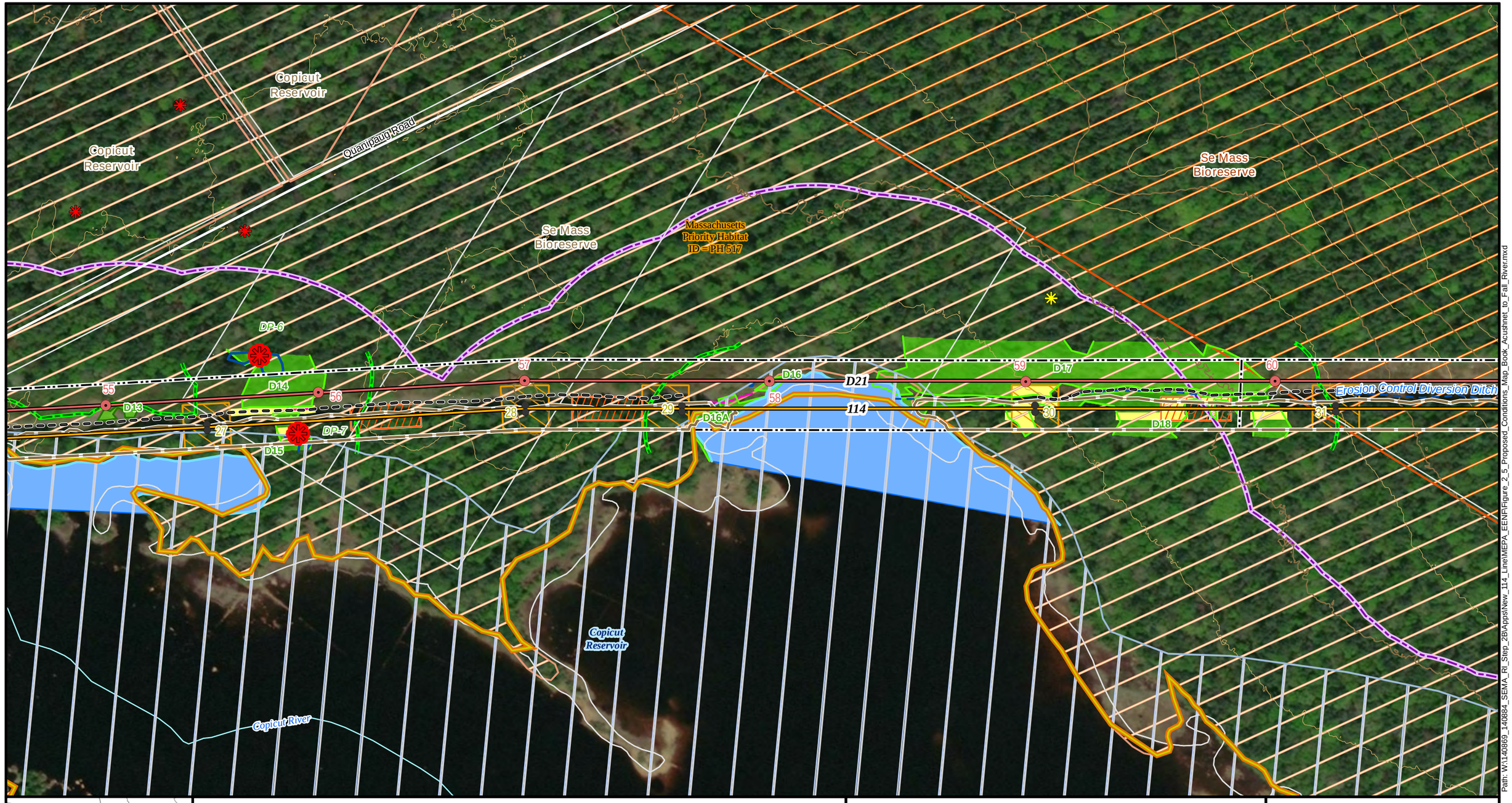



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Limit of Tree Clearing
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Vernal Pool

Field GPS Survey Line (2015-2018)

- Note Road Erosion
- Observed Inundation
- Wetland Border
- Isolated Wetland Border
- Mean Annual High Water Line
- Ditch
- Delineated Open Water
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 400 ft Buffer to Class A Public Water Supply
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Limit of Tree Clearing
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Culvert
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Isolated Wetland Border
- Perennial Stream or River
- Mean Annual High Water Line
- Delineated Open Water
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 400 ft Buffer to Class A Public Water Supply
- Riverfront Area
- 100 ft Buffer Wetland
- FEMA Flood Hazard (DFIRM 100yr)
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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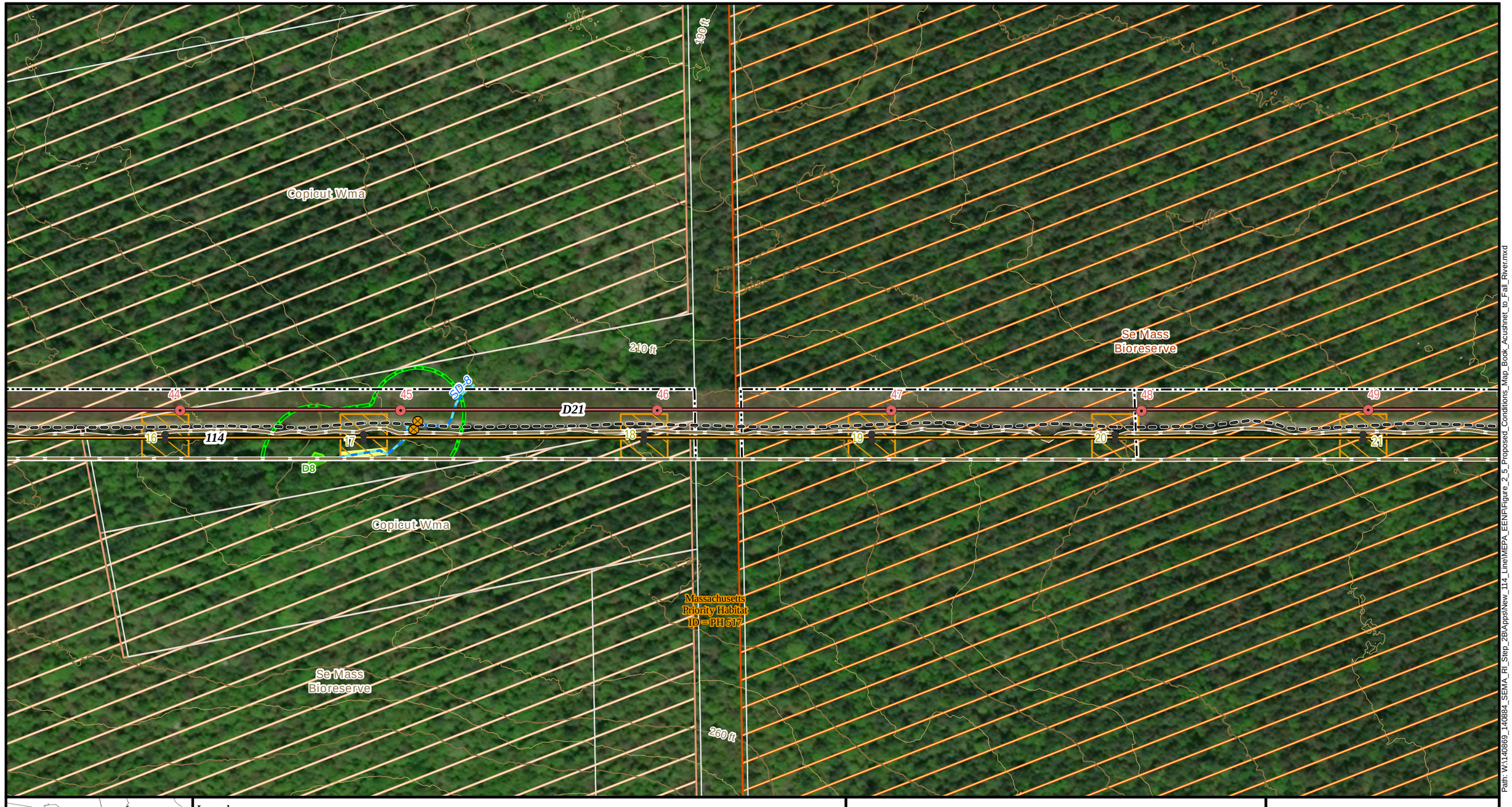



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Limit of Tree Clearing
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Intermittent Stream
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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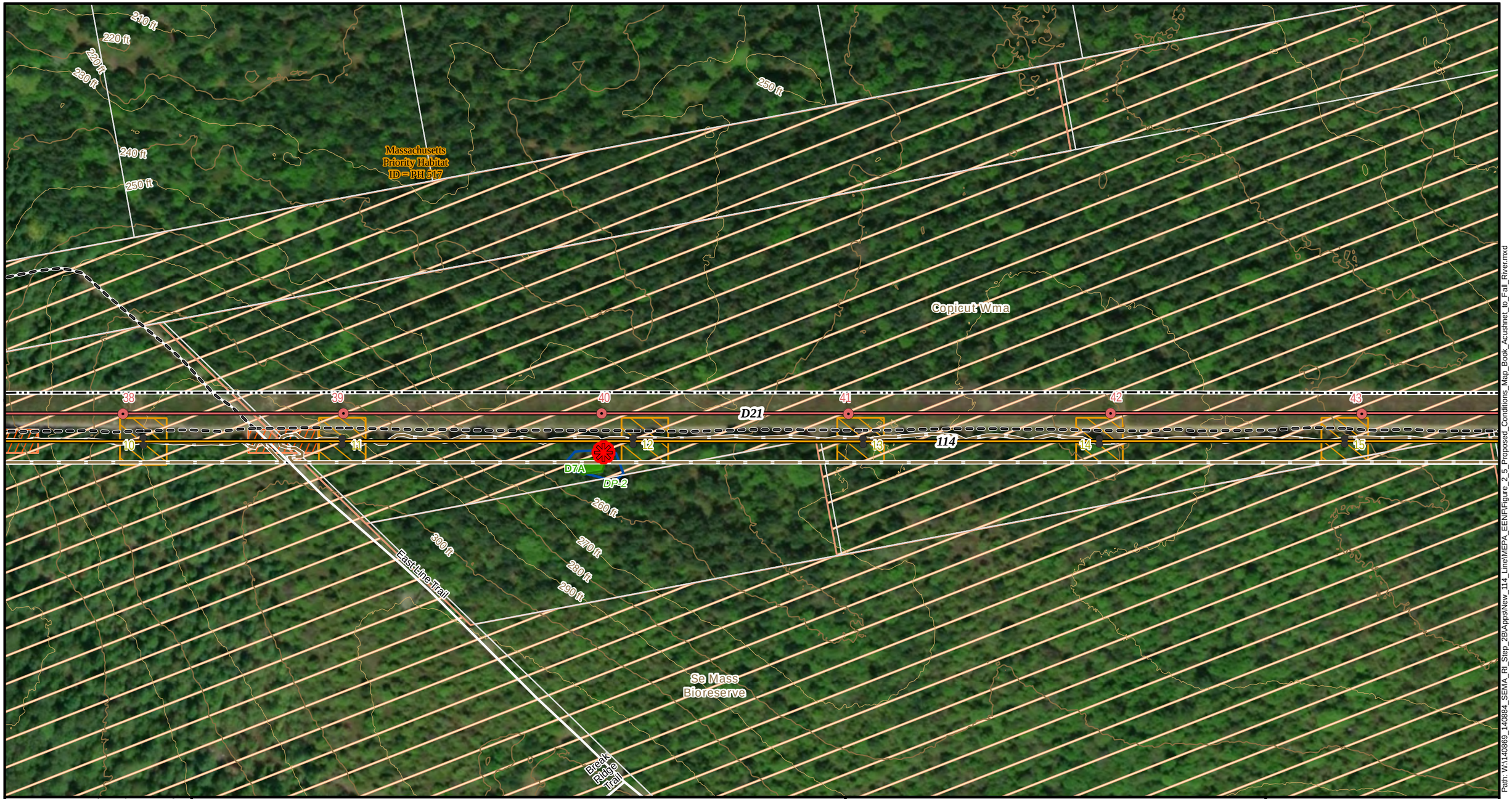



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Limit of Tree Clearing
- Wire Pulling Station
- Work Pad / Area
- Existing Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Vernal Pole

Field GPS Survey Line (2015-2018)

- Observed Inundation
- Isolated Wetland Border
- Field Delineated Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E W S

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Date: 11/13/2018 Author: TDH

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Queen Cutter Brook

East Line Trail

Massachusetts Priority Habitat ID = PH 517

210 ft
220 ft
230 ft
240 ft
240 ft
250 ft

AR14
ARSD
AR13
DP
Se Mass Bioreserve
DP-1
DP-5
D4
D5
D6
D7
D21
114
33
34
35
36
37
38
5
6
7
8
9

Siney Oak Trail

Woodchuck Trail



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Limit of Tree Clearing
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Vernal Pool
- Culvert

Field GPS Survey Line (2015-2018)

- Observed Inundation
- Wetland Border
- Intermittent Stream
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

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Freetown-fall River State Forest
Queen Cutter Brook
Canfield Trail
Bell Rock Rd
Se Mass Bioreserve
Se Mass Bioreserve
M1
M2
#27
N12
Bell Rock S/S
M13
#27
LP-1
L1
L1A
M13
L14
L2
#32
#3
Massachusetts Priority Habitat ID = PH 517
Mowry Path
Siney Oak Trail
#27
30
D1
D21
31
32
D4
D3
D2
1
2
3
114
4



Legend

- Proposed Steel Pole
- Proposed Transmission Line
- Use Existing Access Road
- Limit of Tree Clearing
- Construct New Access Road
- Wire Pulling Station
- Work Pad / Area
- Construction Mat
- Existing Structure
- Existing Transmission Line
- Substation or Tap
- National Grid Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Culvert
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

N E S W

1 " = 200 '

0 100 200 300

Feet

Acushnet to Fall River Reliability Project

Figure 2-5: Proposed Conditions

Page 22 of 22

Commonwealth of Massachusetts

Bristol County:
City of Fall River

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NAD 1983 UTM Zone 18N USFt

Date: 11/13/2018 Author: TDH

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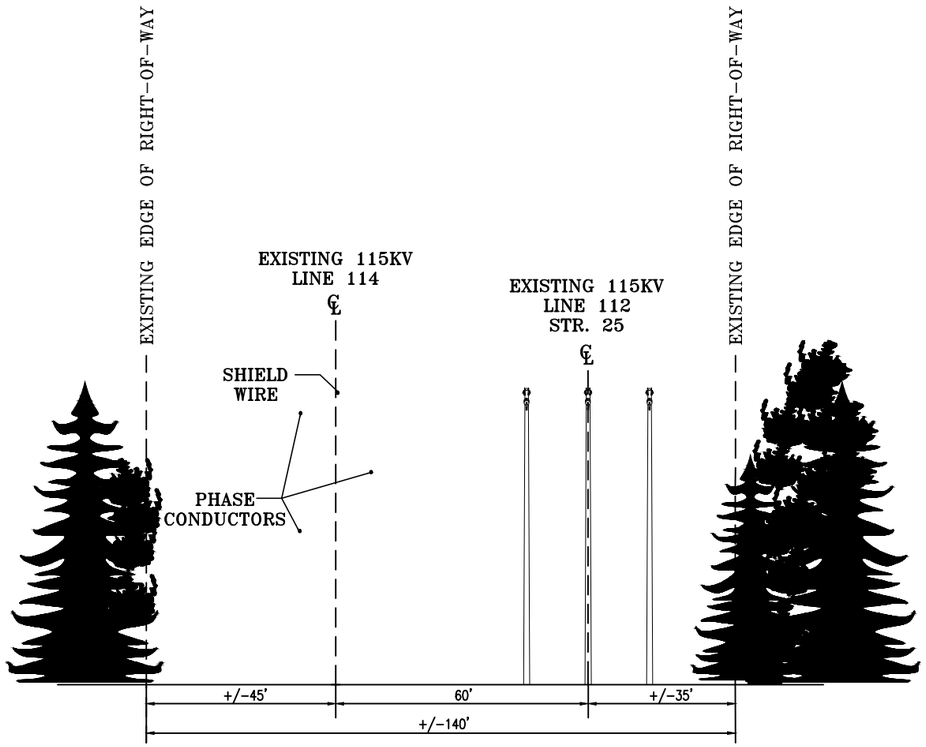
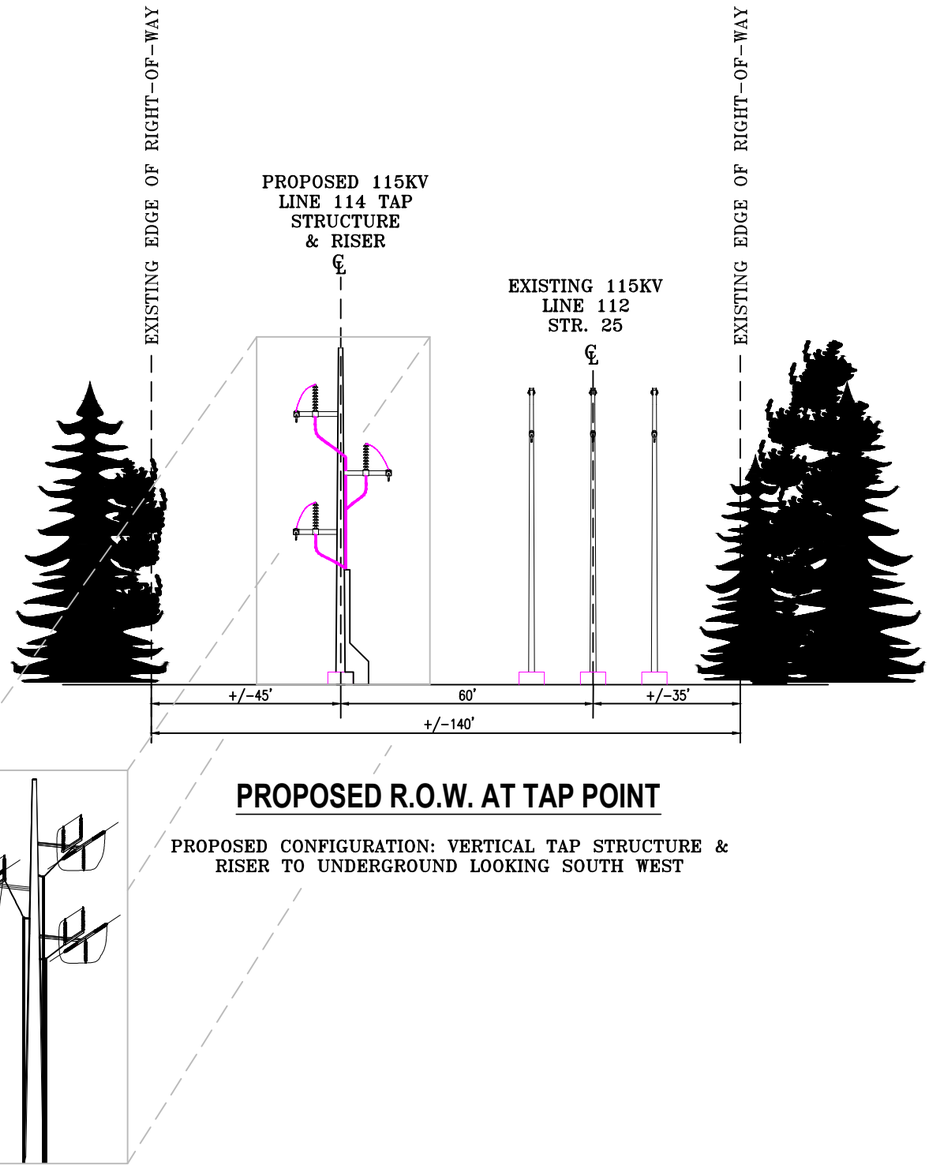


EXISTING R.O.W. AT TAP POINT

EXISTING CONFIGURATION: SINGLE CIRCUIT DELTA MONO POLES (STEEL) & H-FRAME LOOKING SOUTH WEST



PROPOSED R.O.W. AT TAP POINT

PROPOSED CONFIGURATION: VERTICAL TAP STRUCTURE & RISER TO UNDERGROUND LOOKING SOUTH WEST

ISOMETRIC VIEW

Figure 2-6: Typical ROW Cross- Section Drawings
Sheet 1 of 7

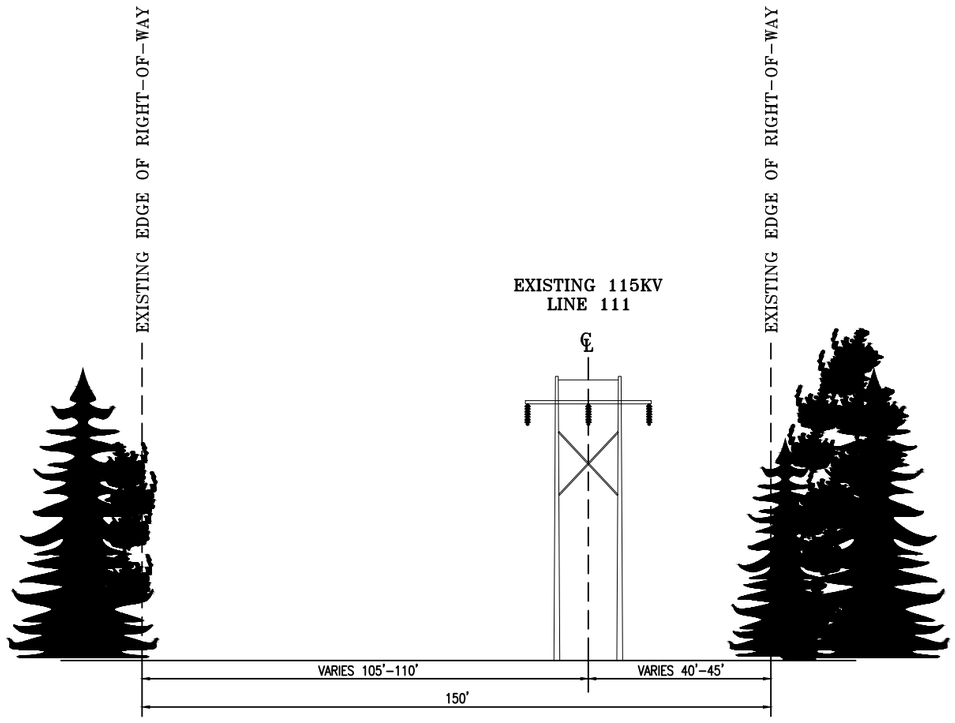
NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

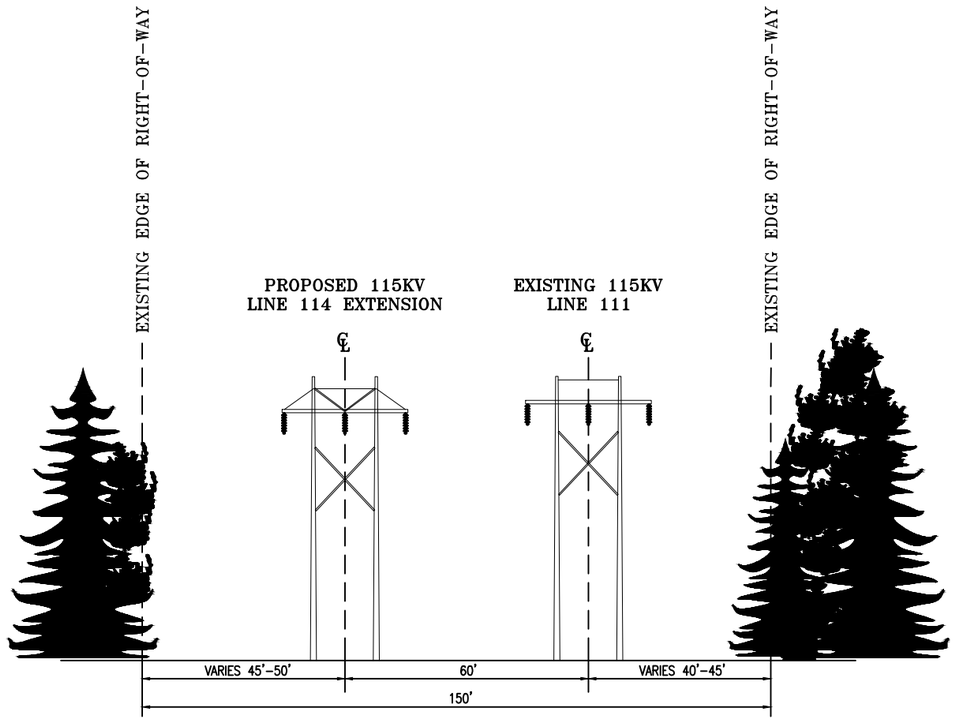
BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH1	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH1	

ES VER: 05/2015



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H–FRAME STRS.
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H–FRAME STRS. (STEEL)
FROM HIGH HILL S/S TO NATIONAL GRID INTERCONNECT 1.2 MILES
LOOKING WEST

Figure 2-6: Typical ROW Cross- Section Drawings
Sheet 2 of 7

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
C	6/29/18	RE–ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE–ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY	CHKD	APP	APP
JJD/TRC	BAF/TRC	TRB/TRC	
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H–SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V–SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH6	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH6	

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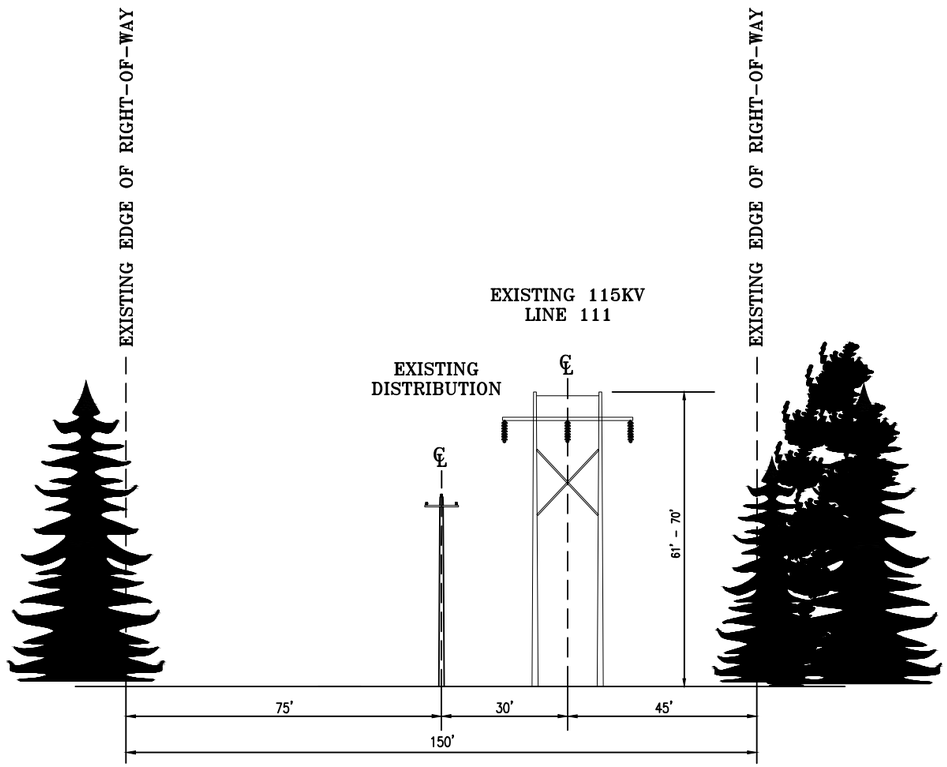
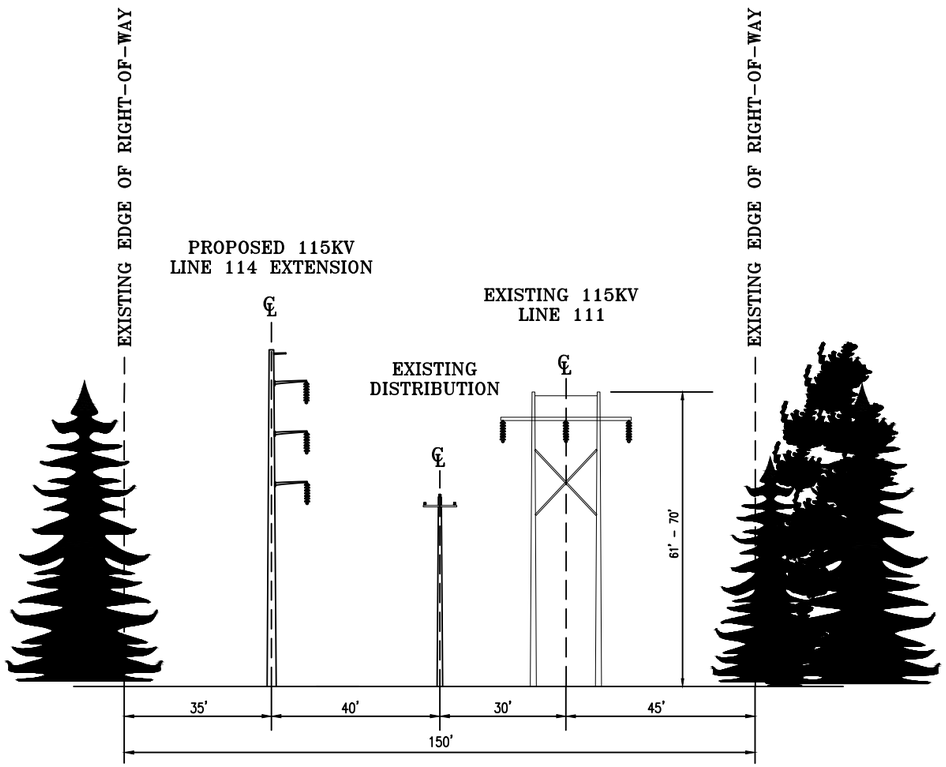


EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRUCTURES (WOOD)
FROM LINE 111 STR. 70 TO HIGH HILL S/S 2 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT MONO POLES (STEEL)
NEW 115KV LINE 114 EXTENSION FROM LINE 111 STR. 70 TO
HIGH HILL S/S 2 MILES
LOOKING WEST

Figure 2-6: Typical ROW Cross- Section Drawings
Sheet 3 of 7

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
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C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
NEW BEDFORD/DARTMOUTH, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH5	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH5	

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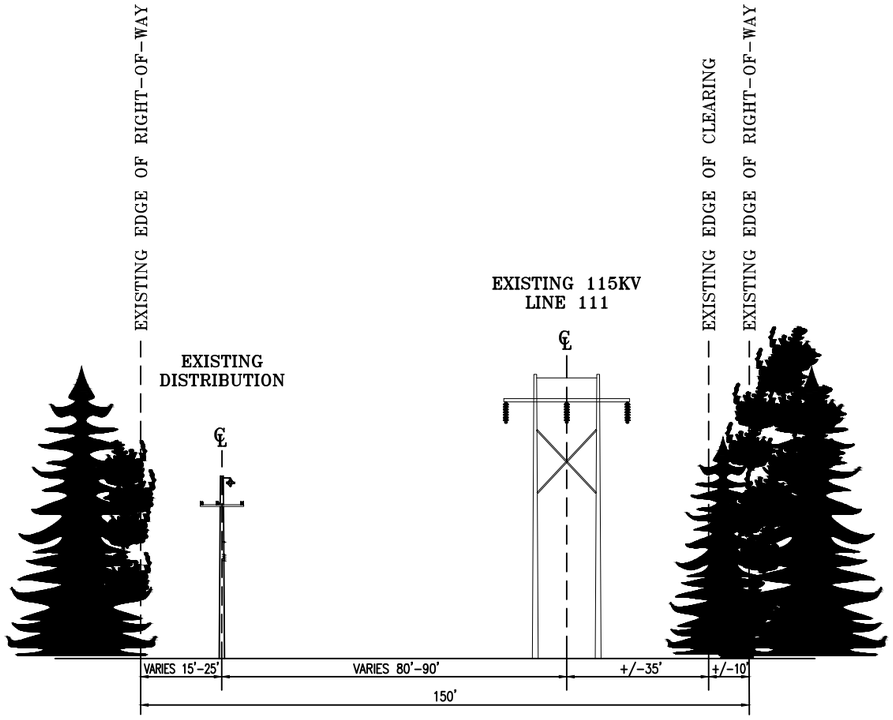
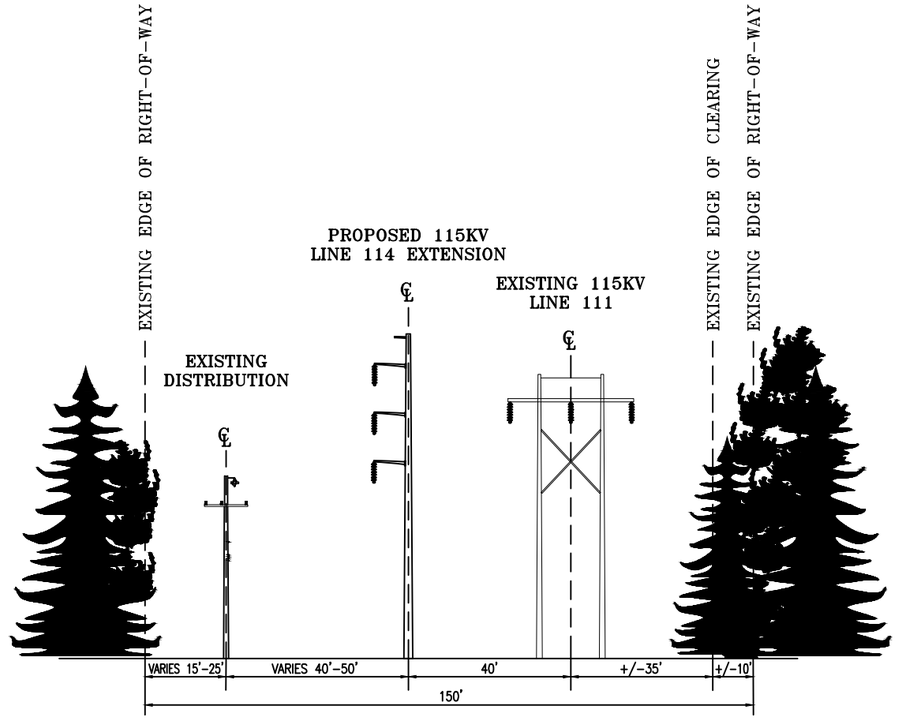


EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
FROM INDUSTRIAL PARK TAP TO LINE 111 STR. 70 0.41 MILES
LOOKING WEST



PROPOSED R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT MONO POLE (STEEL)
NEW 115KV LINE 114 EXTENSION FROM INDUSTRIAL PARK TAP TO LINE 111
STR. 70 0.41 MILES
LOOKING WEST

Figure 2-6: Typical ROW Cross- Section Drawings
Sheet 4 of 7

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH4	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH4	

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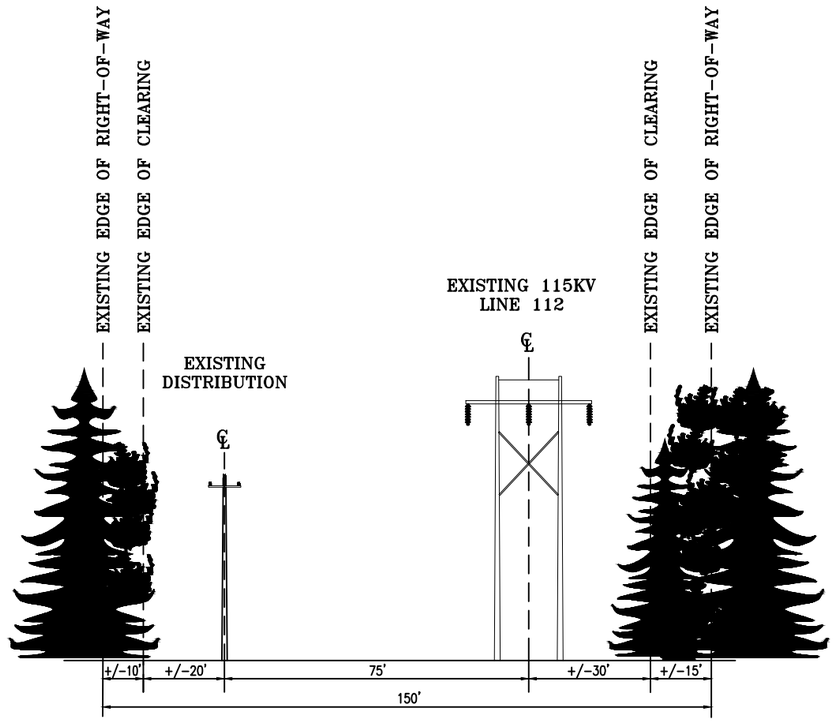
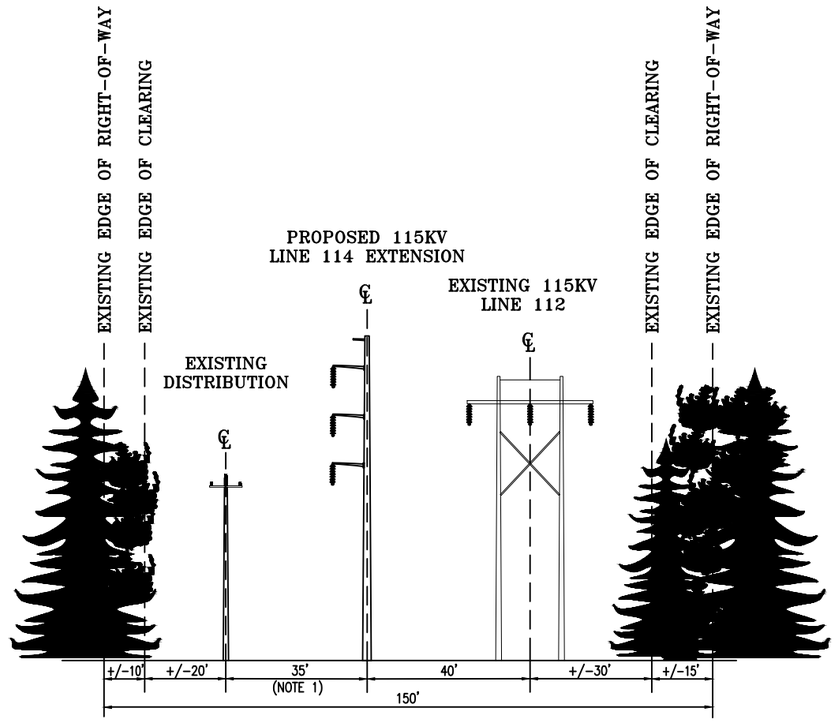


EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRS.
FROM LINE 112 STR. 62 TO INDUSTRIAL PARK TAP 0.27 MILES
LOOKING WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT MONOPOLE (STEEL)
FROM LINE 112 STR. 62 TO INDUSTRIAL PARK TAP 0.27 MILES
LOOKING WEST

Figure 2-6: Typical ROW Cross- Section Drawings

NOTE 1: NON-STANDARD ROW SPACING.

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

EVERSOURCE ENERGY

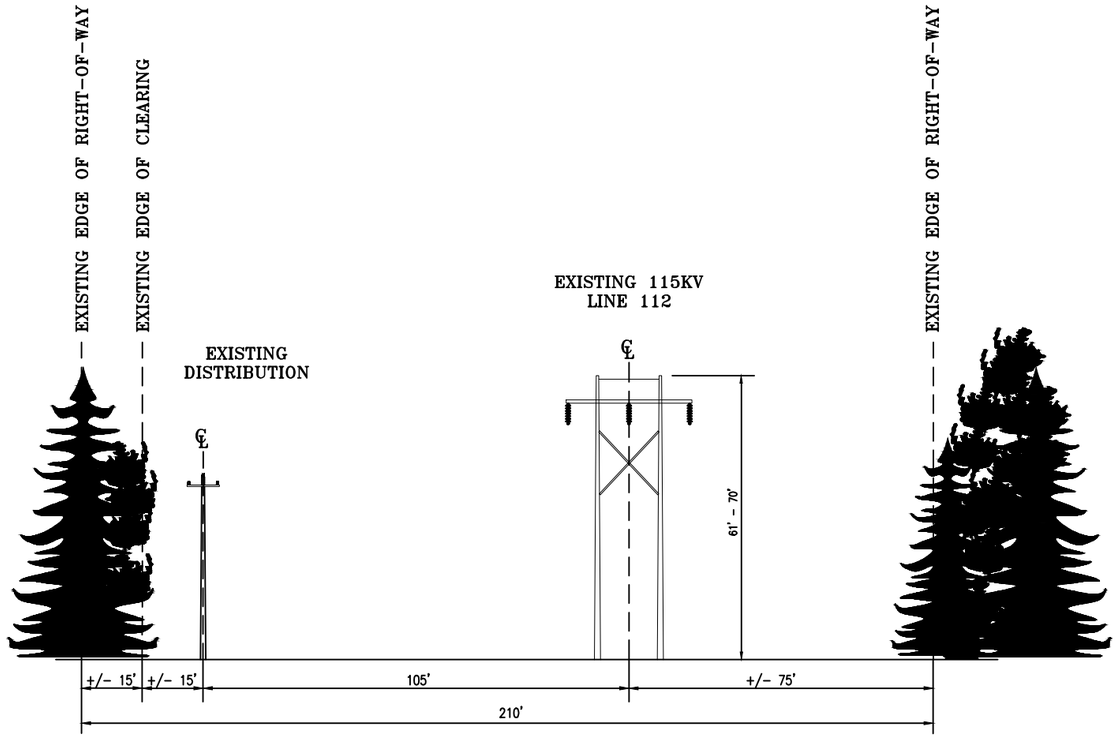
TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH3	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH3	

6/28/2018 3:24 PM - TBrunner - C:\pwworkingemp\pw1\tbrunner\d2437592\291684-T0001.dwg - SH.3
ES VER: 05/2015

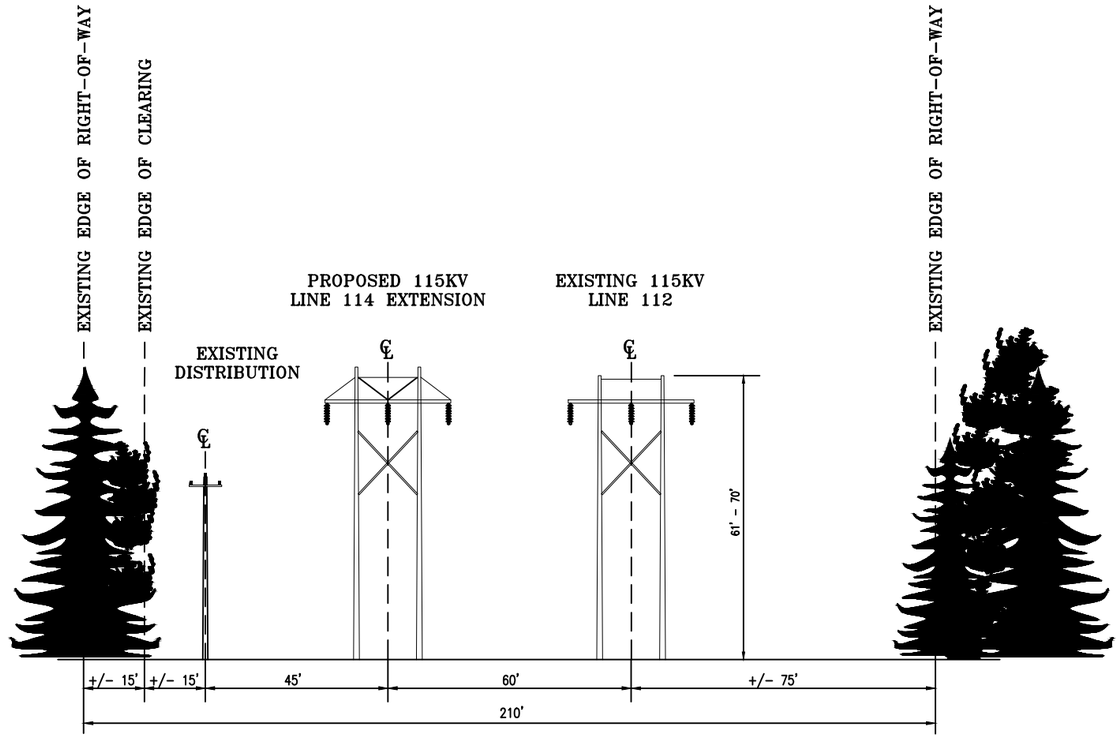
ES VER: 05/2015

6/28/2018 3:24 PM - TBrunner - C:\pwworkingemp\pw1\tbrunner\d2437592\291684-T0001.dwg - SH.2



EXISTING R.O.W.

EXISTING CONFIGURATION: SINGLE CIRCUIT H-FRAME STRUCTURES (WOOD)
FROM TAP TO LINE 112 STR. 62 4.0 MILES
LOOKING NORTH WEST



PROPOSED R.O.W.

PROPOSED CONFIGURATION: SINGLE CIRCUIT H-FRAME (STEEL)
NEW 115KV LINE 114 EXTENSION FROM TAP TO LINE 112 STR. 62
4.0 MILES LOOKING NORTH WEST

Figure 2-6: Typical ROW Cross- Section Drawings
Sheet 6 of 7

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP
C	6/29/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
B	5/18/18	RE-ISSUED FOR REVIEW	KLB	BAF	TRB	
A	4/30/18	ISSUED FOR REVIEW	JJD	BAF	TRB	

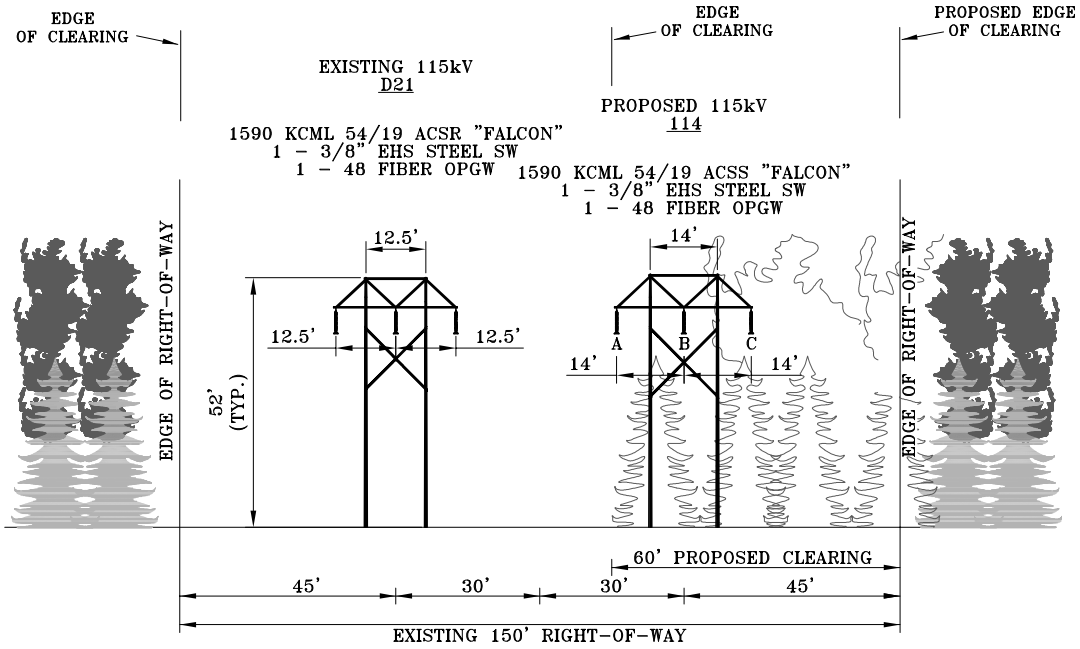
EVERSOURCE ENERGY

TITLE
LINE 114 EXTENSION
LINE 114 TAP TO NATIONAL GRID INTERCONNECTION
TYPICAL ROW CROSS SECTION
ACUSHNET/NEW BEDFORD, MASS

BY JJD/TRC	CHKD BAF/TRC	APP TRB/TRC	APP
DATE 4/30/18	DATE 4/30/18	DATE 4/30/18	DATE
H-SCALE N.T.S.	SIZE ANSI B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E.DWG. 291684-T0001-SH2	
R.E. PROJ. NUMBER 291684		DWG NO. 291684-T0001-SH2	

- CONCEPTUAL -

FOR REFERENCE ONLY



TYPICAL PROPOSED RIGHT-OF-WAY CROSS SECTION
BELL ROCK SUBSTATION TO THE DARTMOUTH TOWN LINE
APPROXIMATELY 4.2 MILES
FALL RIVER, MA

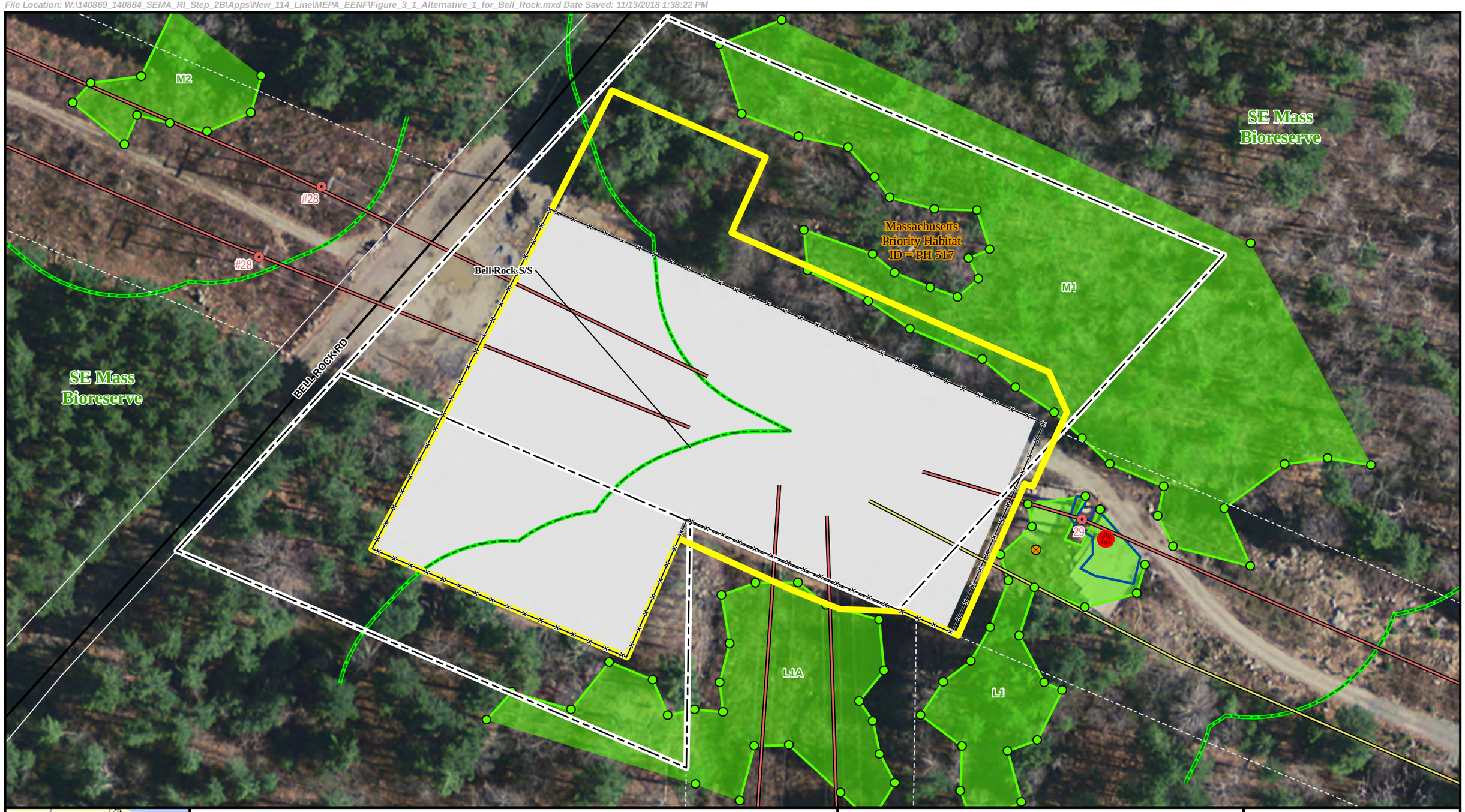
Figure 2-6: Typical ROW Cross- Section Drawings

Sheet 7 of 7

nationalgrid

114 115kV NEW LINE
BELL ROCK TO DARTMOUTH TOWN LINE
MILE 0.0 TO 4.2
CROSS SECTION #1 OF 1

SCALE: NONE REV: C DATE: 11/08/18





Legend

- Utility Structure
- NEP Substation Easement
- Existing Transmission Line
- Other Transmission Line
- Alternative #1 (Preferred Layout)
- Parcel Boundary
- Edge of ROW
- Local Road
- Field Documented Vernal Pool
- Culvert
- Wetland Flag
- 100 ft Buffer Wetland
- Observed Inundation
- Wetland Border
- Field Delineated Wetland *
- MA-NHESP Priority Habitats Rare Species (All of view extent)

Indicates Layer Set to Transparency

N

1 inch = 60 feet

0 30 60

Feet

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 3-1: Alternative #1 for Bell Rock

Commonwealth of Massachusetts
City of Fall River

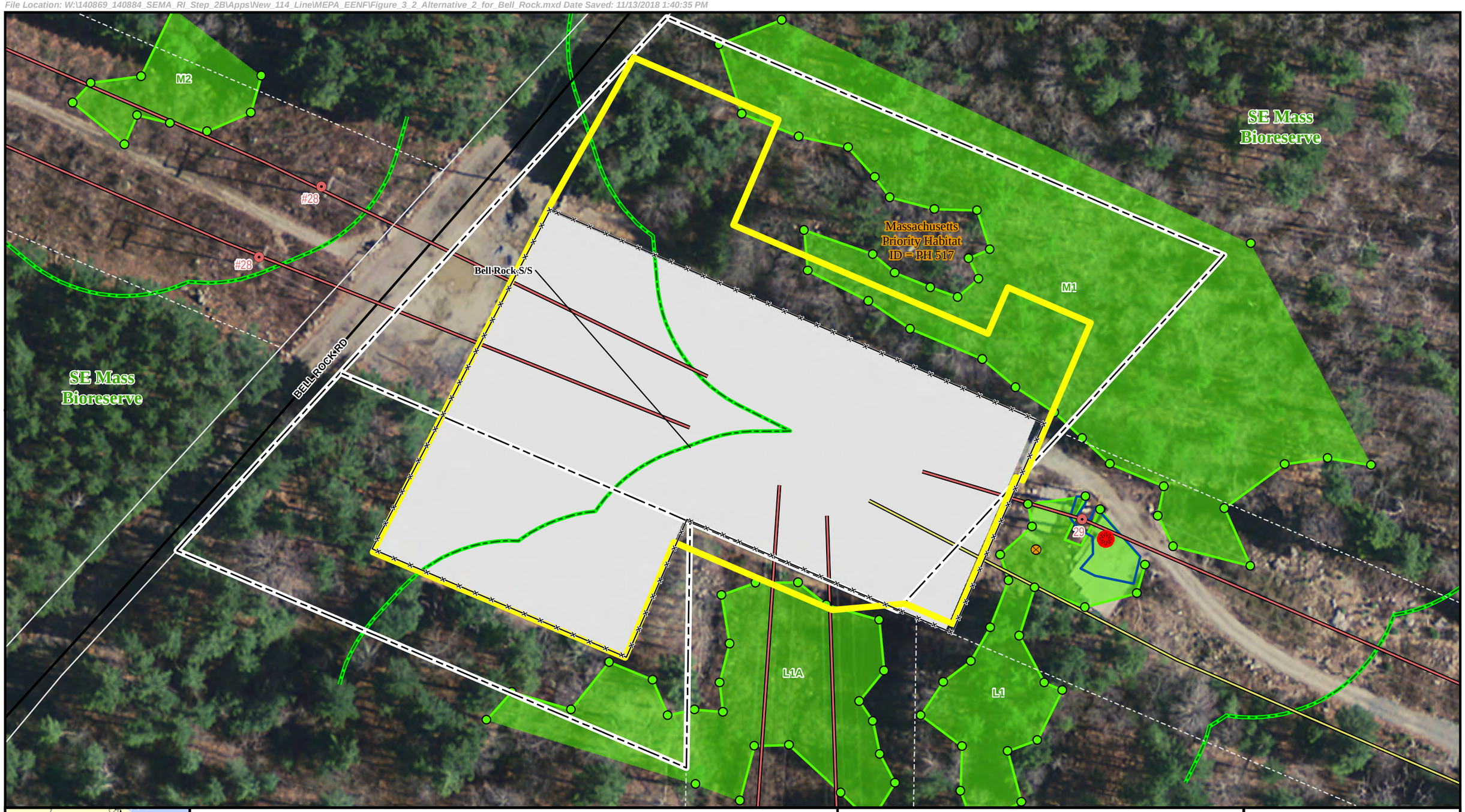
NOT FOR CONSTRUCTION

Imagery Source: National Map Server 2013-2015 High Resolution Orthoimagery

nationalgrid

POWER ENGINEERS

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.





Legend

- Utility Structure
- NEP Substation Easement
- Existing Transmission Line
- Other Transmission Line
- Alternative #2 (Alternate Layout)
- Parcel Boundary
- Edge of ROW
- Local Road
- Field Documented Vernal Pool
- Culvert
- Wetland Flag
- 100 ft Buffer Wetland
- Observed Inundation
- Wetland Border
- Field Delineated Wetland *
- MA-NHESP Priority Habitats Rare Species (All of view extent)

N

1 inch = 60 feet

0 30 60

Feet

Indicates Layer Set to Transparency

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 3-2: Alternative #2 for Bell Rock

Commonwealth of Massachusetts
City of Fall River

NOT FOR CONSTRUCTION

Imagery Source: National Map Server 2013-2015 High Resolution Orthoimagery

nationalgrid POWER ENGINEERS

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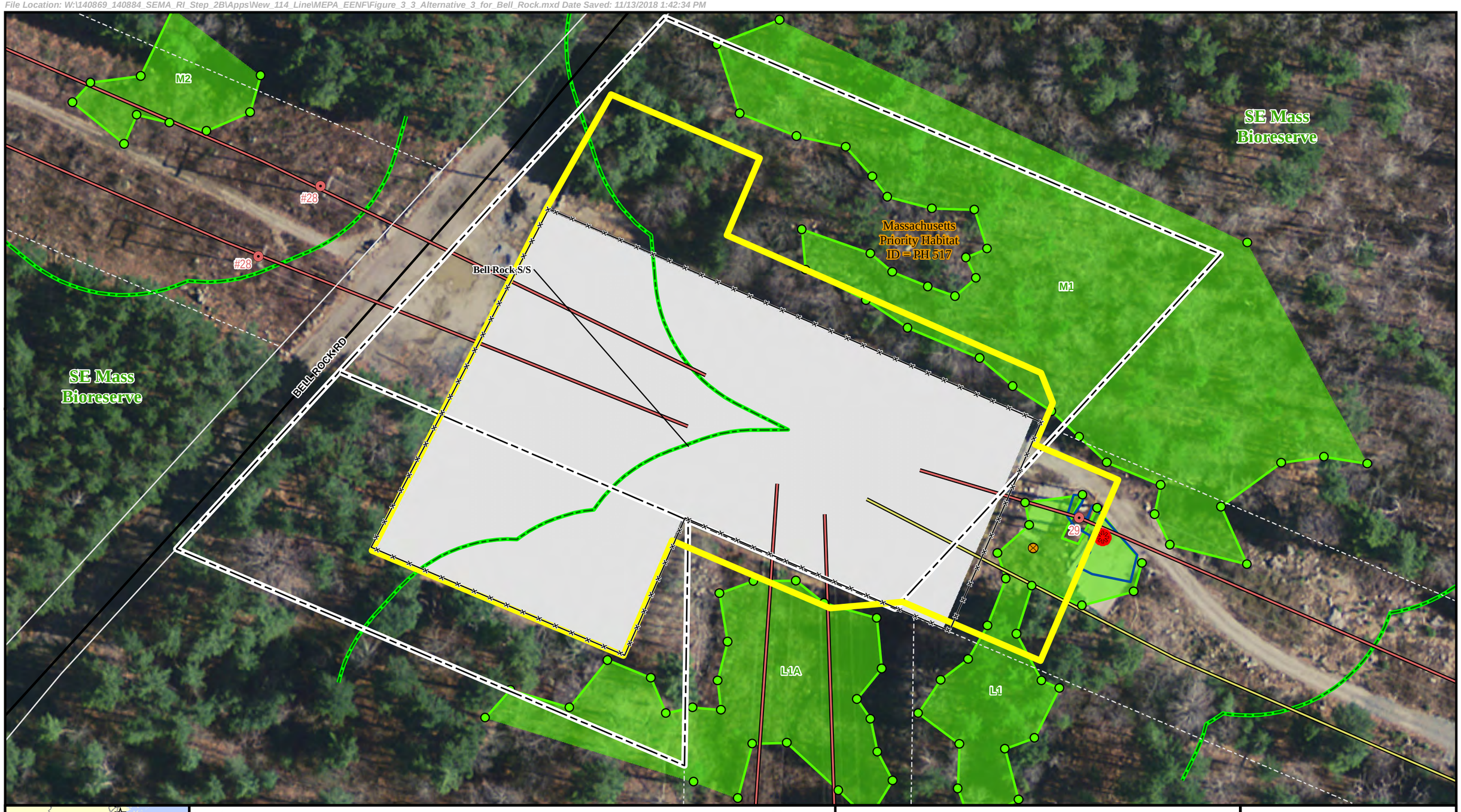




Legend

- Utility Structure
- NEP Substation Easement
- Existing Transmission Line
- Other Transmission Line
- Alternative #3 (Alternate Layout)
- Parcel Boundary
- Edge of ROW
- Local Road
- Field Documented Vernal Pool
- Culvert
- Wetland Flag
- 100 ft Buffer Wetland
- Observed Inundation
- Wetland Border
- Field Delineated Wetland *
- MA-NHESP Priority Habitats Rare Species (All of view extent)

N

1 inch = 60 feet

0 30 60

Feet

***** Indicates Layer Set to Transparency**

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 3-3: Alternative #3 for Bell Rock

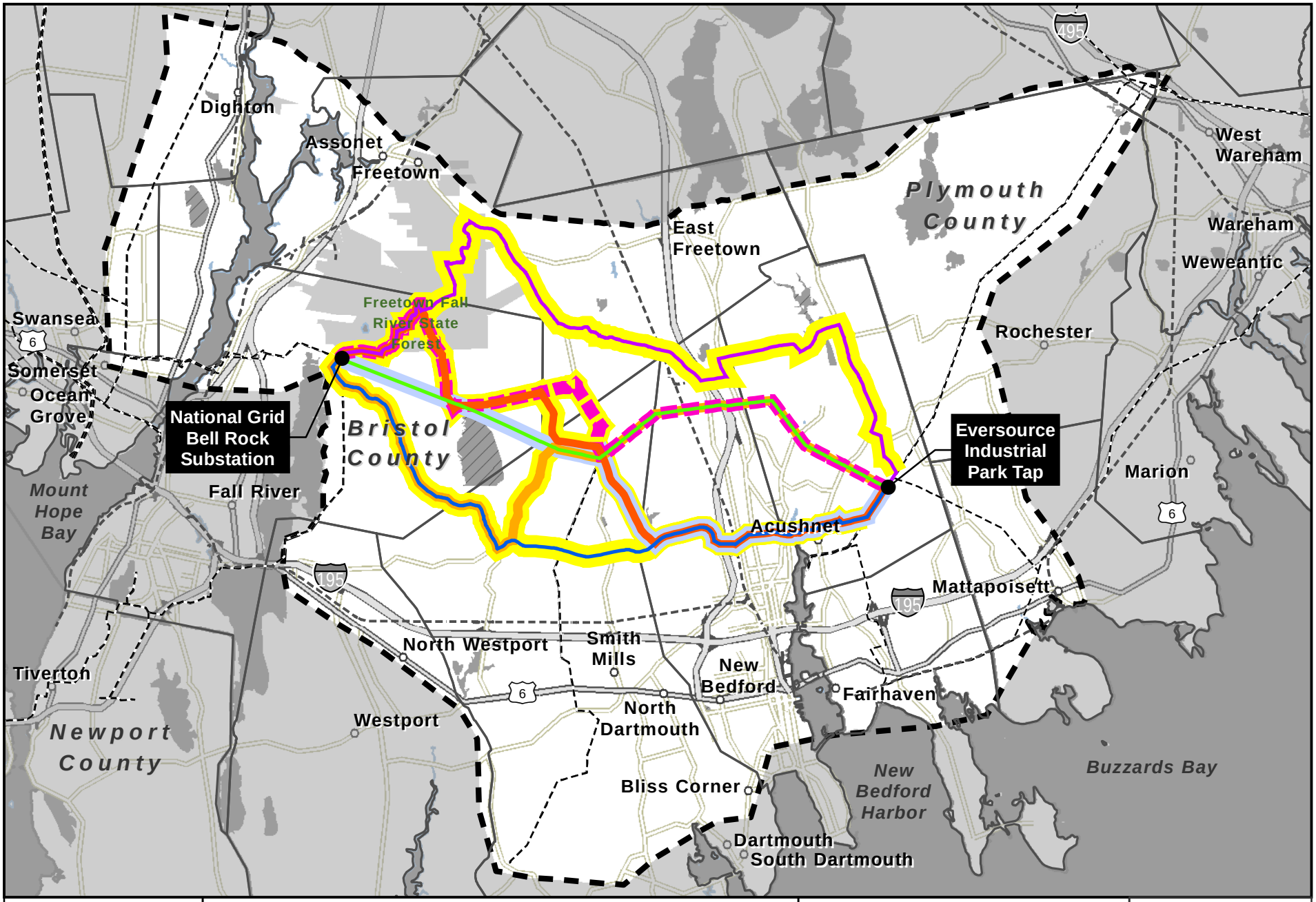
Commonwealth of Massachusetts
City of Fall River

NOT FOR CONSTRUCTION

Imagery Source: National Map Server 2013-2015 High Resolution Orthoimagery

nationalgrid POWER ENGINEERS

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.



N
W E
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1:165,000

0 1 2 3

Miles

Legend

- ISO Route
- Central Underground
- Southern Underground
- North South Underground Crossover
- Hybrid Route 1
- Hybrid Route 2
- Hybrid Route 3
- Underground Portion of Alternative
- MASS DOT Rail Inventory
- Existing Transmission Line
- Town Boundary
- Routing Study Area

Acushnet to Fall River Reliability Project

Figure 3.4: Routing Alternatives

Commonwealth of Massachusetts

11/13/2018

Service Layer Credits:

EVERSOURCE
nationalgrid
POWER ENGINEERS

APPENDIX B AGENCY CORRESPONDENCE

B.1 Bell Rock Substation Rebuild Project

B.2 Acushnet to Fall River Reliability Project

B.1 Bell Rock Substation Rebuild Project Agency Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To: April 05, 2018
Consultation Code: 05E1NE00-2018-SLI-1504
Event Code: 05E1NE00-2018-E-03398
Project Name: Bell Rock Substation No 118 Rebuild Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2018-SLI-1504

Event Code: 05E1NE00-2018-E-03398

Project Name: Bell Rock Substation No 118 Rebuild Project

Project Type: TRANSMISSION LINE

Project Description: The New England Power Company d/b/a National Grid (NEP) is planning substation upgrades and expansion at the existing Bell Rock Substation located at 181 Bell Rock Road in the City of Fall River. Bell Rock Substation lies within NEP's existing ~2.75 acre easement and all improvements will be made within NEP's existing substation and transmission line easements. The purpose of the Project is to improve the electric transmission reliability in the Southeastern Massachusetts area. The proposed Project involves the expansion, rebuild and upgrading of certain station equipment and facilities at the Substation. Construction of the Project will require some tree-clearing and vegetation removal around the perimeter of the Station to accommodate the Substation expansion and new station equipment. Project construction is anticipated to begin in February/March 2020.

Project Location:

Approximate location of the project can be viewed in Google Maps: [redacted]



Counties: Bristol, MA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Erin Whoriskey
Lead Environmental Scientist
NE Environmental Permitting

nationalgrid

April 03, 2018

Ms. Lauren Glorioso
Endangered Species Review Biologist
MA Division of Fisheries and Wildlife
Natural Heritage and Endangered Species Program
1 Rabbit Hill Road
Westborough, MA 01581

Subject: **New England Power Company d/b/a National Grid**
Bell Rock Substation No 118 Rebuild Project
Fall River, Massachusetts

Dear Ms. Glorioso:

The New England Power Company d/b/a National Grid (NEP) is planning substation upgrades and expansion at the existing Bell Rock Substation located at 181 Bell Rock Road in the City of Fall River. Bell Rock Substation lies within NEP's existing ~2.75 acre easement and all improvements will be made within NEP's existing substation and transmission line easements (see Figure 1: Project Location Map). The purpose of the Project is to improve the electric transmission reliability in the Southeastern Massachusetts area. The proposed Project involves the expansion, rebuild and upgrading of certain station equipment and facilities at the Substation, and will primarily include multiple elements, as described below:

1) Expanding the Substation fence line to the North and East by approximately 20,000 square feet;

2) Installing a new control house and substation-related equipment;

3) Reconfiguring transmission line facilities in and around the property; and

4) Upgrading the storm water management system.

Construction of the Project will require some tree-clearing and vegetation removal around the perimeter of the Station to accommodate the Substation expansion and new station equipment.

[redacted] which includes vertebrate and invertebrate animals and native plants officially listed as Endangered, Threatened, or of Special Concern in Massachusetts. Based on a review of the most recent data provided by the NHESP, NEP documented two species of special concern, the Eastern whip-poor-will (*Caprimulgus vociferus*) and Eastern box turtle (*Terrapene carolina*), potentially occurring within the vicinity of the Project.

In addition, Power Engineers, Inc. (POWER) has reviewed the current United States Fish and Wildlife (USFWS) Endangered Species Consultation website (https://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm) in regard to the Project. No federally-designated Critical Habitat is identified for Bristol County, Massachusetts. The website indicates one Federal-listed species, the Northern Long-eared Bat (NLEB, *Myotis septentrionalis*), may occur in the Project Area**.** NLEB may possibly be found in the Project Area due to portions of unfragmented forested habitat. In addition to Massachusetts, NLEB is listed statewide for all of New England. However, designation of Critical Habitat for NLEB has been determined "not prudent" (https://www.fws.gov/midwest/endangered/mammals/nleb/) by the USFWS.

With regard to NLEB, review of the most recent mapping (November 30, 2016) by MA NHESP https://www.mass.gov/service-details/the-northern-long-eared-bat indicates there are no known winter hibernacula or maternity roost trees for NLEB occurring throughout Bristol County. The Project is currently more than 15 miles from the nearest mapped maternity roost tree and more than 35 miles away from the nearest mapped hibernacula. In regards to NLEB, based on the results of the review of USFWS and NHESP mapping and guidance, it is NEP's understanding that no further action or agency consultation for federally-listed species (e.g., NLEB) is required for the Project. Please let us know if you concur with our conclusion.

NEP is seeking updated information on the listing and locations of state-listed rare species within the project area. Enclosed is the completed MESA Information Request Form and fee. We are also seeking guidance on whether field studies need to be done for Eastern whip-poor-wills and Eastern box turtles, or whether avoidance and protection measures during construction are sufficient.

If you have any questions, please do not hesitate to contact me at (781) 907-3598 (Erin.Whoriskey@nationalgrid.com), or Jamie Durand at (401) 439-3020 (jamie.durand@powereng.com).

Sincerely,



Erin Whoriskey
Lead Environmental Scientist
National Grid

Attachments

Cc:

David Beron, National Grid
Andrew Alexiades, POWER
Jamie Durand, POWER
Karen Hanecak, POWER

MESA Information Request Form

Please complete this form to request site-specific information from the Natural Heritage & Endangered Species Program (Please submit only one project per request form).

Please include a check for $50.00 made out to Comm. of MA – NHESP.*

Requestor Information

Name: Erin Whoriskey

Affiliation: National Grid

Address: 40 Sylvan Road

City: Waltham State: MA Zip Code: 02451

Daytime Phone: 781-907-3598 Ext. Email address: Erin.Whoriskey@nationalgrid.com

Project Information

Project or Site Name: Bell Rock Substation No 118 Rebuild Project

Location: Existing NEP Easement & Right-of-Way Town: Fall River

Name of Landowner or Project Proponent: New England Power Company d/b/a National Grid

Acreage of the Property: approx. 4.0 acres

Description of Proposed Project and Current Site Conditions: (If necessary attach additional sheet)

Please refer to attached letter for project elements which include the rebuild and expansion of the existing Bell Rock Substation located in Fall River. In addition, certain transmission line facilities in and around the Substation will be reconfigured. Construction of the Project will require tree clearing and vegetation removal to accomodate the Substation expansion and new station equipment. All improvements will be made within NEP's existing Substation and transmission line easements.

☑ Will this project be reviewed as a Notice of Intent by the local Conservation Commission?

☑ Will this project be undergoing MEPA review for reasons other than rare species?

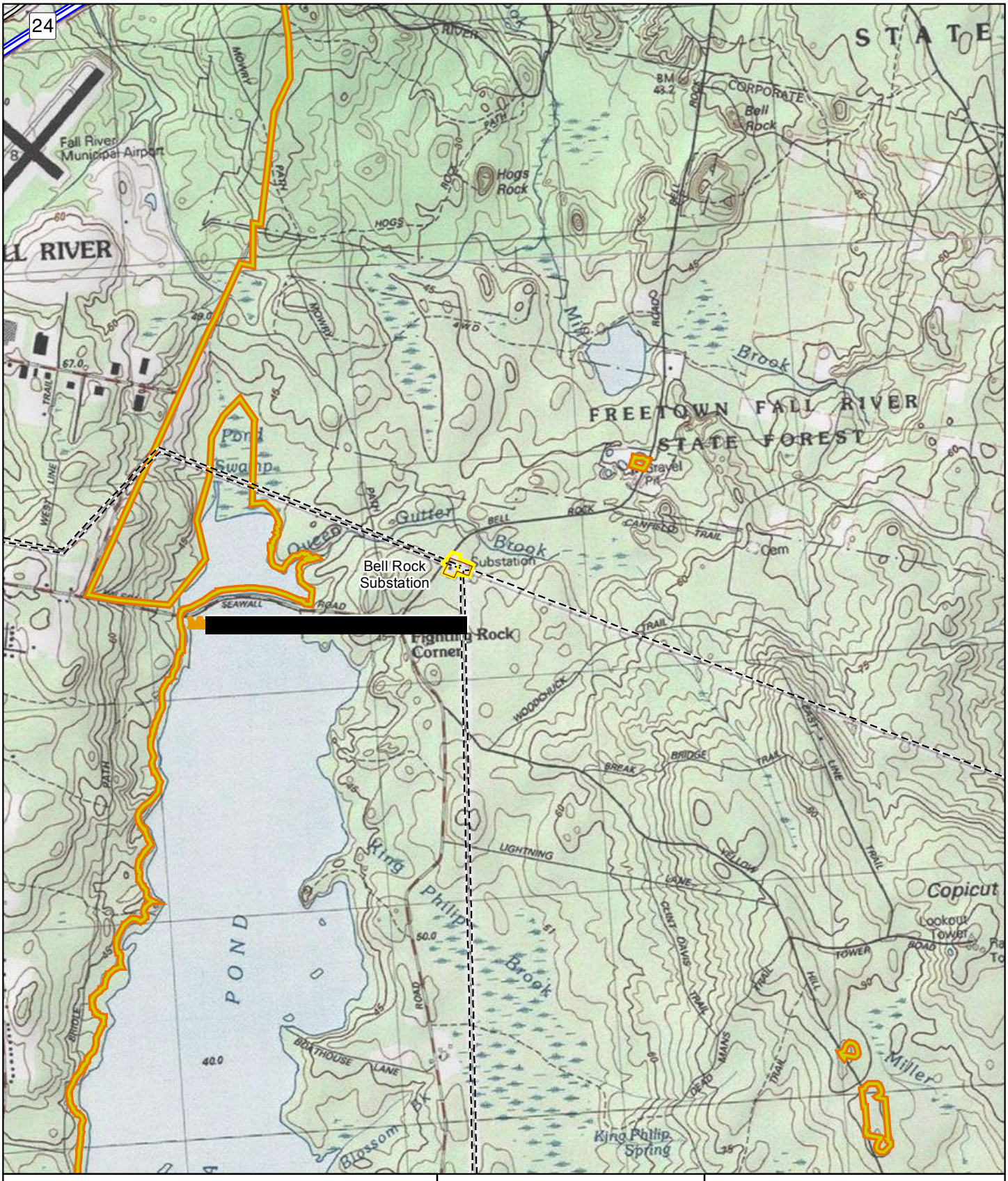
☑ Have you enclosed the required copy of a USGS topographic map in the scale 1:24,000 or 1:25,000 (not copy reduced) with the site location clearly marked and centered on the copy page? (Copies of Natural Heritage Atlas pages are not accepted)

Please **mail** this completed form and topographic map to:

Regulatory Review
Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

Questions regarding this form should be directed according to the county that the property is located:
Berkshire, Essex, Franklin, Hampshire, Hampden, Middlesex & Worcester Counties call: 508-389-6357
Barnstable, Bristol, Dukes, Nantucket, Norfolk, Plymouth & Suffolk Counties call: 508-389-6385

Persons requesting information will receive a written response within 30 days of receipt of all information required. Please do not ask for an expedited review. ***If you are requesting information for habitat management or conservation purposes and you are a non-profit conservation group, government agency or working with a government agency please fill out a Data Release Form.



Legend

- Existing Substation Site
- Proposed Bell Rock Substation Expansion
- Existing Transmission Line
- Priority Habitats Rare Species (MA-NHESP)

Commonwealth of Massachusetts

Bristol County
City of Fall River

Figure 1

Project Location

Bell Rock Substation
No 118 Rebuild Project

NAD 1983 UTM Zone 18N USFt

0 1,000 2,000 3,000
Feet

1:24,000

POWER ENGINEERS

nationalgrid

Date: 4/3/2018

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\Bell_Rock\Natural_Heritage_Bell_Rock_Map_1_Locus_24K_Topo.mxd

MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

May 9, 2018

Erin Whoriskey
New England Power
dba National Grid
40 Sylvan Rd
Waltham MA 02451

RE: Project Location: Bell Rock Substation
Town: FALL RIVER
NHESP Tracking No.: 18-37556

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program of the MA Division of Fisheries & Wildlife (the "Division") for information regarding state-listed rare species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located [redacted] as indicated in the *Massachusetts Natural Heritage Atlas* (14th Edition) for the following state-listed rare species:

Scientific name	Common Name	Taxonomic Group	State Status
Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.mass.gov/nhesp).

Please note that projects and activities located within Priority and/or Estimated Habitat **must** be reviewed by the Division for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Wetlands Protection Act (WPA)
If the project site is within Estimated Habitat and a Notice of Intent (NOI) is required, then a copy of the NOI must be submitted to the Division so that it is received at the same time as the local conservation commission. If the Division determines that the proposed project will adversely affect the actual Resource Area habitat of state-protected wildlife, then the proposed project may not be permitted (310 CMR 10.37, 10.58(4)(b) & 10.59). In such a case, the project proponent may request a consultation with the Division to discuss potential project design modifications that would avoid adverse effects to rare wildlife habitat.

A streamlined joint MESA/WPA review process is available. When filing a Notice of Intent (NOI), the applicant may file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the NOI form, please visit the MA Department of Environmental Protection's website: https://www.mass.gov/how-to/wpa-form-3-wetlands-notice-of-intent.

MA Endangered Species Act (MESA)

If the proposed project is located within Priority Habitat and is not exempt from review (see 321 CMR 10.14), then project plans, a fee, and other required materials must be sent to Natural Heritage Regulatory Review to determine whether a probable Take under the MA Endangered Species Act would occur (321 CMR 10.18). Please note that all proposed and anticipated development must be disclosed, as MESA does not allow project segmentation (321 CMR 10.16). For a MESA filing checklist and additional information please see our website: https://www.mass.gov/regulatory-review.

We recommend that rare species habitat concerns be addressed during the project design phase prior to submission of a formal MESA filing, as avoidance and minimization of impacts to rare species and their habitats is likely to expedite endangered species regulatory review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. If the purpose of your inquiry is to generate a species list to fulfill the federal Endangered Species Act (16 U.S.C. 1531 et seq.) information requirements for a permit, proposal, or authorization of any kind from a federal agency, we recommend that you contact the National Marine Fisheries Service at (978)281-9328 and use the U.S. Fish and Wildlife Service's Information for Planning and Conservation website (https://ecos.fws.gov/ipac). If you have any questions regarding this letter please contact Emily Holt, Endangered Species Review Assistant, at (508) 389-6385.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

October 27, 2015

Jaime M. Donta
Archaeological Field Representative
POWER Engineers, Inc.
303 U.S. Route One, Suite 2A
Freeport, ME 04032

RE: New England Power d/b/a National Grid Bell Rock Substation Rebuild Project,
181 Bell Rock Road, Fall River, MA. MHC # RC.58972.

Dear Ms. Donta:

Staff of the Massachusetts Historical Commission (MHC) have reviewed the Project Notification Form (PNF) and Due Diligence Literature Review, received October 22, 2015, submitted for the project referenced above.

The MHC notes that the project requires a permit from the US Army Corps of Engineers. The MHC, as the office of the State Historic Preservation Officer, is a consulting party to the Corps, to assist and advise the Corps in its responsibilities in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800.2(c)(1)).

The MHC is unable to ascertain the project area of potential effect and requires additional information. Please submit an annotated aerial photograph indicating the location and direction of view to key to the photographs in Appendix C of the Due Diligence report, and scaled existing and proposed conditions project plans, measuring no larger than 11" x 17", when they become available.

A copy of the Massachusetts Environmental Policy Act (MEPA) Environmental Notification Form (ENF) should be submitted to the MHC when it is filed with the MEPA office.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), Massachusetts General Laws Chapter 9, Sections 26-27C (950 CMR 71) and MEPA (301 CMR 11). If you have any questions, please contact me at this office.

Sincerely,

Jonathan K. Patton
Staff Archaeologist/Preservation Planner
Massachusetts Historical Commission

xc: Erin Whoriskey, National Grid
Kevin Kotelly, USACOE-New England District
Kate Atwood, USACOE-New England District
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Patrice Kish, DCR
Ellen Berkland, DCR

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

PERMIT TO CONDUCT ARCHAEOLOGICAL FIELD INVESTIGATION

Permit Number 3643 Date of Issue March 28, 2016

Expiration Date March 28, 2017

POWER Engineers, Inc. is hereby authorized to conduct an archaeological field investigation pursuant to Section 27C of Chapter 9 of General Laws and according to the regulations outlined in 950 CMR 70.00.

Bell Rock Substation, Fall River

Project Location

Brona Simon

Brona Simon, State Archaeologist
Massachusetts Historical Commission

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

May 12, 2017

Erin Whoriskey
New England Power d/b/a National Grid
40 Sylvan Road
Waltham, MA 02451

RE: New England Power d/b/a National Grid Bell Rock Substation Rebuild Project,
181 Bell Rock Road, Fall River, MA. MHC # RC.58972.

Dear Ms. Whoriskey:

Staff of the Massachusetts Historical Commission (MHC) have reviewed the draft technical report *Results of Intensive (Locational) Survey at Bell Rock Substation Rebuild Project parcel in Fall River*, submitted by POWER Engineers, received April 21, 2017, for the project referenced above.

Results of the intensive (locational) archaeological survey yielded no historic or archaeological resources. Since no significant historic or archaeological resources were identified within the project area MHC concurs with the management recommendation provided in this technical report. No further survey is recommended for the project, as proposed. The MHC recommends that the involved federal agency could make a finding of "no historic properties affected" (36 CFR 800.4(d)(1)) for the project as proposed.

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), and Massachusetts General Laws Chapter 9, Sections 26-27C (950 CMR 70-71). Please contact Jonathan K. Patton at this office if you have questions or require additional information.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Barbara Newman, USACOE-New England District
Kate Atwood, USACOE-New England District
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Stuart Eldridge, Power Engineers, Inc., Attn: Jamie Donta

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

B.2 Acushnet to Fall River Reliability Project Agency Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To: July 06, 2018
Consultation Code: 05E1NE00-2018-SLI-2300
Event Code: 05E1NE00-2018-E-05371
Project Name: Fall River to Acushnet Reliability Project - 114 Line

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2018-SLI-2300

Event Code: 05E1NE00-2018-E-05371

Project Name: Fall River to Acushnet Reliability Project - 114 Line

Project Type: TRANSMISSION LINE

Project Description: The New England Power Company d/b/a National Grid ("NEP") and NSTAR d/b/a Eversource Energy (Eversource) are proposing to undertake the Fall River to Acushnet Reliability Project – 114 Line (Project), which involves the installation of a new 115 kilovolt overhead transmission line extending from NEP's existing Bell Rock Substation in Fall River to the Eversource's Industrial Park Tap in Acushnet. The purpose of the Project is to improve the electric transmission reliability in the Southeastern Massachusetts area. The project is a series of proposed improvements to the electrical transmission system that will provide additional safe, reliable, and economic electric service to the municipalities of Fall River, Dartmouth, New Bedford, and Acushnet in Bristol County, Massachusetts. Construction of the Project will require tree-clearing and vegetation removal to accommodate the new 114 Line. Project construction is anticipated to begin in Fall 2020.

Project Location:

Approximate location of the project can be viewed in Google Maps: [redacted]



Counties: Bristol, MA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Erin Whoriskey
Lead Environmental Scientist
NE Environmental Permitting

Denise Bartone
Supervisor
Eversource Licensing & Permitting

March 27, 2018

Ms. Lauren Glorioso
Endangered Species Review Biologist
MA Division of Fisheries and Wildlife
Natural Heritage and Endangered Species Program
1 Rabbit Hill Road
Westborough, MA 01581

Subject: **New England Power Company d/b/a National Grid and Eversource Energy**
Fall River to Acushnet Reliability Project - 114 Line
Fall River, Dartmouth, New Bedford, and Acushnet, Massachusetts

Dear Ms. Glorioso:

The New England Power Company d/b/a National Grid ("NEP") and NSTAR d/b/a Eversource Energy (Eversource) are planning to install a new 115 kilovolt ("kV") overhead transmission line extending from NEP's existing Bell Rock Substation in Fall River to the Eversource's Industrial Park Tap in Acushnet. The proposed Project includes the installation of approximately 12 miles of new overhead 115 kV electric transmission line traversing the municipalities of Fall River, Dartmouth, New Bedford, and Acushnet in Bristol County, Massachusetts (Figure 1). The purpose of the Project is to improve the electric transmission reliability in the Southeastern Massachusetts area.

The new line will be located within existing rights-of-way (ROWs) currently occupied by the D-21, 111 and 112 115 kV transmission lines. Tree-clearing and vegetation removal in certain locations will be required to expand the cleared width of the existing ROW and to install the new 115 kV transmission structures and lines in the southern portion of the ROW.

[redacted] which includes vertebrate and invertebrate animals and native plants officially listed as Endangered, Threatened, or of Special Concern in Massachusetts. Based on a review of the most recent data provided by the NHESP, NEP and Eversource documented two species of special concern, the whip-poor-will (*Caprimulgus vociferus*) and Eastern box turtle (*Terrapene carolina*), potentially occurring within the vicinity of the Project. We understand that there also some rare plant species occurrences in the vicinity of the Project, including the following: weak rush (*Juncus debilis*); long-leaved panic-grass (*Panicum rigidulum* ssp. *pubescens*); rigid flax (*Linum medium* var. *texanum*); and Philadelphia panic-grass (*Panicum philadelphicum* ssp. *philadelphicum*).

In addition, POWER Engineers, Inc. (POWER) has reviewed the current United States Fish and Wildlife (USFWS) Endangered Species Consultation website (https://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm) in regard to the Project. No federally-designated Critical Habitat is identified for Bristol County, Massachusetts. The website indicates one Federal-listed species, the Northern Long-eared Bat (NLEB, *Myotis septentrionalis*), may occur in the Project Area. NLEB may possibly be found in the Project Area due to portions of unfragmented forested habitat. NLEB is listed statewide for all of New England however designation of Critical Habitat for NLEB has been determined "not prudent" (https://www.fws.gov/midwest/endangered/mammals/nleb/) by the USFWS.

With regard to NLEB, review of the most recent mapping (November 30, 2016) by NHESP https://www.mass.gov/service-details/the-northern-long-eared-bat indicates there are no known winter hibernacula or maternity roost trees occurring in Bristol County. The Project is currently more than 15 miles from the nearest mapped maternity roost tree and more than 35 miles from the nearest mapped hibernacula. In regards to NLEB, based on the results of the review of USFWS and NHESP mapping and guidance, it is NEP's and Eversource's understandings that no further action or agency consultation for federally-listed species (e.g., NLEB) is required for the Project. Please let us know if you concur with our conclusion.

NEP and Eversource are seeking updated information on the listing and locations of state-listed rare species within the project area. We are also seeking guidance on whether species-specific field studies need to be done for whip-poor-wills, Eastern box turtles, and state-listed rare plant species, or whether avoidance and protection measures are sufficient.

If you have any questions, please do not hesitate to contact us Erin Whoriskey at (781) 907-3598 (Erin.Whoriskey@nationalgrid.com), Denise Barton at (781) 441 8174 (densie.bartone@eversource.com) or Jamie Durand at (401) 439-3020 (jamie.durand@powereng.com).

Sincerely,

Erin Whoriskey Cahill
Lead Environmental Scientist
National Grid

Denise Bartone
Supervisor
Eversource

Attachments

Cc: Dave Beron, National Grid
Nathan Dennis, Eversource
Andrew Alexiades, POWER
Jamie Durand, POWER
Karen Hanecak, POWER

MESA Information Request Form

Please complete this form to request site-specific information from the Natural Heritage & Endangered Species Program (Please submit only one project per request form).

Please include a check for $50.00 made out to Comm. of MA – NHESP.*

Requestor Information

Name: Erin Whoriskey

Affiliation: National Grid

Address: 40 Sylvan Road

City: Waltham State: MA Zip Code: 02451

Daytime Phone: 781-907-3598 Ext. Email address: Erin.Whoriskey@nationalgrid.com

Project Information

Project or Site Name: Fall River to Acushnet Reliability Project - 114 Line

Location: Existing NEP Right-of-Way Town: Fall River

Name of Landowner or Project Proponent: New England Power Company d/b/a National Grid

Acreage of the Property: approx. 76 acres

Description of Proposed Project and Current Site Conditions: (If necessary attach additional sheet)

Please refer to attached letter for project elements which include the installation of a new overhead 115 kilovolt transmission line extending approximately 4.2 miles from the existing NEP Bell Rock Substation in Fall River to the Fall River/Dartmouth municipal line interconnecting with the Eversource system. Construction of the Project will require tree clearing and vegetation removal along the D21 transmission line right-of-way.

☑ Will this project be reviewed as a Notice of Intent by the local Conservation Commission?
☑ Will this project be undergoing MEPA review for reasons other than rare species?
☑ Have you enclosed the required copy of a USGS topographic map in the scale 1:24,000 or 1:25,000 (not copy reduced) with the site location clearly marked and centered on the copy page? (Copies of Natural Heritage Atlas pages are not accepted)

Please **mail** this completed form and topographic map to:

Regulatory Review
Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

Questions regarding this form should be directed according to the county that the property is located:
Berkshire, Essex, Franklin, Hampshire, Hampden, Middlesex & Worcester Counties call: 508-389-6357
Barnstable, Bristol, Dukes, Nantucket, Norfolk, Plymouth & Suffolk Counties call: 508-389-6385

Persons requesting information will receive a written response within 30 days of receipt of all information required. Please do not ask for an expedited review. *If you are requesting information for habitat management or conservation purposes and you are a non-profit conservation group, government agency or working with a government agency please fill out a Data Release Form.

MESA Information Request Form

Please complete this form to request site-specific information from the Natural Heritage & Endangered Species Program (Please submit only one project per request form).

Please include a check for $50.00 made out to Comm. of MA – NHESP.*

Requestor Information

Name: Denise Bartone

Affiliation: Eversource Energy

Address: 247 Station Drive, SE270

City: Westwood State: MA Zip Code: 02090

Daytime Phone: 781-441-8174 Ext. Email address: denise.bartone@eversource.com

Project Information

Project or Site Name: Fall River to Acushnet Reliability Project - 114 Line

Location: Existing Eversource Right-of-Way ROW 143 Town: Dartmouth, New Bedford, Acushnet

Name of Landowner or Project Proponent: Eversource Energy ("Eversource")

Acreage of the Property: approx. 143 acres

Description of Proposed Project and Current Site Conditions: (If necessary attach additional sheet)

Please refer to attached letter for project elements which include the installation of a new overhead 115 kilovolt transmission line extending approximately 7.9 miles from the existing NEP system at the Fall River/Dartmouth municipal town line to the Industrial Park Tap in Acushnet. Construction of the Project will require some selective tree removal and vegetation removal along the existing transmission line right-of-way.

- ☑ Will this project be reviewed as a Notice of Intent by the local Conservation Commission?
- ☑ Will this project be undergoing MEPA review for reasons other than rare species?
- ☑ Have you enclosed the required copy of a USGS topographic map in the scale 1:24,000 or 1:25,000 (not copy reduced) with the site location clearly marked and centered on the copy page? (Copies of Natural Heritage Atlas pages are not accepted)

Please **mail** this completed form and topographic map to:

Regulatory Review
Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

Questions regarding this form should be directed according to the county that the property is located:
Berkshire, Essex, Franklin, Hampshire, Hampden, Middlesex & Worcester Counties call: 508-389-6357
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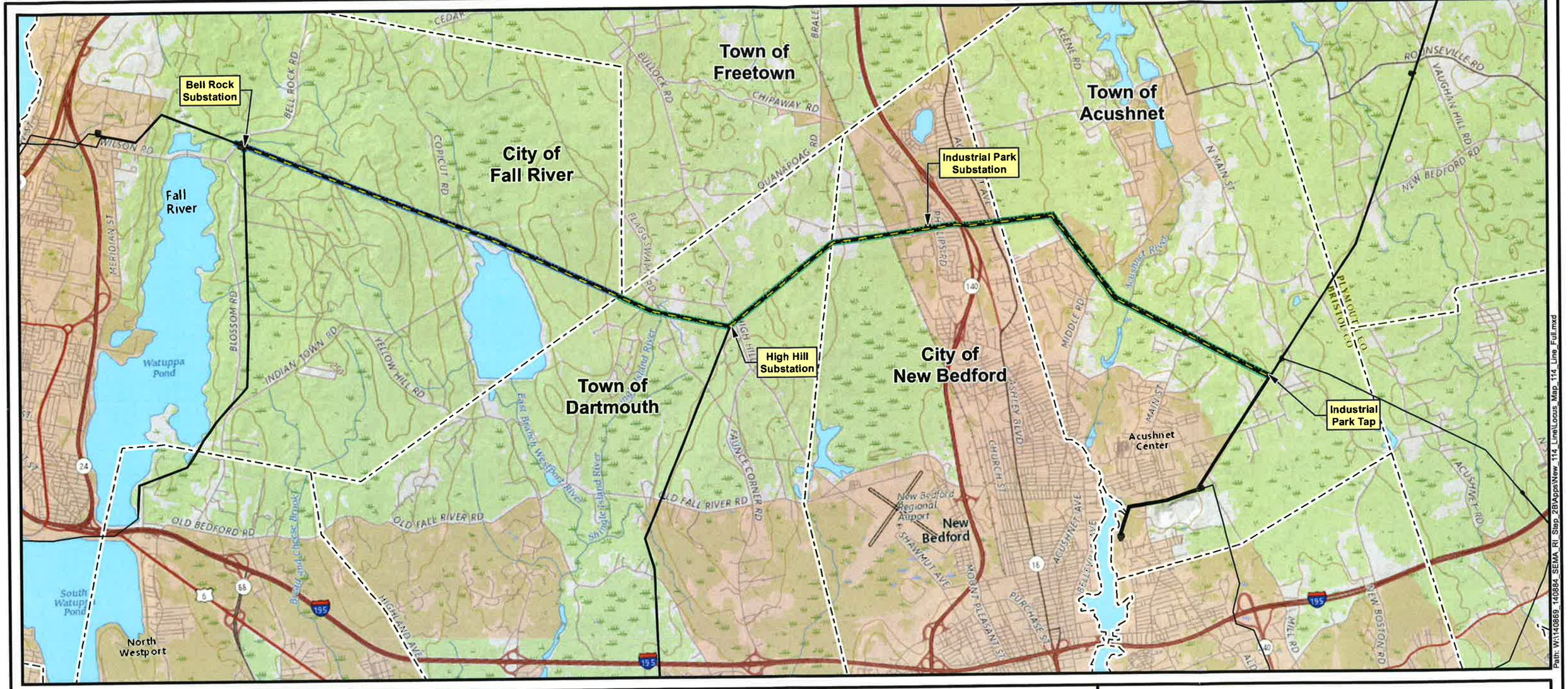
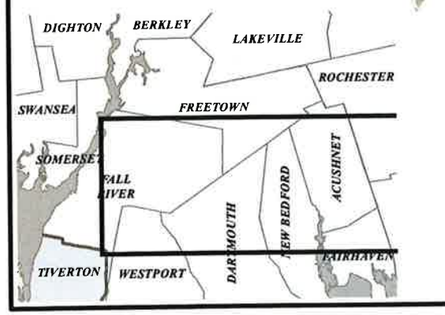
Persons requesting information will receive a written response within 30 days of receipt of all information required. Please do not ask for an expedited review. *If you are requesting information for habitat management or conservation purposes and you are a non-profit conservation group, government agency or working with a government agency please fill out a Data Release Form.



Project Vicinity



Legend

- New 114 Line Extension
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Town Boundary

Fall River to Acushnet Reliability Project

Figure 1

Project Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N W E S

0 1 2 Miles

1 " = 1 miles

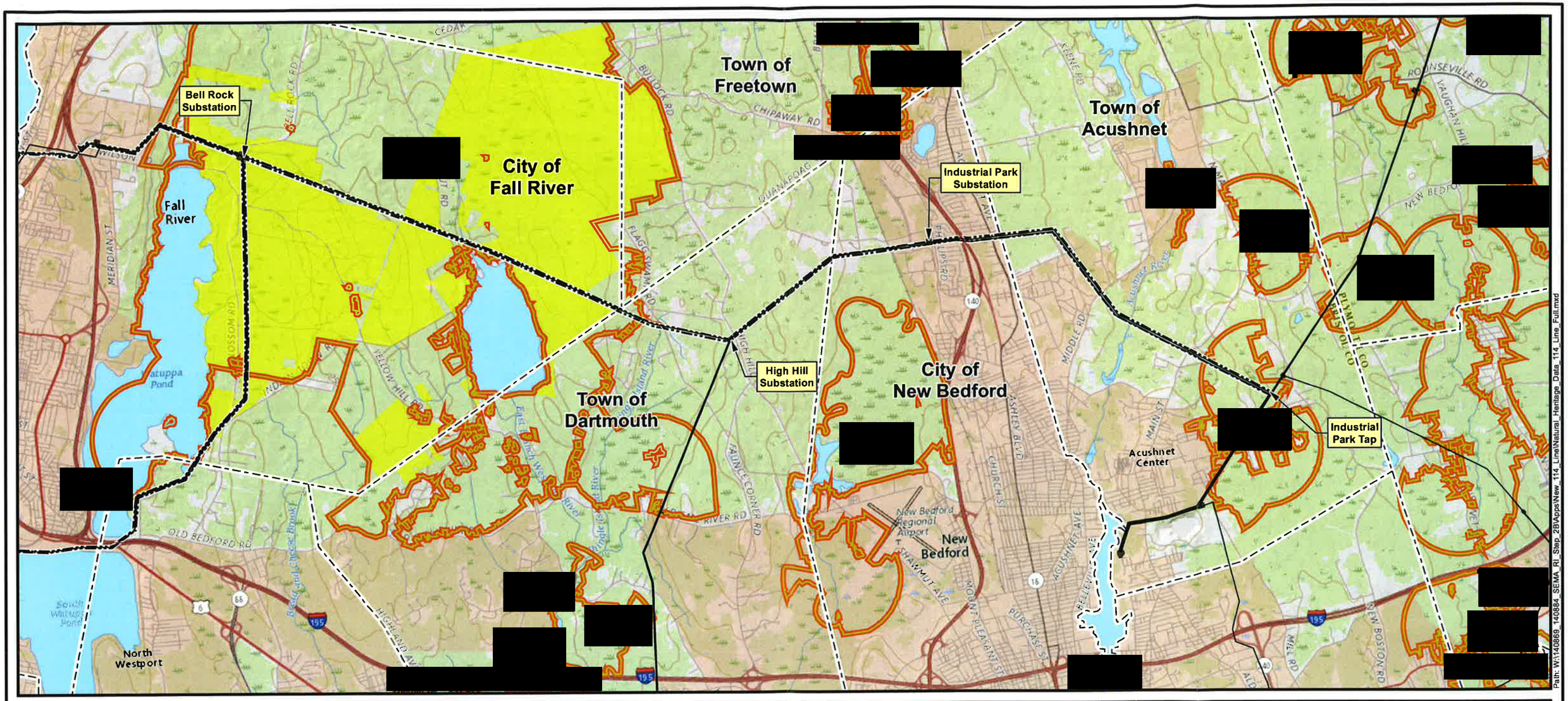
EVERSOURCE nationalgrid

NOT FOR CONSTRUCTION

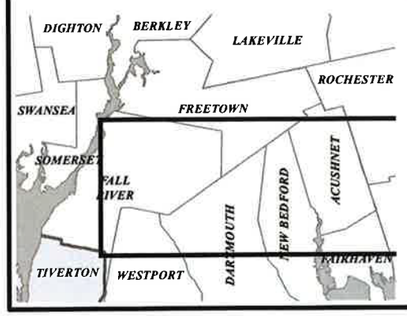
Date: 3/2/2018

Author: TDH

Path: W:\140869_140884_SEMA_RI_Stop_28\Apps\New_114_Line\Locus_Map_114_Line_Full.mxd



Project Vicinity



Legend

- Project Transmission Line
- Existing Power Facility
- Existing Right of Way
- Town Boundary
- SE Mass Bioreserve
- Priority Habitats Rare Species (MA-NHESP)

The Study Area

Figure 1

Natural Heritage Program Data

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N
W E
S

0 1 2 Miles

1 " = 1 miles

nationalgrid

NOT FOR CONSTRUCTION

Date: 2/21/2018

Author: TDH

MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

Jack Buckley, *Director*

April 09, 2018

Erin Whoriskey
New England Power
dba National Grid
40 Sylvan Rd
Waltham MA 02451

RE: Project Location: Fall River to Acushnet Reliability Project- 114 Line
Existing NEP ROW
Town: FALL RIVER
NHESP Tracking No.: 18-37556

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program of the MA Division of Fisheries & Wildlife (the "Division") for information regarding state-listed rare species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located [redacted] as indicated in the *Massachusetts Natural Heritage Atlas* (14th Edition). Our database indicates that the following state-listed rare species have been found in the vicinity of the site:

Scientific name	Common Name	Taxonomic Group	State Status
Panicum rigidulum ssp pubescens	Long-Leaved Panic-Grass	Plant	Threatened
Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern
Linum medium var texanum	Rigid Flax	Plant	Threatened
Juncus debilis	Weak Rush	Plant	Endangered
Panicum philadelphicum ssp. Philadelphicum	Philadelphia Panic-Grass	Plant	Special Concern
Ambystoma opacum	Marbled Salamander	Amphibian	Threatened

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.mass.gov/nhesp).

Please note that projects and activities located within Priority and/or Estimated Habitat **must** be reviewed by the Division for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Wetlands Protection Act (WPA)

If the project site is within Estimated Habitat and a Notice of Intent (NOI) is required, then a copy of the NOI must be submitted to the Division so that it is received at the same time as the local conservation commission. If the Division determines that the proposed project will adversely affect the actual Resource Area habitat of state-protected wildlife, then the proposed project may not be permitted (310 CMR 10.37, 10.58(4)(b) & 10.59). In such a case, the project proponent may request a consultation with the Division to discuss potential project design modifications that would avoid adverse effects to rare wildlife habitat.

A streamlined joint MESA/WPA review process is available. When filing a Notice of Intent (NOI), the applicant may file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the NOI form, please visit the MA Department of Environmental Protection's website: http://www.mass.gov/eea/agencies/massdep/service/approvals/wpa-form-3.html.

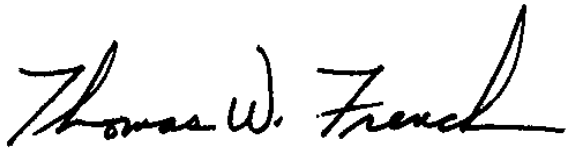
MA Endangered Species Act (MESA)

If the proposed project is located within Priority Habitat and is not exempt from review (see 321 CMR 10.14), then project plans, a fee, and other required materials must be sent to Natural Heritage Regulatory Review to determine whether a probable Take under the MA Endangered Species Act would occur (321 CMR 10.18). Please note that all proposed and anticipated development must be disclosed, as MESA does not allow project segmentation (321 CMR 10.16). For a MESA filing checklist and additional information please see our website: www.mass.gov/dfw/nhesp/regulatory-review.

We recommend that rare species habitat concerns be addressed during the project design phase prior to submission of a formal MESA filing, as avoidance and minimization of impacts to rare species and their habitats is likely to expedite endangered species regulatory review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. If the purpose of your inquiry is to generate a species list to fulfill the federal Endangered Species Act (16 U.S.C. 1531 et seq.) information requirements for a permit, proposal, or authorization of any kind from a federal agency, we recommend that you contact the National Marine Fisheries Service at (978)281-9328 and use the U.S. Fish and Wildlife Service's Information for Planning and Conservation website (https://ecos.fws.gov/ipac). If you have any questions regarding this letter please contact Melany Cheeseman, Endangered Species Review Assistant, at (508) 389-6357.

Sincerely,



Thomas W. French, Ph.D.
Assistant Director

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

Jack Buckley, *Director*

MASSWILDLIFE

April 09, 2018

Denise Bartone
Eversource Energy
247 Station Dr, SE270
Westwood, MA 02090

RE: Project Location: Fall River to Acushnet Reliability Project- 114 Line
Existing Eversource ROW 143
Town: ACUSHNET, DARTMOUTH, NEW BEDFORD
NHESP Tracking No.: 18-37556

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program of the MA Division of Fisheries & Wildlife (the "Division") for information regarding state-listed rare species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located [redacted] as indicated in the *Massachusetts Natural Heritage Atlas* (14th Edition). Our database indicates that the following state-listed rare species have been found in the vicinity of the site:

[redacted]

Scientific name	Common Name	Taxonomic Group	State Status
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

[redacted]

Scientific name	Common Name	Taxonomic Group	State Status
Panicum rigidulum ssp pubescens	Long-Leaved Panic-Grass	Plant	Threatened
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.mass.gov/nhesp).

Please note that projects and activities located within Priority and/or Estimated Habitat **must** be reviewed by the Division for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Wetlands Protection Act (WPA)
If the project site is within Estimated Habitat and a Notice of Intent (NOI) is required, then a copy of the NOI must be submitted to the Division so that it is received at the same time as the local conservation

commission. If the Division determines that the proposed project will adversely affect the actual Resource Area habitat of state-protected wildlife, then the proposed project may not be permitted (310 CMR 10.37, 10.58(4)(b) & 10.59). In such a case, the project proponent may request a consultation with the Division to discuss potential project design modifications that would avoid adverse effects to rare wildlife habitat.

A streamlined joint MESA/WPA review process is available. When filing a Notice of Intent (NOI), the applicant may file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the NOI form, please visit the MA Department of Environmental Protection's website: http://www.mass.gov/eea/agencies/massdep/service/approvals/wpa-form-3.html.

MA Endangered Species Act (MESA)

If the proposed project is located within Priority Habitat and is not exempt from review (see 321 CMR 10.14), then project plans, a fee, and other required materials must be sent to Natural Heritage Regulatory Review to determine whether a probable Take under the MA Endangered Species Act would occur (321 CMR 10.18). Please note that all proposed and anticipated development must be disclosed, as MESA does not allow project segmentation (321 CMR 10.16). For a MESA filing checklist and additional information please see our website: www.mass.gov/dfw/nhesp/regulatory-review.

We recommend that rare species habitat concerns be addressed during the project design phase prior to submission of a formal MESA filing, as avoidance and minimization of impacts to rare species and their habitats is likely to expedite endangered species regulatory review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. If the purpose of your inquiry is to generate a species list to fulfill the federal Endangered Species Act (16 U.S.C. 1531 et seq.) information requirements for a permit, proposal, or authorization of any kind from a federal agency, we recommend that you contact the National Marine Fisheries Service at (978)281-9328 and use the U.S. Fish and Wildlife Service's Information for Planning and Conservation website (https://ecos.fws.gov/ipac). If you have any questions regarding this letter please contact Melany Cheeseman, Endangered Species Review Assistant, at (508) 389-6357.

Sincerely,

Thomas W. French, Ph.D.
Assistant Director

Public Archaeology Laboratory

April 5, 2018

Brona Simon
State Archaeologist
State Historic Preservation Officer and Executive Director
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

Re: National Grid and Eversource Energy
Line 114 Extension Project, Fall River, Dartmouth, New Bedford, and Acushnet, Massachusetts
PNF, Due Diligence Report, and Intensive (Locational) Archaeological Survey Permit Application
PAL #s 3477 and 3491

Dear Ms. Simon:

On behalf of National Grid and Eversource Energy, enclosed please find a Project Notification Form for the proposed Line 114 Extension Project, a new 12.1-mile, 115 kV transmission line in Fall River, Dartmouth, New Bedford, and Acushnet, Massachusetts. Portions of the Project extend through Fall River and Freetown State Forest, property owned by the Massachusetts Department of Conservation and Recreation (DCR).

Also, please find enclosed a Cultural Resource Due Diligence Report and an application for a permit to conduct an intensive (locational) archaeological survey for the National Grid portion of the Project, which extends from the existing Bell Rock Substation to the Dartmouth town line in Fall River. The Project right-of-way referenced in the permit application is on the Fall River East, Massachusetts quadrangle.

Please note that the Eversource Energy portion of the Project is in development, and PAL will submit a separate cultural resources due diligence report and archaeological permit application under separate cover.

26 Main Street Pawtucket, RI 02860 | 401.728.8780 Main | 401.728.8784 Fax
palinc.com

We would like to begin the survey as soon as possible. Thank you in advance for your time and attention to this matter. If you have any questions or require additional information, please do not hesitate to contact Jenifer Elam, Principal Investigator, or Gregory Dubell, Energy Projects Manager, at your convenience.

Sincerely,

Deborah C. Cox, RPA
President

Enclosures

cc: Erin Whoriskey, National Grid (w/ encl. – via email)
Denise Bartone, Eversource Energy (w/ encl. – via email)
Ellen Berkland, Massachusetts DCR (w/encl.)
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah) (w/encl.)
Ramona Peters, Mashpee Wampanoag Tribe (w/ encl.)
David Weeden, Mashpee Wampanoag Tribe (w/encl.)
John Brown, III, Narragansett Indian Tribe (w/encl.)
Doug Harris, Narragansett Indian Tribe (w/encl.)

950 CMR: DEPARTMENT OF THE STATE SECRETARY

APPENDIX B
COMMONWEALTH OF MASSACHUSETTS

SECRETARY OF STATE: MASSACHUSETTS HISTORICAL COMMISSION

PERMIT APPLICATION: ARCHAEOLOGICAL FIELD INVESTIGATION

A. General Information

Pursuant to Section 27(c) of Chapter 9 of the General Laws and according to the regulations outlined in 950 CMR 70.00, a permit to conduct a field investigation is hereby requested.

1. Name(s): Jenifer C. Elam, RPA
2. Institution: The Public Archaeology Laboratory, Inc.

   Address: 26 Main Street
   Pawtucket, Rhode Island 02860
3. Project Location:
   see attached
4. Town(s): Fall River
5. Attach a copy of a USGS quadrangle with the project area clearly marked.

   see attached
6. Property Owner(s): New England Power Company d/b/a National Grid
7. The applicant affirms that the owner has been notified and has agreed that the applicant may perform the proposed field investigation.
8. The proposed field investigation is for a(n):

   a. Reconnaissance Survey
   b. Intensive Survey
   c. Site Examination
   d. Data Recovery

B. Professional Qualifications

1. Attach a personnel chart and project schedule as described in 950 CMR 70.11 (b).

a. Personnel

Principal Investigator(s):	Jenifer C. Elam, RPA
Project Archaeologist(s):	Erin Flynn
Field Crew:	PAL Staff

b. Schedule

Fieldwork:	April 2018, weather permitting
Laboratory:	May 2018
Report:	June 2018

2. Include copies of curriculum vitae of key personnel (unless already on file with the State Archaeologist).

C. Research Design

1. Attach a narrative description of the proposed Research Design according to the requirements of 950 CMR 70.11.

2. The Applicant agrees to perform the field investigations according to the standards outlined in 950 CMR 70.13.

3. The Applicant agrees to submit a Summary Report, prepared according to the standards outlined in 950 CMR 70.14 by:

4. The specimens recovered during performance of the proposed field investigation will be curated at:

The Public Archaeology Laboratory, Inc.
26 Main Street
Pawtucket, Rhode Island 02860

SIGNATURE Jennifer C Elam
APPLICANT(S)

March 29, 2018
DATE

May 4, 2018

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

Barbara Newman
Chief, Permits and Enforcement Branch
Regulatory Division
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Attn: Mike Weirbonics

RE: National Grid d/b/a New England Power Company and Eversource Line 114 115kV Transmission Line Extension, Fall River, Dartmouth, Acushnet and New Bedford, MA. PAL #3477 and 3491. MHC #RC.64212.

Dear Ms. Newman:

Staff of the Massachusetts Historical Commission (MHC), office of the State Historic Preservation Officer, have reviewed the Project Notification Form (PNF) for the project referenced above, and the State Archaeologist's field investigation permit application to conduct intensive (locational) archaeological survey for the Fall River portion of the project.

The PNF indicates that National Grid and Eversource propose to construct a new 115kV electrical transmission line from the Bell Rock Substation in Fall River, through Dartmouth and New Bedford, to the Industrial Park Tap in Acushnet. Preliminary project plans submitted to the MHC are for the National Grid portion in Fall River. Project plans for the Eversource portion of the project in Dartmouth, New Bedford and Acushnet are in development.

The project requires review and permitting by the US Army Corps of Engineers. The MHC looks forward to consultation with the Corps pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800).

When the information becomes available, the MHC and other consulting parties should be provided scaled existing and proposed conditions project plans for the complete project, sized no larger than 11″ by 17″ format. Project plans should show all proposed project impact areas, including access routes, vehicle and equipment storage, staging, or laydown areas, and work and pull pads.

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (48 Fed. Reg. 190) (1983)), and Massachusetts General Laws Chapter 9, Sections 26-27C (950 CMR 70-71). If you have questions or require additional information, please contact Jonathan K. Patton at this office.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Erin Whoriskey, National Grid
Denise Bartone, Eversource Energy
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Ellen Berkland, MA DCR
Deborah C. Cox, PAL, Attn: Jenifer Elam

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

PERMIT TO CONDUCT ARCHAEOLOGICAL FIELD INVESTIGATION

Permit Number 3827 Date of Issue May 4, 2018

Expiration Date May 4, 2019

PAL is hereby authorized to conduct an archaeological field investigation pursuant to Section 27C of Chapter 9 of General Laws and according to the regulations outlined in 950 CMR 70.00.

National Grid Line 114 Extension Project, Fall River

Project Location

Brona Simon

Brona Simon, State Archaeologist
Massachusetts Historical Commission

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

PERMIT TO CONDUCT ARCHAEOLOGICAL FIELD INVESTIGATION

Permit Number 3871 Date of Issue October 11, 2018

Expiration Date October 11, 2019

PAL is hereby authorized to conduct an archaeological field investigation pursuant to Section 27C of Chapter 9 of General Laws and according to the regulations outlined in 950 CMR 70.00.

Eversource Line 114 Extension Project, Dartmouth, New Bedford, and Acushnet

Project Location

Brona Simon

Brona Simon, State Archaeologist
Massachusetts Historical Commission

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

APPENDIX C NATIONAL GRID'S ENVIRONMENTAL GUIDANCE EG303-NE

SCOPE: This specification provides Environmental Procedures and Best Management Practices (BMPs) for work on electric and natural gas transmission and distribution rights-of-way (ROWs), fee-owned and easement, cross-country, and public/private roadways, as well as substations, company facilities and on customer-owned projects, and other facilities in New England.

Note that project-specific permits may have other BMPs/constraints that differ from this Environmental Guidance (EG). The projects shall be constructed in accordance with the project-specific permits and this specification. For maintenance work in New Hampshire, there is a state specific BMP manual which supersedes EG-303NE, where applicable[1]. For work in Vermont, there is a state specific BMP manual which may supersede EG-303NE, where applicable[2]. The Massachusetts Runoff, Erosion & Sedimentation Control Field Guide published by the Massachusetts Association of Conservation Commissions (MACC) is incorporated herein as a reference. The MACC Guide is intended as a supplement to EG-303NE and shall be superseded by EG-303NE in the case of an inconsistency or conflict.

PURPOSE: The purpose of this specification is to provide National Grid personnel, consultants and contractors with BMPs to support work that is protective of the environment and that complies with all applicable environmental laws, regulations and company policies and procedures. Environmental policies require the Company to avoid, minimize and mitigate negative impacts to the environment.

POLICY: These BMPs are to be effectively and consistently followed by all personnel accessing Company facilities, ROWs, and customer projects for inspection, maintenance and construction work purposes.

If there are any questions on this guidance, contact the local or project National Grid Environmental Scientist.

These BMPs do not apply to Company employees and contractors performing routine vegetation management activities that are not part of a construction or maintenance project. Employees and contractors maintaining vegetation on Company ROWs and substations shall follow the National Grid Right-of-Way Vegetation Management Plan; Right-of-Way Vegetation Management Specification; Substation, Switch Yard, and Pole Yard Vegetation Management Specification; and Right-of-Way Vegetation Mowing Specification. For more information regarding routine vegetation management, please contact a National Grid Forester.

[1] The "Best Management Practices Manual For Utility Maintenance In And Adjacent To Wetlands and Waterbodies in New Hampshire"

[2] Vermont DEC, 2006. The Vermont Standards and Specifications for Erosion Prevention and Sediment Control.

APPLICABLE REGULATIONS: Refer to Applicable Regulations in state-specific EG-301 documents.

CONTACTS: If there are any questions on this guidance, contact the National Grid Environmental Scientist.

1.0 Definitions

Refer to **Glossary in Appendix 1** and **Acronyms in Appendix 2**.

2.0 Project Planning

Prior to the start of any project (proposed new facilities or maintenance of existing facilities), the Project Engineer or other project planner shall determine whether any environmental permits or approvals are required, per the state-specific EG-301 environmental checklists. Any questions regarding which activities may be conducted in regulated areas or within environmentally sensitive areas shall be referred to the National Grid Environmental Scientist or Project Environmental Consultant

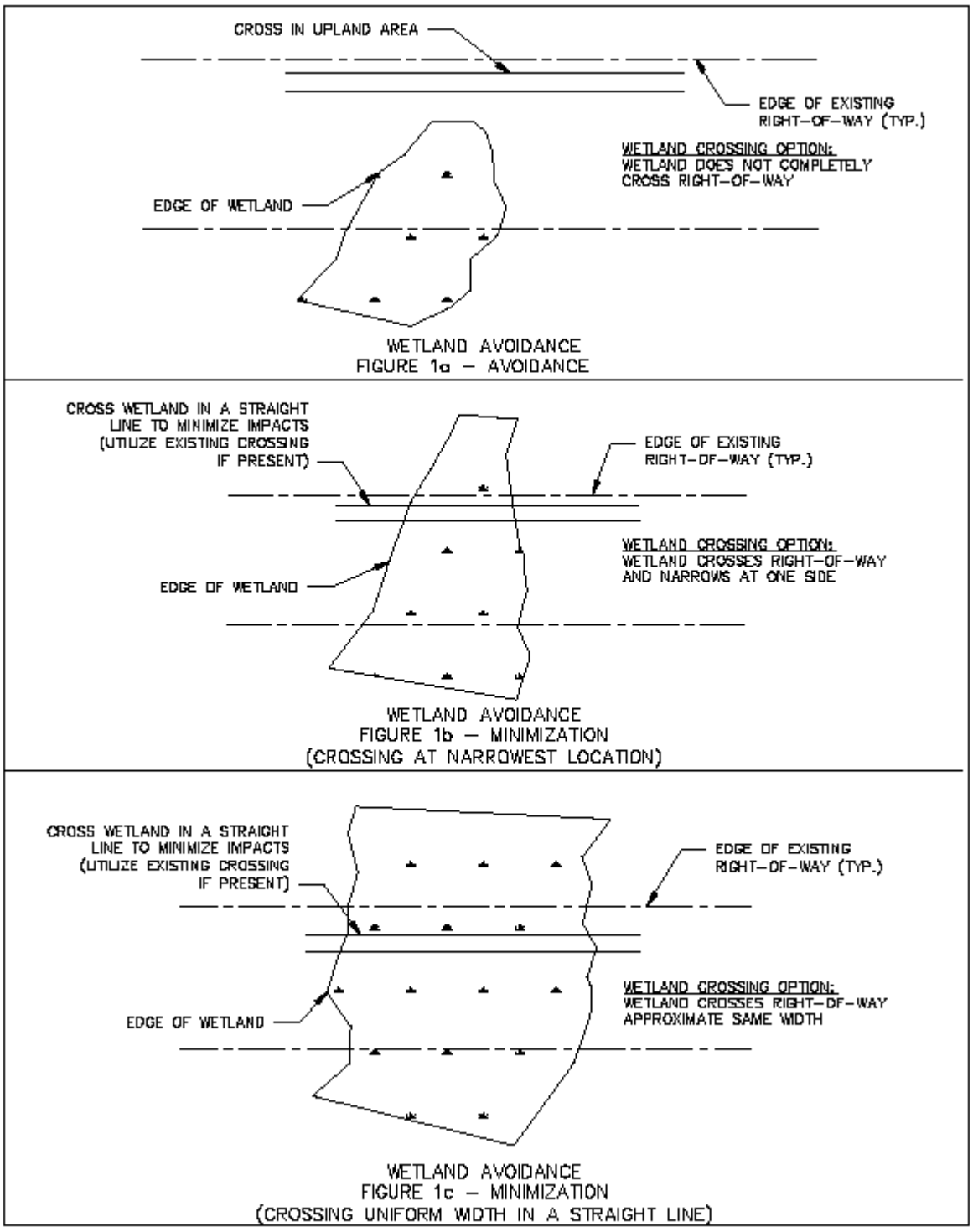
All new construction and maintenance projects shall follow clear and enforceable environmental performance standards, which is the purpose for which these BMPs have been compiled.

2.1 Avoidance and Minimization

Measures shall always be taken to avoid impacts to wetlands, waterways, rare species habitats, known below and above ground historical/archeological resources and other environmentally sensitive areas. If avoidance is not possible, then measures shall be taken to minimize the extent of impacts. Alternate access routes or staging areas shall always be considered. Below is a list of methods that shall be considered where impacts are unavoidable:

- Use existing ROW access where available. Keep to approved routes and roads without deviating from them or making them wider.
- Off-ROW access shall never be assumed and shall be coordinated through National Grid Real Estate before being implemented.
- Where no existing ROW access is present, avoid wetlands and if a wetland crossing is necessary, cross wetlands at the most narrow point possible or at the location of a previously used crossing (if evident). Figure 1 below illustrates this minimization technique.
- Avoid and minimize stream crossings;
- Minimize the width of typical access roads through wetlands to a maximum width of 16 feet;
- Conduct work manually (without using motorized equipment) in wetlands, wherever possible;

- Use swamp, timber, or similar mats in wetlands to minimize soil disturbance and rutting when crossing or working within wetlands. When not using mats for access, standard vehicles shall not be allowed to drive across wetlands without the prior approval of the National Grid Environmental Scientist. Use of a low ground pressure (LGP) vehicle may be a feasible alternative to mats provided that such LGP vehicle use has been reviewed and approved by the National Grid Environmental Scientist. See Section 8.0.
- Coordinate the timing of work to cause the least impacts during the regulatory low-flow period under normal conditions, when water/ground is frozen, after the spring songbird nesting season, and, outside of the anticipated amphibian migration window (mid-February to mid-June). Refer to the United States Army Corps of Engineers (USACE) state-specific General Permit for the definition of the low-flow period in each state at: http://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/. A summary table is provided in Section 8.0.
- Seek alternative routes or work methods to minimize impact.


CROSS IN UPLAND AREA
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND DOES NOT COMPLETELY CROSS RIGHT-OF-WAY
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1a – AVOIDANCE
CROSS WETLAND IN A STRAIGHT LINE TO MINIMIZE IMPACTS (UTILIZE EXISTING CROSSING IF PRESENT)
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND CROSSES RIGHT-OF-WAY AND NARROWS AT ONE SIDE
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1b – MINIMIZATION
(CROSSING AT NARROWEST LOCATION)
CROSS WETLAND IN A STRAIGHT LINE TO MINIMIZE IMPACTS (UTILIZE EXISTING CROSSING IF PRESENT)
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND CROSSES RIGHT-OF-WAY APPROXIMATE SAME WIDTH
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1c – MINIMIZATION
(CROSSING UNIFORM WIDTH IN A STRAIGHT LINE)

2.2 Historically Significant Areas

Areas that have been identified as historically and/or culturally significant shall be avoided in accordance with site-specific avoidance plans, as applicable. Refer to the project-specific Environmental Field Issue (EFI) for any applicable avoidance plans or consult with the National Grid Environmental Scientist. Demarcation of these areas to be avoided shall use staked orange snow fencing or an equivalent physical barrier (not just ribbon flagging) and signage. Refer to Section 16.0 for signage guidance.

2.3 Rare Species Habitat

Work within areas that have been identified as mapped rare species habitat shall follow site-specific requirements, as applicable. In Massachusetts, maintenance activities within mapped habitat (known as Priority Habitat of Rare Species) shall follow the BMPs outlined in the Natural Heritage Endangered Species Program (NHESP)-approved National Grid Operation and Maintenance Plan. Work in mapped rare species habitat may require, at a minimum, turtle training for crews and sweeps of work areas for turtles, botanist identification of rare plant locations and avoidance of these locations, and protection of vernal pools, all prior to the start of work. Demarcation of these areas to be avoided (e.g., rare plant populations, overwintering turtles, nests) shall use staked orange snow fencing or an equivalent physical barrier (not just ribbon flagging) and signage. Refer to Section 16.0 for signage guidance.

Other requirements may apply in NH, VT and RI. Refer to the project-specific EFI for any applicable measures or consult with the National Grid Environmental Scientist.

2.4 Meetings

Pre-permitting meetings shall take place early in the project development process to determine what permits are triggered by the proposed work and the timeline required for permitting. During these meetings, the team shall develop access plans and BMPs to be used during construction of the project.

Field / Constructability review meetings shall take place on-site to evaluate construction site access and job site set-up, to ensure that the project can proceed as permitted. It is at this point in time where work areas, pulling locations, laydown areas, parking areas, and equipment storage areas are evaluated and located. Off-ROW areas under consideration should be included in this discussion.

Prior to submitting permit plans to regulatory authorities, the construction group (contractor or National Grid) shall review the plans for final sign off.

Pre-construction meetings are typically held prior to the commencement of all work to appoint responsible parties, discuss timing of work, and further consider options to avoid and/or minimize impacts to sensitive areas. These meetings can occur on- or off-site and shall include all the willing and available stakeholders (i.e., utility employees, contractors, consultants,

inspectors, and/or monitors, and regulatory personnel). Training of crews and supervisors of the EFI, Stormwater Pollution Prevention Plan (SWPPP), rare species, and other permit requirements shall be conducted at a pre-construction meeting.

Pre-job briefings shall be conducted daily or otherwise routinely scheduled meetings shall be conducted on-site with the work crew throughout the duration of the work. These meetings are a way of keeping everyone up to date, confirming there is consensus on work methods and responsibilities, and ensuring that tasks are being fulfilled with as little impact to the environment as possible.

The Project Environmental Scientist/Monitor and Construction Project Manager shall communicate regularly (e.g. weekly or bi-weekly meetings or phone conversations) to discuss the work completed since last communication (i.e. work locations, wetland impacts, equipment used, and unexpected delays or work conditions). These meetings or calls shall include the expected schedule of construction for the upcoming week, the long term construction plans, and planned methods for working near/in wetlands. Both the Project Environmental Scientist/Monitor and Construction Project Manager shall work together so the Project complies with all environmental permits and regulations. When changes to the Project scope or agreed work plan are proposed they shall be done so with the final approval of the National Grid Environmental Scientist.

2.5 Communication of Project Specific Environmental Requirements

Project specific environmental concerns, to include sensitive resources, permits, approved access and time-of-year or other restrictions, shall be communicated to the project team and be included as part of the Pre-Bid and Pre-Construction Meetings. Project specific requirements shall be communicated to the project manager/construction manager/engineering group using the following guidelines:

Environmental Field Issue – The EFI will be a full document consisting of narrative, project permits, access and matting plans. A table summarizing pertinent (but not all) permit conditions and the responsible party for those conditions shall be included in the EFI. Copies of all permits should be included as attachments. This will be prepared for most projects with multiple permits or large, complex projects (siting board, Section 404, 401 WQC, SWPPP). There shall be EFI training at the pre-construction meeting. Appendix 3 is a sample EFI template.

Simplified Environmental Field Issue – The Simplified EFI is a memorandum containing environmental resources present, project permit(s), access and matting plans and a table summarizing relevant permit conditions and responsible party for those conditions. Copies of all permits should be included as attachments. The Simplified EFI will be prepared for most projects with 1 or 2 permits (Order of Conditions, S404 Cat 1). The Simplified EFI should also be provided for projects that have environmental resources present, but the scope of the project

does not trigger environmental permitting (e.g., the scope of work qualifies for maintenance exemption(s)). The resources present shall be discussed at the Pre-Bid and Pre-Construction meetings and any changes in scope will require additional review by the National Grid project team.

E-mail delivery of Permit and any Sediment/Erosion control or BMP plan – For those projects with only one permit (eg., MA Order of Conditions, RI DEM permit, RI CRMC permit, NH Utility Notification) or projects with a sediment & erosion control plan (local town requirement or for exempt maintenance work), a copy of the permit and any applicable plan will be emailed to the PM (and the project team where deemed necessary) to be incorporated into the Construction Field Issue.

STORMS work management system input – For STORMS work, no EFI is prepared unless multiple permits are required for the project (see guidance above). If only a MA Order of Conditions, MA Determination of Applicability, RI DEM permit, RI CRMC permit, RI SESC Approval, or NH Utility Notification is required, then the permit is attached in Documents tab and conditions noted in Remarks/comments section. Appendix 5 contains standard STORMS boilerplate language.

2.6 Timing of Work

Regulatory authorities may place seasonal or time-of-year restrictions on project construction elements. These time-of-year restrictions may be state or permit-specific, and shall be adhered to.

Work during frozen conditions. Activities conducted once wetland areas are frozen sufficient to minimize rutting and other impacts to the surrounding environment may be authorized by the National Grid Environmental Scientist. Work during this time also generally reduces disturbance of aquatic and terrestrial wildlife movement by avoiding sensitive breeding and nesting seasons. When not using mats for access, vehicles shall not be allowed to drive across wetlands without the prior approval of the National Grid Environmental Scientist.

Work during the regulatory low-flow period. Conducting work during the low-flow period can reduce impacts to surface water and generally avoids spawning and breeding seasons of aquatic organisms. If the water is above normal seasonal levels, adjustments to work activities and methods are required.

2.7 Alternate Access

2.7.1 Manual Access

In some cases such as for smaller projects, work areas can be accessed manually. This includes access on foot through upland and shallow wetland areas, access by boat through open water or ponded areas, and climbing of structures where possible.

Smaller projects, such as repair of individual structures, or parts of structures, that do not categorically require the use of heavy machinery, shall be accessed manually to the greatest extent practicable.

2.7.2 Use of Overhead/Aerial Access

Using helicopters can be expensive and is not always feasible, but it may be appropriate in some situations in order to get workers and equipment to a site that otherwise may be very difficult to access. The use of overhead and/or aerial equipment may be beneficial for work in areas where larger water bodies, deep crevices, or mountainous areas hinder ground access. The landing area for helicopters shall be reviewed for environmentally sensitive resources. Use of helicopters requires Project Manager and Senior Management approval.

3.0 Inspection, Monitoring and Maintenance

All construction practices and controls shall be inspected on a regular basis and in accordance with all applicable permits and local, state, and federal regulations to avoid and correct ANY damage to sensitive areas.

The construction crews shall be responsible for completing daily inspections, and IMMEDIATELY bring any **damage or observed erosion, or failed erosion controls** to the attention of the Person-In-Charge and the National Grid Environmental Scientist. Where applicable and/or as directed by environmental permits issued for the project, the Project Environmental Consultant shall conduct weekly (at a minimum) inspections of the project work areas and shall document their inspection using the Stormwater, Wetlands & Priority Habitat Environmental Compliance Site Inspection / Monitoring Report form found in Appendix 6 and issue the report within 24 hours. The Person-in-Charge shall work with the National Grid Environmental Scientist and the Project Environmental Consultant to determine when and how the repairs shall be made.

Project-specific Action Logs and Long-Term Restoration Logs are prepared as needed by the National Grid Environmental Scientist or the Project Environmental Consultant to track issues and/or repairs and assign responsible parties.

4.0 Best Management Practices

The BMP sections presented in this EG address access, construction, snow and ice management, structures in wetlands, access road maintenance and repair, clean-up and restoration standards, ROW gates, field refueling and maintenance operations, management of spills/releases, and a summary of key construction BMPs.

Note that BMPs shown on any permit drawings for a specific project may need to be revised and or supplemented during the execution of a project based on unforeseen or unexpected factors such as extreme weather or unknown subsurface conditions. It is the responsibility of

the Contractor to work with the National Grid Environmental Scientist and/or the Project Environmental Consultant to identify necessary changes and to ensure that construction-related impacts to wetlands, water bodies and other environmentally sensitive areas are avoided.

Any deviation from the approved Best Management Practices shown in the EFI and/or SWPPP plans shall be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting or could result in a permit violation.

4.1 Wetland Boundary Demarcation

Prior to the start of any activity conducted under an environmental permit, wetland boundaries shall be reviewed. Flagging for wetland boundaries, stream banks and other resource areas shall be refreshed as needed. This may become particularly important when the original flagging was placed in previous seasons and now may have become obscured.

4.2 Sedimentation and Erosion Controls

Appropriate sedimentation and erosion control devices shall be installed at work sites, in accordance with permit conditions and/or regulatory approvals, and as needed to prevent adverse impacts to water resources and adjacent properties.

The overall purpose of such controls is to prevent and control the movement of disturbed soil and sediment from work sites to adjacent, undisturbed areas, and particularly to water resources, public roads and adjacent properties. All proprietary controls shall be installed per manufacturer's recommendations and specifications.

Appropriate sedimentation and erosion control devices include but are not limited to: silt fencing, straw bales, wood chip bags, straw wattles, compost socks, erosion control blankets, mulch, slope interruption practices, flocculent powder/blocks and storm drain/catch basin inlet protection. Such controls shall be installed between the work area and environmentally sensitive areas such as wetlands, streams, drainage courses, roads and adjacent property when work activities shall disturb soils and result in a potential for causing sedimentation and erosion.

In Massachusetts, use of monofilament-encased wattles shall be avoided in mapped Priority Habitat for snakes and amphibians. For projects with work within mapped Priority Habitat for snakes and amphibians, wattles that are encased in a sock, hemp, fiber, or movable jute netting are required to prevent entrapment. Also, "wildlife gaps" should occur every 50 feet, if possible, given wetland permit conditions. This spacing of the wattles allows snakes and amphibians to move across the ROW. Refer to the Amphibian and Reptile BMPs in Appendix 7.

Staked straw bales often serve as the demarcation of the limits of work and/or sensitive areas to be avoided. Work shall never be conducted outside the limit of erosion controls without prior approval from the National Grid Environmental Scientist.

Project plans depict proposed erosion controls, however field conditions may warrant additional practices be implemented (e.g., wet conditions, frozen conditions, poorly drained soils, steep slopes, materials used for work pads, transition areas to construction mats, number of trips across work areas, etc.).

Any deviation from the approved erosion controls shown in the EFI and/or SWPPP plans needs to be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting or result in a permit violation.

Appendix 7 provides typical sketches of common sedimentation and erosion controls. If a SWPPP is required for the project, maintenance and inspection of erosion controls shall follow the SWPPP requirements. Sedimentation and erosion controls shall be properly maintained and inspected on a periodic basis, until work sites are properly stabilized and restored. Inspections shall be documented using the Inspection Form "Storm Water, Wetlands & Priority Habitat Environmental Compliance Site Inspection/Monitoring Report" (**Appendix 6**).

The sequence and timing of the installation of sedimentation and erosion control measures is critical to their success. Sedimentation and erosion controls shall be installed prior to commencing construction activities that may result in any soil disturbance or cause otherwise polluted site runoff. Inspection of these devices may be required by the National Grid Environmental Scientist or by regulators prior to the start of work. The installation of water bars and other erosion control measures shall be installed shortly thereafter.

4.3 Concrete Wash Outs

Concrete wash outs shall be used for management of concrete waste. Concrete and concrete washout water shall not be deposited or discharged directly on the ground, in wetlands or waterbodies, or in catch basins or other drainage structures. Where possible, concrete washouts shall be located away from wetlands or other sensitive areas. Consult the National Grid Environmental Scientist on proposed concrete wash out locations prior to their use. Following the completion of concrete pouring operations, the wash outs shall be disposed of off-site with other construction debris. Refer to BMPs in Appendix 7.

4.4 Construction Activities in Standing Water

The use of silt curtains or turbidity barriers may be required when working in or adjacent to standing water such as ponds, reservoirs, low flowing rivers/streams, or coastal areas. Silt curtains and turbidity barriers prevent sediment from migrating beyond the immediate work area into the resource areas.

Coffer dams constructed using sheet piling or large sandbags (Trade names such as "the Big Bag" or "DamItDams") may be used to temporarily isolate and contain a work area in standing water.

When working in standing water, an oil absorbent boom, in addition to a silt curtain or other temporary barrier, shall be placed around the work area for spill prevention.

Work in drinking water reservoirs or other waters may require extensive regulatory agency review, even for maintenance work, which could result in additional time required for permitting, review and material procurement prior to the start of work.

4.5 Dewatering

Where excavations require the need for dewatering of groundwater or accumulated stormwater, the water shall be treated before discharge. Appropriate controls include dewatering basins, flocculent blocks, filter bags, filter socks, or weir tanks. Schematics of these BMPs are included in Appendix 7. Water trucks or fractionation tanks may be utilized if watertight containers are desired for controlled on-site discharge or for off-site discharge into an approved dewatering area when site restrictions make it difficult to utilize other dewatering methods on-site. Dewatering discharge water shall never be directed into wetlands, streams/rivers, other sensitive resource areas, catch basins, other stormwater devices, or substation Trenwa trenches. Dewatering flow shall be controlled so that it does not cause scouring or erosion through the use of a dewatering basin, filter sock, or equivalent. If it is determined that the chosen controls are not appropriately filtering the fine sediment from the dewatering pumpate then the National Grid Environmental Scientist shall be notified immediately and the controls shall be revised or supplemented.

When establishing a dewatering basin, consideration should be given to the anticipated volume of water and rate of pumping in determining the size of the dewatering basin. Dewatering basins shall be constructed on level ground. Once pumping commences, the basin shall be monitored frequently to assure that the rate of water delivery to the structure is low enough to prevent water from flowing, unfiltered, over the top of the basin walls. The basin shall be monitored throughout the dewatering process because the rate of filtration shall decrease as sediment clogs the filter fabric. If the basin is not appropriately filtering the fine sediment from the dewatering pumpate then the basin may need to be supplemented with a flocculent block. Field conditions shall dictate how often the basin should be inspected.

Distance to sensitive areas, direction of flow (toward or away from protected, or sensitive areas, such as wetlands, ponds, or streams), amount of vegetative ground cover between the basin and nearby sensitive areas, ground conditions (ledge, frozen, etc.), volume of water being pumped, and pump-rate, are some of the factors to be considered when determining an

inspection frequency. Clogged filter fabric shall be replaced and accumulated sediment shall be removed as necessary from the basins to maintain efficacy.

Any new dewatering location (not previously reviewed and approved by the National Grid Environmental Scientist during project planning or permitting) shall be reviewed and the discharge location approved by the National Grid Environmental Scientist before use.

Complex projects that require large scale dewatering shall require individual review by the National Grid Environmental Scientist and may trigger additional permitting.

Dewatering in areas of known chemical contamination may require a separate NPDES permit, or other approval, and treatment or containment system. Consult with the National Grid Environmental Scientist.

4.5.1 Overnight Dewatering

Some projects may necessitate 24-hour dewatering for on-site construction activities. Overnight dewatering will be evaluated on a case-by-case basis by the National Grid Environmental Department.

If it is necessary to conduct overnight dewatering on a project, a dewatering plan must be submitted to the Environmental Department for review and approval **5 business days prior to beginning dewatering activities**. Sufficient knowledge of flow, discharge, and re-infiltration rate of water must be obtained and submitted for review. The Environmental Department may require monitored dewatering for a period of time in order to provide this data in support of a request for 24-hour dewatering. The dewatering plan must include at a minimum:

1. Location of dewatering system, system components (basin, frac tank, etc), and materials.
2. Location of discharge and distance from closest wetland.
3. Location of erosion controls. A secondary perimeter of erosion controls will be required around the dewatering system for overnight dewatering.
4. Peak flow, discharge rate and re-infiltration rates.
5. Visual monitoring plan for discharge. Expected duration of dewatering.
6. Emergency provisions if overnight, unattended dewatering is proposed.

4.5.2 Dewatering Clean Up/Restoration

Basins shall be cleaned and removed as soon as dewatering is complete. Sediment removed from the dewatering basin shall be allowed to dry before being disposed of by evenly spreading it over unvegetated upland areas where erosion is not a concern if clean or removing it from the site for proper disposal. Off-site trucking of wet soils is prohibited. The sediment disposal area shall be approved by the National Grid Environmental Scientist or the Project Environmental Consultant prior to use. Stabilization measures shall also need to implemented and approved

by the National Grid Environmental Scientist or the Project Environmental Consultant. Soils/sediments shall be dewatered and dried to the point practicable for either on-Site reuse or off-Site transport.

4.6 Check Dams

Check dams are a porous physical barrier installed perpendicular to concentrated storm water flow. They are used to reduce erosion in a swale by reducing runoff energy (velocity), while filtering storm water, thereby aiding in the removal of suspended solids.

Check dams should only be used in small drainage swales that shall not be overtopped by flow once the dams are constructed. These dams should not be placed in streams. Check dams are typically installed in ROWs or on other construction sites prior to the start of soil disturbing work. Per the Rhode Island Soil Erosion and Sediment Control Handbook, no formal design is required for a check dam if the contributing drainage area is 2 acres or less and its intended use is shorter than 6 months; however, the following criteria should be adhered to when specifying check dams.

- The drainage area of the ditch or swale being protected should not exceed 10 acres.
- The maximum height of the check dam should be 2 feet.
- The center of the check dam must be at least 6 inches lower than the outer edges.
- The maximum spacing between the dams should be such that the toe at the upstream dam is at the same elevation as the top of the downstream dam.

Per the NHDES stormwater manual, the use of check dams should be limited to swales with longitudinal slopes that range between 2 to 5 percent that convey drainage from an area less than 1 acre. Existing conditions that exceed these limitations should be assessed in the field and discussed with the National Grid Environmental Scientist to determine the viability of this BMP for the specific application. Check dams are often comprised of stone, straw bales, sand bags, or compost/silt socks. Use of check dams should be coordinated with the National Grid Environmental Scientist to ensure that the material selection, spacing and construction method are appropriate for the site. Check dams composed of biodegradable materials (e.g. straw bales or wattles, wood chip bags) may require periodic replacement for continued proper functioning[3]. Refer to BMPs in Appendix 7.

4.7 Water Bars

Water bars should be used on sloping ROWs to divert storm water runoff from unstabilized or active access roads when needed to prevent erosion. Surface disturbance and tire compaction promote gully formation by increasing the concentration and velocity of runoff. Water bars are

[3] Grass growth on a biodegradable type check dam is evidence that the material is decomposing. While this doesn't mean it is no longer functioning, it means it may be in a weakened condition and could potentially fail under high flow velocity. It is acceptable for grass to be growing on a stone check dam.

constructed by forming a ridge or ridge and channel diagonally across the sloping ROW. Each outlet should be stable. The height and side slopes of the ridge and channel are designed to divert water and to allow vehicles to cross. When siting water bars, consideration shall be given to the sensitivity of the area receiving the diverted runoff. For example, runoff should not be directed into a wetland, waterbody, other environmentally sensitive areas, or to private property or public roadways. Refer to BMPs in Appendix 7.

4.8 Retaining Walls

In some situations, retaining walls comprised of concrete blocks, gabions, boulders or other comparable materials may be required to stabilize the shoulder of existing access roads and/or supplement required erosion controls. Installation of such measures shall not be allowed as a maintenance activity. Should these controls be considered for a project, it shall be reviewed by the National Grid Environmental Scientist, as design and additional permitting may be required.

4.9 Slope Stabilization

Temporary slope stabilization practices help to keep exposed, erodible soils stabilized while vegetation is becoming established. Acceptable temporary slope stabilization practices may include the use of erosion control blankets, or hydraulic erosion control. Erosion control blankets, often comprised of natural fibers (e.g., jute, straw, coconut, or other degradable materials) are a useful slope stabilization, erosion control and vegetation establishment practice for ditches or steep slopes. Blankets are typically installed after final grading and seeding for temporary or permanent seeding applications. Hydraulic erosion control practices, including Bonded Fiber Matrix or hydroseed with a soil stabilizer (e.g., tackifier and/or mulch) may be an acceptable or desirable alternative form of temporary slope stabilization. For all practices, manufacturer's specifications should be followed for installation depending on slope and other field conditions. Consult the National Grid Environmental Scientist prior to selecting and installing any slope stabilization practices. Refer to BMPs in Appendix 7.

4.10 Maintenance of Sedimentation and Erosion Controls

Sedimentation and erosion controls shall be maintained in good operational condition during the course of the work. This includes, but is not limited to, replacing straw bales that are no longer in good condition, re-staking straw bales, replacing or re-staking silt fence, and removing accumulated sediment. Remove sediment before it has accumulated to one half the height of any exposed silt fence fabric, straw bales, other filter berm, check dams or water bars. Accumulated sediment shall be removed from sedimentation basins to maintain their efficacy. Manage the removed sediment by evenly spreading it over unvegetated upland areas where erosion is not a concern, by stockpiling and stabilizing, or by disposing of off-site. Stabilization measures shall also need to be implemented and approved by the National Grid Environmental

Scientist or the Project Environmental Consultant. Where a SWPPP has been prepared for a specific site, the guidelines documented therein shall govern the management of sediment.

5.0 Right-of-Way (ROW) Access

Whenever possible, access shall be gained along existing access routes or roads within the ROW. However, in some cases there is no existing access. In many cases, temporary access can be utilized. The following practices provide general guidance on accessing a ROW. Check with a National Grid Environmental Scientist to determine if any environmental permitting is required before utilizing a temporary access.

National Grid operates substations and has cross-country ROW with overhead electric power lines in four New England States. MA, NH and RI also have transmission and distribution natural gas pipelines. Access is needed to substations, ROWs, and customer property, for inspection, maintenance and construction activities. Many projects are located in or near environmentally sensitive areas, such as rivers/streams, wetlands, floodplains, or rare species habitat, etc., which are protected from activities that may disturb these resources.

Note that the building of new roads or enlargement of existing roads is **prohibited** unless this activity is allowed by a project-specific permit, and the new roads appear on the Site Plans that were authorized in the regulatory approvals.

5.1 Off-ROW Access

Off-ROW access shall be evaluated for wetlands, rare species, cultural resources and other potential sensitive receptors, as applicable. National Grid Real Estate and Stakeholder Relations shall also be contacted as soon as possible once off-ROW access is determined to be needed.

5.2 Stabilized Construction Entrance/Exit for Access to ROWs from Public or Private Roads

A suitable (minimum 15-foot wide by 50-foot long) construction entrance/exit shall be installed at the intersection of the ROW access road/route with public/private paved roads, or other such locations where equipment could track mud or soil onto paved roads. The construction entrance/exit should be comprised of clean stone installed over a geotextile fabric. Geotextile fabric may be omitted for permanent construction entrances/exits on a case-by-case basis with the approval of the National Grid Environmental Scientist. Refer to BMPs in Appendix 7.

Construction entrance areas shall be monitored and maintained to ensure that stone or other material is not deposited onto the roadway, causing a safety concern. Where track-out of sediment has occurred onto a roadway, it shall be swept off the road by the end of that same work day.

If a construction entrance/exit is clogged with sediment and no longer functions, the sediment and stone may require removal and replacement with additional clean stone (clean stone refreshment) to ensure this tracking pad is performing its intended function adequately. Heavier traffic use may require this clean stone refreshment multiple times throughout a project. Reinforcement of these stabilized construction entrance/exits with asphalt binder or asphalt millings is not likely to be considered "maintenance" and may trigger additional permitting requirements[4]. In some cases, heavily used construction entrances/exits may benefit from the installation of a 5-15 foot strip of asphalt binder or asphalt millings closest to the paved roadway to capture any stone that is tracked from the stone apron. Such cases shall be evaluated on an individual basis with the National Grid Environmental Scientist.

Once work is complete, the construction entrance/exit shall either be removed or retained, depending upon future maintenance-related access needs, property ownership, and/or project-specific approvals. If removed, the area shall be graded, seeded (if adequate root and seed stock are absent) and mulched. Proper approvals for leaving access roads in place shall be obtained; contact the National Grid Environmental Scientist and Property Legal.

5.3 Maintenance of Existing Access Roads

In many cases, the existing access road may need to be maintained to allow passage of the heavy equipment required for scheduled maintenance work. Access roads cannot deviate from the approved and permitted access plans. Maintenance of these roads may include adding clean gravel or clean crushed stone to fill depressions and eroded areas. This activity shall be conducted only within the width of the existing access road footprint and does not include widening existing access roads

If gravel begins to migrate onto the existing vegetated road shoulder, this gravel shall be removed during the project and/or after the completion of use of the road to ensure the road fill is not spreading into adjacent resource areas, or resulting in the road becoming much wider than its pre-existing or permitted condition. In some areas of mapped rare species habitat or other sensitive areas where project-specific permit conditions require the prevention of the migration of sediments into adjacent resources, an engineered stabilization system (e.g., GeoWeb or similar) may be suitable to prevent sedimentation while allowing for unrestricted wildlife migration.

In Massachusetts, any proposed widening of access roads in turtle Priority Habitat would require individual consultation with NHESP and, depending on the level of impact proposed, may require a Project Review filing. The limited filling of ruts or potholes is compatible with the National Grid Operation and Maintenance Plan approved by NHESP under the Massachusetts Endangered Species Act, however, severely rutted access roads in turtle Priority

[4] Depending on the road, use of an asphalt binder or asphalt millings as a construction entrance/exit may trigger state or local permit requirements.

Habitat that require extensive linear feet of stone for safe passage will require individual consultation with NHESP.

Major reconstruction projects may require multiple permits. In all cases, the fill to be used for existing access roads shall be clean and free of construction debris, trash or woody debris. Use of processed gravel may be approved by the Person-In-Charge and the National Grid Environmental Scientist, on a case-by-case basis. If clean stone is used then addition of more erosion controls may not be necessary.

5.4 Maintenance of Existing Access Routes (Cross Country Routes)

Ruts and depressions along existing access routes and within the existing ROW may only be leveled and graded. Addition of fill or stone may require permitting as well as additional erosion controls, and needs to be approved by the National Grid Environmental Scientist.

5.5 Maintenance of Existing Culverts

Damaged culverts may not be repaired or replaced without consulting with the National Grid Environmental Scientist to determine if a permit is required. For functioning culverts, care shall be taken to protect adjacent wetlands and watercourses by installing appropriate sedimentation and erosion controls around the downstream end of the culvert. Culverts shall be repaired/replaced in kind and shall not be changed in size unless approval has been obtained from the National Grid Environmental Scientist. In-kind replacement is replacement using the same material, functional inverts, diameter and length as the existing culvert. Changes to any of these characteristics shall require permitting. Installation of any **new** culvert is not allowed without obtaining all necessary permits first. Refer to BMPs in Appendix 7.

If, at the time of anticipated replacement, there is heavy flow through the culvert, the Person-In-Charge shall consult with the National Grid Environmental Scientist, to verify whether the culvert shall be replaced at that time. Water may need to be temporarily diverted during culvert repair/replacement. There typically are seasonal restrictions limiting both the replacement of existing culverts as well as installation of new culverts to the low-flow period. The low-flow period can vary from state to state. If any unexpected conditions are encountered during culvert replacement, the National Grid Environmental Scientist shall be contacted immediately prior to the work being completed for additional consultation.

5.6 Temporary Construction Access over Drainage Ditch or Swale

In some situations, construction access from paved roads onto ROWs may require the crossing of drainage ditches or swales along the road shoulder. In these situations, the installation of construction mats, mat bridges or temporary culverts may facilitate construction access over the ditches or swales. These culverts shall be temporary only, sized for peak flow, and shall be removed after construction is complete. Consult with the National Grid Environmental

Scientist prior to installation. In addition, if access over existing culverts may require extending the culvert, consult with the National Grid Environmental Scientist. Refer to BMPs in Appendix 7.

5.7 Construction Material along ROW

After preparing a site by clearing and/or installing any necessary erosion and sediment controls and prior to the start of construction, material such as poles, cross-arms, cable, insulators, stone and other engineered backfill materials may be placed along the ROW, as part of the project. The stockpiling of stone and other unconsolidated material on construction mats shall be avoided, if determined necessary due to access and work pad constraints, the material must be placed on a geotextile fabric and be properly contained with a sedimentation barrier such as straw wattle. No construction material shall be placed in wetlands or other sensitive resource areas unless authorized by the National Grid Environmental Scientist or Project Environmental Consultant

6.0 Winter Conditions

6.1 Snow Management

DO NOT stockpile or dispose of snow in any water body, including wetlands, rivers/streams, the ocean, reservoirs, ponds, or stormwater catch basins. A buffer of at least 25 feet shall be maintained between any snow disposal area and any the high water mark of any surface water. A silt fence or equivalent barrier shall be securely placed between the snow storage area and the high water mark of rivers, streams, ponds, or the ocean. In addition to water quality impacts and flooding, snow disposed in surface water can cause navigational hazards when it freezes into ice blocks. Some state and local authorities have specific snow management requirements. Consult with the National Grid Environmental Scientist on specific restrictions.

DO NOT deposit snow within a wellhead protection area (e.g., a Zone II), in a high or medium-yield aquifer, or within 200 feet of a private well, where road salt may contaminate water supplies**. Consult with the National Grid Environmental Scientist to determine if a proposed disposal area is located within one of these sensitive areas.**

Avoid disposing of snow on top of storm drain catch basins or in storm water drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water and could also result in fines or a violation being assessed against National Grid.

All debris in a snow storage area shall be cleared from the site and properly disposed of no later than May 15 of each year.

Care shall be taken not to plow road materials away when removing snow.

6.2 De-Icing

Where allowed, calcium chloride is preferred as a de-icing agent when applied according to manufacturer's guidelines in upland areas. Sand shall be used on construction mats through wetland areas.

Consult with the National Grid Environmental Scientist on de-icing agents when working in a facility or substation close to resource areas. Many municipalities have specific requirements for de-icing agents allowed within 100 feet of wetland resources and other sensitive areas.

6.3 Snow and Ice Management on Construction Mats

Proper snow removal on construction mats shall avoid the formation of ice. To avoid the formation of ice, snow shall be removed from construction mats before applying sand. Prior to their removal from wetlands, sand shall be collected from the construction mats and disposed of in an upland area. A round street sweeping brush mounted on the front of a truck may be an effective way to remove snow from construction mats. Propane heaters may also be suitable solutions for snow removal and/or de-icing of construction mats.

Once construction mats are removed, wetlands shall be inspected for build up of sand that may have fallen through construction mats. Care shall be taken to inspect wetland crossings as each mat is removed to ensure sand is properly removed and disposed of off-site.

7.0 Construction Mats

The use of construction mats allows for heavy equipment access within wetland areas. The use of construction mats minimizes the need to remove vegetation beneath the access way and helps to reduce the degree of soil disturbance and rutting in soft wetland soils. Construction mats most often used by National Grid are wooden timbers bolted together typically into 4-ft by 16-ft sections, wooden lattice mats, or composite mats. In some cases, construction mats or other mats are used for staging or access in upland areas based on site conditions (e.g., agricultural field access). Refer to BMPs in Appendix 7.

Typically construction mats may be installed on top of the existing vegetation, however in some instances cutting large woody vegetation may be required. Check with National Grid Environmental Scientist prior to cutting or clearing vegetation for construction mat placement.

Follow the approved plans in the EFI for construction mat installation and do not deviate from the plans. **Any deviation from the approved plans needs to be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting, require stopping the project or result in a permit violation or revocation.**

7.1 Construction Mats and Mowing

Close coordination with the mowing contractor shall be required to ensure that access plans are followed, and construction mats are utilized when necessary. Sometimes mowing contractors may have to work off the leading edge of a construction mat to mow in order to lay the next construction mat and continue further into the wetland. Under no circumstances shall trees or shrubs be allowed to be pulled out of the wetland by the root ball. The root ball of trees and shrubs shall remain intact. Chipping debris and excessive amounts of slash shall not be placed in wetlands or other resource areas. In some instances, it may be beneficial to pile a reasonable amount of slash within a nearby upland area to create habitat for wildlife. This activity shall be approved by the National Grid Environmental Scientist.

7.2 Stream Crossings and Stream Bank Stabilization

Stream crossings shall be bridged with construction mats or other temporary minimally-intrusive measures unless fording is acceptable for the site and is authorized by the National Grid Environmental Scientist. Care shall be taken when installing a construction mat bridge to insure that the stream bed and banks are not damaged during installation and removal and that stream flow is not unduly restricted. Where stream width allows, construction mats shall be installed to span the watercourse in its entirety without stringer placement in the water or any restriction of stream flow. Environmental permits may be required to cross or disturb protected waters, depending upon state-specific regulatory requirements. Refer to BMPs in Appendix 7. Immediately following construction mat removal, all stream banks shall be stabilized and restored to prevent sedimentation and erosion.

7.3 Cleaning of Construction Mats

Mats shall be certified clean by the vendor prior to installation. The vendor shall use the certification form provided as Appendix 8 to document compliance. Clean is defined as being free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site. Any equipment or timber mats that have been placed or used within areas containing invasive species within the project site shall be cleaned of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project site to prevent the spread of invasive species from one area to another[5]. **Mats shall be cleaned prior to being removed at the completion of the project: exceptions to this requirement may be made on a case-by-case basis.** Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of construction mats.

[5] On ROW projects where multiple wetlands may be dominated by the same invasive species, cleaning may not be required for movement along the ROW. Check with the National Grid Environmental scientist for guidance.

7.4 Stone Removal for Construction Mat Placement

For situations where the matting contractor determines that stones or boulders must be removed or relocated within wetland areas in order to install safe and level structure work pads or access roads the boulders shall be moved in a manner which does not result in significant soil disturbance (i.e., pushing with a bull dozer is not allowed). The boulders shall not be placed on any existing vegetated areas within wetlands or within vernal pools. When numerous boulders shall be removed from a wetland area, they shall be deposited in an upland area outside of the flagged wetland limits, outside of any cultural resource areas and outside of any RTE species populations. Any boulders that shall be placed within buffers (In MA, the 100-foot buffer zone, and in RI, the 50-foot Perimeter Wetland, 100-foot or 200-foot Riverbank Wetlands) shall be placed to avoid causing soil disturbance and they shall be within an approved limit of work. When there is a significant number of boulders that need to be removed, the National Grid Environmental Scientist shall be consulted for guidance.

7.5 Transition onto Mats

Erosion controls and stone or wood chip ramps shall be installed to promote a smooth transition to and minimize sediment tracking onto construction mats. Geotextile may be added beneath stone or wood chip transitions to facilitate removal, as necessitated by site or permit conditions. Mat transitions shall be removed once construction mats have been removed and during restoration. Refer to BMPs in Appendix 7.

7.6 Corduroy Roads

Corduroy roads are a wetland crossing method where logs are cut from the immediate area and used as a road bed to prevent rutting from equipment crossing. This technique is designed to be used in areas of wetland crossings where there is no defined channel or stream flow and should never be used in streams. Corduroy logs shall be placed in the narrowest area practicable for crossing with the logs placed perpendicular to the direction of travel across wet area. The use of corduroy logs shall only be in emergencies when approved by the National Grid Environmental Scientist or when they have been specifically permitted as part of a project. Refer to BMPs in Appendix 7.

7.7 Construction Mat Removal

Once construction mats are removed, wetlands shall be inspected for build up of sand or other materials that may have fallen through construction mats. Care shall be taken to inspect wetland crossings as each mat is removed to ensure any materials are properly removed and disposed of off-site.

7.8 Utility Air Bridging

In ROWs where other utility facilities (including but not limited to gas, oil, fiber optic, electric, water, and sewer) are co-located within the transmission ROW, bridging may be required to cross those facilities. The project team shall coordinate with the respective utility company prior to determining if bridging or permanent crossings are required.

8.0 LGP Equipment Use

Only when approved by the National Grid Environmental Scientist on a case-by-case basis shall equipment with a LGP **psi that meets the state-specific USACE General Permit requirement when loaded** be allowed to access through wetlands. Refer to the state-specific General Permit for the definition of LGP in each state at: http://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/, or to the summary table provided below. The National Grid Environmental Scientist's approval of the use of LGP equipment through wetlands depends on several criteria including:

- Time of year. LGP equipment use may be allowed if weather and field conditions at the time of construction are suitable to eliminate/minimize the concern of rutting or other impacts. Frozen, frozen snow pack, low flow, or drought conditions are typically acceptable conditions. Spring and fall construction, due to the typical higher precipitation, are not suitable times of year for LGP equipment use.
- Number of trips. Multiple trips through a wetland have shown to increase the potential for damage and require matting. LGP equipment use shall likely only be approved if trips are limited to one trip in and one trip out.
- Type of wetland system. Some wetlands have harder soils/substrate, and may be passable without causing significant damage. Some of the wetlands along National Grid ROWs have existing hard bottom roads that have been vegetated over time and may be traversed with LGP equipment without construction mats.
- Emergencies. LGP equipment use may be allowed during emergency or storm conditions for outage restoration.
- State-specific USACE General Permit Performance Standards. The standard is for no impact to the wetland, which may be obtained by using LGP equipment **when loaded**). "*Where construction requires heavy equipment operation in wetlands, the equipment shall either have low ground pressure (as specified in the USACE GP), or shall not be located directly on wetland soils and vegetation; it shall be placed on construction mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation.*"
- Local bylaws. Municipal wetland bylaws, where applicable, shall be reviewed for prohibitive conditions or applicable performance standards.

LGP equipment approval is required **at the time of construction for each wetland crossing** and shall be dependent upon the above conditions. In addition, LGP equipment use and

approval shall be assessed by the National Grid Environmental Scientist during construction on a continuing basis; LGP equipment use shall cease immediately if field conditions are found to be unsuitable. ***Please note that if LGP vehicles are used, and wetlands damage occurs, the use of the LGP equipment shall be suspended.***

ACOE New England District General Permit Requirements

State	Restrictions	Maximum PSI for Use without Mats	Reference
MA	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Equipment must be operated on adequately dry or frozen conditions such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands.	3 psi	MA General Permit, General Condition 14
NH	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Be operated on frozen wetlands.	4 psi	NH General Permit, General Condition 17
VT	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Be operated on frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Note: Written authorization from the Corps required to waive the use of mats during frozen or dry conditions.	3 psi	Vermont General Permit, General Condition 14

State	Restrictions	Maximum PSI for Use without Mats	Reference
RI	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Be operated on frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Note: Written authorization from the Corps required to waive the use of mats during frozen or dry conditions.	6 psi	Rhode Island General Permit, General Condition 15

9.0 Soil Disturbing Activities

9.1 Dust Control

Cutting activities shall be conducted to minimize the impacts of dust on the surrounding areas. Dust suppression is an important consideration. Water or application of calcium chloride or other National Grid approved equivalent in accordance with the manufacturer's guidelines may be used for dust control along ROWs in upland areas. During application of water for dust control, care shall be taken to ensure that water does not create run-off or erosion issues. Refer to BMPs in Appendix 7.

9.2 Clearing

Clearing is not allowed without specific permission as it constitutes soil disturbance under several regulatory programs and may trigger permitting by increasing the project's footprint of disturbance. If clearing is required for a project, the limit of clearing shall be established with flagging or construction fencing and/or erosion controls. Clearing shall be done in accordance with project specific permits. Following the completion of clearing, the limits of work shall be re-established. Refer to BMPs in Appendix 7.

9.3 Grubbing

Grubbing is not allowed without specific permission as it constitutes soil disturbance under several regulatory programs and likely triggers permitting by increasing the project's footprint of disturbance. If grubbing is required for a project, the limit of grubbing shall be re-established after clearing has been completed. The area of grubbing shall be identified with flagging or construction fencing and/or erosion controls. Grubbing shall be conducted in accordance with project-specific permits.

9.4 Blasting, Noise and Vibration Control

If blasting is anticipated, the project team, including the National Grid Environmental Scientist, shall be consulted.

If possible, plan work in residential areas to avoid noisy activities at night, weekends or during evenings. Emergency work in residential areas should be carried out in such a way as to keep noise to a minimum at night and weekends. Equipment should be maintained as per the manufacturer's guidance to minimize noise and vibration.

Work plans must consider local noise ordinances and provide specific controls to ensure noise levels are maintained within specified limitations.

All equipment shall be maintained in good working condition in order to minimize noise and vibration impacts.

9.5 Site Grading

The work site shall not be graded other than in accordance with project permits. Any proposed grading shall be reviewed by the National Grid Environmental Scientist for wetlands, rare species habitat, areas of cultural and historical significance, and other environmentally sensitive areas prior to start of work. In some cases, additional testing for cultural or historical resources may be triggered by proposed grading; alternatives to grading may be sought due to protracted time frame of obtaining the permit associated with testing and performing the testing. Grading outside of a regulated area shall be kept to the minimum extent necessary for safe and efficient operations and shall comply with the project permit plans.

Grading shall be performed in a manner which does not increase the erosion potential at the Site (e.g., terraces or slope interruptions shall be utilized). Graded sites shall be promptly stabilized by applying a National Grid approved seed mix (if adequate root and seed stock are absent), and mulching with hay, straw or cellulose (use straw or cellulose hydromulch where the potential introduction of invasive plant species is of concern) to reduce erosion and visual impact, as soon as possible following completion of work at the site. Grading within a regulated area shall be subject to the review and approval of the National Grid Environmental Scientist.

In some municipalities, site grading activities require the prior approval of the Town Engineer, Building and Zoning Official, or Public Works Director. Local ordinances or bylaws should be reviewed for applicable restrictions and permitting thresholds

9.6 Work Pads

When work pads are being constructed, only clean material shall be used in their construction. Work pads shall only be constructed in areas approved by the National Grid Environmental Scientist and shown on the approved permit access plans.

9.7 Site Staging and Parking

During the project planning and permitting process, locations shall be identified for designated crew parking areas, material storage, and staging areas. Where possible, these areas should be located outside of buffer zones, watershed protection areas, and other environmentally sensitive areas. Any proposed locations shall be evaluated for all sensitive receptors and for new projects requiring permitting, shall be incorporated onto permitting and access plans.

9.8 Soil Stockpiling

Soil stockpiles shall be located in upland areas and, if in close proximity to wetlands and wetland buffers, shall be enclosed by staked straw bales or another erosion control barrier. The stockpiling of stone, drill spoils and other unconsolidated material on construction mats shall be avoided unless determined necessary due to access and work pad constraints. Additional controls, such as watertight mud boxes and geotextile/filter fabric over or between construction mats shall be considered for stockpile management. If material is placed on construction mats and falls through into wetlands, the material must be removed by hand. Saturated soils shall be allowed to dewater prior to off-site transport for sufficient time to ensure that water/sediment is not deposited onto construction mats or public roads during transport.

9.9 Top Soil/High Organic Content Soil

When the work site requires excavation and grading, the top soil shall be stockpiled separately from the material excavated. This top soil shall be spread as a top dressing over the disturbed area during restoration of the site.

In some instances where work is occurring within wetlands, high organic content soil may be displaced. Such high organic content soil shall be segregated from other excavated materials and stockpiled for use in wetland restoration areas. Care shall be taken to minimize the handling of high organic content soil. Preferably, the soil shall be stockpiled in one location until it is moved to the restoration area.

10.0 Stone Wall Dismantling and Re-building

Removal or alteration of stonewalls shall be avoided, whenever possible. As appropriate, some stonewalls removed or breached by construction activities shall be repaired or rebuilt. Rebuilt stone walls shall be placed on the same alignment that existed prior to temporary removal, to

the extent that it shall not interfere with operations. The removal and rebuilding of stone walls requires approval from the National Grid Environmental Scientist and Property Legal, and may require several weeks lead time for coordination. Note that not all states allow this technique. Dismantling may not be allowed at all due to quality or significance of the wall. Once a stone wall has been identified as requiring dismantling, the following procedures shall be followed:

- Identify stone wall that is required to be temporarily dismantled and notify project team that a site visit is warranted to review the stone wall.
- The National Grid Environmental Scientist, with support from Property Legal and/or cultural/historical consultant, shall determine if permitting or additional permissions are required prior to dismantling stone wall.
- Once permit or permissions have been received, full documentation of wall dimensions (measurements and photographs) shall be submitted to the National Grid Environmental Scientist. Documentation of the wall dimensions shall be marked onto a copy of the applicable EFI access plan (or equivalent plan) with a useful reference for future locating such as GPS coordinates and/or measurement from a permanent reference point (closest structure location or closest cross street, etc.). The wall shall be photographed from all sides with a written description of the photograph (i.e. southern side of wall looking north). In addition, documentation of the length of wall to be dismantled shall be recorded. Take special care to note if granite property bounds (or other marker) are located within the wall so additional survey can be accomplished prior to dismantling in cases where the stone wall represents a property boundary. Site visits by project team (which shall include the National Grid Environmental Scientist) are a mandatory requirement prior to dismantling.
- No dismantling shall take place until documentation has been submitted to the National Grid Environmental Scientist and approved as sufficient documentation.
- Stones from the wall shall be removed from the work area and temporarily stored in nearby location, away from wetlands; buffer zones; rare species habitat and other historical/archeological concerns.
- Avoid dismantling via the “bulldozer” method when possible as this method makes it nearly impossible to rebuild the wall in the same alignment due to its uncontrolled nature. Dismantling shall be conducted either by hand, with stones stacked as they are removed, or on less “sensitive” walls to use an excavator with a thumb to grab each stone and build a stockpile. Significant ground disturbance below the wall shall be avoided.

Once construction and access in the area has been completed, the wall shall be rebuilt to pre-dismantled conditions or better. If rebuilding a stone walls can not be placed on the same alignment that existed prior to temporary removal, approval from the National Grid Environmental Scientist and Property Legal is required. **Note that if the wall represents a legal property boundary or is historically or culturally significant (or was previously determined to be in a very high quality condition), a professional stone masonry company may be required to document wall alignment, and conduct the dismantling and rebuilding**

11.0 Avian Nest Removal

Avian nest removal shall be done in accordance with EG-304. Consult the National Grid Environmental Scientist prior to removing any nests. There are seasonal restrictions of the removal of avian nests and federal or state permits may be necessary prior to removal

12.0 Drilling Fluids and Additives

Notify the National Grid Environmental Scientist if drilling fluids/additives are proposed to be used on a project. Use and disposal of spent drilling fluids/slurries shall be approved by the National Grid Environmental Scientist, as regulatory approvals and drinking water wells may be of concern. Deactivation and sampling may be required prior to disposal.

13.0 Grounding Wells

The installation of grounding wells shall require erosion controls and proper soil management. Due to the typical depth required for grounding wells (typically 50 to 200 feet or more), erosion controls shall be installed around the proposed well location when working in buffer zone, in proximity to sensitive resources or near slopes. Also, dewatering basins may be required for the proper management of groundwater. The National Grid Environmental Scientist shall be consulted for the disposal of any excess soil.

14.0 Counterpoise and Cathodic Protection

The installation of counterpoise or cathodic protection shall require erosion controls and proper soil management. The National Grid Environmental Scientist shall be consulted for the disposal of any excess soil.

15.0 Gates

When not in use, gates shall be locked with a company-approved lock or double locked with the property owner's lock. New gates may be installed during a project, however, installation of a gate requires permission from the property owner, and may require environmental permitting. Consult with National Grid Real Estate and the National Grid Environmental Scientist prior to installing a new gate, as well as with the appropriate engineering department for the current company gate specifications. Refer to BMPs in Appendix 7. Installation of ROW access restrictions (e.g., stone, bollards, other) at road crossings also require consultation with the National Grid Environmental Scientist and Property Legal.

16.0 Signage

Specific signage may be required by permits or be specified in the EFI to limit access in certain sensitive areas. Signs shall be used to clarify allowed access and sensitive areas, such as:

- "No snow stockpiling beyond this point,"
- "Approved access (to structures A-F)";
- "Do not cross this area until construction mats are in place";
- "No vehicle crossing";
- "Areas to avoid"; and
- "Environmentally Sensitive Area – Keep Out."

Signs shall be used in conjunction with snow fencing or other physical barriers as demarcation for sensitive areas (e.g., rare species areas, sensitive archeological locations, etc.) that need to be protected and avoided by construction activities. In addition, permit signs required by the regulatory agencies shall be present (i.e. MADEP, RIDEM, EPA (SWPPP), ACOE, etc) at construction sites and/or ROW access points. Construction signage shall be installed and maintained by the contractor performing the work during the project. Absence of signage does not eliminate the need to comply with access plans, permit conditions, and other regulatory requirements. Refer to BMPs in Appendix 7.

17.0 Refueling and Maintenance Operations

17.1 Spill Prevention and Response Plan

Spill controls shall be provided on every field vehicle. Bulk storage of fuels (55 gallons or greater) shall be approved by the National Grid Environmental Scientist prior to being brought on site. The need for a field spill plan shall be evaluated specific to the project for regulatory requirements under SPCC regulations or local ordinances. A field spill plan would include information on fuels and oils being used, approximate amounts in each container or type of equipment, location, fueling location, secondary containment, response and notification procedures, including contact phone numbers, etc. All personnel shall be briefed on spill prevention and response prior to the commencement of construction. The state-specific EG-501 and EG-502 shall be followed in the event of a spill.

Typical construction activities do not require the use or storage of large quantities of oil or hazardous materials (i.e., greater than 55 gallons). However, oil and/or hazardous materials (OHM) may be required in limited quantities to support construction or vehicle operations. Best practices shall be followed in the use and storage of OHM which include but are not limited to: storage and refueling greater than 100 feet from resource areas; maintenance of spill response equipment at work locations sufficient to handle incidental releases from operating equipment; general training for on-site personnel for spill clean up response for incidental releases of OHM; and contracting with an on-call spill response contractor that is capable of managing incidental and significant releases of OHM. There may situations that additional precautions shall be

required for the storage or use of OHM (i.e., within wellhead protection areas, GA/GAA areas, Zone IIs). Storage of OHM shall be done in accordance with any applicable regulatory requirements.

17.2 Field Refueling

Small equipment such as pumps and generators shall be placed in small swimming pools or on absorbent blankets/pads, to contain any accidental fuel spills. Small swimming pools with absorbent blankets/pads, and/or other secondary containment, shall be used for refueling of fixed equipment in wetlands and should be maintained to prevent accumulation of precipitation.

17.3 Grease, Oil, and Filter Changes

Routine vehicle maintenance shall not be conducted on project sites.

17.4 Other Field Maintenance Operations

When other vehicle or equipment maintenance operations (such as emergency repairs) occur, company personnel or contractors at field locations shall bring vehicles or equipment to an access location a minimum of 100 feet away from environmentally sensitive areas (e.g., wetlands or drinking water sources). A paved area, such as a parking lot or roadway, is a preferred field maintenance location to minimize the possibility of spills or releases to the environment.

Crews shall take all usual and reasonable environmental precautions during repair or maintenance operations. Occasionally, it is infeasible to move the affected vehicle or equipment from an environmentally sensitive area to a suitable access area. When this situation occurs, precautions shall be taken to prevent oil or hazardous material release to the environment. These precautions include (but are not limited to) deployment of portable basins or similar secondary containment devices, use of ground covers, such as plastic tarpaulins, and precautionary placement of floating booms on nearby surface water bodies.

17.5 Tools and Equipment

Cleaning of tools and equipment shall be conducted away from environmentally sensitive areas (such as wetlands, buffer zones or drinking water sources) to the maximum extent possible. A paved area such as a parking lot or roadway is preferred, to minimize the possibility of spill or release to the environment. Crews shall wipe up all minor drips or spills of grease and oil at field locations.

18.0 Stabilization Deadlines for Projects Subject to EPA Construction General Permit

18.1 Deadlines to Initiate Stabilization Activities (Permanent and Temporary)

Soil stabilization measures shall be implemented immediately whenever earth-disturbing activities have permanently or temporarily ceased on any portion of the project. The following are some examples of activities that constitute initiation of stabilization:

- Preparing the soil for vegetative or non-vegetative stabilization;
- Applying mulch or other non-vegetative product to the exposed area;
- Seeding or planting the exposed area;
- Finalizing the arrangements to have stabilization product fully installed in compliance with the deadlines to complete stabilization in Section 18.2 below.

18.2 Deadlines to Complete Stabilization Activities (Permanent and Temporary)

As soon as practicable, but no later than 14 calendar days or 7 calendar days (for areas discharging to a sensitive water) after the initiation of soil stabilization measures commence the following should be completed:

- For vegetative stabilization, all activities necessary to initially seed or plant the area to be stabilized; and
- For non-vegetative stabilization, the installation or application of all such non-vegetative measures.

18.3 Vegetative Stabilization (all except for arid, semi-arid, or on agricultural lands)

- Provide established uniform vegetation (e.g., evenly distributed without large bare areas), which provides 70% or more of the density of coverage that was provided by vegetation prior to commencing earth-disturbing activities. Avoid the use of invasive species as cover.
- For final stabilization, vegetative cover must be perennial; and
- Immediately after seeding or planting a disturbed area to be vegetatively stabilized, a non-vegetative erosion control must be implemented to the area while the vegetation is becoming established. Examples include; mulch and rolled erosion control products.

18.4 Vegetative Stabilization (Agricultural Lands)

- Disturbed areas on land used for agricultural purposes that are restored to their pre-construction agricultural use are not subject to vegetative stabilization standards.

18.5 Non-Vegetative Stabilization

If using non-vegetative controls to stabilize exposed portions of your site, or if you are using such controls to temporarily protect areas that are being vegetatively stabilized, you must provide effective non-vegetative cover to stabilize any such exposed portions of the site. Examples of non-vegetative stabilization techniques include, but are not limited to, rip-rap, gabions, and geotextiles.

19.0 Clean-up and Restoration Standards

The following steps shall be taken once construction has been completed at each location along the ROW or within the project site. The following are minimum guidelines for clean-up and stabilization standards. Please refer to permit conditions for project-specific related standards. Refer to the EFI for applicable permit requirements and to determine if the site needs to be reviewed and approved by the permitting authorities prior to removal of erosion controls.

19.1 Removal of Sedimentation and Erosion Controls

After all work has been satisfactorily completed and vegetation has been re-established to a minimum of 75% cover, and upon approval by the National Grid Environmental Scientist, all non-biodegradable materials (e.g., siltation fencing, straw bale strings, stakes, straw wattle mesh casing, etc.) shall be disposed of properly off-site.

Dependent on permit requirements, sedimentation and erosion controls may not be allowed to be removed until after inspection and approval by one or more permitting authority. In most cases, removed straw bales may be used to mulch disturbed areas. Remaining straw bales that do not block the flow of water may be left in place unless they are required to be removed pursuant to permit conditions. Straw bales that block the flow of water shall be removed.

Prior to project construction being completed, the project team will develop post-construction inspection intervals to ensure timely removal of temporary BMPs. BMPs will be removed when the area is stabilized, which typically occurs when the area has either naturally stabilized (75 % cover), or seed and mulch that was installed has achieved 75% cover.

19.2 In-Situ Restoration

Unless otherwise specified in permits or prescribed by the National Grid Environmental Scientist or the Project Environmental Consultant, all disturbed areas, including stream banks, wetlands and access routes, shall be restored following the completion of work. When the work is completed and construction mats have been removed, the National Grid Environmental Scientist or Project Environmental Consultant shall conduct an inspection. Wetlands shall be inspected for build up of sand or other materials that may have fallen through construction mats. Care shall be taken to

inspect wetland crossings carefully after construction mat removal to ensure any materials are properly removed and disposed of off-site.

Restoration of Soil Compaction. If rutting or soil compaction following construction mat removal is observed, the area shall be returned to pre-existing conditions, and comparable to the surrounding area, by light hand raking or by back-blading with machinery. Restoration shall be overseen by the Project Environmental Consultant or National Grid Environmental Scientist. Deep ruts (>12") shall be filled in using available, loose soil from the work area.

Seeding and Mulching. If adequate root and seed stock are absent and have been stripped from the area, graded sites shall be promptly stabilized by applying an approved seed mix and mulching with straw to reduce erosion and visual impact. Seeding and mulching shall be completed as soon as possible following completion of work at the site. For some wetland areas, natural re-vegetation may be more appropriate than seeding disturbed sites. Wetland areas where adequate root and seed stock are absent will be seeded using an approved wetland native seed mix. For some wetland areas, natural re-vegetation may be more appropriate than seeding disturbed sites. Refer to BMPs in Appendix 7 for seed mix tables and mulch ratio tables.

If needed, the import of quality topsoil onto the ROW will be required. Topsoil should be tested, and approved by the Project Environmental Consultant or National Grid Environmental Scientist to determine its suitability for site conditions. Fertilizers will be approved on a case-by-case basis.

For upland areas, the disturbed vegetation and soil shall be restored and stabilized[6] by regrading the area to pre-existing conditions, if needed, seeding (if adequate root and seed stock are absent) and mulching the exposed soil, and removing strings and stakes from straw bales and using broken up straw bales for the mulch. Siltation fencing, strings and stakes shall be removed for disposal as ordinary waste. Refer to BMPs in Appendix 7 for seed mix tables and mulch ratio tables.

Excess boulders. Additional boulders could be used at proposed and existing gate locations to use on either side of the gates as a deterrent for unauthorized vehicle access or be placed along the edges of work pads where steep slopes are present for safety purposes. The final placement of boulders should be reviewed prior to installation with Stakeholder Relations and the National Grid Environmental Scientist or Project Environmental Consultant.

Unless otherwise specified in Project-specific permit conditions, the National Grid Environmental Scientist or Project Environmental Consultant shall develop an inspection frequency to monitor restored areas for stabilization, germination and successful revegetation.

[6] For projects subject to the 2012 CGP, stabilization is required within 14 days, or within 7 days for sensitive areas.

19.3 Invasive Species

All equipment shall be certified clean[7] utilizing the attached form (Appendix 8) or equivalent as approved by the vendor prior to mobilization to the work site. The vendor shall use the certification from provided as Appendix 8 to document compliance with invasive species management BMPs, Clean is defined as being free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site. Any equipment that has been placed or used within areas containing invasive species within the project site shall be cleaned of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project site to prevent the spread of invasive species from one area to another[8]. **Equipment shall be cleaned prior to being removed at the completion of the project: exceptions to this requirement shall be determined on a case-by-case basis.** Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of equipment.

19.4 Cleaning of Equipment

At the completion of the project, Equipment shall be cleaned prior to being de-mobilized to prevent tracking of material onto roads and causing safety issues. Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of equipment

19.5 Access Routes (Cross Country Routes)

Cross country access routes shall be returned to pre-construction grade (if needed), seeded (if adequate root and seed stock are absent) and mulched. Pre-existing sandy soils within mapped rare turtle habitat shall not be seeded unless directed by the National Grid Environmental Scientist so as to not alter nesting habitat.

19.6 Access Roads

Constructed gravel roads shall be left in place following project completion unless permit conditions require their removal. Refer to the specific permit conditions for these provisions. If the road is to be removed, the crushed stone and geotextile fabric shall be removed from the work site. This excess material can be retained off-site for future maintenance-related access needs. Seeding and/or mulching of gravel roads is generally not required, unless necessary to prevent erosion.

[7] The Appendix 8 certification form (or equivalent as approved by National Grid Environmental scientist) shall be used to document the clean certification

[8] On ROW projects where multiple wetlands may be dominated by the same invasive species, cleaning may not be required for movement along the ROW. Check with the National Grid Environmental scientist for guidance.

19.7 Stone Work Pads

Unless permit conditions or property owner's require the removal of constructed stone work pads following project completion, constructed work pads shall be left in place. Refer to the specific permit conditions for these provisions.

19.8 Construction Materials on ROWs

As soon as the structure work has been completed, all used parts and trash are to be picked up and removed from the project site. Retired poles shall be removed in accordance with National Grid Engineering Standard SP,06.01.301. In some cases, the used material from structure work may be temporarily stored at the work area by placing it out of the wetlands or other sensitive resource area until work in the adjacent areas has been completed. However, treated wood poles shall never be stored in standing water or in wetlands. If the project is cancelled, all material shall be removed from the project site. Excess material brought to the project site shall be removed upon project completion. Consult with the National Grid Environmental Scientist on whether the work site shall be restored in addition to the measures outlined above

19.9 Improved Areas

Yards, lawns, agricultural areas, and other improved areas shall be returned to a condition at least equal to that which existed at the start of the project. Alternately, if requested, the property owner may be reimbursed to perform their own restoration, after the site has been left in an environmentally sound manner. If this option is requested, it shall be documented in a written release signed by the property owner. Consult with National Grid Real Estate and/or Stakeholder Relations for the details on existing agreements. Off-ROW access shall never be assumed and shall be coordinated through Real Estate before being implemented. Depending on the access point, construction matting or other BMPs may be required to prevent ruts, lawn damage, or other property damage. Restoration following the completion of work and any use of improved areas shall be conducted in accordance with the measures outlined above.

19.10 Property Damage

All damage to property occurring as a result of a project shall be immediately repaired or replaced. In some locations, it may be desirable to document pre-existing damage prior to work commencing in that area in order to demonstrate afterwards that the damage did not result from the project. Work crews, the Project Environmental Consultant or the National Grid Environmental Scientist shall document repairs that were performed in response to damage from unauthorized vehicle use.

19.11 Overall Work Site

Upon satisfactory completion of work, the construction personnel shall remove all work-related trailers, buildings, rubbish, waste soil, temporary structures, and unused materials belonging to

them or used under their direction during construction, or waste materials from previous construction and maintenance operations. All areas shall be left clean, without any litter or equipment (wire, pole butts, anchors, insulators, cross-arms, cardboard, coffee cups, water bottles, etc.) and restored to a stable condition and as near as possible to its original condition, where feasible. Debris and spent equipment shall be returned to the operating facility or contractor staging area for disposal or recycling (cardboard) as appropriate in accordance with EG-111.

19.12 Material Storage/Staging and Parking Areas

Upon completion of all work, all material storage yards, staging areas, and parking areas shall be completely cleared of all waste and debris. Unless otherwise directed or unless other arrangements have been made with an off ROW or off-property owner, material storage yards and staging areas shall be returned to the condition that existed prior to the installation of the material storage yard or staging area. Regardless of arrangements made with a landowner, all areas shall be restored to their pre-construction condition or better. Also any temporary structures erected by the construction personnel, including fences, shall be removed by the construction personnel and the area restored as near as possible to its original condition, including seeding and mulching as needed.

20.0 Notification of Emergency Work

Because it is sometimes difficult to identify wetlands and other sensitive environmental areas, the National Grid Environmental Scientist shall be notified within 24 hours or by the next working day whenever emergency off-road repair work takes place. Although the routine maintenance and emergency repair work is generally allowed, due to site conditions or the scope of the project, notification to the regulating agencies may be required

21.0 Appendices

APPENDIX 1:	Glossary
APPENDIX 2:	Acronyms
APPENDIX 3:	EFI Template
APPENDIX 4:	Simplified EFI Template
APPENDIX 5:	Standard STORMS boilerplate language
APPENDIX 6:	Storm Water, Wetlands & Priority Habitat Environmental Compliance Site Inspection / Monitoring Report Form
APPENDIX 7:	BMP Drawings and Guidelines
APPENDIX 8:	Certification Sheet for Invasive Species Control

Appendix 1 – Glossary

Access Road – An existing, periodically maintained road often consisting of gravel and/or exposed soils or vegetated with grasses but devoid of woody vegetation, that is visible on aerial photography and shown on ROW T-sheets. May include newly permitted permanent roads (i.e., roads to be constructed in accordance with a project-specific permit).

Access Route - A pathway previously used or proposed to be used by crews for access along the ROW. Routes may be shown on ROW T-sheets or previous project access plans but are not improved as maintained gravel/exposed soil roads. Access routes may be mown and can consist of trails utilized by recreational vehicles.

Action Logs – Project-specific log used to document action items required for permit compliance. The log identifies timeframes for completion and responsible parties. The log is typically updated by the Project Environmental Consultant or the National Grid Environment Scientist and circulated to the project team on a weekly, or more frequent, basis.

Bank – The transitional slope immediately adjacent to the edge of a surface water body, the upper limit of which is usually defined by a break in slope, or, for a wetland, where a line delineated in accordance with applicable state and federal regulations that indicates a change from wetland to upland.

BMP – Best Management Practice. Individual engineered constructions or operating procedures intended to minimize and mitigate soil disturbance, erosion, sedimentation, turbid discharges, and/or impacts to sensitive receptors.

Clean - free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site.

Clean Gravel – Gravel is a type of coarse-grained soil that consists of small stones and other mineral particles. Clean Gravel shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001) Clean Gravel will not have fine materials that could lead to a turbid discharge.

Clean Stone (Crushed Stone) – Clean Stone (Crushed Stone) shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001). Clean Stone will not have fine materials that could lead to a turbid discharge.

Clearing – The cutting of trees and large bushes by hand and/or mechanical means.

Compost Socks – Tubular devices comprised of non-degradable, photodegradable, or biodegradable mesh tubing containing organic compost matrix. Compost socks are effective for intercepting site runoff, trapping sediment, and treating for soluble pollutants by filtering stormwater runoff. .

Compost socks are a useful sedimentation control device along construction site perimeters, as check dams in drainage channels, as a slope interruption practice on long and/or steep slopes, and around drain or street curb inlets.

Construction Mats - construction, swamp, and timber mats ("construction mats") are generic terms used to describe structures that distribute equipment weight to minimize disturbance to wetland soil and vegetation while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes.

Corduroy Road – Corduroy roads are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another.

Dewatering Basin – An established containment area for saturated materials and pumped discharges. This measure is used for the purpose of de-watering soils prior to transport off site or for use in another location on site, and for allowing suspended sediment to settle out of pumped discharges.

Detention/Retention Basin – A detention/retention basin is designed for the purpose of detaining or retaining water. A dewatering basin is a form of detention basin

Dewatering – Use of a system of pumps, pipes and temporary holding dams to drain or divert waterways or wetlands, or lower the groundwater table before and during excavation activities.

Drainage Ditch or Swale – a clearly noticeable channel that is typically dry, except after precipitation events. Intermittent and perennial streams and rivers are not included in this definition.

Dredge – To dig, excavate, or otherwise disturb the contour or integrity of sediments in the bank or bed of a wetland, a surface water body, or other area within the regulating bodies' jurisdiction.

Dredge Spoils – Material removed as the result of dredging.

Embankment – A protective bank constructed of mounded earth or fill materials located between a roadway (or rail bed) and a seasonal stream or other wetland.

Environmental Field Issue – Document that contains copies of all project-specific environmental permits and summarizes all environmental permit conditions. The EFI is prepared by the Project Environmental Consultant or the National Grid Environment Scientist and copies are provided to the Project Manager, Construction Supervisor(s), and other team members as appropriate.

Environmental Monitoring Records – Examples of checklists and/or monitoring reports suggested for use by the Company Environmental Engineer to document conformance of the project with this Environmental Guidance and or project specific permit/license conditions.

Environmental Scientist – Formerly Environmental Engineer. The National Grid Environmental Department representative for the project or the territory where the work is located. For a map of Environmental Department staff territories, refer to the Environmental page of the National Grid infonet.

Environmentally Sensitive Areas – Examples of environmentally sensitive areas that may be found on National Grid properties are rivers, streams, ponds, lakes, wetlands, bogs, swamps, salt marshes, rare species habitat, wellhead protection areas, cultural sites, parks, preserves, schools and as otherwise defined by Federal, State or local regulations. Refer to EG-301.

Erosion Controls – The utilization of methods to prevent soil detachment and minimize displacement or washing down slopes by rainfall or run-off. Common practices include, but are not limited to:

(a) Temporary and Permanent Seeding

(b) Mulching, Soil Binders, Tackifiers

(c) Erosion Control Blankets

(d) Hydraulic Erosion Control

Excavate/Excavation – To dig, remove, or form a cavity or a hole in an area within the department's jurisdiction.

Fill (n.) – Any rock, soil, gravel, sand or other such material that has been deposited or caused to be deposited by human activity.

Fill (v.) – To place or deposit materials in or on a wetland, surface water body, bank or otherwise in or on an area within the jurisdiction of the department.

Flats – Relatively level landforms composed of unconsolidated mineral and organic sediments usually mud or sand, that are alternately flooded and exposed by the tides and that usually are continuous with the shore.

Frozen condition – Field conditions when the upper portion of the ground surface freezes or when areas of standing water freeze solid such that vehicle passage over these areas is supported without any resulting soil disturbance. The frozen conditions must have been affected by severe cold (maximum daily temperatures less than 32 degrees F) for a continuous 2-week period.

GAA – Rhode Island groundwater classification, groundwater resources that are know or presumed to be suitable for drinking water use without treatment and are located in one of the three areas described below.

a) The state's major stratified drift aquifers that are capable of serving as a significant source for a public water supply ("groundwater reservoirs") and the critical portion of their recharge area as delineated by DEM;

b) The wellhead protection area for each public water system community water supply well. Community watrer supply wells are those that serve resident populations and have at least 15 service connections or serve at least 25 individuals, e. g. municipal wells and wells serving nursing homes, condominiums, mobile home parks, etc.; and

c) Groundwater dependent areas that are physically isolated from reasonable alternative water supplies and where existing groundwater warrants the highest level of protection. At present only Block Island has been designated as meeting this criterion..

GA – Rhode Island groundwater classification, groundwater resources that are know or presumed to be suitable for drinking water use without treatment. However, groundwater classified by GA does not fall within any of the three priority areas described under the GAA classification.

Grade/Grading – The movement of soil and fill material to change the elevation of the land. The term refers to the combined actions of excavating and filling to change elevation or shape.

Grubbing – The removal of stumps/roots by mechanical means during site preparation activities.

Immediately - As soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased.

In-kind replacement - replacement using the same material, functional inverts, diameter and length as the existing item. In-kind replacement includes the substitution of a structure with a similar structure in approximately the same location as is practicable, and is approximately the same in design. The design may be altered to meet applicable utility standards, and may include alternate materials designed to prolong the life of that service.

Intermittent Stream – A stream that flows for sufficient time to develop and maintain a defined channel, but which might not flow during dry portions of the year.

In the Dry – Work done either during periods of low water or behind temporary diversions, such as Earth Dike / Drainage Swale and Lined Ditches designed and installed in accordance with best management practices.

Limit of Work/Disturbance – The approved project limits within regulated areas. All project related activities in regulated areas must be conducted within the approved limit of work/disturbance. The limit of work/disturbance shall be depicted on the approved permit site plans and in the EFI plans. Where it is warranted National Grid may require that these limits be identified in the field by flagging, construction fencing, and/or perimeter erosion controls.

Long-Term Restoration Logs - Project-specific log used to document restoration required following the completion of construction or as areas of the project have been completed (i.e., segments of ROW for a multi-mile project). The log is typically updated by the Project Environmental Consultant or the National Grid Environment Scientist Environment Scientist and circulated to the project team on a weekly basis.

Low Flow Conditions – Low water flow that generally occurs during the summer, as a result of decreased precipitation and the removal of water by increased evaporation and evapotranspiration by vegetation. Work done under low-flow conditions minimizes the potential for environmental damage. The USACE defines the calendar dates for low flow conditions in its New England state-specific Programmatic General Permits.

Low Ground Pressure – equipment that meets the USACE GP state-specific defined Pounds per Square Inch (PSI) ground pressure when loaded. Use of LGP equipment ***requires approval*** from the National Grid Environmental Scientist.

Marsh – A wetland:

a) That is distinguished by the absence of trees and shrubs;

b) Dominated by soft-stemmed herbaceous plants such as grasses, reeds, and sedges; and

c) Where the water table is at or above the surface throughout the year, but can fluctuate seasonally.

Methods – Are the construction practices and procedures that take place through choosing the proper equipment, trucks and labor to execute the earth moving activities based on the existing conditions and implementing creative and sensitive scheduling for the daily activities.

NHESP - Natural Heritage Endangered Species Program; a department within the Massachusetts Division of Fisheries and Wildlife that is responsible for protecting the 176 species of vertebrate and invertebrate animals and 259 species of native plants that are officially listed as Endangered, Threatened or of Special Concern in Massachusetts.

Perennial – A stream that contains water at all times except during extreme drought.

Permanently Ceased – Is applicable to earth disturbance activities when clearing and excavation within any area of the Project that will not include permanent structures has been completed.

Person-in-Charge – A National Grid Project Engineer, Manager, Supervisor, Field Construction Coordinator or equivalent Contractor personnel assigned to oversee and coordinate work activities.

Processed Gravel – Processed Gravel shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001)

Processed Gravel will not have fine materials that could lead to a turbid discharge. Gravel consisting of inert material that is hard, durable stone and is free from loam and clay, surface coatings and deleterious materials.

Regulating Body – Federal, State, or local authority that has jurisdiction over resource areas that may be impacted by company operations

Regulated Wetland Area – Those areas that are subject to federal, state or local wetland regulation, including certain buffer or adjacent areas.

Repair – The restoring of an existing legal structure by partial replacement of work, or broken, or unsound parts (Env-Wt 101.73).

Replacement – The substitution of a new structure for an existing legal structure with no change in size, dimensions, location, configuration, construction, or which conforms in all material aspects to the original structure

Right-of-Way – A corridor of land where National Grid has legal rights (either fee ownership, lease or easement) to construct, operate, and maintain an electric power line and/or natural gas pipeline and may include work on customer owned properties.

River – A watercourse that is larger than a perennial stream and flows all year long.

Routine Utility Rights-of-Way Maintenance Activity – Includes but is not limited to vegetation management and repair or replacement of existing utility structures.

Sedimentation Controls – Silt fences, straw bales, compost socks/berms and other barrier devices strategically placed to intercept and treat sediment-laden site runoff.

Sensitive Water - Includes any sediment or nutrient impaired water or a water that is identified by the state, tribe or EPA as Tier 2, 2.5 or Tier 3 for antidegradation purposes.

Siltation Curtain – An impervious barrier erected to prevent silt and sand and/or fines from being washed into a wetland, surface water body or other area of concern.

Surface Water Body or Surface Waters – Those portions of waters which have standing or flowing water at or on the surface of the ground.

Spill Prevention, Control and Countermeasure Plans – Required for site operations that involve the storage of 1,320 gallons or greater of fuel and oils, both in storage containers and stored in equipment. Response actions to spills and releases are specified in these plans.

Stormwater Pollution Prevention Plan – A site-specific, written document that, among other things: (1) identifies potential sources of stormwater pollution at a construction site; (2) describes stormwater

control measures to reduce or eliminate pollutants in stormwater discharge from a construction site; and (3) identifies procedures the operator will implement to comply with the terms and conditions of EPA NPDES Construction General Permit (CGP). SWPPPs must be prepared, maintained on-site, and amended as necessary in order to obtain NPDES permit coverage for specific construction site stormwater discharges under the EPA NPDES CGP.

Temporarily Ceased - Is applicable when there are earth disturbance activities such as clearing, grading, and/or excavation that are not complete, but will be idle in one area for a period of up to 14 or more calendar days, and which will resume in the future. The 14 calendar day timeframe begins as soon as you now that construction work on a portion of the Project will be left incomplete and idle. In circumstances where there are unanticipated delays and you do not know at first how long the work stoppage will continue, the requirement to immediately initiate stabilization is triggered as soon as you know with reasonable certainty that work will be stopped for 14 or more additional calendar days.

Tidal Wetlands – A wetland whose vegetation, hydrology or soils are influenced by periodic inundation or tidal waters.

Topsoil – The uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils and ranging in depth from 2 to 10 inches.

Turbidity – The condition in which solid particles suspended in water make the water cloudy or even opaque in extreme cases.

United States Geological Survey topographic map – A map that uses contour lines to represent the three-dimensional features of a landscape on a two-dimensional surface. These maps use a line and symbol representation of natural and artificially created features in an area.

Wetland – An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation (more than 50 percent) typically adapted for life in saturated soil conditions (hydric soils). Wetlands include but are not limited to swamps, marshes, bogs, and similar areas.

Work Site – An area where work is performed.

Worker – Company employee, contractor, consultant working on site.

Zone II - Massachusetts - That area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). It is bounded by the groundwater divides which result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone IIs shall extend up gradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedrock , or a recharge boundary).

Appendix 2 – Acronyms

ASTM	American Society for Testing and Materials
BMP	Best Management Practices
EFI	Environmental Field Issue
EG	Environmental Guidance
EPA	Environmental Protection Agency
GA/GAA	Rhode Island Groundwater Classifications – see glossary
LGP	Low Ground Pressure
MA	Massachusetts
MA DEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
NE	New England
NH	New Hampshire
NH DES	New Hampshire Department of Environmental Services
NHESP	Natural Heritage Endangered Species Program
NPDES	National Pollutant Discharge Elimination System
OHM	Oil and/or Hazardous Materials
PSI	Pounds per square inch
RI	Rhode Island
RI DEM	Rhode Island Department of Environmental Management
RI CRMC	Rhode Island Coastal Resources Management Council
RI SESC	Rhode Island soil erosion and sediment control
ROW	Right-of-Way
RTE	Rare, Threatened or Endangered
SPCC	Spill Prevention, Control and Countermeasure
SWPPP	Storm Water Pollution Prevention Plan
TOY	Time-of-Year
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VT	Vermont
VT DEC	Vermont Department of Environmental Conservation

Zone II Massachusetts Groundwater Protection district – see glossary

Appendix 3 – EFI template

See EG303NE_Form1 for the EFI template

Appendix 4 – Simplified EFI template

See EG303NE_Form2 for the Simplified EFI template

Appendix 5 – Standard STORMS boilerplate language

See EG303NE_Form3 for examples of standard STORMS boilerplate language

Appendix 6

See EG303NE_Appendix6_Reporting Form published separately

Appendix 7 – BMPs

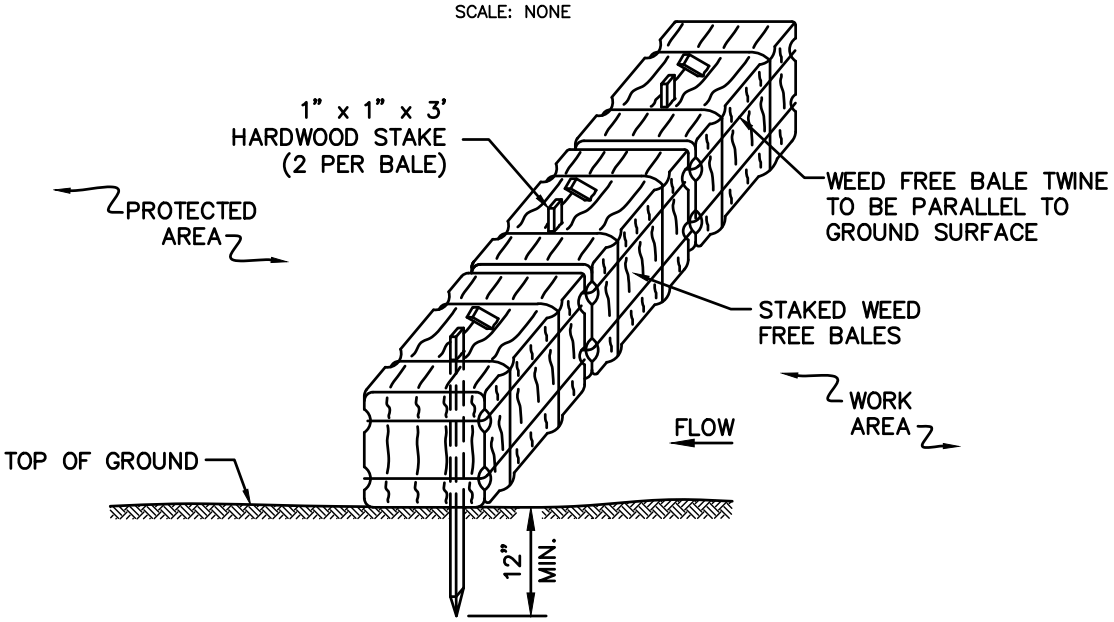
See EG303NE_Form4 for a list of BMPS

See EG303NE_Form5 for BMP details

	BMP #	Measure
Sediment & Erosion Controls	SEC-1	Weed free bale barrier
	SEC-2	Sediment control fence
	SEC-3	Silt fence / weed free barrier
	SEC-4	Silt Soxx
	SEC-5	Straw Wattle
	SEC-6	Erosion Control Blanket - Ditch
	SEC-7	Erosion Control Blanket - Slope
	SEC-8	Hydroseeding with Tackifier (slope stabilization)
	SEC-9	Mulch materials, rates and uses (from NY)
	SEC-10	Seeding options - Upland Seed Mixes
	SEC-11	Seeding options - Wetland Seed Mix
	SEC-12	Distribution Pole Erosion Control
Crossing Measures	CM-1	Prefabricated mats
	CM-2	Construction mat bridge
	CM-3	Construction mat layout (with transition)
	CM-4	Construction mat layout (with transition & BMPs)
	CM-5	Construction mat - Air Bridge
	CM-6	Corduroy road
	CM-7	Rock Ford
	CM-8	Temporary construction entrance / exit
	CM-9	Temporary construction culvert
	CM-10	Access way stabilization
	CM-11	Construction signage
Advanced Applications	AA-1	Reinforced silt fence
	AA-2	Sediment filter
	AA-3	Stone check dams
	AA-4	Straw / haybale check dam
	AA-5	Waterbar
	AA-6	Sandbag check dam
	AA-7	Earth dike
	AA-8	Drainage swale and lined ditch
	AA-9	Sedimentation basin
	AA-10	Dewatering basin - Small scale
	AA-11	Dewatering basin - Large scale
	AA-12	Dirtbag
	AA-13	Concrete waste sump
	AA-14	Outpak concrete washout
	AA-15	Barrier fence (construction fence)
	AA-16	ROW gates / fences
	AA-17	Bollard
	AA-18	Dust control
	AA-19	Catch Basin Inlet Protection
	AA-20	Silt Sack
	AA-21	Turbidity Curtain
	AA-22	Siltsoxx Amphibian & Reptile Crossing #1
	AA-23	Siltsoxx Amphibian & Reptile Crossing #2
	AA-24	Siltsoxx Amphibian & Reptile Crossing #3
	AA-25	Cultural Avoidance

BMP DETAIL

SCALE: NONE



NOTES:

1. THE GROUND SHALL BE PREPARED TO PROVIDE COMPLETE CONTACT WITH THE BALES.

BMP PICTURE



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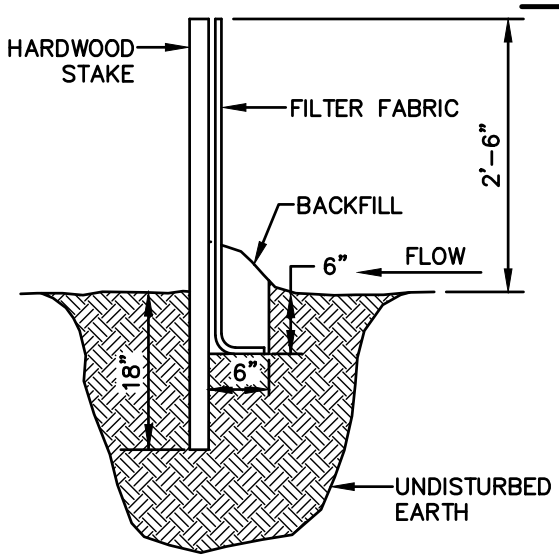
SEC-1
WEED FREE BALE BARRIER

File: BALE_BARRIER.DWG

BMP DETAIL

SCALE: NONE



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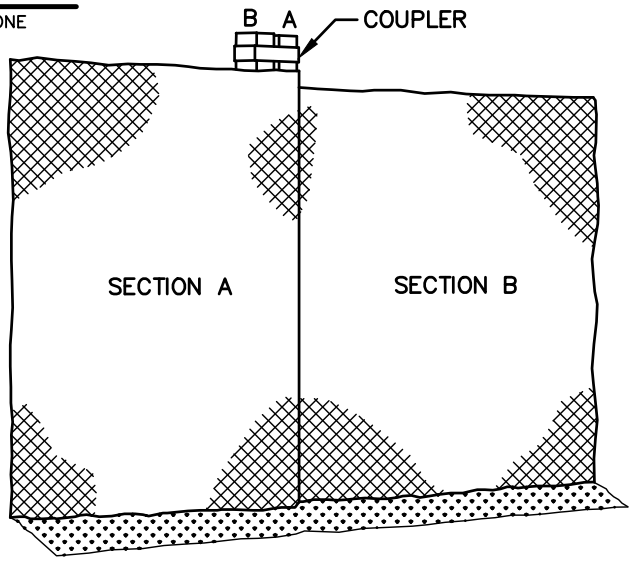
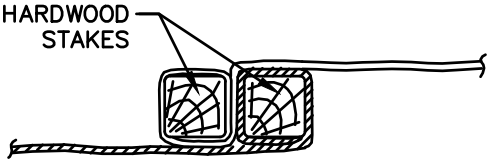


SECTION



PLAN

BMP PICTURE

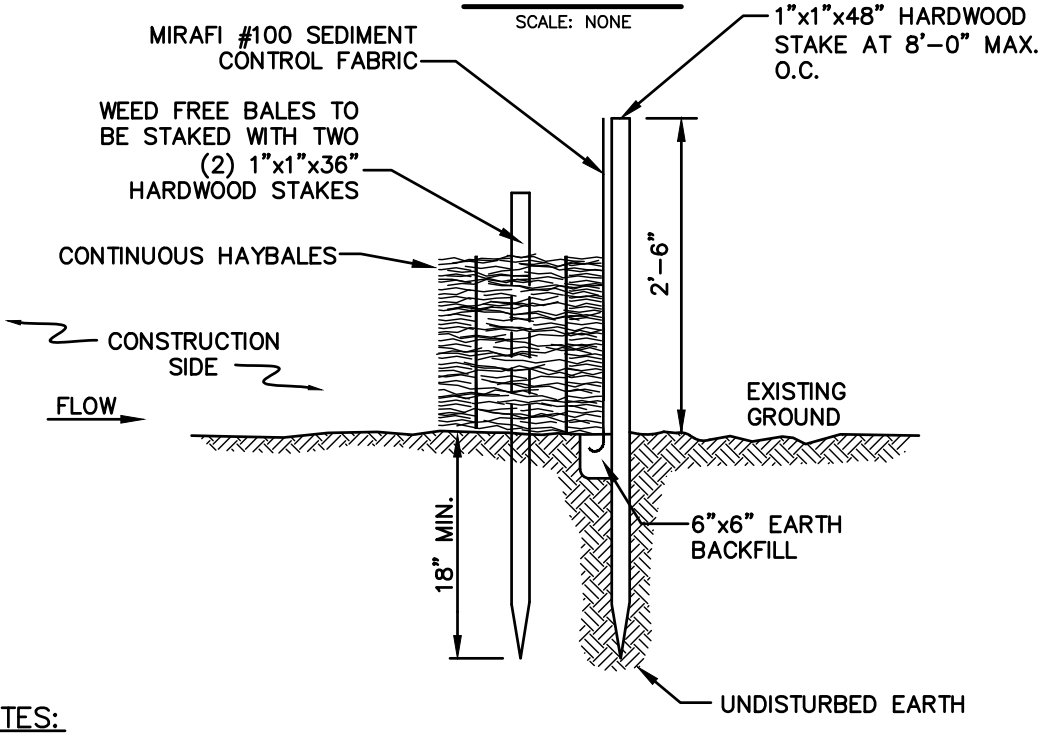


SEC-2
SEDIMENT CONTROL FENCE

File: Sediment_Fence.dwg

BMP DETAIL

SCALE: NONE



NOTES:

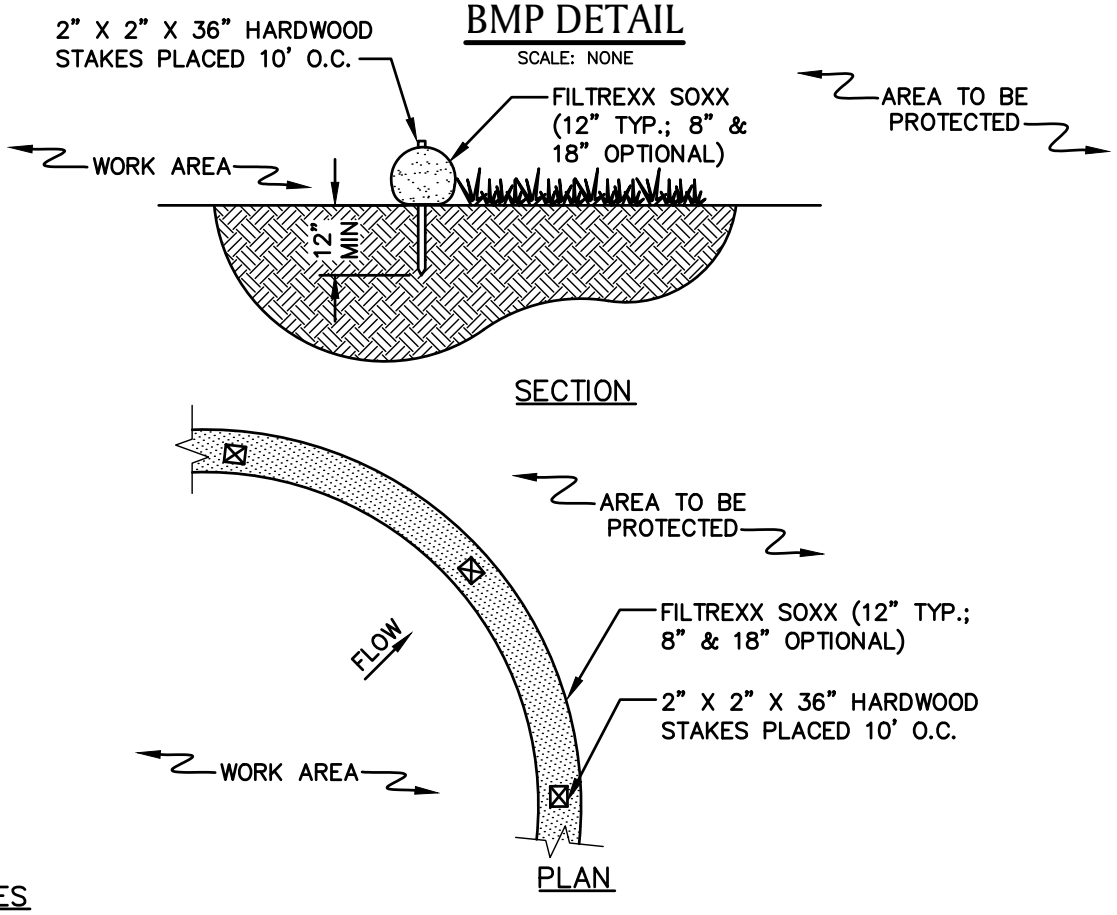
1. BALES SHALL BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY TWO (2) 1"X1"X36" HARDWOOD STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. BALES SHALL BE REMOVED AND REPLACED WHEN THEY BECOME FILLED WITH SEDIMENT AND BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. BALES SHALL BE REMOVED WHEN THE EMBANKMENTS STABILIZE.
6. BALES TO BE TWINE BOUND.

BMP PICTURE



BMP DETAIL

SCALE: NONE



NOTES

1. PRODUCT TO BE FILTREXX SILT SOXX OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
4. MESH CONTAINMENT MATERIAL SHOULD BE KNITTED PHOTODEGRADABLE OR BIODEGRADABLE MATERIAL, WITH OPENING SIZES BETWEEN 1/8" – 3/8".
5. COMPOST MEDIA SHOULD HAVE PARTICLE SIZE WHERE 99% < 2", 50% > 1/2".
6. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



*** PICTURE AND DETAIL PROVIDED BY FILTREXX LAND IMPROVEMENT SYSTEMS**

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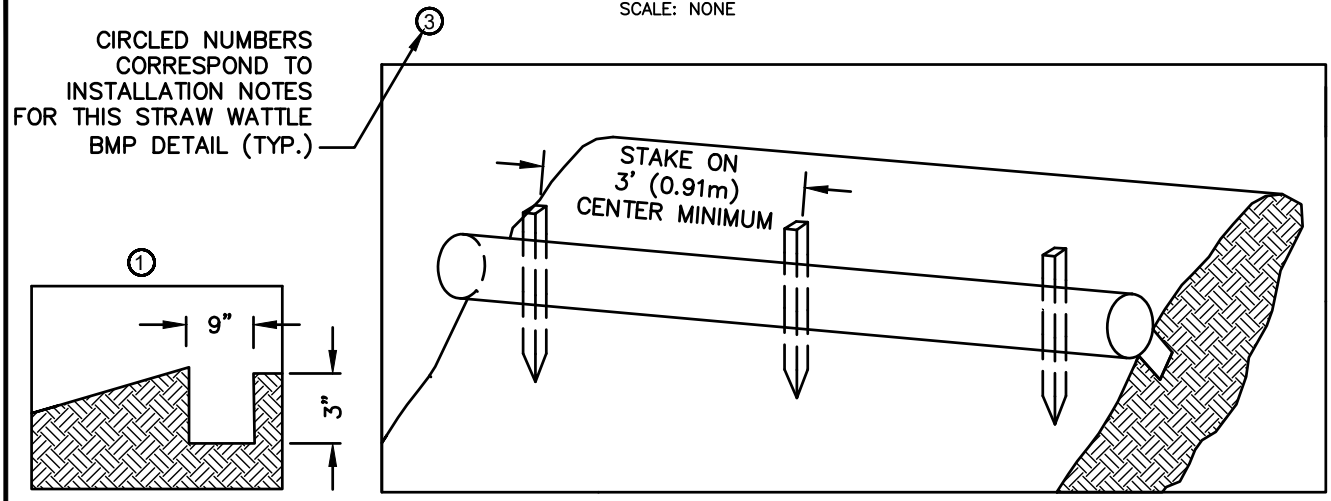
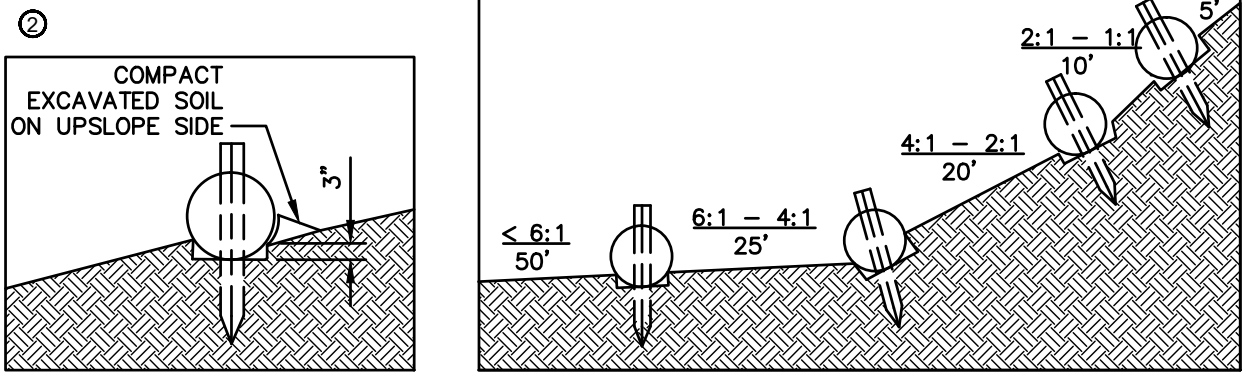
SEC-4
SILT SOXX *

File: SiltSOXX.dwg

BMP DETAIL

SCALE: NONE





TYPICAL WATTLE SPACING DETAIL

NOTES:

1. PRODUCT TO BE TENSAR NORTH AMERICAN GREEN STRAW WATTLE OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. TYPICAL WATTLE SPACING BASED ON SLOPE GRADIENT. COORDINATE SPACING AND LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
3. MINIMUM 12" DIAMETER WATTLES SHOULD BE USED FOR HIGHLY DISTURBED AREAS (I.E., HEAVILY USED ACCESS ROAD WITH ADJACENT WETLAND) AND MINIMUM 9–10" WATTLES SHOULD BE USED FOR LESS DISTURBED SOILS.

INSTALLATION NOTES:

1. BEGIN AT THE LOCATION WHERE THE WATTLE IS TO BE INSTALLED BY EXCAVATING A 2–3" DEEP X 9" WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UPSLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE WATTLE IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE EXCAVATED TRENCH AGAINST THE WATTLE ON THE UPHILL SIDE. ADJACENT WATTLES SHOULD TIGHTLY ABUT.
3. SECURE THE WATTLE WITH 18–24" HARDWOOD STAKES EVERY 3–4' AND WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE LEAVING AT LEAST 2–3" OF STAKE EXTENDING ABOVE THE WATTLE. STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.

*** DETAIL AND PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN**

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SEC-5

STRAW WATTLE * (1 OF 2)

File: Straw_Wattle.dwg

BMP PICTURE



STRAW WATTLE – SHALLOW SLOPE (≤4:1)
(ALTERNATE STAKING)

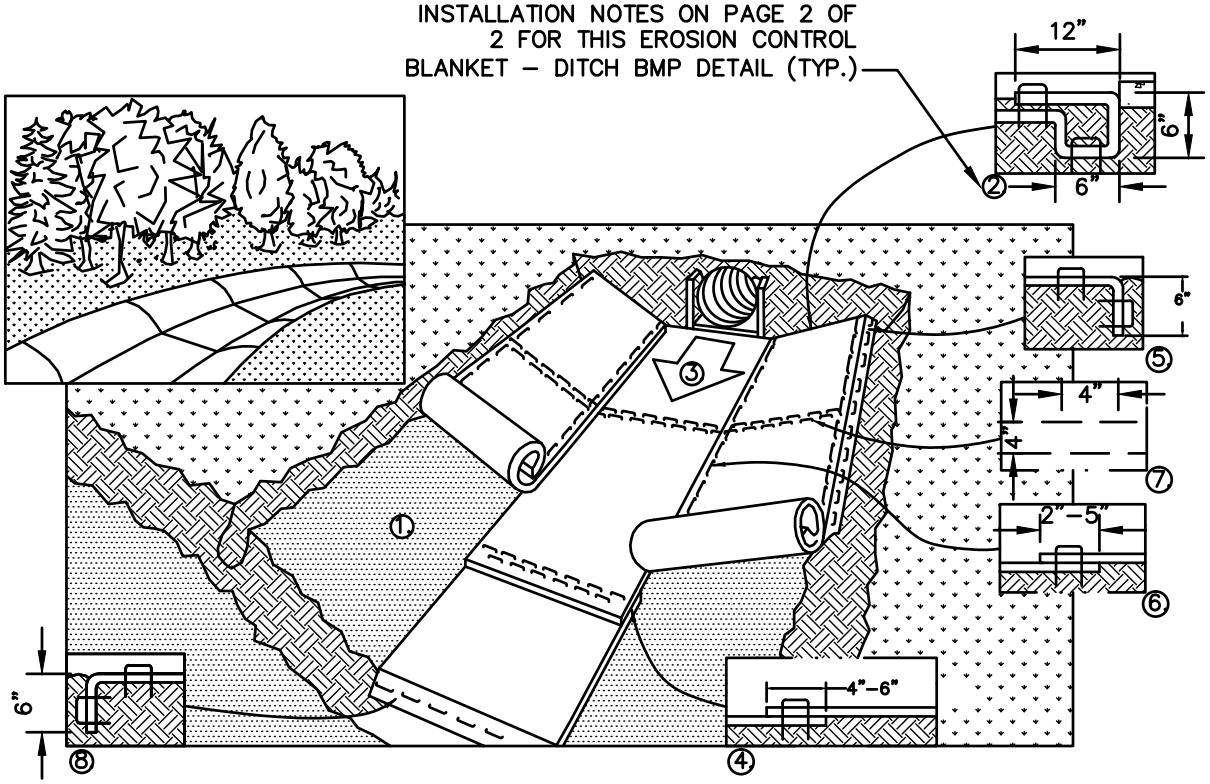
ALTERNATE STAKING INSTALLATION NOTES:

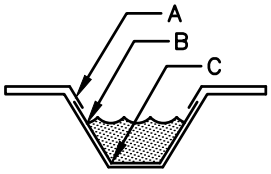
1. ON SHALLOW SLOPES (≤4:1), STRAW WATTLE MAY BE SECURED WITH 18–24" HARDWOOD STAKES DRIVEN AGAINST THE SIDES OF THE WATTLE INSTEAD OF THROUGH. STAKES SHALL ALTERNATE SIDES, AND BE SPACED 3–4' MAX.
2. TWINE SHALL BE TIED FROM STAKE TO STAKE, CRISS–CROSSING THE STRAW WATTLE. TIE TWINE TO STAKES BELOW THE HEIGHT OF THE WATTLE.

BMP DETAIL

SCALE: NONE

CIRCLED NUMBERS CORRESPOND TO INSTALLATION NOTES ON PAGE 2 OF 2 FOR THIS EROSION CONTROL BLANKET – DITCH BMP DETAIL (TYP.)





CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTES:

1. PRODUCT TO BE NORTH AMERICAN GREEN EROSION CONTROL BLANKET OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.
3. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE ROLLED EROSION CONTROL PRODUCTS (RECP's).

BMP DETAIL

INSTALLATION NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP's EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMAPCT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) ACROSS THE WIDTH OF THE RECP's.
3. ROLL CENTER RECP's IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. ™ WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE RECP's END OVER END (SHINGLE STYLE) WITH A 4" – 6" (10 CM –15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER TO SECURE RECP's.
5. FULL LENGTH EDGE OF RECP's AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT RECP's MUST BE OVERLAPPED APPROXIMATELY 2" – 5" (5 CM –12.5 CM) (DEPENDING ON RECP's TYPE) AND STAPLED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 M – 12 M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE RECP's MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

BMP PICTURE



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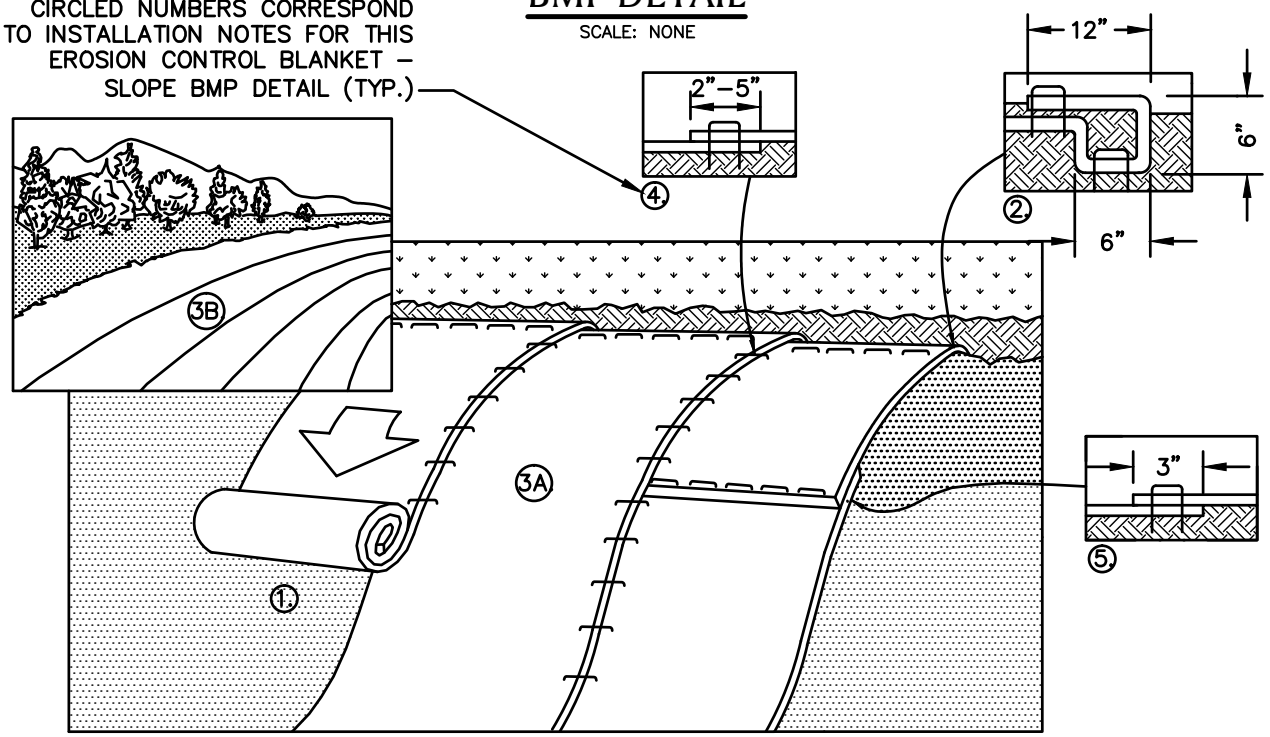
SEC-6
EROSION CONTROL BLANKET - DITCH * (2 OF 2)

File: Erosion_Blanket_Ditch.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. PRODUCT TO BE NORTH AMERICAN GREEN EROSION CONTROL BLANKET OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLES OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE RECP's.

INSTALLATION NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL–O–SEED DO NOT SEED PREPARED AREA. CELL–O–SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP's EXTENDED BEYOND THE UP–SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECP's.
3. ROLL THE RECP's (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP's MUST BE STAPLED WITH APPROXIMATELY 2" – 5" (5 CM – 12.5 CM) OVERLAP DEPENDING ON RECP's TYPE.
5. CONSECUTIVE RECP's SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE RECP's WIDTH.

*** PICTURE AND DETAIL PROVIDED BY TENSAR NORTH AMERICAN GREEN**

SEC-7
EROSION CONTROL BLANKET - SLOPE * (1 OF 2)

File: Erosion_Blanket_Slope.dwg

BMP PICTURE



File: Erosion_Blanket_Slope.dwg

*** PICTURE AND DETAIL PROVIDED BY TENSAR NORTH AMERICAN GREEN**
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SEC-7
EROSION CONTROL BLANKET - SLOPE * (2 OF 2)

BMP PICTURE



NOTES:

1. COORDINATE MIXTURE TYPE AND APPLICATION AREAS WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.
2. A MINIMUM OF 1500 LBS. PER ACRE OF A PAPER/CORN FIBER OR EQUIVALENT WITH NATURAL TACKIFIERS WILL BE USED ON SLOPES LESS THAN 3:1.
3. A BFM (BONDED FIBER MATRIX) WILL BE USED ON SLOPES GREATER THAN 2:1.
4. A FGM (FLEXIBLE GROWTH MATRIX) OR ESM (EXTREME SLOPE MATRIX) WILL BE USED ON SLOPES GREATER THAN 1:1.
5. REFER TO BMP #10 FOR SEED MIXTURE OPTIONS.

*** PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN**
*** TACKIFIER INFORMATION PROVIDED BY FILTREXX LAND IMPROVEMENT SYSTEMS AND TENSAR NORTH AMERICAN GREEN**

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SEC-8
HYDROSEEDING WITH TACKIFIER
(SLOPE STABILIZATION) *

File: Hydroseeding.dwg

BMP

Definition

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface.

Purpose

The primary purpose is to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch is also used alone for temporary stabilization in non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.



NOTE:

1. PICTURE DEPICTS STRAW MULCH APPLICATION (FROM MULCH SPREADER) ON STEEP SLOPE WITH AN IMPROVED DRAINAGE SWALE.
2. COORDINATE MULCH MATERIALS AND RATES WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

* BMP INFORMATION FROM "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (AUGUST, 2005)." INFORMATION OBTAINED VIA WEBSITE: http://www.dec.ny.gov/chemical/29066.html

SEC-9
MULCH MATERIALS, RATES AND USES (FROM NY) *

File: Mulch_Materials.dwg

UPLAND ROW RESTORATION MIX – GENERAL

Species Composition Options:

- Andropogon gerardii; Niagra Big Bluestem
- Schizachyrium scoparium; Little Bluestem
- Elymus Canadensis; Canada Wild Rye
- Elymus virginicus; Virginia Wildrye
- Lolium multiflorum; Annual Ryegrass
- Sorghastrum nutans; Indiangrass
- Chamaecrista fasciculate; Partridge Pea
- Desmodium canadense; Showy Tick Trefoil
- Helioposis helianthoides; Ox–Eye Sunflower
- Panicum virgatum; Switchgrass
- Rudbeckia hirta; Black Eyed Susan
- Poa palustris; Fowl Bluegrass
- Agrostis perennans; Upland Bentgrass
- Agrostis alba; Redtop
- Festuca rubra; Red Fescue
- Lotus corniculatus; Birds–Foot Trefoil
- Chrysanthemum leucanthem; Ox–Eye Daisy
- Aster novae–angliae; New England Aster

Example Seed Mixes:

1. Native Upland wildlife forage and Cover Meadow Mix – Ernst Conservation Seeds (ERNMX–123)
2. Eastern Ecotype Native Grass Mix– Ernst Conservation Seeds (ERNMX–177)
3. New England Native Warm Season Grass Mix – New England Wetland Plants, Inc.
4. New England Logging Road Mix – New England Wetland Plants, Inc.
5. Northeast Upland Wildflower/Restoration Erosion Mix – Southern Tier Consulting (STCMX–2)

UPLAND ROW RESTORATION MIX – DRY/ROCKY SITES

Species Composition Options:

- Festuca rubra; Red Fescue
- Schizachyrium scoparium; Little Bluestem
- Elymus Canadensis; Canada Wild Rye
- Bouteloua gracillis; Blue Grama
- Lolium multiflorum; Annual Ryegrass
- Lolium perenne; Perennial Ryegrass
- Agrostics scabra; Rough Bentgrass
- Agrostis perennans; Upland Bentgrass
- Sorghastrum nutans; Indiangrass

Example Seed Mixes:

1. New England Erosion Control/ Restoration Mix for Dry Sites – New England Wetland Plants, Inc.
2. Ernst Conservation Seeds and similar companies can create a custom seed mix matching the composition above (with site specific additions if necessary).

WETLAND ROW RESTORATION MIX

Species Composition Options:

- Agrostis stolonifera; Creeping Bentgrass
- Poa trivialis; Rough Bluegrass
- Alopecurus arundinaceus; Creeping Meadow Foxtail
- Lolium multiflorum; Annual Ryegrass
- Festuca rubra; Creeping Red Fescue
- Elymus virginicus; Virginia Wildrye
- Schizachyrium scoparium; Little Bluestem
- Andropogon gerardii; Niagra Big Bluestem
- Carex vulpinoidea; Fox sedge
- Panicum virgatum; Switchgrass
- Agrostis scabra; Rough Bentgrass
- Aster novae–angliae; New England Aster
- Eupatorium perfoliatum; Boneset
- Euthamia graminifolia; Grass Leaved Goldenrod
- Scirpus atrovirens; Green Bulrush
- Verbene hastate; Blue Vervain
- Juncus effusus; Soft Rush
- Scirpus cyperinus; Wool Grass
- Panicum clandestinum; Deertongue

Example Seed Mixes

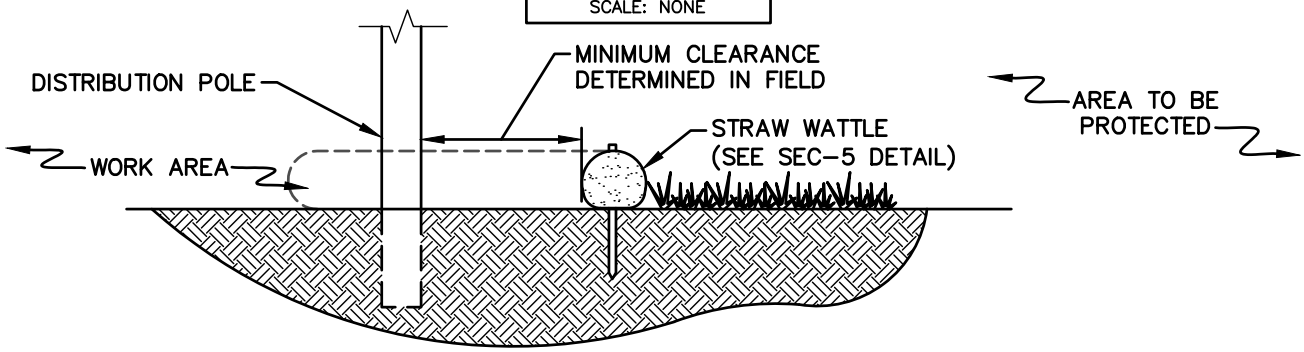
1. New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites – New England Wetland Plants, Inc.
2. Northeast Wetland Grass Seed Mix – Southern Tier Consulting (STCMX–7)
3. Ernst Conservation Seeds and similar companies can create a custom seed mix matching the composition above (with site specific additions if necessary).

GERNERAL NOTES:

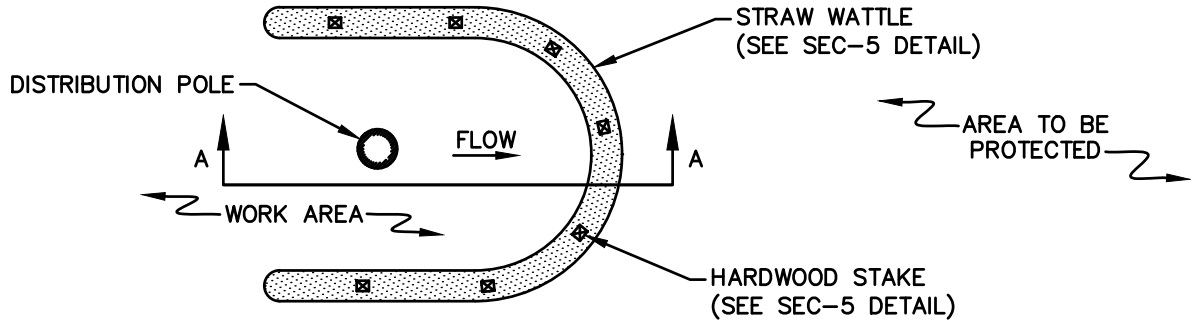
1. Seed mixes described herein are intended to cover a variety of typical new england landscapes. However, site specific seed mixes will need to be evaluated in coastal or mountainous regions.
2. Seed mixes described herein are intended for general ROW restoration. Site specific wetland seed mixes may be required by local, state and/or federal regulators for certain impacts to wetlands.
3. All seed mixes are to be approved by National Grid Environmental Scientist prior to construction and must conform with all project permits.
4. Seedbed preparation and maintenance as well as temporary erosion and sediment controls are crucial to the establishment of newly seeded areas. Coordinate with National Grid Environmental Scientist on seed bed preparation and maintenance as well as temporary erosion and sediment controls prior to construction.

BMP DETAIL

SCALE: NONE



SECTION A–A



PLAN

NOTES

1. PRODUCT TO BE STRAW WATTLE OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST (SEE SEC–5 BMP DETAIL).
2. STRAW BALE BARRIER PER SEC–1 BMP DETAIL TO BE AN AVAILABLE ALTERNATE DEPENDING ON SITE CONDITIONS AT THE DIRECTION OF NATIONAL GRID ENVIRONMENTAL SCIENTIST (SEE FIGURE 2).
3. MINIMUM CLEARANCE BETWEEN POLE AND EROSION CONTROL TO BE DETERMINED BY CONDITIONS OF POLE INSTALLATION/REPLACEMENT WORK AND ASSOCIATED DISTURBANCE.

BMP PICTURE



FIGURE 1: TYP. STRAW WATTLE APPLICATION



FIGURE 2: ALT. STRAW BALE APPLICATION

BMP PICTURE

SCALE: NONE

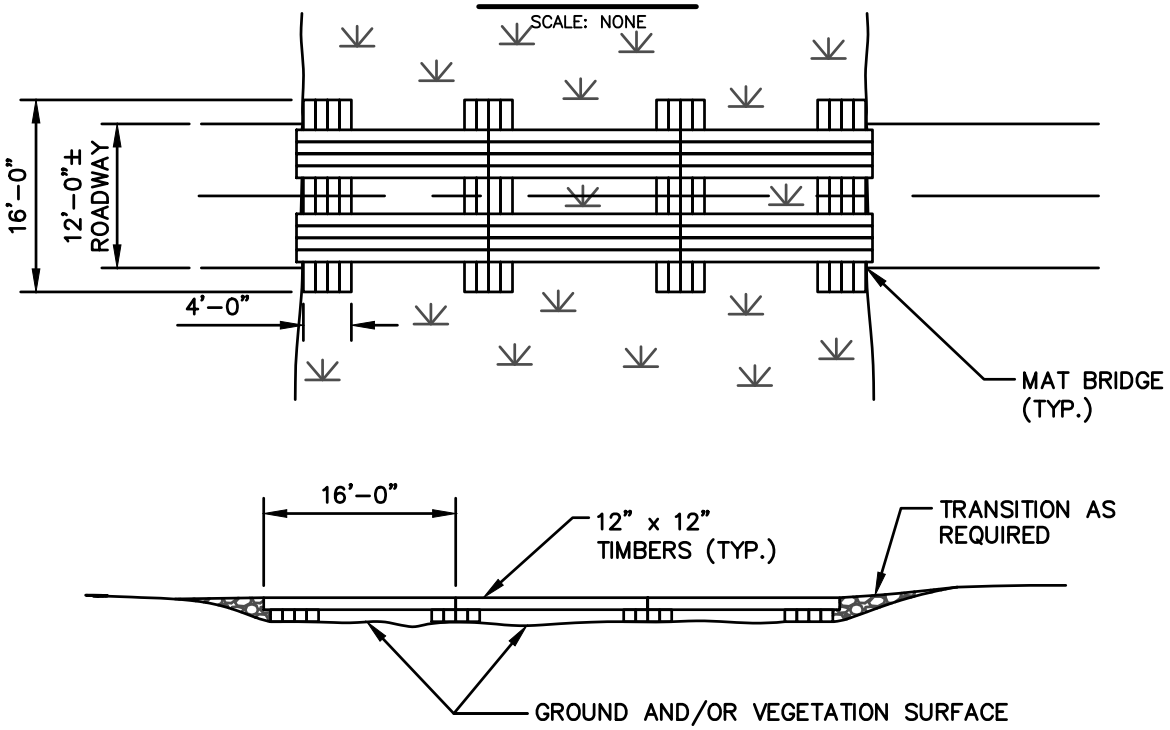


NOTES:

1. PRODUCT TO BE ALTURNAMATS' PREFABRICATED MATS OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. PRODUCT AVAILABLE IN 4X8' UNITS.
3. IF MATS ARE INSTALLED IN A WETLAND AREA, INSTALL EROSION CONTROLS TO CONTAIN MATERIAL UTILIZED IN THE MAT TRANSITIONS.

BMP DETAIL

SCALE: NONE



NOTES:

1. IF MATS ARE INSTALLED IN A WETLAND AREA, INSTALL EROSION CONTROLS TO CONTAIN MATERIAL UTILIZED IN THE MAT TRANSITIONS.

BMP PICTURE



CM-2
CONSTRUCTION MAT BRIDGE
(1 OF 2)

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File: Mat_Bridge.dwg

BMP PICTURE - SINGLE SPAN

SCALE: NONE





NOTES:

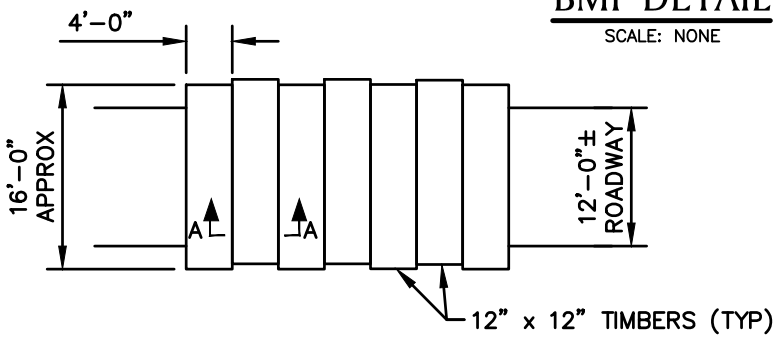
1. WHERE STREAM WIDTH ALLOWS, INSTALL CONSTRUCTION MATS TO SPAN THE WATERCOURSE IN ITS ENTIRETY WITHOUT STRINGER PLACEMENT IN THE WATER OR ANY RESTRICTION OF STREAM FLOW.

2. INSTALLATION OF THE CONSTRUCTION MAT BRIDGE SHALL NOT DAMAGE THE STREAM BED AND BANKS. WHERE POSSIBLE, FOOTERS SHALL BE PLACED PARALLEL TO THE TOP OF THE STREAM BANKS, WITH ACCESS MATTING PLACED ACROSS THE TOP OF THE STRINGERS DISTRIBUTING THE WEIGHT OF THE CONSTRUCTION EQUIPMENT.

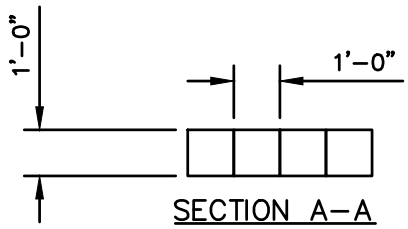
3. AT STREAM CROSSINGS THAT CANNOT BE SPANNED BY A SINGLE SECTION OF CONSTRUCTION MATTING, AND WHERE PERMITS ALLOW, STRINGERS SHALL BE PLACED ATOP THE STREAM BED PARALLEL TO THE FLOW OF WATER.

BMP DETAIL

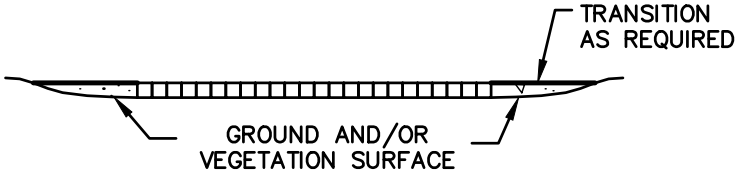
SCALE: NONE



TYPICAL PLAN VIEW



SECTION A–A
TYPICAL MAT SECTION
BOLTED TOGETHER



TYPICAL SECTION VIEW

NOTES:

1. TO BE INSTALLED IF NECESSARY TO PREVENT RUTTING, TO ACCESS STRUCTURES.
2. THIS DETAIL SHOWS TYPICAL DIMENSIONS. SOME CONTRACTOR'S CONSTRUCTION MATS ARE DIMENSIONALLY DIFFERENT FROM WHAT IS SHOWN HERE.
3. DEPENDENT ON SITE CONDITIONS, MULTIPLE LAYERS OF CONSTRUCTION MATS MAY BE INSTALLED.

BMP PICTURE



CM-3
CONSTRUCTION MAT LAYOUT
(WITH TRANSITION)

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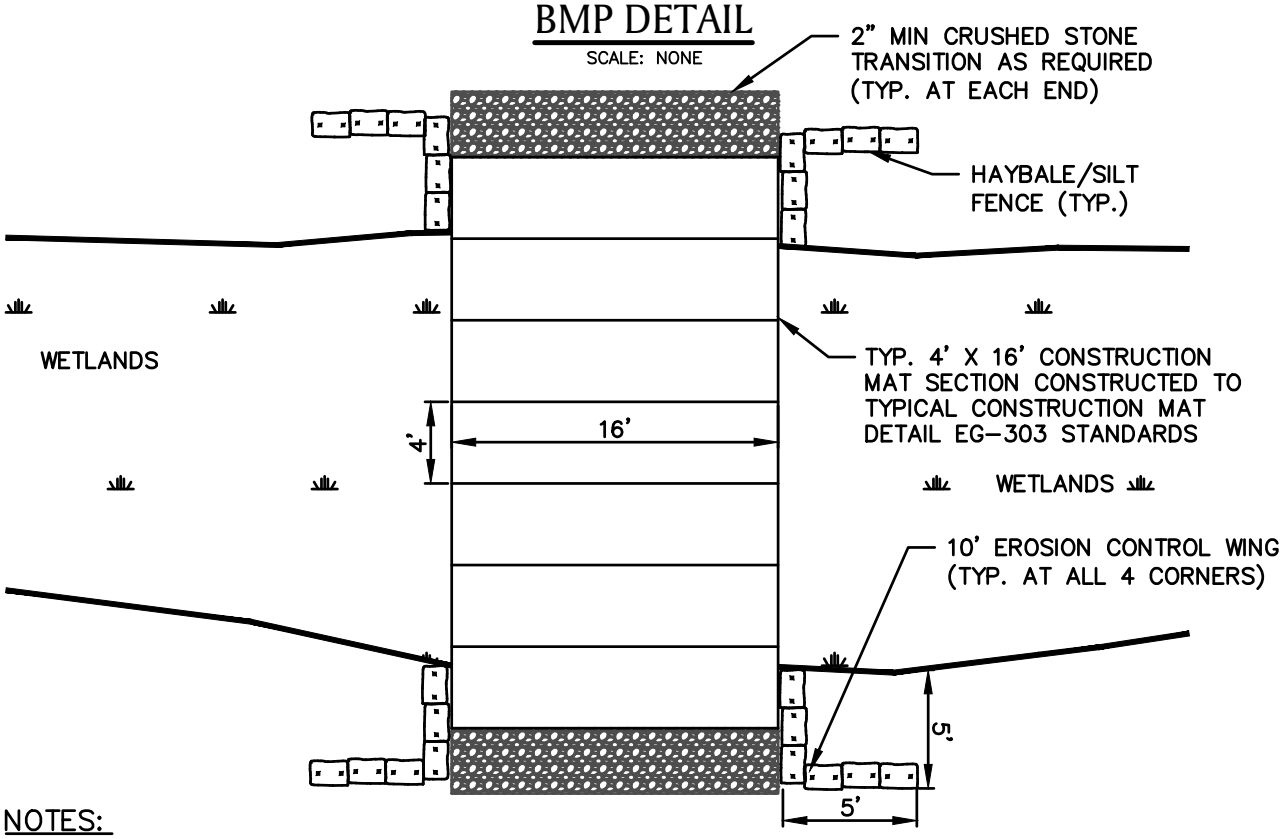
File: Swamp_Mat_Layout.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. ADD FILTER FABRIC AS NEEDED UNDER STONE TRANSITION RAMPS.
2. ALL MEASUREMENTS AND LOCATIONS ARE APPROXIMATE.

BMP PICTURE



CM-4
CONSTRUCTION MAT LAYOUT
(WITH TRANSITION AND BMPs)

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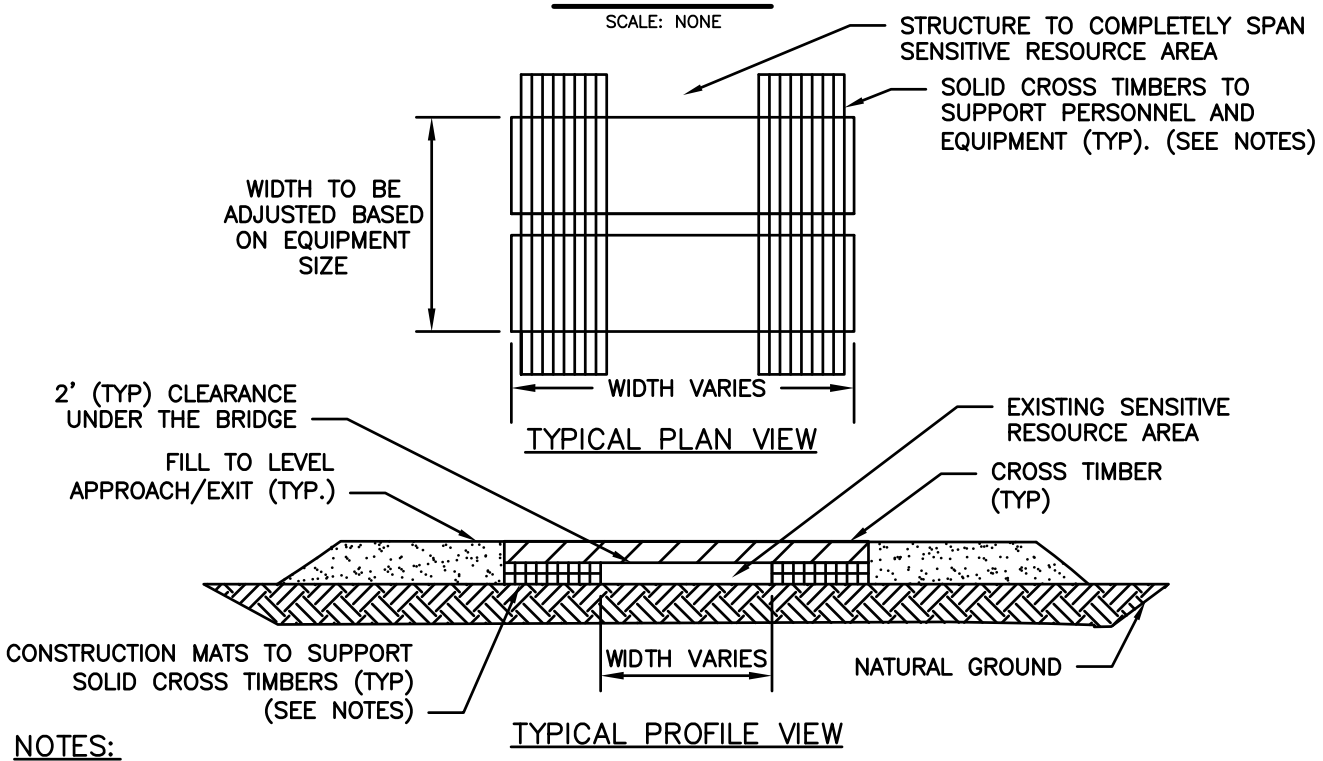
File: Swamp_Mat_Transition and BMPs.dwg

BMP DETAIL

SCALE: NONE



NOTES:

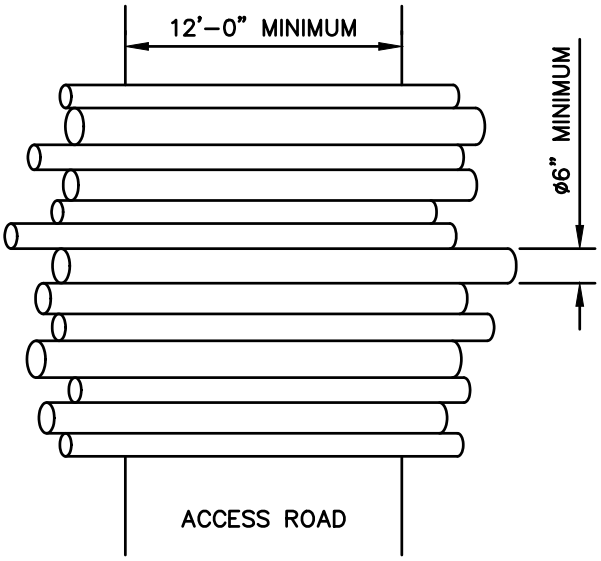
1. THE DETAIL SHOWN IS CONCEPTUAL. CONSTRUCTION MATS AND CROSS TIMBERS SHALL BE SIZED AND SELECTED BASED ON SPAN WIDTH, CROSSING EQUIPMENT AND FIELD CONDITIONS.
2. THE NUMBER OF CONSTRUCTION MATS MAY VARY DEPENDING ON THE CLEARANCE HEIGHT.
3. EQUIPMENT AND PERSONNEL LOAD SHALL BE DISTRIBUTED ON ALL TIMBERS.
4. EACH EQUIPMENT OPERATOR AND USER OF THE FIELD BRIDGE SHALL BE FAMILIAR WITH THE DESIGN AND THE MAXIMUM EQUIPMENT AND PERSONNEL LOADS.
5. THIS DETAIL MAY NOT BE APPLICABLE IN ALL FIELD CONDITIONS.
6. INSTALL EROSION CONTROLS ADJACENT TO THE CULVERT ENDS TO PROTECT THE WATERWAY FROM ROADWAY DEBRIS.

BMP PICTURE



BMP DETAIL

SCALE: NONE



RANDOM LENGTH AND DIAMETER LOGS PLACED ACROSS AN ACCESS ROAD

NOTE:

1. A SIMILAR BRUSH MAT INSTALLATION CONSISTING OF SMALLER DIAMETER STEMS AND LOGS CAN BE USED.
2. CORDUROY ROADS SHALL ONLY BE USED IN EMERGENCIES OR AFTER APPROVAL FROM THE PROJECT ENVIRONMENTAL CONSULTANT OR NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

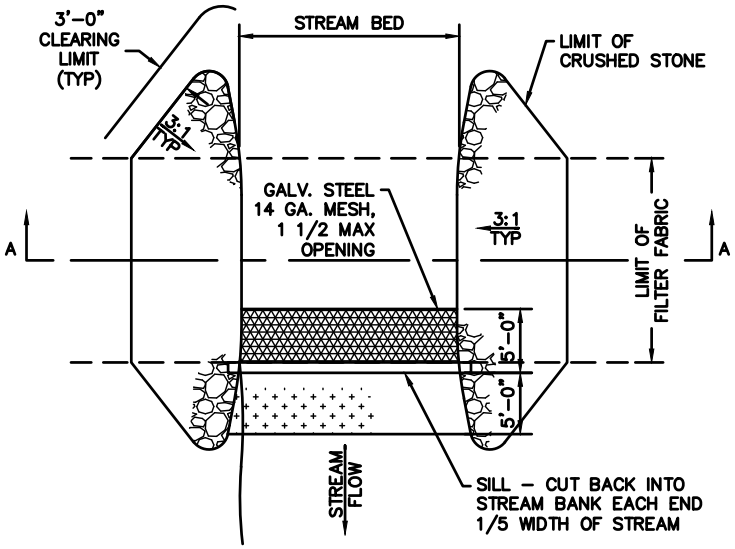


CM-6
CORDUROY ROAD

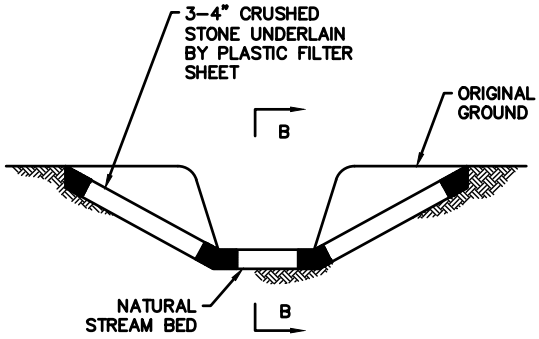
File: Corduroy_Road.dwg

BMP DETAIL

SCALE: NONE



PLAN VIEW



SECTION 'A-A'

BMP PICTURE





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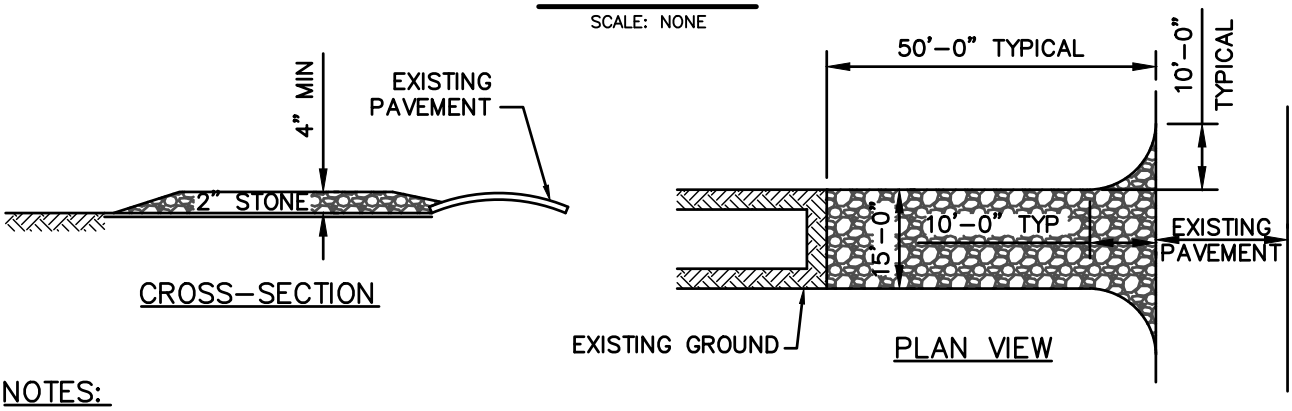
CM-7
ROCK FORD

File: Rock_Ford.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. STONE SIZE – USE 2" STONE (MINIMUM) TO 6" STONE (MAXIMUM)
2. LENGTH – GREATER THAN OR EQUAL TO 50 FEET
3. THICKNESS – 4"
4. WIDTH – FIFTEEN (15) FOOT TYP., BUT NOT LESS THAN FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS ENTRANCE. IF PIPING IS IMPRACTICAL, MOUNTABLE BERM SHALL BE PERMITTED.
6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
7. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED.
8. THE CLEAN STONE SHOULD BE INSTALLED OVER A GEOTEXTILE FABRIC. GEOTEXTILE FABRIC MAY BE OMITTED FOR PERMANENT CONSTRUCTION ENTRANCES/EXITS ON A CASE–BY–CASE BASIS WITH THE APPROVAL OF THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.
9. FOLLOWING CONSTRUCTION, THE CONSTRUCTION ENTRANCE/EXIT SHALL BE REMOVED AND THE AREA GRADED, SEEDED, AND MULCHED AS NEEDED. ENTRANCE/EXITS MAY REMAIN DEPENDING UPON FUTURE ACCESS NEEDS AND/OR PROJECT–SPECIFIC APPROVALS BUT REQUIRES APPROVALS FROM THE NATIONAL GRID ENVIRONMENTAL SCIENTIST AND PROPERTY LEGAL.

BMP PICTURE

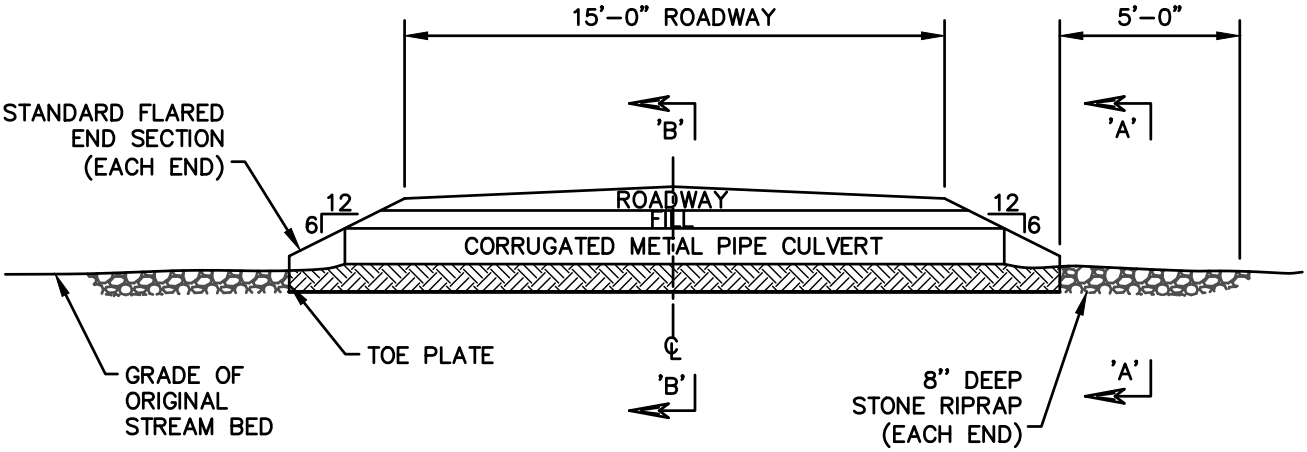


CM-8
TEMPORARY CONSTRUCTION ENTRANCE/ EXIT

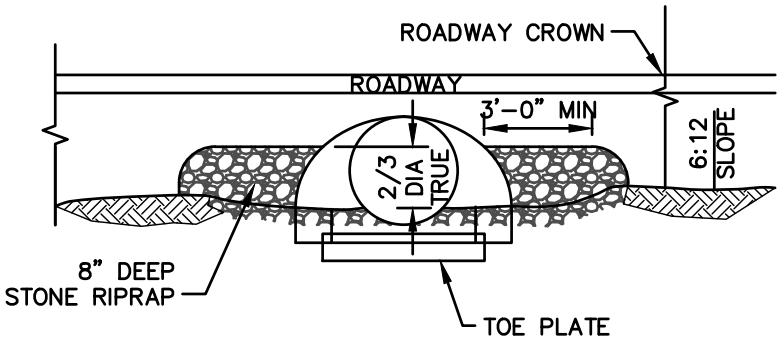
File: Temp_Construction_Ent.dwg

BMP DETAIL

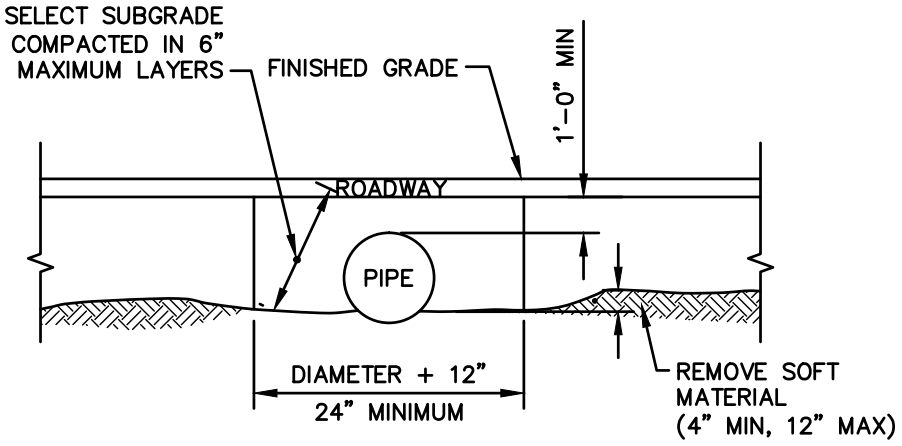
SCALE: NONE



CROSS SECTION



SECTION 'A–A'
(SAME BOTH ENDS)



SECTION 'B–B'

CM-9
TEMPORARY CONSTRUCTION
CULVERT (1 OF 2)

File: Temp_Constr_Culvert.dwg

BMP DETAIL

SCALE: NONE

NOTES:

1. CULVERT DESIGN AND LAYOUT SHALL BE COORDINATED WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST (NGES).
2. CROWN ROADWAY 1/2 INCH PER FOOT.
3. LAY THE CULVERT STRAIGHT AND AS NEARLY AS POSSIBLE ALONG THE EXISTING STREAM BED AND WITH THE INVERTS AT OR SLIGHTLY BELOW BED ELEVATION.
4. CORRUGATED METAL PIPE IS TO BE GALVANIZED STEEL, OR ALUMINIZED STEEL (TYPE 2), WITH BOLTED CONNECTORS.
5. DIAMETERS SHALL BE AS PER THE PROJECT DRAWINGS AND THE SPECIFICATION. THE PIPE GAGE SHALL BE AS FOLLOWS:

DIAMETER (INCHES)	GAGE
12" – 15"	.004"
18" – 24"	.079"
30" – 36"	.109"

6. INSTALLATION OF CULVERTS LARGER THAN 36 INCH DIAMETER SHALL REQUIRE SPECIAL ENGINEERING DESIGN.
7. SELECT SUBGRADE SHALL BE A GRANULAR MATERIAL AS DESCRIBED IN NYSDOT SPECIFICATION ITEM 203–2.02C, OR AS APPROVED BY A NGES.
8. STONE RIPRAP SHALL BE AS DESCRIBED IN NYSDOT SPECIFICATION ITEM 203–2.02D, WITH 8 INCH MAXIMUM SIZE, OR AS APPROVED BY A NGES. EXCEPT WHERE PROTECTED BY STONE, ALL EMBANKMENT SLOPES ARE TO BE STABILIZED, MULCHED AND SEEDED AS PER PROJECT SPECIFICATIONS.
9. OUTLET SHOULD BE CONFIGURED NOT TO CREATE HYDRAULIC JUMP OR PLUNGE POOL.
10. INSTALL EROSION CONTROLS ADJACENT TO THE CULVERT ENDS TO PROTECT THE WATERWAY FROM ROADWAY DEBRIS.

BMP PICTURE



BMP PICTURE



NOTE:

1. PICTURE SHOWS VIEW OF ACCESS WAY STABILIZATION ADJACENT TO A WETLAND.
2. COORDINATE STABILIZATION DESIGN AND PRODUCT WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE




NO ACCESS – WETLAND/STREAM CROSSING MATS REQUIRED







NO ACCESS – A.) PROJECT LIMITS E.G. ROW LIMITS
B.) HISTORICAL/CULTURAL
C.) ENVIRONMENTALLY SENSITIVE E.G. THREATENED & ENDANGERED
D.) OTHER





APPROVED ACCESS

BMP DETAIL

SCALE: NONE

WIRE BACKED SILT FENCE



MUTUAL INDUSTRIES WIRE BACKED SILT FENCE
PART # 1776-14-24
36" X 100'
36" MISF 1776 FABRIC
24" 14GA WIRE MESH
OPENING OF MESH 2" X 4"
FABRIC HOG RINGED EVERY 12"-18" ALONG THE TOP OF THE FENCE

ROLL WEIGHT 40 LBS

32 ROLLS PER PALLET

NOTES:

1. PRODUCT TO BE MUTUAL INDUSTRIES' WIRE BACKED SILT FENCE OR APPROVED EQUAL BY NATIONAL ENVIRONMENTAL SCIENTIST.
2. COORDINATE INSTALLATION METHOD AND LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

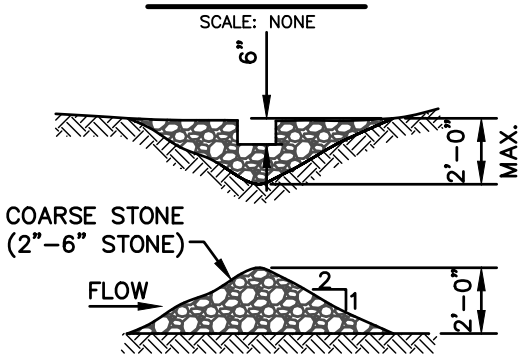
BMP PICTURE



NOTE:

1. PICTURE SHOWS SEDIMENT FILTER WITHIN A WETLAND.

BMP DETAIL



STONE CHECK DAM

NOTES:

1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. THE CENTER OF THE CHECK DAM MUST BE AT LEAST 6" LOWER THAN THE OUTER EDGES.
4. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
5. MAX. SPACING: TOE OF THE UPSTREAM DAM IS SAME ELEVATION AS TOP OF DOWNSTREAM DAM.
6. STONE SHALL BE FREE OF FINE PARTICLES TO PREVENT TURBID DISCHARGES.

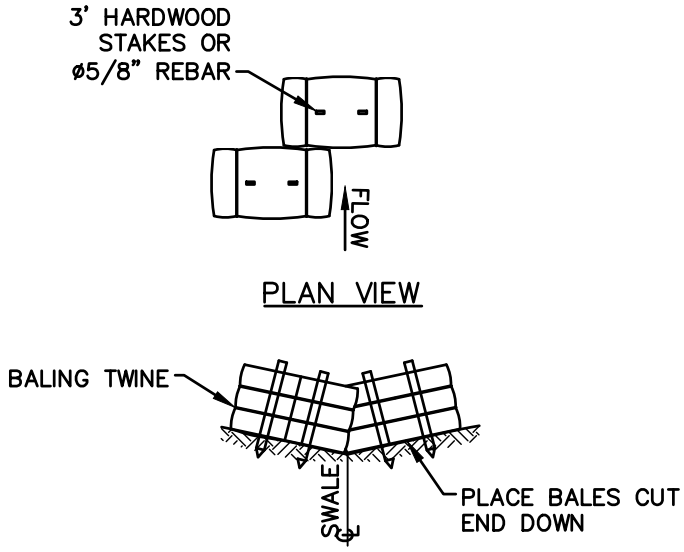
BMP PICTURE



NOTE: A SMALLER STONE SIZE IS SHOWN IN THIS PICTURE.

BMP DETAIL

SCALE: NONE



NOTES:

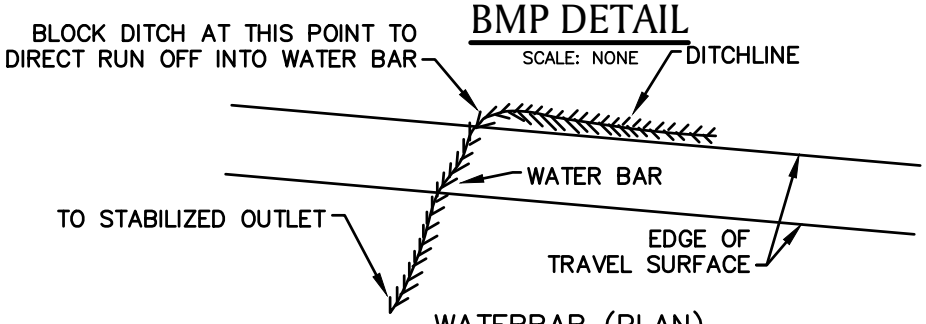
1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

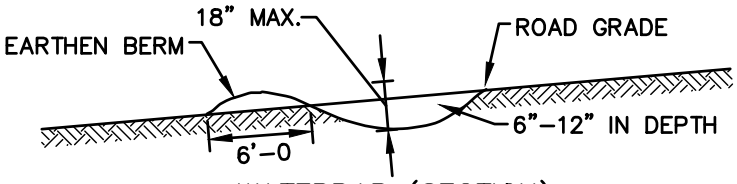


BMP DETAIL

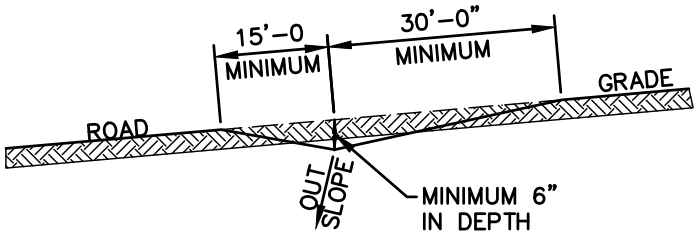
SCALE: NONE



WATERBAR (PLAN)



WATERBAR (SECTION)



DISCHARGE (SECTION)

NOTE:

1. LINE WITH 2"–6" STONE UNDERLAIN BY GEOTEXTILE FILTER FABRIC, KEYED INTO ROAD SURFACE AT LEAST 10 FEET EACH SIDE OF WATERBAR.
2. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

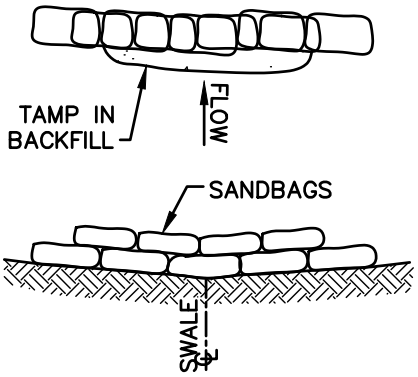
BMP PICTURE





BMP DETAIL

SCALE: NONE



SANDBAG
CHECK DAM

NOTES:

1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



NOTE:

1. PICTURE DOES NOT DEPICT "TAMP IN BACKFILL"

BMP PICTURE

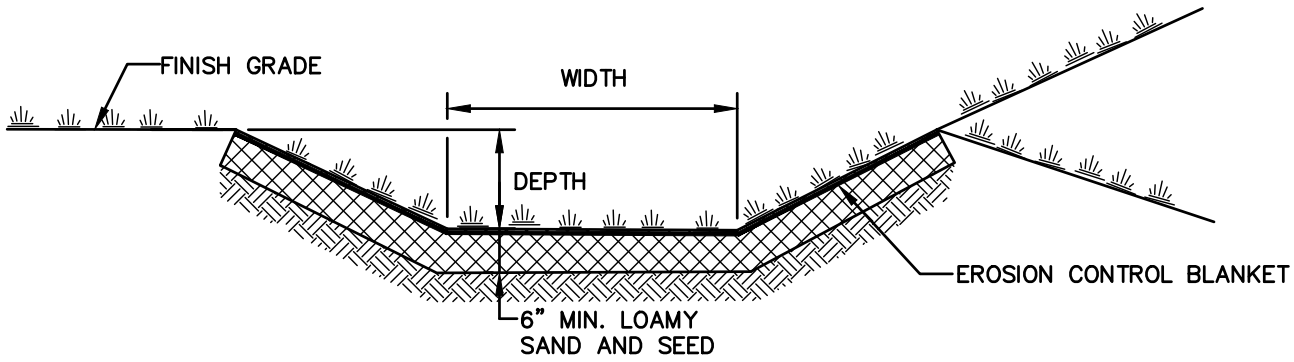


NOTE:

1. EXACT SIZE, LOCATION AND DESIGN IS DEPENDANT ON SITE CONDITIONS, AND LOCAL AND STATE REGULATIONS. COORDINATE THIS BMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.

BMP DETAIL

SCALE: NONE



NOTES:

1. WIDTH AND DEPTH OF SWALE, AND EROSION CONTROL BLANKET TYPE TO BE COORDINATED WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. REFER TO DETAILS SEC–10 AND SEC–11 FOR SEED MIXTURE OPTIONS.

BMP PICTURE

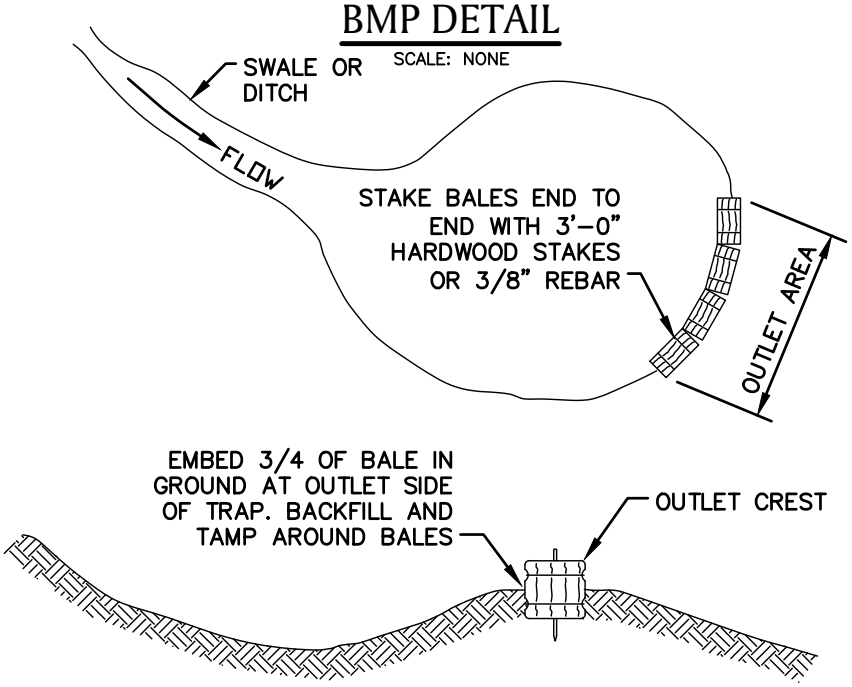


AA-8
DRAINAGE SWALE AND
LINED DITCH

File: Lined_Drainage_Swale.dwg

BMP DETAIL

SCALE: NONE



TYPICAL PROFILE

NOTES

1. SIZE, SHAPE AND PROFILE OF SEDIMENT WILL VARY ACCORDING TO ANTICIPATED FLOW VOLUME AND SURROUNDING TERRAIN AND SHALL BE COORDIANTED WITH THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE BASIN SHALL BE CUT BELOW THE GROUNDLINE. FILL SHALL NOT BE USED TO HOLD WATER UNLESS ROLLED AND COMPACTED.
3. OUTLET AREA IS TO REMAIN FREE OF EXCAVATION SPOILS.
4. OUTLET CREST ELEVATION SHALL BE LOWER THAN INLET ELEVATION AND AT LEAST 1'–0" BELOW THE TOP OF THE BASIN.ARMOUR SLOPES >8% IN OUTLET AREA WITH STONE OF APPROPRIATE SIZE TO PREVENT SCOUR.
5. ARMOUR SLOPES >8% IN OUTLET AREA WITH STONE OF APPROPRIATE SIZE TO PREVENT SCOUR.

BMP PICTURE

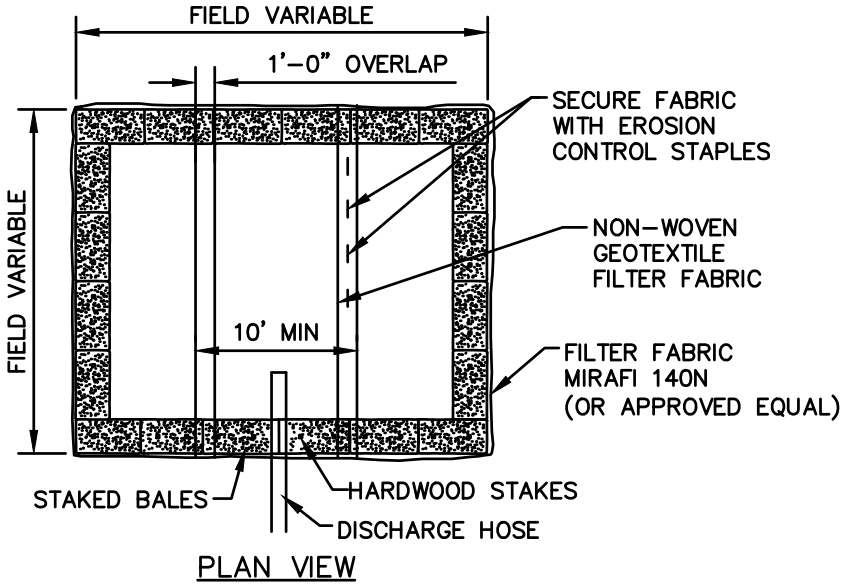


AA-9
SEDIMENTATION BASIN

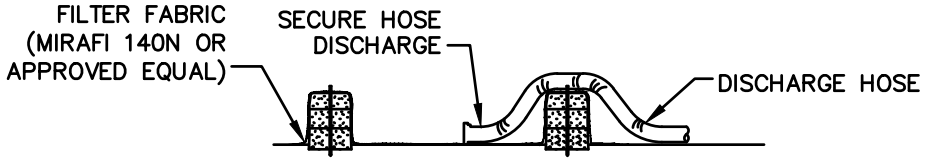
File: Sedimentation_Basin.dwg

BMP DETAIL

SCALE: NONE



PLAN VIEW



CROSS–SECTION

NOTES:

1. NUMBER OF BALES MAY VARY DEPENDING ON SITE CONDITIONS,
2. THE BASIN TO BE SIZED TO PREVENT DISCHARGE WATER FROM OVERTOPPING BASIN.
3. KEEP AS FAR FROM WETLANDS AS PRACTICAL.
4. CLEAN AND REMOVE AS SOON AS DEWATERING IS COMPLETE.

BMP PICTURE



AA-10
DEWATERING BASIN
(SMALL SCALE)

File: Dewat_Bas_Small.dwg

BMP PICTURE

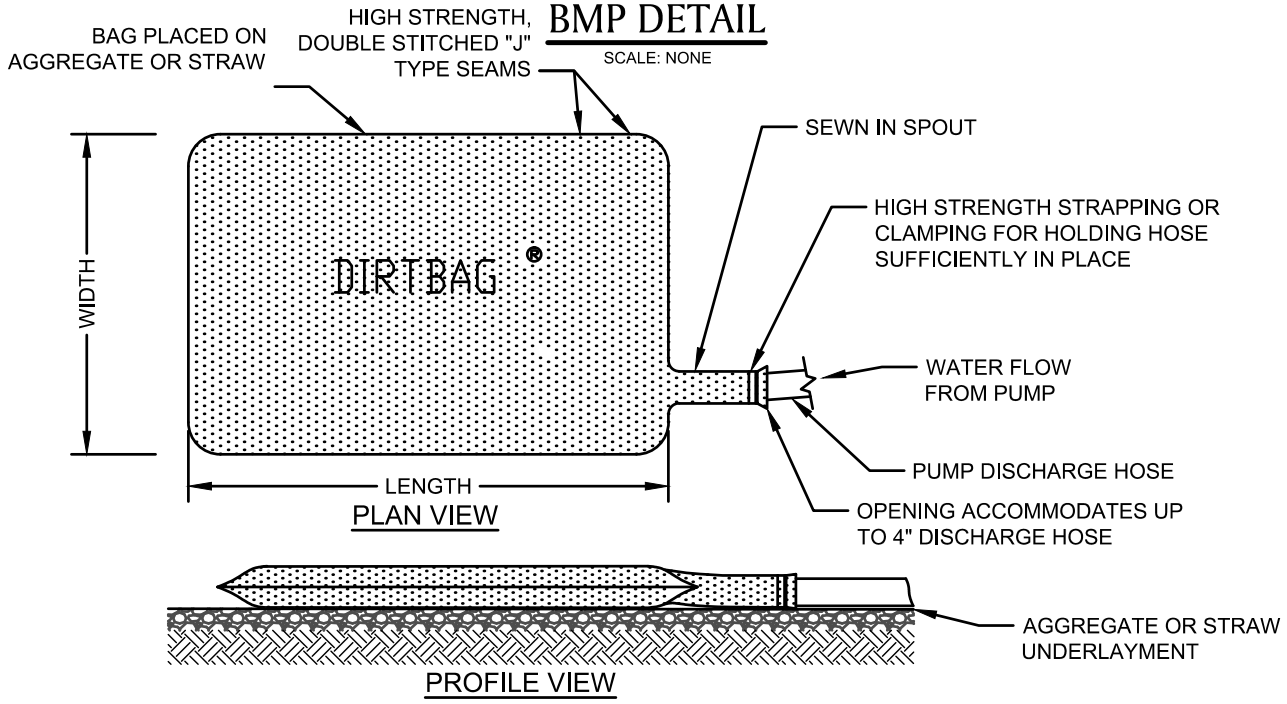


NOTE:

1. EXACT SIZE, LOCATION AND DESIGN IS DEPENDANT ON SITE CONDITIONS, AND LOCAL AND STATE REGULATIONS. COORDINATE THIS BMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.

BMP DETAIL

SCALE: NONE



NOTE:
ONCE PUMPING COMMENCES, THE DIRT BAG SHALL BE MONITORED FREQUENTLY TO ASSURE THAT THE CONNECTIONS ARE SECURELY FASTENED AND THE RATE OF WATER DELIVERY TO THE STRUCTURE IS LOW ENOUGH TO PREVENT UNFILTERED WATER FROM FLOWING FROM THE HOSE CONNECTIONS OR BAG.

BMP PICTURE



* PICTURE AND DETAIL PROVIDED BY ACF ENVIRONMENTAL

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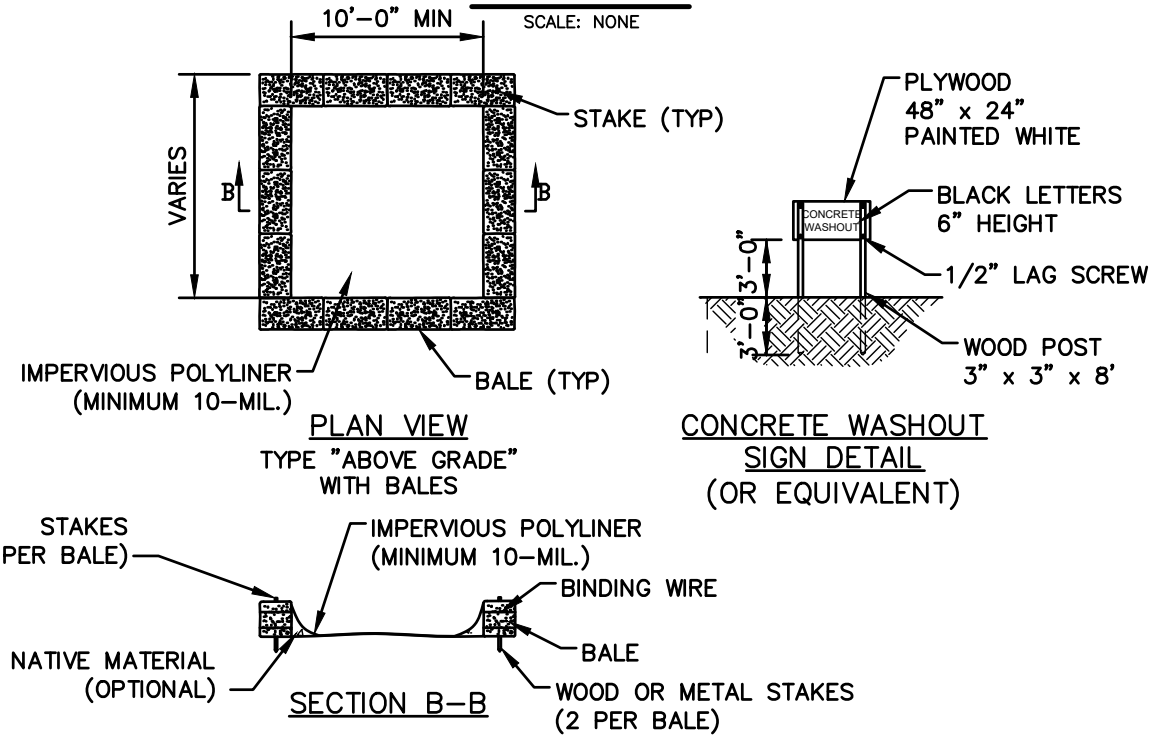
AA-12
DIRTBAG *

File: Dirtbag.dwg

BMP DETAIL



NOTES:

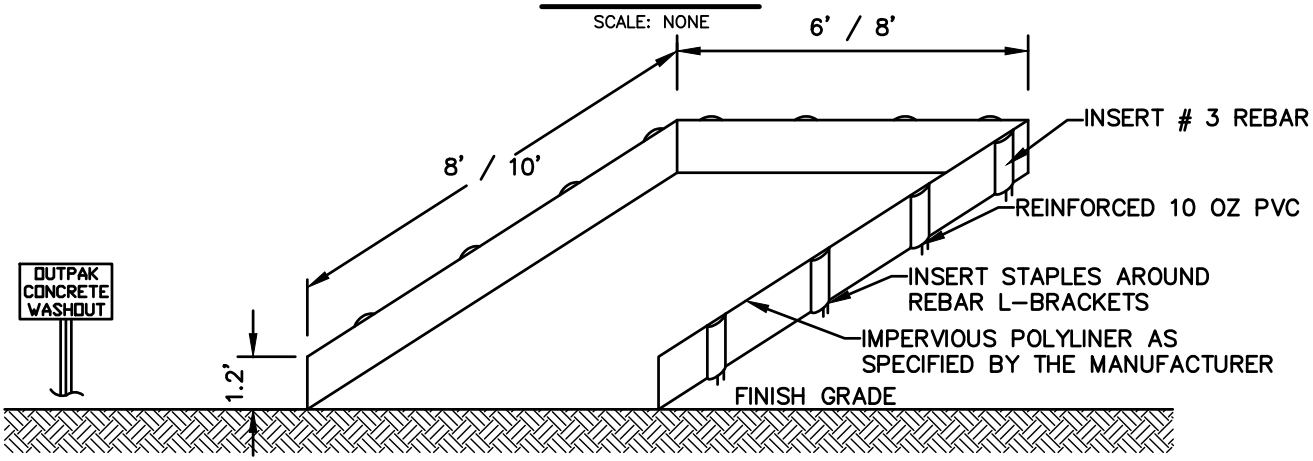
1. NUMBER OF BALES MAY VARY DEPENDING ON SITE CONDITIONS. COORDINATE SIZE AND LOCATION OF CONCRETE WASTE SUMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. KEEP AS FAR FROM DRAINAGE CHANNELS AND WETLAND AREAS AS PRACTICAL.
3. SUMPS TO BE CLEANED AND WASTE CONCRETE REMOVED AND PROPERLY DISPOSED OF UPON COMPLETION OF WORK.
4. SEE ADDITIONAL NOTES ON DETAIL AA–14.

BMP PICTURE



BMP DETAIL

SCALE: NONE



CROSS SECTION

NOTES:

1. PRODUCT TO BE OUTPAK PVC CONCRETE WASHOUT OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT.
3. SIGNS SHALL BE PLACED AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT.
4. THE CONCRETE WASHOUT AREA WILL BE REPLACED AS NECESSARY TO MAINTAIN CAPACITY FOR WASTE CONCRETE AND OTHER LIQUID WASTE.
5. WASHOUT RESIDUE SHALL BE REMOVED FROM THE SITE AND DISPENSED OF AT AN APPROVED WASTE SITE.
6. DO NOT MIX EXCESS AMOUNTS OF FRESH CONCRETE OR CEMENT ON-SITE.
7. DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS.
8. AVOID DUMPING EXCESS CONCRETE IN NON-DESIGNATED DUMPING AREAS.
9. LOCATE WASHOUT AREA AT LEAST 50' FROM STORM DRAIN, OPEN DITCHES, OR WATERBODIES. COORDINATE LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
10. WASH OUT WASTES INTO THE OUTPAK WASHOUT WHERE THE CONCRETE CAN SET, BE BROKEN UP, AND THEN DISPOSED OF PROPERLY.
11. A SECURE, NON-COLLAPSING, NON-WATER COLLECTING COVER MUST BE PLACED OVER CONCRETE WASHOUT PRIOR TO PREDICTED WET WEATHER TO PREVENT ACCUMULATION AND OVERFLOW OF PRECIPITATION.

BMP PICTURE



*** PICTURE AND DETAIL PROVIDED BY OUTPAK WASHOUT**

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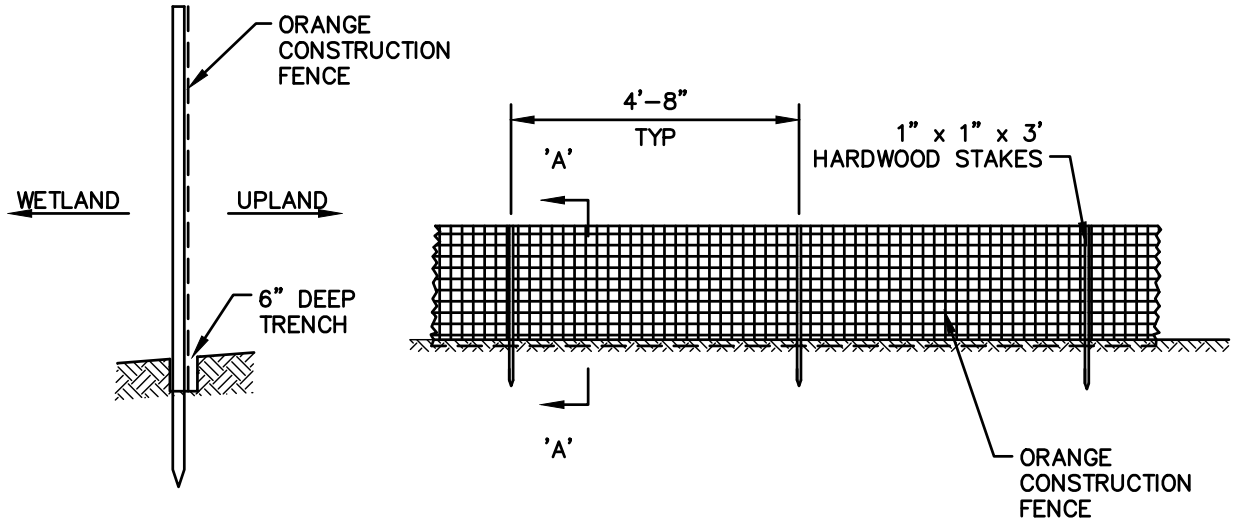
AA-14

OUTPAK CONCRETE WASHOUT *

File: Outpak_Washout.dwg

BMP DETAIL

SCALE: NONE



SECTION A-A

BMP PICTURE



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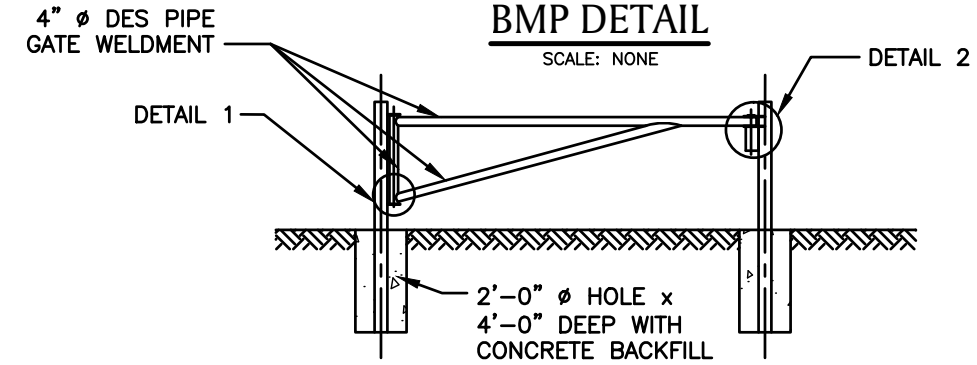
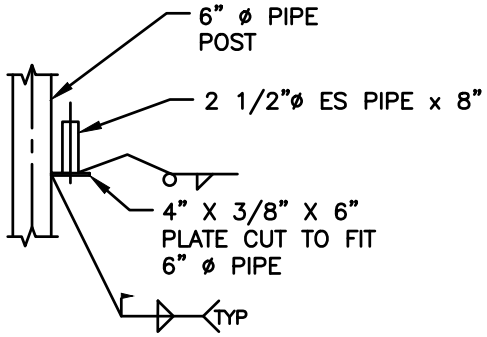
AA-15
BARRIER FENCE
(CONSTRUCTION FENCE)

File: Barrier_Fence.dwg

BMP DETAIL

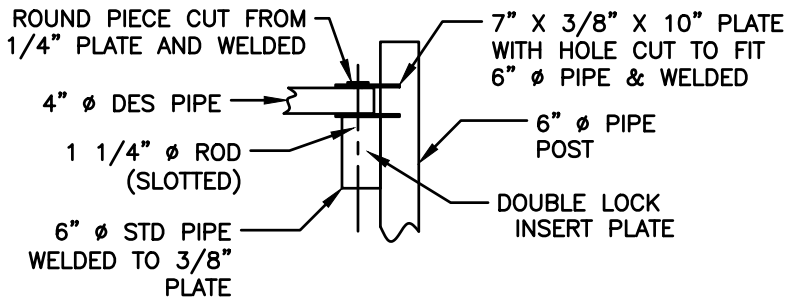
SCALE: NONE





DETAIL 1

SIMILAR DETAIL AT TOP



DETAIL 2

NOTES:

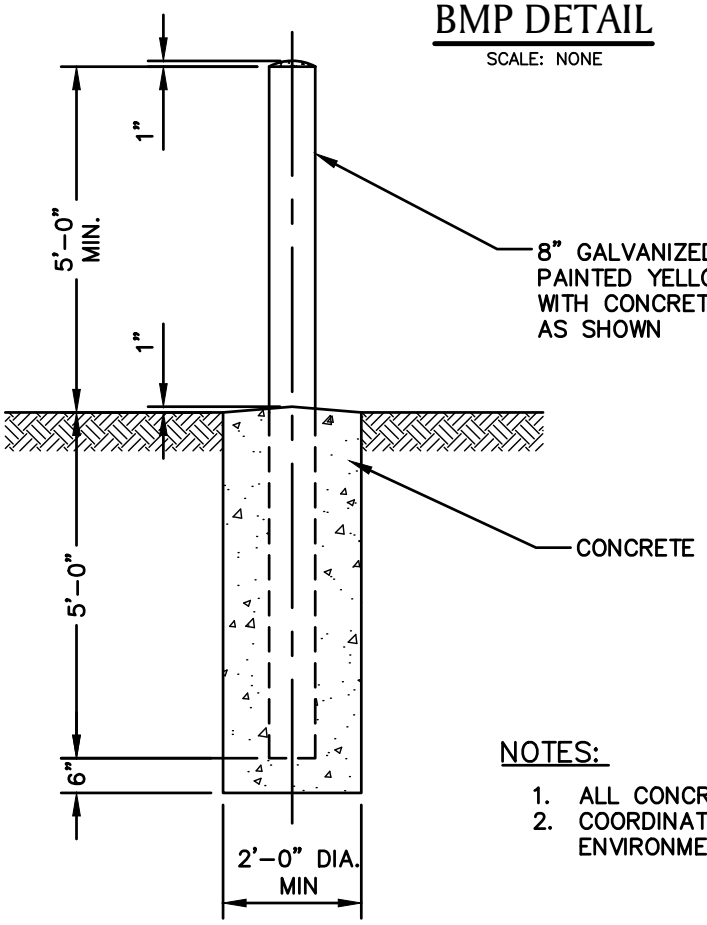
1. ALL GATE STEEL PIPES SHALL BE IN ACCORDANCE WITH ASTM A–501, PLATES SHALL BE ASTM A–36.
2. ALL STEEL PIPES SHALL BE PRIMED WITH ZINC–CHROMATE PRIMER AND FINISHED WITH AN APPROVED OSHA "SAFETY YELLOW" TOP COAT COMPATIBLE WITH THE PRIMER AND FOR EXTERIOR EXPOSURE.
3. REFLECTORS SHALL BE SPACED AT 3 FEET ALONG THE LENGTH OF THE CROSSBAR AND BRACE
4. BACKFILL AT POSTS TO BE COMPACTED.

BMP PICTURE



BMP DETAIL

SCALE: NONE



NOTES:

1. ALL CONCRETE TO BE 2500 P.S.I. MINIMUM.
2. COORDINATE LOCATIONS WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



BMP



Definition

The control of dust resulting from land-disturbing activities.

Purpose

To prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

Design Criteria

Construction operations should be scheduled to minimize the amount of area disturbed at one time. Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria is given; see construction specifications below for common methods of dust control.

Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the local permitting authority.

Construction Specifications

A. Non-driving Areas – These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

Mulch (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

Spray adhesives – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B. Driving Areas – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access routes.

Polymer Additives – These polymers are mixed with water and applied to the driving surface by a water truck with a gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

Barriers – Woven geotextiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

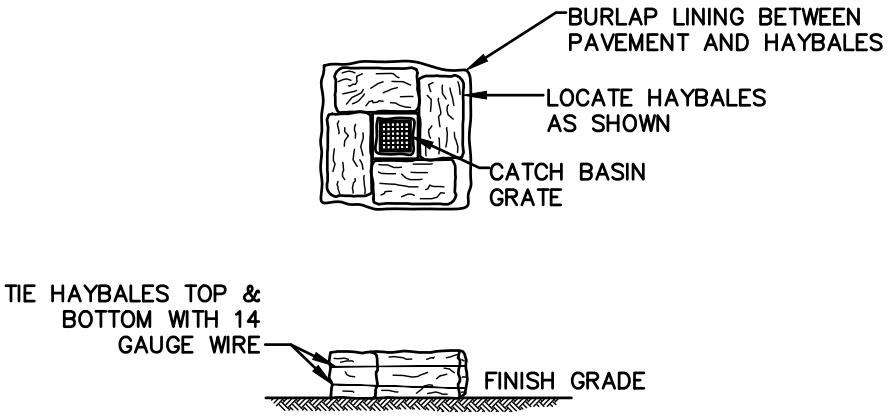
* BMP INFORMATION FROM "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (AUGUST, 2005)." INFORMATION OBTAINED VIA WEBSITE: http://www.dec.ny.gov/chemical/29066.html

AA-18
DUST CONTROL (FROM NY) *

File: Dust_Control.dwg

BMP DETAIL

SCALE: NONE



NOTES:

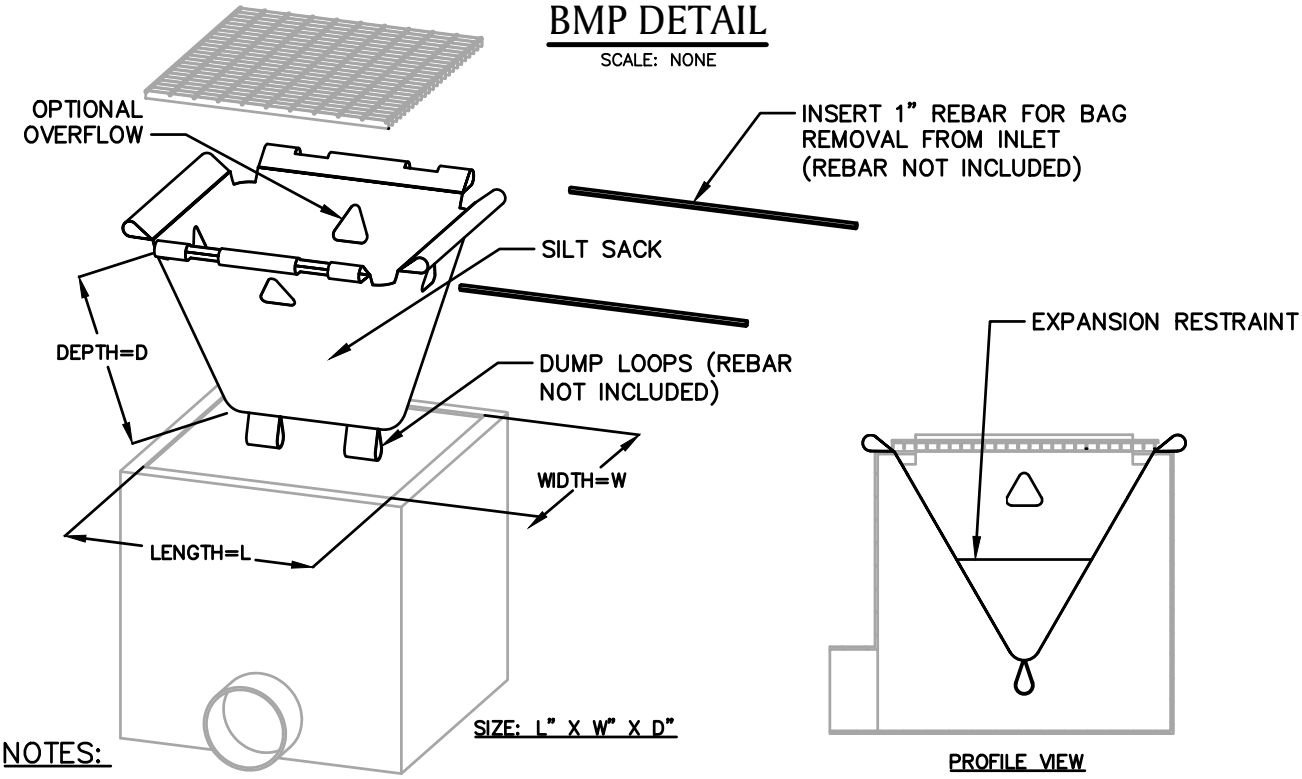
1. SURROUND STREET DRAINAGE STRUCTURE INLET WITH HAY BALES PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED. ACCUMULATED SEDIMENTS SHALL BE REMOVED.
2. HAYBALES PLACED ON PAVEMENT SHALL HAVE BURLAP PLACED BETWEEN PAVEMENT AND HAYBALE

BMP PICTURE



BMP DETAIL

SCALE: NONE



NOTES:

1. PRODUCT TO BE SILT SACK OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE USE OF A SILT SACK OPTIONAL OVERFLOW AND OVERALL DIMENSIONS ARE TO BE COORDINATED WITH A NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



*** DETAIL PROVIDED BY ACF ENVIRONMENTAL**

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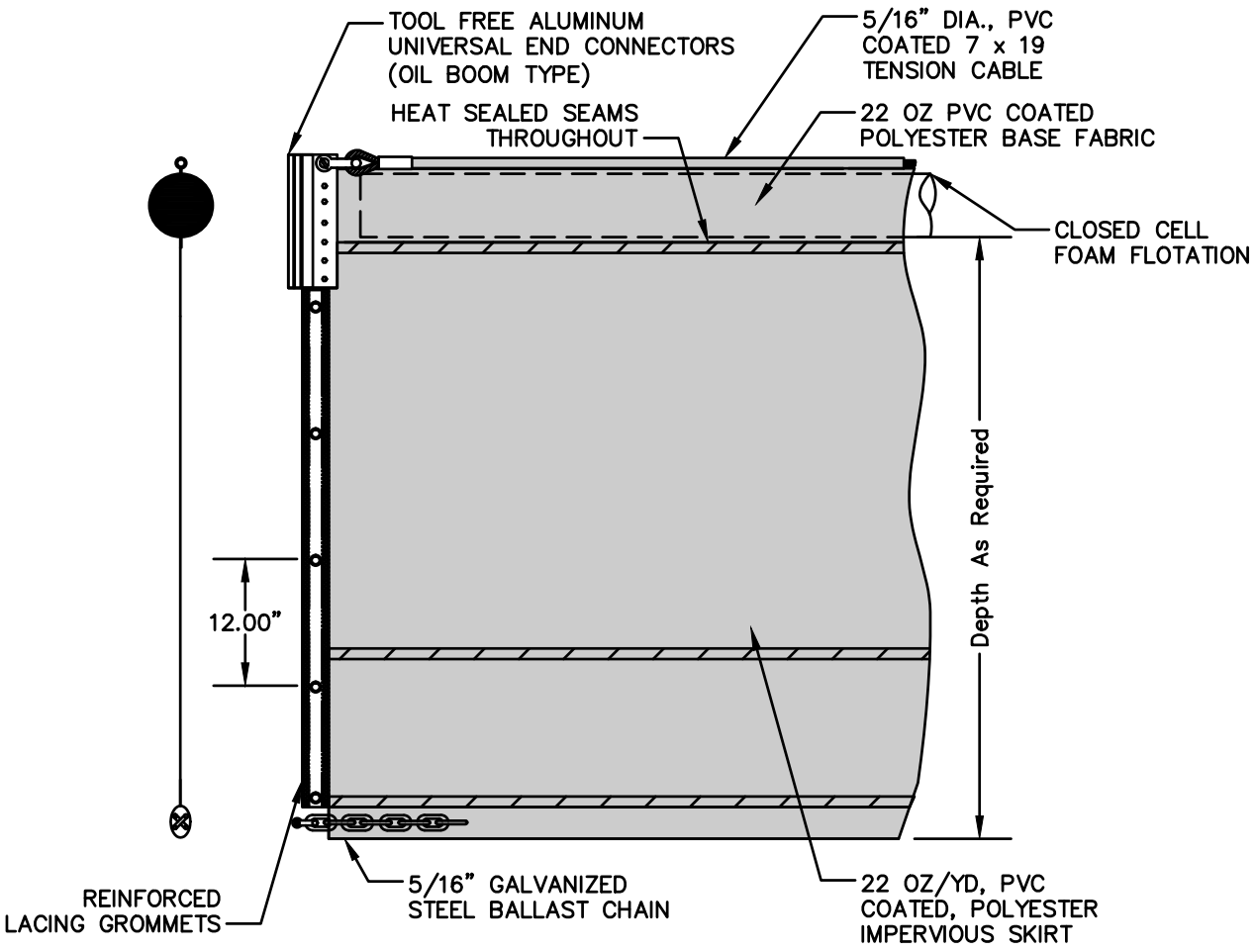
AA-20
SILT SACK *

File: SILT SACK.dwg

BMP DETAIL

SCALE: NONE



BMP PICTURE



*** DETAIL PROVIDED BY BROCKTON EQUIPMENT / SPILLDAM INC.**
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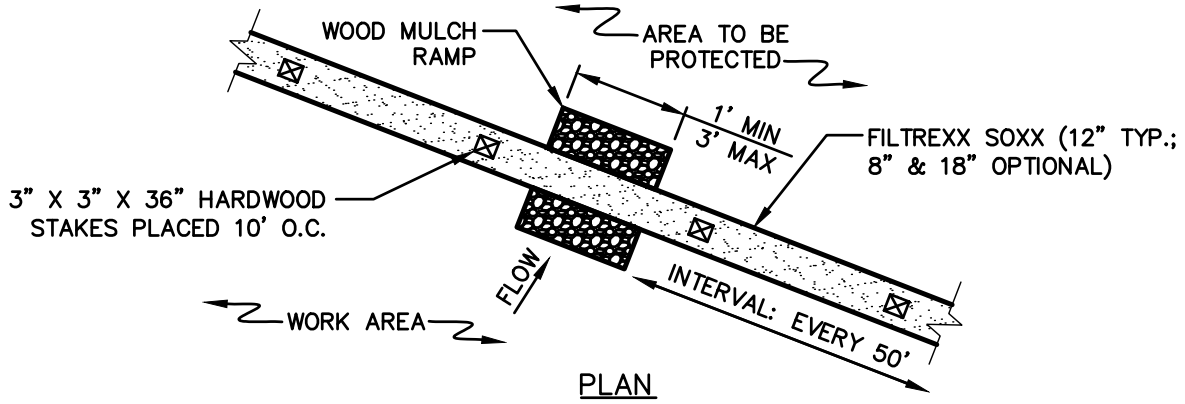
AA-21
TURBIDITY CURTAIN *

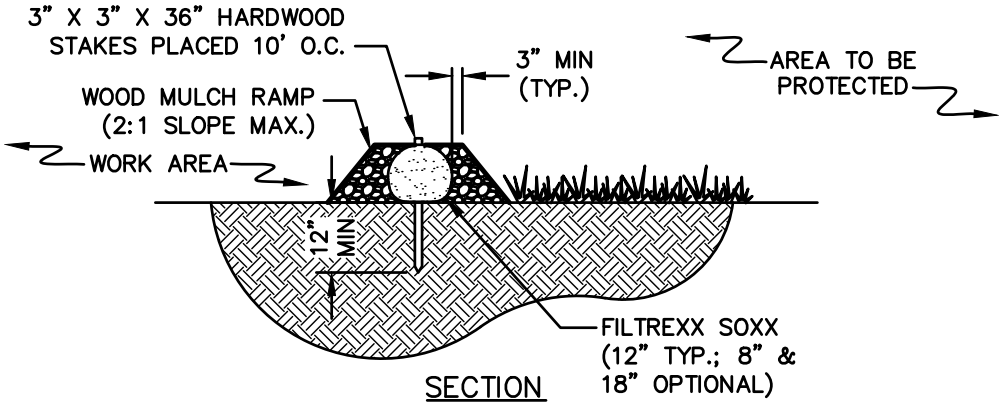
File: Turbidity_Curtain.dwg

BMP DETAIL

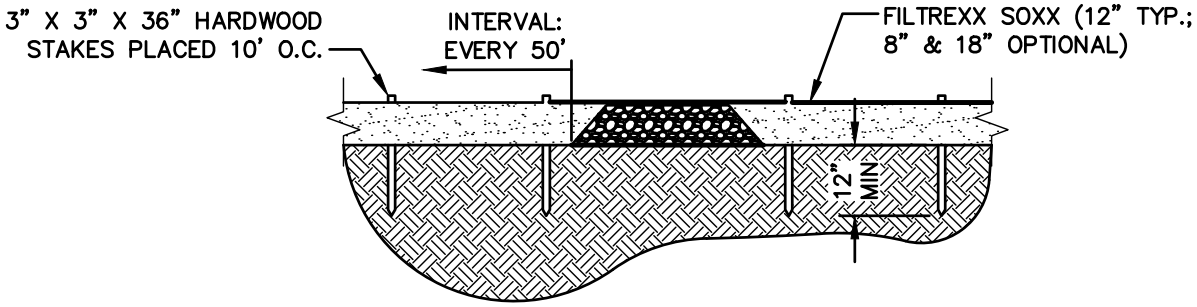
SCALE: NONE



PLAN



SECTION



PROFILE

NOTES

1. PRODUCT TO BE FILTREXX SILT SOXX OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
4. NON-MONOFILAMENT CONTAINMENT MATERIAL SHOULD BE KNITTED PHOTODEGRADABLE OR BIODEGRADABLE MATERIAL, WITH OPENING SIZES BETWEEN 1/8" – 1/4".
5. COMPOST MEDIA SHOULD HAVE PARTICLE SIZE WHERE 99% < 2", 50% > 1/2".
6. COMPOST MATERIAL TO BE DISPOSED OF ON-SITE, OR IN ACCORDANCE WITH ENVIRONMENTAL PERMITS AS APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
7. WOOD MULCH RAMP IS OPTIONAL DEPENDING ON SUBSTRATE/SITE CONDITIONS, AND TO BE APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP # AA-22
SILTSOXX AMPHIBIAN & REPTILE CROSSING #1 (1 OF 2)

File: Alternate_Mulch_Ramp_Siltsoxx.dwg

BMP PICTURE



SALAMANDER AND SNAKE CROSSING #1

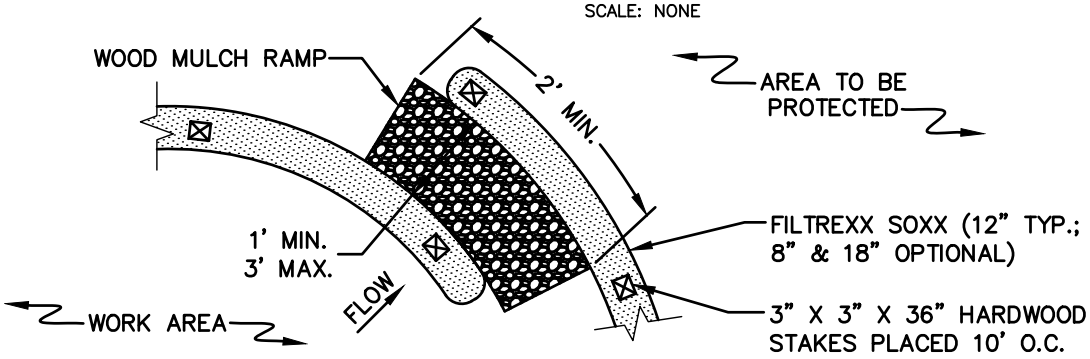
ALTERNATE WOOD MULCH RAMP SILTSOXX NOTES:

1. SILTSOXX, BY FILTREX INTERNATIONAL, OR APPROVED EQUAL PRODUCT SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.

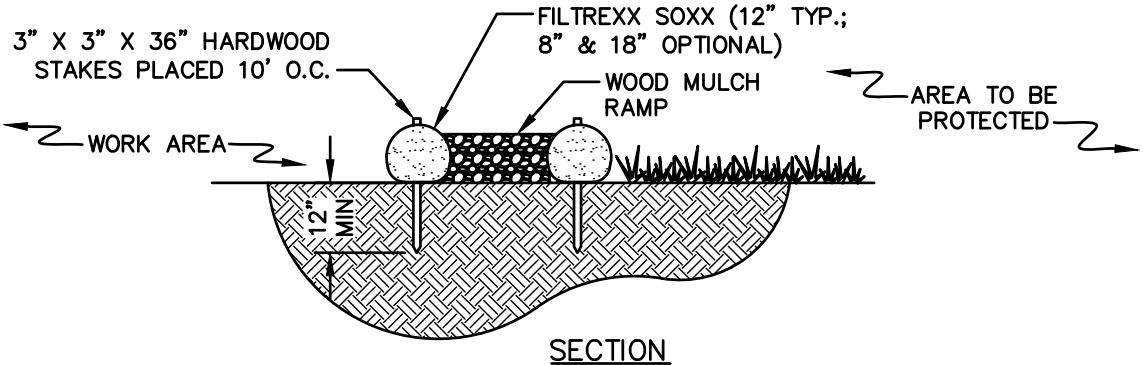
2. BMP SHOULD ONLY BE UTILIZED IN AREAS WHERE RARE SALAMANDER AND SNAKE HABITAT OCCURS, OR AT THE DIRECTION OF THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP DETAIL

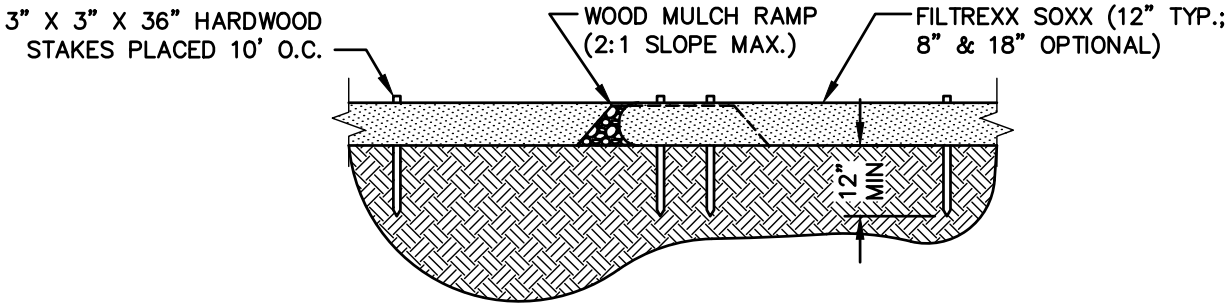
SCALE: NONE



PLAN



SECTION



PROFILE

NOTES

1. PRODUCT TO BE FILTREXX SILT SOXX OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
4. NON-MONOFILAMENT CONTAINMENT MATERIAL SHOULD BE KNITTED PHOTODEGRADABLE OR BIODEGRADABLE MATERIAL, WITH OPENING SIZES BETWEEN 1/8" – 1/4".
5. COMPOST MEDIA SHOULD HAVE PARTICLE SIZE WHERE 99% < 2", 50% > 1/2".
6. COMPOST MATERIAL TO BE DISPOSED OF ON-SITE, OR IN ACCORDANCE WITH ENVIRONMENTAL PERMITS AS APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
7. WOOD MULCH RAMP IS OPTIONAL DEPENDING ON SUBSTRATE/SITE CONDITIONS, AND TO BE APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
8. GAPS TO BE SPACED EVERY 50 FT, IF POSSIBLE GIVEN WETLAND PERMIT CONDITIONS.

BMP # AA-23
SILTSOXX AMPHIBIAN & REPTILE CROSSING #2 (1 OF 2)

File: Alternate_Siltsoxx.dwg

BMP PICTURE



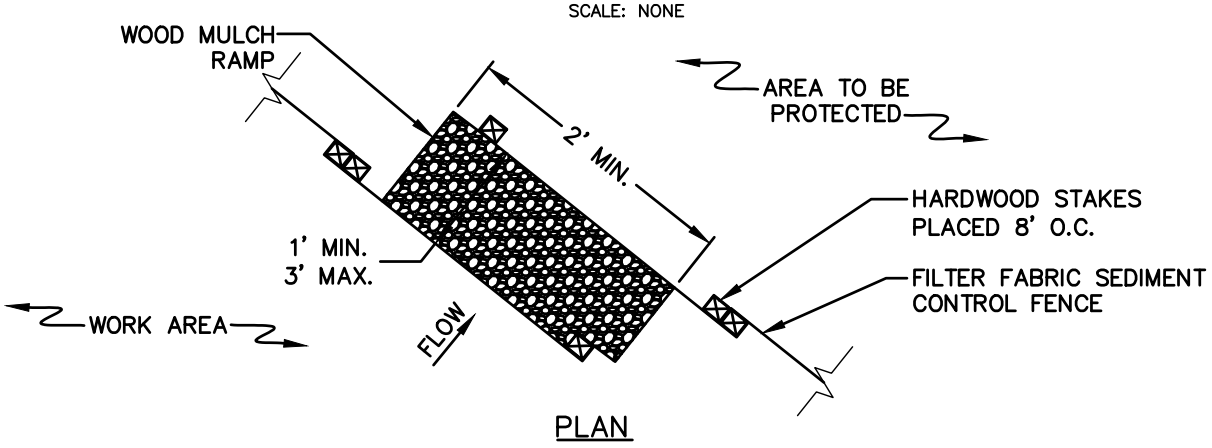
SILTSOXX AMPHIBIAN & REPTILE CROSSING #2

ALTERNATE WOOD MULCH RAMP SILTSOXX NOTES:

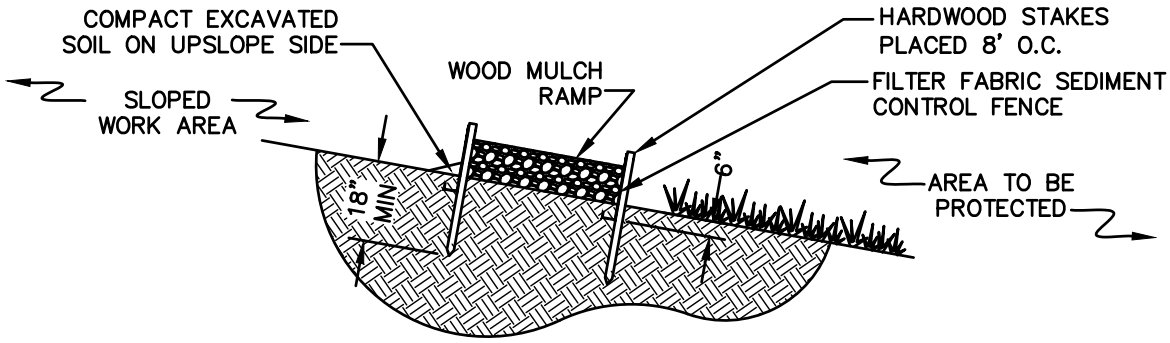
1. SILTSOXX, BY FILTREX INTERNATIONAL, OR APPROVED EQUAL PRODUCT SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.
2. BMP SHOULD ONLY BE UTILIZED IN AREAS WHERE RARE SALAMANDER AND SNAKE HABITAT OCCURS OR AT THE DIRECTION OF THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP DETAIL

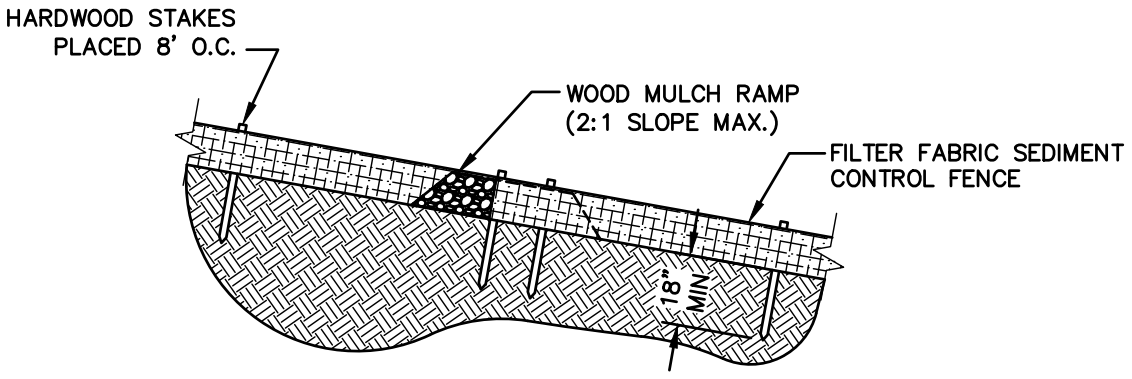
SCALE: NONE



PLAN



SECTION



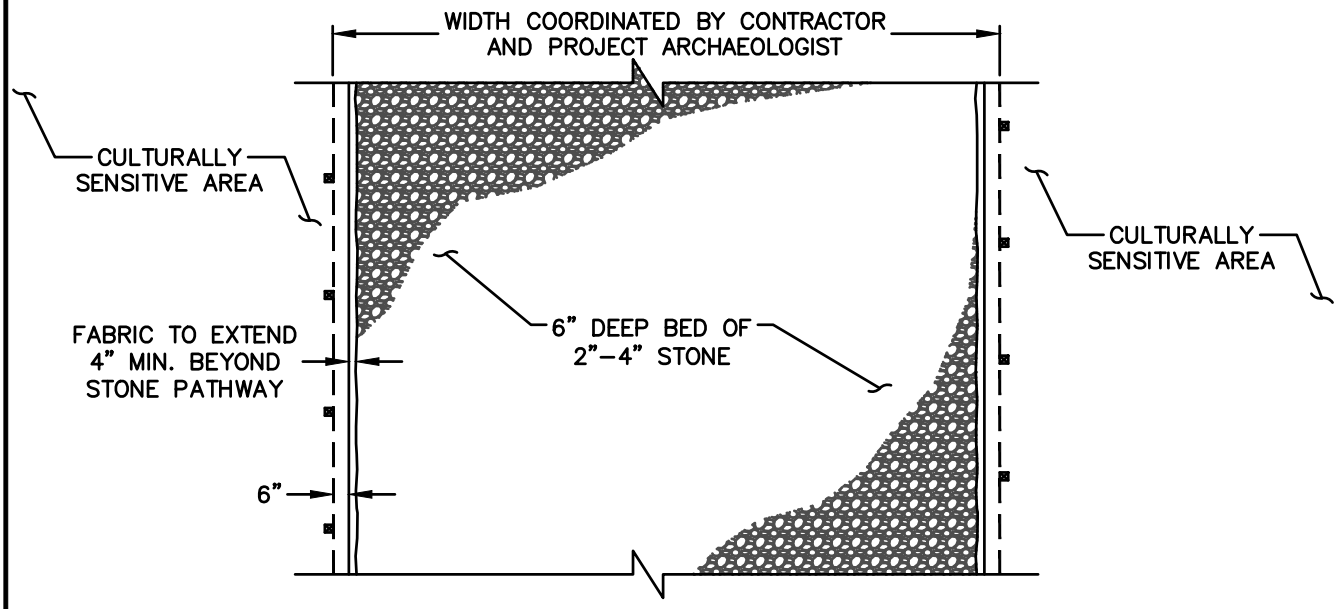
PROFILE

NOTES

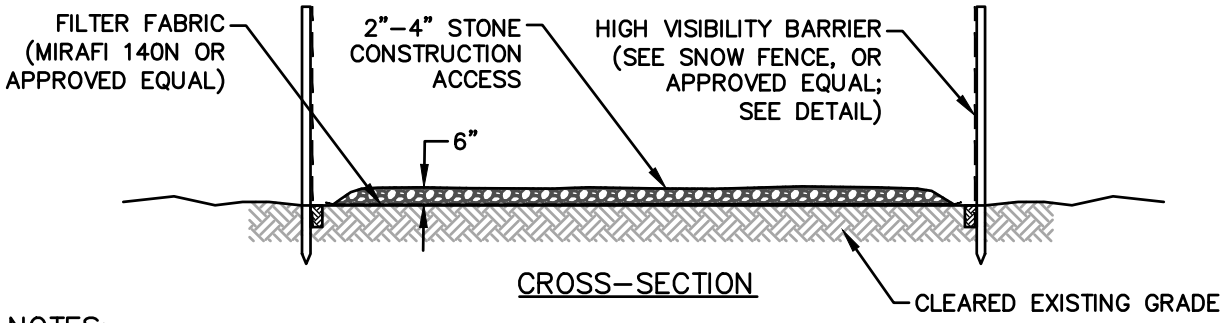
1. IN AREAS WHERE SLOPES OR RUN-OFF VOLUME PROHIBIT USE OF SILTSOXX, CROSSINGS CAN BE PROVIDED THROUGH TRENCHED SILT FENCE.
2. INTALL SILT FENCE TO SPECIFICATIONS IN EG303 APPENDIX 7 "SEC-2 SEDIMENT CONTROL FENCE."
3. WOOD MULCH RAMP IS OPTIONAL DEPENDING ON SUBSTRATE/SITE CONDITIONS, AND TO BE APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
4. GAPS TO BE SPACED EVERY 50 FT, IF POSSIBLE GIVEN WETLAND PERMIT CONDITIONS.

BMP DETAIL

SCALE: NONE



PLAN VIEW



CROSS–SECTION

NOTES:

1. ARCHAEOLOGICAL SITE BOUNDARIES, AS DEFINED BY INTENSIVE ARCHAEOLOGICAL SURVEY AND SITE AVOIDANCE AND PROTECTION PLANS, WILL BE DEMARCATED BY STAKING BY THE PROJECT ARCHAEOLOGIST.
2. GEOTEXTILE AND STONE MAY REMAIN IN PLACE FOLLOWING CONSTRUCTION IF PERMANENT PROTECTION IS NECESSARY AND DEPENDENT ON EASEMENT RIGHTS.
3. WHERE APPROVED BY THE PROJECT–SPECIFIC SAPP, CONSTRUCTION MATTING MAY BE ADDED OVER, OR IN PLACE OF, THE FABRIC AND STONE.
4. INSTALLATION AND REMOVAL OF FABRIC AND STONE, EROSION CONTROLS, AND/OR CONSTRUCTION MATTING WILL BE MONITORED BY THE PROJECT ARCHAEOLOGIST AT EACH LOCATION(S).
5. INSTALLATION OF THESE MEASURES WILL BE CONDUCTED WITH LOW–GROUND PRESSURE VEHICLES WHERE FEASIBLE.
6. WHERE REQUIRED BY THE PROJECT–SPECIFIC SAPP, TEMPORARY, HIGH VISIBILITY PROTECTIVE FENCING (E.G., SNOW FENCE OR PLASTIC FENCE) WILL BE ERECTED ALONG THE SITE BOUNDARIES OUTSIDE OF THE WORKSPACE WITHIN THE ROW IN ORDER TO PREVENT VEHICLES FROM TRAVELING THROUGH THOSE SITE AREAS DURING CONSTRUCTION. THE PROTECTIVE FENCE WILL BE POSTED WITH "NO TRESPASSING" SIGNS, SO THAT THE SITES CAN BE AVOIDED BY ALL CONSTRUCTION RELATED ACTIVITIES. THE FENCING WILL BE REMOVED UPON COMPLETION OF THE PROJECT. THE INSTALLATION AND REMOVAL OF FENCING WILL BE MONITORED BY THE PROJECT ARCHAEOLOGIST.

BMP PICTURES





APPENDIX 8
CERTIFICATION FORM FOR INVASIVE SPECIES CONTROL

Certain permit conditions, therefore a Condition of Contracts for the Prime Contractor, any Subcontractors, and any equipment or mat vendors for ***National Grid Projects*** shall be required to Certify their equipment[9] {each piece of equipment used on site} as 'clean'[10].

_____ (*name of firm*) hereby Certifies that

_____ (*make, model, and/or type*)

_____ (*equipment ID tag or #)* meets the following

1. before entry on to the job site, has been sufficiently cleaned to remove all accumulated mud, debris, plant fragments, and detritus that could harbor seeds, roots, or plant fragments of so-called invasive plant species; and

2. that the above piece of equipment has neither been off-loaded nor operated in the interval between cleaning and delivery to the jobsite.

3. that equipment deployed in areas of invasive species (as identified in project plans) shall be cleaned prior to redeployment

_____ (*signed*) _____ (*dated*)

_____ (*printed name*) _____ (*title*)

_____ (*Firm*)

The signed original of this form {one for each piece of equipment (or lot[11] of mats)} is to be given to the NG Field Construction Coordinator assigned to the project.

[9] Equipment may include, but <u>is not</u> limited to bulldozers, excavators, backhoes, bucket trucks (tracked or wheeled), pulling equipment, concrete trucks, compressors, drilling equipment, and mats (composite, wood, or other materials).

[10] With regard to invasive species, the definition of clean means free of accumulated mud, debris, plant fragments, and detritus that could harbor seeds, roots, or plant fragments of so-called invasive plant species.

[11] Lot of mats is the number of mats that may be transported by one forwarder/truck at a time.

Record of Change		
Date of Review/Revision:		
Revision	**Date**	**Description**
0	1/23/12	Issued New England Specific EG-303 NE
1	04/22/13	Stone wall dismantling edits.
2	1/23/14	added bmp # 39, edited text on p40 to reference form1 and form2
3	08/29/14	Added section on communication of project specific environmental requirements (2.5), added appendices for EFI, simplified EFI, and STORMS boilerplate language. Added language concerning removal of BMPs (18.1). Minor edits to BMP details, and renumbered appendices. Added construction mat transition, mat air bridge and silt sack BMP details.
4	2/5/15	Adding additional language about signage and demarcation of rare species populations and historic resources.
5	07/01/2015	Revised construction entrances/exits (5.2) per R170 audit findings.
6	09/28/2015	Added 4.1 (Refreshing of wetland flagging), revised 9.7 (stockpiling on mats), added 18.0 (stabilization deadlines) revised 19.2 (in-situ restoration), and edited BMP details (straw wattle, seeding options), added rock ford detail.
7	10/03/16	Added text to 2.5 for Simplified EFI (documentation of environmental resources present on projects where no permitting required).
8	10/21/2016	Amended Sections 9.1 and 9.4, adding guidance on dust, noise and vibration control requirements.
9	05/31/2017	Amended 4.2 & 5.3 for rare species considerations in MA, and edited 4.5 for overnight dewatering provisions.

10	04/03/2018	Amended text to change “swamp mats” to “construction mats, ” added summary table of USACOE GP low PSI requirements, and added new BMP details in Appendix 7.

APPENDIX D EVERSOURCE CONSTRUCTION & MAINTENANCE ENVIRONMENTAL REQUIREMENTS



Tighe&Bond

Construction & Maintenance
Environmental Requirements

Best Management Practices Manual for Massachusetts and Connecticut

Prepared For:

Eversource Energy Environmental Licensing and Permitting Group
107 Selden Street
Berlin, CT

September 2016

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Appendix A Sediment and Erosion Controls

Appendix B Applicable Regulations in Connecticut

Appendix C Applicable Regulations in Massachusetts

Appendix D Example Frac-Out Plan

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Table TOC-1
Best Management Practices Summary Table

	Area/Activity	Applicable BMPs	Tab	Tab Section
CONSTRUCTION	Upland	Construction Entrance Track Pad	1	A
	`	Stormwater Management BMPs (includes temporary water bars, drainage swales, and sedimentation basins)		B
	Wetland	Construction mats	2	A
		Permeable Road		B
	Watercourse Crossings	Without bridged crossings	3	A
		Bridged crossings		B
		Culverts		C
		Poled fords		D
	De-Energized	Construction mat workpads, including construction mats and lightweight mats	4	A
	Energized	Construction mat workpads		B
SOIL STOCKPILE MANAGEMENT	All	Soil Stockpile Management	5	A

Table TOC-2

Appendix A: Erosion/ Sedimentation and Water Control Summary Table

Type	Applicable Control	Location
EROSION/ SEDIMENTATION CONTROLS	Preservation of Existing Vegetation	
	Topsoil Segregation for Work in Wetlands and Agricultural Areas	
	Straw (or Hay) Bales*	Section I
	Silt Fence	
	Syncopated Silt Fence	
	Erosion Control Blankets	
	Straw/Compost Wattles	
	Wood Chip Bags	
	Catch Basin Protection	
	Loaming and Seeding	
	Mulching with Hay/Straw/Woodchips	
	Coir Log Use for Bank Stabilization	
	Level Spreader	
	Check Dams	
	Temporary and Permanent Diversions	
	Temporary and Permanent Trench Breaker	
WATER CONTROL	Dewatering Activities	
	- Overland Flow	
	- Frac Tank	
	- Filter Bags and Hay Bale Containment	
	- Discharge Hose Filter Socks	Section II
	Coffer Dam and Stream Bypass via Pumping	
	Coffer Dam and Stream Bypass via Gravity	
	Silt Barriers	

***** Straw bales preferred in wetlands, if allowed by permit, and hay bales in uplands

TABLE TOC-3
List of Acronyms

Acronym	Definition
ATV	All-Terrain Vehicle
BMP	Best Management Practices
ConnDOT	Connecticut Department of Transportation
ACOE	United States Army Corps of Engineers
CT	Connecticut
CTDEEP	Connecticut Department of Energy and Environmental Projection
EBT	Eastern Box Turtle
EPA	United States Environmental Protection Agency
Eversource	Eversource Energy
EL&P	Environmental Licensing and Permitting
FEMA	Federal Emergency Management Agency
HDD	Horizontal Directional Drilling
LGP	Low Ground Pressure
MA	Massachusetts
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassWPA	Massachusetts Wetlands Protection Act
NDDB	Connecticut Natural Diversity Database
NHESP	Massachusetts Natural Heritage Endangered Species Program
OLISP	Office of Long Island Sound Programs
ORV	Off-Road Vehicle
PSI	Pounds per square inch
RIM	Record Information Management System
ROW	Right of Way
TOC	Table of Contents

Section 1
Introduction

1.1 Purpose

As a matter of Eversource Energy (Eversource) policy regarding environmental stewardship and in accordance with local, state, and federal regulations, all construction and maintenance projects shall use environmentally sound best management practices (BMPs) to minimize or eliminate environmental impacts that may result from construction activities. Regardless of whether a specific permit is needed for the work, construction and maintenance projects must follow internal environmental performance standards, which is the purpose of these BMPs. In many cases, maintenance activities are exempt from regulatory authorization. Permits are usually required for new work. Contractors will be provided with copies of any project specific permits, and will be required to adhere to any and all conditions of the permit(s). Permit conditions that are more detailed than the BMPs outlined in this manual shall always be given priority. However, where certain construction elements are not addressed by permit conditions, or where permitting is not required, or for emergency situations where obtaining a permit before the work occurs may not be an option, these BMPs shall be considered as Eversource's standards. In some cases, and at the discretion of the Eversource Management, the BMPs presented herein may be modified to be more appropriate for site-specific conditions.

1.2 Scope and Applicability

These BMPs primarily address the disturbance of soil, water, and vegetation incidental to construction within on- and off-road utility corridors, substations, including the establishment of access roads and work areas, within rights of way (ROWs) and on private property, in and near wetlands, watercourses, or other sensitive natural areas (such as protected species), including storm drain systems (e.g., catchbasins). Types of construction include, but are not limited to, installation or maintenance of underground and overhead utilities, access road repair/improvement or installation, and upgrades or maintenance of substations and other facilities. Other common construction issues such as noise, air pollution, oil spill procedures, handling of contaminated soils, and work safety rules are addressed in the Eversource Energy Contractor Work Rules and related appendices.

1.3 Definitions

The following definitions are provided to clarify use of common terms throughout this document.

Best Management Practice (BMP): A means to reduce and minimize impact to natural resources.

Casing: A galvanized steel corrugated pipe that serves as the form for a utility structure foundation.

Emergency Projects: Actions needed to maintain the operational integrity of the system or activities necessary to restore the system and affected facilities in response to a sudden and unexpected loss of electric or gas service or events that affect public health and safety.

Embedded Culvert: A culvert that is installed in such a way that the bottom of the structure is below the stream bed and there is substrate in the culvert.

Environmentally Sensitive Areas: An area containing natural features, cultural features or ecological functions of such significance to warrant protection. Some examples are rivers, streams, ponds, lakes, wetlands, rare species habitat, water supply protection areas, cultural sites, parks, and agricultural land.

Erosion Control: A measure to prevent soil from detachment and transportation by water, wind, or gravity.

Existing Access Roads: Previously permitted or grandfathered access roads that are used to access structures that are clearly visible or can be found by mowing or by the presence of road materials in soil cores.

Grubbing: A site preparation method that is used to clear the ground of roots and stumps.

Intermittent Watercourse: An intermittent watercourse is broadly defined as a channel that a flowing body of water follows at irregular intervals and does not have continuous or steady flow. Regulatory definitions for intermittent water courses are:

- Connecticut—Per the Connecticut Inland Wetland and Watercourses Act, intermittent watercourses are delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation.

- Massachusetts—Under the Massachusetts Wetlands Protection Act (MassWPA), a jurisdictional intermittent watercourse is defined as a body of running water which moves in a definite channel in the ground due to a hydraulic gradient, does not flow throughout the year, and which flows within, into or out of an area subject to protection under the MassWPA. Intermittent watercourses upgradient of any Bordering Vegetated Wetlands are not jurisdictional under the MassWPA. A watercourse can be determined to be intermittent if it meets MassWPA criteria in regards to watershed characteristics found on the Stream Stats website or documented observations of no flow.

Limit of Work/Disturbance: The boundaries of the approved project within regulated areas. All project related activities in regulated areas must be conducted within the approved limit of work/disturbance. The limit of work/disturbance should be depicted on the approved permit site plans, which may require the limits to be identified in the field by flagging, construction fencing, and/or perimeter erosion controls.

Low-Impact Vehicles: Vehicles that have a lesser impact on an environmentally sensitive area due to the vehicle being smaller, lighter, or different in another way than a vehicle which would have a greater impact. Low impact vehicles could include ORVs or

ATVs, tracked vehicles with low ground pressure, or vehicles with oversized balloon-type tires.

Maintenance Projects: Typically consist of activities limited to the repair and/or replacement of existing and lawfully located utility structures and/or facilities where no substantial change in the original structure or footprint is proposed. Maintenance activities also include vegetation management.

Minimization: Causing as little disturbance to an area as practicable during construction.

New Construction: Construction of new transmission or distribution facilities that previously did not exist or construction that substantially modifies existing facilities. All new (and existing) construction projects are required to go through a full permit review by the Eversource Environmental Licensing and Permitting Department.

Pre-Construction Notification (PCN): Project activities that do not qualify for SV or where otherwise required by the terms of the MA and CT GPs must submit a PCN and obtain written verification before starting work in ACOE jurisdiction. Refer to MA and CT GP appendices for PCN thresholds. Projects that cannot be completed under a PCN must file for an Individual Permit with the ACOE. In CT, for coastal projects, notification is provided to ACOE by CT DEEP, Office of Long Island Sound Programs (OLISP) or by applicants as necessary. Written approval from ACOE is required.

Restoration: To return a disturbed area to its former, original or unimpaired condition. A site is considered fully restored when it has returned (as closely as practicable) to its original state. Restoration of disturbed areas should occur as soon as practicable following the completion of activities at that location.

Re-Vegetation: Establishment of plant material for temporary or permanent soil stabilization.

Right of Way: A pathway, road, or corridor of land where Eversource Energy has legal rights (either fee ownership, lease, or easement) to construct, operator, and maintain an electric power line and/or natural gas pipeline.

Self-Verification (SV): Activities that are eligible for SV are authorized under the MA and CT GPs and may commence without written verification from the ACOE provided the prospective permittee has:

i. Confirmed that the activity will meet the terms and conditions of applicable MA and CT GPs

ii. Submitted the Self-Verification Notification Form (SVNF) to the ACOE.

In CT, coastal projects do not require filing of a Self-Verification Notification Form. ACOE relies on CT DEEP and OLISP submittals.

Stabilization: A system of permanent or temporary measures used alone or in combination to minimize erosion from disturbed areas.

Sediment Control: Control of eroded so that it does not wash off and pollute nearby wetland and water resources.

Vehicles with Low Ground Pressure: Vehicles which have tires or tracks that apply less than three pounds per square inch (psi) on the ground surface.

Work: For the purposes of this BMP Manual, the disturbance of soil, water, and vegetation incidental to construction within on- and off-road utility corridors, substations, including but not limited to the establishment of access roads and work areas, in and near wetlands, watercourses, or other sensitive natural areas, including storm drain systems (e.g., catch basins). Types of construction include, but are not limited to installation or maintenance of underground and overhead utilities, substations and other facilities.

1.4 BMP References

The following table lists the public guidance documents utilized during the preparation of this BMP manual. Refer to these documents for additional information.

TABLE 1-2

Document Title
General
Best Management Practices (BMPs) Manual for Access Road Crossings of Wetlands and Waterbodies, EPRI, Palo Alto, CA (2002) 1005188.
Gas Research Institute. Horizontal Directional Drilling Best Management Practices Manual (2002) ENSR Corporation, Westford, MA and Trenchless Engineering Corp., Houston, TX.
Connecticut
Connecticut Department of Transportation (ConnDOT). ConnDOT Drainage Manual (October 2000) http://www.ct.gov/dot/cwp/view.asp?a=1385&Q=260116
Connecticut Standard Specifications for Roads, Bridges and Incidental Construction, FORM 816 (2004) http://www.ct.gov/dot/cwp/view.asp?a=3609&q=430362
Connecticut Department of Energy & Environmental Protection. Connecticut Guidelines for Erosion and Sediment Control. (2002) http://www.ct.gov/deep/cwp/view.asp?a=2720&q=325660&deepNav_GID=1654%20
Connecticut Department of Energy & Environmental Protection, Bureau of Natural Resources, Division of Forestry. Best Management Practices for Water Quality While Harvesting Forest Products (2007) http://www.ct.gov/dep/lib/deep/forestry/best_management_practices/best_practicesmanual.pdf
Massachusetts
Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways and Bridges (1988) http://www.mhd.state.ma.us/default.asp?pgid=content/publicationmanuals&sid=about
Massachusetts River and Stream Crossing Standards (Revised March 1, 2011) http://www.nae.usace.army.mil/Portals/74/docs/regulatory/StreamRiverContinuity/MA_RiverStreamCrossingStandards.pdf
Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas. Original Print: March 1997. *Reprint: May 2003*. http://www.mass.gov/eea/docs/dep/water/essec1.pdf
The Massachusetts Unpaved Roads BMP Manual (Winter 2001) http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/dirtroad.pdf

Section 2
Project Planning

After undergoing an initial screening review by the department conducting the proposed project, if resources are identified, the project is required to go through a permit review by the Environmental Licensing and Permitting Group. The permit review process is supported by Geographic Information Systems (GIS) or a similar program that references the most current spatial data for the project areas in question. Through the GIS review process various geo-processing tools are used to compose maps and provide a spatial reference to environmentally sensitive areas. In consultation with the Environmental Licensing and Permitting Group, the Project Engineer, permitting specialist, or other project planner should determine regulatory jurisdiction and which (if any) environmental permits or approvals are required before starting any project. Questions regarding which activities may be conducted in regulated areas or within environmentally sensitive areas should be referred to the Environmental Licensing and Permitting Group. Summaries of potentially applicable laws and regulations are provided in Appendices B and C of this document.

2.1 Types of Wetlands

Wetland areas common to New England and common to both Connecticut and Massachusetts include, but are not limited to, the following:

Forested Wetlands

Forested wetlands are wetlands that are dominated by trees that are 20 feet or taller. These wetlands are typically drier with standing water typically occurring during periods of high precipitation, seasonally high groundwater, snowmelt, and runoff (e.g., early spring through mid-summer). Tree species typical of this type of wetland include red maple (*Acer rubrum*) and eastern hemlock (*Tsuga canadensis*). "Pit and mound" topography is common in forested wetlands, where mature trees grow on the higher and drier mounds and obligate wetland species are found in the lower pits.

Scrub-Shrub Wetlands

Scrub-shrub wetlands are dominated by woody vegetation less than 20 feet tall, and may include peat bogs. Typical bog species include leatherleaf (*Chamaedaphne calyculata*), cotton grasses (*Eriophorum* sp.), cranberry (*Vaccinium macrocarpon, V. oxycoccus*), and black spruce (*Picea marina*). Other non-bog scrub-shrub wetlands are characterized by buttonbush (*Cephalanthus occidentalis*), alders (*Alnus* sp.), dogwoods (*Cornus* sp.), and arrowwoods (*Viburnum* sp.).

Marshes

Marshes are dominated by erect, herbaceous vegetation and appear as grasslands or stands of reedy growth. These wetlands are commonly referred to by a host of terms, including marsh, wet meadow, fen. These areas are flooded all or most of the year and, in New England, tend to be dominated by cattails (*Typha* sp.).

Wet Meadows

Typical wet meadow species include grasses such as bluejoint (*Calamagrostis canadensis*) and reed canary grass (*Phalaris arundinacea*), sedges (*Carex* sp.) and rushes (*Juncus* sp.), and various other forbs such as Joe-Pye-weeds (*Eupatorium* sp.) and asters (*Aster* sp.).

Floodplains

A floodplain is generally defined as an area of low-lying ground adjacent to a stream or river that is formed mainly of river sediments and is subject to flooding. State-specific regulatory definitions vary and are described as follows:

- In Connecticut, areas that contain alluvial or floodplain soils are regulated as wetlands. These areas may flood so infrequently or be so freely drained that hydrophytic vegetation and hydric soils are not present. Soils in these areas must be examined carefully to determine whether well drained alluvial or floodplain soils are present.

- In Massachusetts, a floodplain is a type of wetland resource are that floods following storms, prolonged rainfall, or snowmelt. There are three types of floodplain areas protected under the MassWPA: coastal areas, areas bordering rivers and streams, and isolated depressions that flood at least once a year.

Streams

A stream is any natural flowing body of water that empties to any ocean, lake, pond or other river. Perennial streams, or rivers, have flows throughout the year. Intermittent streams do not have surface flows throughout the year, though surface water may remain in isolated pockets.

Vernal Pools

Vernal pools are typically contained basin depressions lacking permanent aboveground outlets. These areas fill with water with the rising water table of fall and winter and/or with the meltwater and runoff of winter and spring snow and rain. The pools contain water for a few months in the spring and early summer. Due to periodic drying cycles, vernal pools do not support breeding fish populations and can thus serve as breeding grounds for a variety of amphibians, including some rare and protected species of frogs and salamanders.

Other Considerations

Other regulated factors taken into consideration during the project planning process include the presence of protected (i.e., threatened, rare or endangered) species, non-native invasive plant species and/or historical and archaeological resources. Special requirements may need to be evaluated as part of new construction and/or some maintenance activities.

2.2 Meetings

A pre-construction meeting is typically held prior to the commencement of all work with the purpose to appoint responsible parties, discuss timing of work, and further consider options to avoid and/or minimize disturbance to sensitive areas. The meeting

confirms that there is consensus on work methods and responsibilities, and ensure that tasks will be fulfilled with as little disturbance to the environment as practicable. These meetings can occur on or off-site and should include all the applicable stakeholders (i.e., Eversource, contractors, consultants, inspectors and/or monitors, and regulatory agency personnel). A short and less formal briefing should suffice for smaller maintenance projects.

2.3 Site Staging and Parking

During the project planning and permitting process, locations should be identified for designated crew parking areas, material storage, and staging areas. Where possible, these areas should be located outside of buffer zones, watershed protection areas, and other environmentally sensitive areas. Any proposed locations should be evaluated for all sensitive receptors and for new projects requiring permitting, should be incorporated onto permitting and access plans.

2.4 Construction Monitoring

Construction projects require environmental monitoring, which can be conducted either internally or by consultants. Some permitted projects require oversight by designated and pre-approved compliance monitors. Environmental monitoring is a way to keep a chronological record of pre-construction site conditions, progress, and changes that are made, as well as to document issues and authorized solutions.

If work will occur in a wetland resource area or an area mapped or otherwise designated as rare or endangered species habitat, permit conditions may dictate that construction be monitored by a qualified and pre-approved wetland or wildlife specialist.

2.5 Signage/Limit of Boundaries

Where appropriate, wetland delineation flagging or signage shall be installed that makes clear where critical boundaries (i.e., the limits of jurisdictional wetland resource areas and/or rare species habitat) and setbacks occur, regulatory authorization by agencies, and certain uses on ROWs are prohibited, such as ORV traffic.

Where appropriate, signage shall be installed along sediment and erosion control barriers at appropriate intervals, heights and sizes to ensure that the presence and location of said barriers is clear to construction personnel during deep snow or other low visibility conditions. Inspection and maintenance of this signage shall be conducted on a regular basis to ensure effectiveness.





Examples of signage at wetlands.

Section 3
Construction Considerations

During all project activities (e.g., maintenance, new construction), federal, state, and local regulatory authorities require steps be taken to avoid, minimize, and/or mitigate disturbance to the environment. Wetlands and other sensitive areas should be avoided whenever practicable. However, some work may require entrance into these areas in order to perform work. This section discusses measures that should be taken to minimize disturbance to if work must occur within sensitive areas.

BMPs were developed to aid in this process and should be carefully selected and implemented based on the proposed activities and the nature of sensitive area(s) encountered at each site. Proper selection of BMPs should take into consideration the project goals, permit requirements, and site specific information. Once an assessment of the area is made and requirements of the project are established, all BMPs should be considered and implemented as appropriate.

Tables TOC-1 and TOC-2 summarize BMP types. This section addresses BMPs specific to construction of new access roads, repair of existing access roads, the installation of work pads, structure-related work, and soil stockpile management. Information regarding recommended erosion and sedimentation controls or stormwater controls is also discussed. Please refer to Appendix A for typicals and representative photographs of BMPs used for erosion and sedimentation control and water diversion during construction.

3.1 Avoidance and Minimization

Avoidance and minimization should always be considered before beginning any construction or maintenance project. Take appropriate measures to avoid construction impacts to wetlands, waterways, rare species habitats, known below and above ground historical/archeological resources, and other environmentally sensitive areas. Use existing ROW access whenever practicable. Keep to approved routes and roads and do not widen or deviate from them. Consult with the Environmental Licensing and Permitting Group, when avoidance is not practicable, to determine measures to minimize the extent of construction impacts. Alternate access routes and/or staging areas that will minimize construction impacts to the natural environment may be considered.

3.2 Rare Species Habitat

The Environmental Licensing and Permitting Group coordinates with state and local agencies when work is within areas that are identified as rare species habitat. In Connecticut, the Natural Diversity Database (NDDB) is used to identify rare species habitat and is under the Department of Energy and Environmental Projection (CTDEEP). In Massachusetts, the Natural Heritage Endangered Species Program (NHESP) is consulted to identify rare species habitat, which is under the Department of Fisheries and Wildlife and part of the Natural Heritage network. State regulatory agencies may require crew training and turtle sweeps of work areas, botanist identification of rare plants for avoidance, and protection of vernal pools, prior to starting the work.

3.3 Vernal Pools

Construction within and across wetlands and in proximity to vernal pools should be limited to the extent practicable to avoid working in the periods between April 1st and June 1st. This will allow for obligate vernal pool species to emigrate to the breeding areas, deposit egg masses, and allow for hatching and development of juveniles. Silt fence should be installed at the limits of the construction to prevent individual reptiles and amphibians from entering the workspace, but in a manner that does not impede movement to and from pools from adjacent forested uplands. Consider installing syncopated silt fencing.

Protection Measures

When performing construction activities in proximity to vernal pools, a number protection measures should be implemented.

Vegetation Removal

- Maintain existing scrub-shrub vegetation (consistent with ROW vegetation management requirements) within 25 feet of vernal pools, except in areas where access roads and work pads must be installed.

- Minimize removal of low growing (scrub-shrub) vegetation surrounding vernal pools by utilizing construction matting where access is needed. If vegetation must be cut adjacent to vernal pools, the cut vegetation (slash) should be left in place to serve as recruitment for leaf litter and coarse woody debris.

Erosion and Sedimentation Control

- Install and maintain erosion and sedimentation control measures along construction access roads and work pads to protect water quality and to limit the potential for sediment transport to vernal pools.

- Promptly remove erosion and sedimentation control devices upon final revegetation and stabilization of the ROW.

Access Roads

- Use construction mats, corduroy roads, or clean materials (i.e., clean riprap, gravel, stone or equivalent and rock fords) in locations where existing on-ROW access roads must be improved and are adjacent to vernal pools.

- Man-made depressions along existing on-ROW access roads provide low-quality vernal pool breeding habitat (due to an insufficient hydroperiod). Access roads must be graded and/or improved to accommodate project construction vehicles and may eliminate these depressions and the associated potential for amphibian breeding habitat. Perform improvements to on-ROW access roads outside of the breeding and migration seasons of vernal pool species to avoid direct impacts to amphibians that may breed in the man-made depressions along existing on-ROW access roads.

Scheduling and Site-Specific Considerations

- To the extent practicable (considering circuit outages and other construction timing constraints), schedule access road and work pad installation in and around vernal pool habitats to minimize interference with amphibian breeding and migration seasons.

- For project activities that must occur adjacent to vernal pools during amphibian migration periods, implement measures on a site-specific basis to facilitate unencumbered amphibian access to and from vernal pools. Consider the site-specific conditions including the type of construction activity that will occur in proximity to a vernal pool, the amphibian species known to occur in the vernal pool, and seasonal conditions. Identify appropriate mitigation measures. Options to be evaluated to allow amphibian access to vernal pools may include, but not be limited to: syncopated silt fencing in the immediate vicinity of vernal pools; elevated construction matting; and aligning erosion and sedimentation controls to avoid bifurcating vernal pool habitat.

3.4 Access Roads

Existing construction access roads are unpaved roadways that work crews use to access a site within a ROW. These access roads were generally either permitted previously or constructed prior to the promulgation of regulations and are grandfathered in under past general permits.

3.4.1 New Access Roads

New access roads are generally associated with new or large-scale projects that have separate permitting requirements. Construction of new access roads will be based on plans that are reviewed and approved by applicable federal, state, and local agencies. If a new access road is needed and not associated with a large project, notify the Environmental Licensing and Permitting Group to make a decision on best access routes and identification of the necessary permits and approvals required to construct the new road. **Permit requirements must be followed.**

3.4.2 Existing Access Roads

The travel surface width of access roads in upland areas will not exceed 16 feet. This does not include side slopes. Maintaining existing access roads includes mowing of vegetation, grading, placement/replacement of stone, and the installation/maintenance of erosion control features (e.g., water bars, swales, sedimentation basins).

When access roads are in wetlands, measures should be taken to avoid disturbance to wetlands, waterways, and sensitive areas. If avoidance is not practicable, then measures should be taken to minimize the extent of disturbance. Alternate access routes should always be considered. Below is a list of methods that should be considered where disturbance is necessary:

- Minimize the width of typical access roads through wetlands. If an existing access road is evident in the wetland, the existing width of the access road must be maintained. If unable to ascertain the original width of the access, then do not make the road wider than 16 feet (including side slopes).

- To the extent practicable, use low-impact vehicles and/or vehicles with low ground pressure when driving through wetlands.
- Coordinate the timing of work to cause the least impacts during the regulatory low-flow period under normal conditions, when water/ground is frozen, after the spring songbird nesting season, and, outside of the anticipated amphibian migration window (mid- February to mid-June). The United States Army Corps of Engineers defines the low-flow periods for streams as follows:
    - Connecticut streams—July 1 through September 30
    - Massachusetts non-tidal streams—July 1 through September 30
    - Massachusetts tidal streams—November 16 to February 15
    - New Hampshire streams—July 15 through October 1
- Use construction mats in wetlands to minimize soil disturbance and rutting when work needs to occur during non-frozen ground conditions.
- If practicable, conduct work manually if warranted (decision to be made by Project Team).

Existing access roads that have become part of the wetland are considered previous fill that were either permitted or grandfathered and where it is evident that an access road exists, it is acceptable to place stone over the previously placed fill. Where the existing access road is not evident, Environmental Licensing and Permitting must be consulted to make a determination whether stone can be placed in the wetland. If stone is not evident, through soil cores, hand digging or other methods, construction mats will be used. If permanent access is warranted through the wetland, the new access road will need to have a permitting review and will likely require permits.

The access road in the wetland should not exceed 16 feet in width (unless there is evidence that the road was originally wider than 16 feet).

Over time, existing access roads require maintenance and repair. Travel by construction equipment and general traffic to reach a particular portion of the ROW must be via the designated access road and route. Changes in the location of the access road or the use of alternate roads must be reviewed and approved by the Project Team prior to their construction or use. Access road routes were selected to prevent degradation of the utility corridor, and must be constructed, used, and maintained in accordance with this manual, as well as federal, state, and local requirements, and other project plans.

Though, in some situations, they may be necessary, constructing duplicate access roads should be avoided to the extent practicable. Some appropriate reasons for suggesting alternate routes are:

- Poor site conditions along preferred route because of weather or season.
- Property rights constraints, or property owner's preference.
- Equipment requirements.
- Unanticipated off-site access limitations along existing roads.
- Unanticipated access opportunities (e.g., ice, snow, other developments) which may avoid environmental disturbance and/or reduce cost.

General Design: New and Existing Access Roads

Construction access roads that require new grading and/or filling, or are to be heavily used require the creation of a stable, tractable, load-bearing surface resistant to erosion. If the existing soil and subsoil are not well drained, it may be necessary to import an aggregate road base (i.e., gravel borrow) such as that meeting the requirements of aggregate found in the:

- *Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways and Bridges*, Section 400
- Connecticut *Standard Specifications for Roads, Bridges and Incidental Construction*, Section M1.02

When the construction access road follows the same route as the permanent design road, constructing the grades and subgrade for the permanent roadway early in the construction sequence is recommended.

The travel surface of construction access roads shall typically not exceed 16 feet in width except for passing points, where necessary. Subgrading shall not extend beyond the space required for the finished road and normal side slopes.

Where practicable, construction access roads should conform to the contours of the land, avoiding grades steeper than 10 percent and creating side slopes no steeper than a ratio of 2:1. If the side slopes are steeper than 2:1, then use of engineered slope stabilization methods may be necessary Consider the volume and type of construction traffic as well as the extent that natural ground must be altered to accommodate the traffic. If no grading is required and the construction traffic is very intermittent (i.e., access roads used to maintain utility lines) the measures used may be limited to water bars, or some top dressing with gravel or stone in areas where the vegetation over soft soil is destroyed by traffic.

During wet weather, these roadways can generate significant quantities of sediment if not constructed with adequate stormwater management and erosion control measures. During an active construction or maintenance activity, inspection of the construction access road and the associated erosion and sedimentation measures should be conducted by the person(s) designated at the pre-construction meeting, should occur regularly while the activity is occurring, and repairs to controls should be made in a timely matter. Repairs may include regrading and/or top dressing the traveled surface with additional aggregate to eliminate ruts, as well as those repairs required by each erosion and sedimentation measure used. When the roadway is no longer needed on a regular basis, the access road should be reviewed to ensure that the road is left in a condition that prevents future erosion and sedimentation (i.e., installation of water bars, gravel, etc.). In some cases, permit conditions may warrant that the access road be removed and that the disturbed area be seeded and mulched as required to match the pre-construction conditions.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during access road construction or maintenance by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Outlet protection**, a **level spreader**, a **trench breaker**, a **sediment trap or basin**, or a **stone check dam** may be used to de-energize concentrated flows from diversions and in temporary channels.
- **Geotextile silt fencing**, **compost filter berms**, **straw wattles** and **hay/straw bale barriers** may be utilized to provide protection at the toe of fill slopes and discharges from water bars.
- Side slopes can be protected by installing **erosion control blankets** and **seeding** the area with a fast-growing native or annual grass mix.
- **Dust contro**l should be employed when construction access road conditions create airborne dust.
- **Geotextile fabric** shall be used beneath all new fill and construction entrances, where needed.

3.4.2.1 Best Management Practices – New Access Roads

The following are BMPs that are applicable to new access roads in uplands and are described at the following tabs:

Construction Entrance Track Pad – Tab 1A

Stormwater Management BMPs (includes Water Bars, Drainage Swales, and Sedimentation Basins) – Tab 1B

TAB 1A

Construction Entrance Track Pad

Applications: Erosion and sedimentation control, roadway protection

Limitations:

- Maintenance is required if the pad becomes clogged with soil.
- Muddy conditions may warrant the use of a tire wash station.

Overview:

Where access roads or construction areas connect to paved roads, a stone track pad must be installed at the construction entrance to prevent construction machinery from tracking soil onto paved roadways. Materials appropriate to construction site soil conditions should be employed and/or replenished, as necessary.

Installation:

- Use 3- to 6-inch washed stone to install stone tracking pads at a minimum length of 50 feet and a minimum depth of 12 inches.
- On sites with clayey soils, underlay stone tracking pads with a geotextile liner to prevent the stone from sinking into the soil.

Maintenance:

- Periodically inspect the stone in the entrance tack pad. If the pad becomes clogged with soil, remove and refresh and/or clean stone.

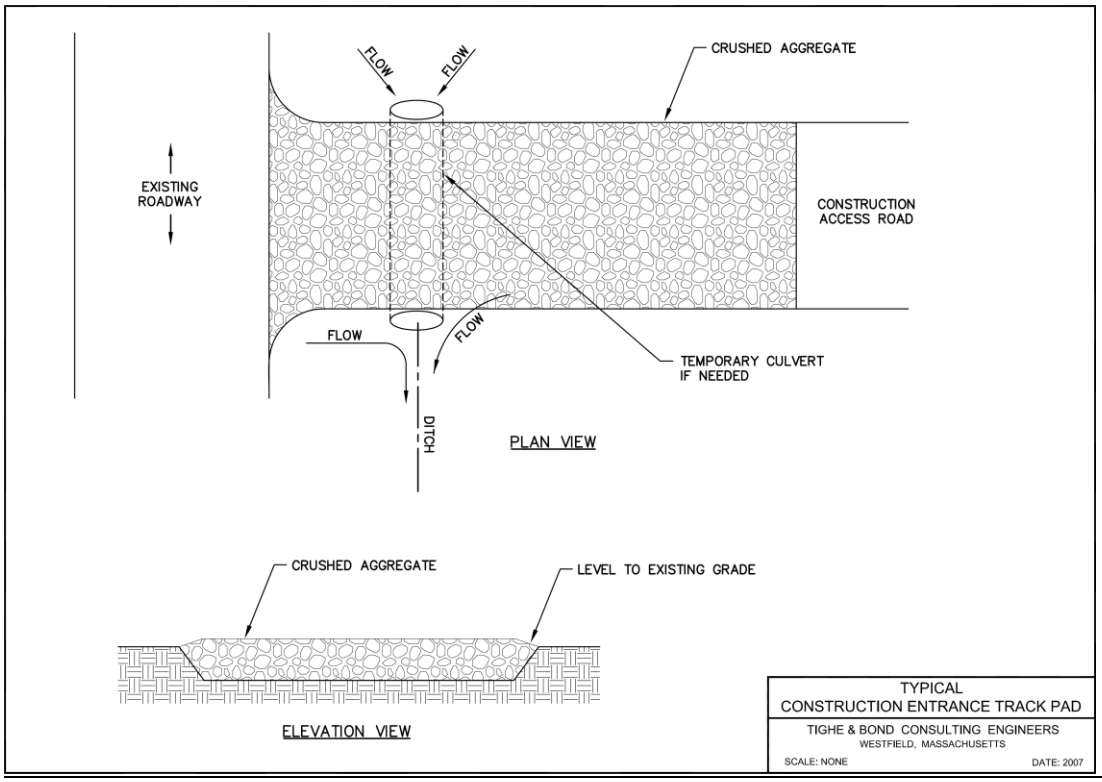
Additional Comments:

If muddy conditions warrant the use of a tire wash station, procedures should be established to ensure soils are not tracked off site.

Where appropriate and when safety and environmental conditions are considered, vehicle tires or tracks may be spun quickly ("burn out") on the track pad to further facilitate the removal of soil.



Construction entrance track pad.



TAB 1B

Water Bar

Applications: Erosion and sedimentation control

Limitations:

- Should never be used to direct a watercourse into another waterbody or to divert unfiltered runoff to a wetland.
- Can impede vehicular movement.
- Damage from vehicle traffic and stormwater flow may require water bars to be reinstalled/reworked at the beginning and end of each construction season.

Overview:

Water bars are linear features built diagonally across access roads or ROWs to redirect waterflow off of the road surface at non-erosive intervals. In general, they consist of a trench dug at least 6 inches below grade followed by an earthen mound at least 6 inches above grade. Use water bars to prevent erosion on sloping roadways less than 100-feet wide. Water bars must be designed to be stable throughout their useful life and meet the criteria in the table below. The maximum capacity should be the peak runoff from a 10-year storm. Permanent diversions (Appendix A) may also be used if water bars are not suitable.

Installation:

- Set water bar direction to utilize stable outlets and do not allow upslope water bar runoff to converge with down slope water bars.
- Construct the bar immediately after vegetation has been cleared on constant or slightly increasing grades, not exceeding 2%. Avoid reverse grades.
- Mark the location and width of the ridge and disk the entire length.
- Fill ridge to above the design height and compact with wheeled equipment to the design cross section.
- Construct sediment traps or outlet stabilization measures, as needed.
- After the area has been permanently stabilized, remove the ridge and channel to blend with the natural ground level.
- Seed and mulch diversions that are intended for use for more than 30 days.

Minimum Cross Section

Top Width (ft)	Height (ft)	Side Slopes
0	1.5	4:1
4	1.5	2:1

Maximum Recommended Spacing

Land Slope (%)	Spacing (ft)
1 or less	300
2	200
3 to 5	150
Greater than 5	100

Maintenance:

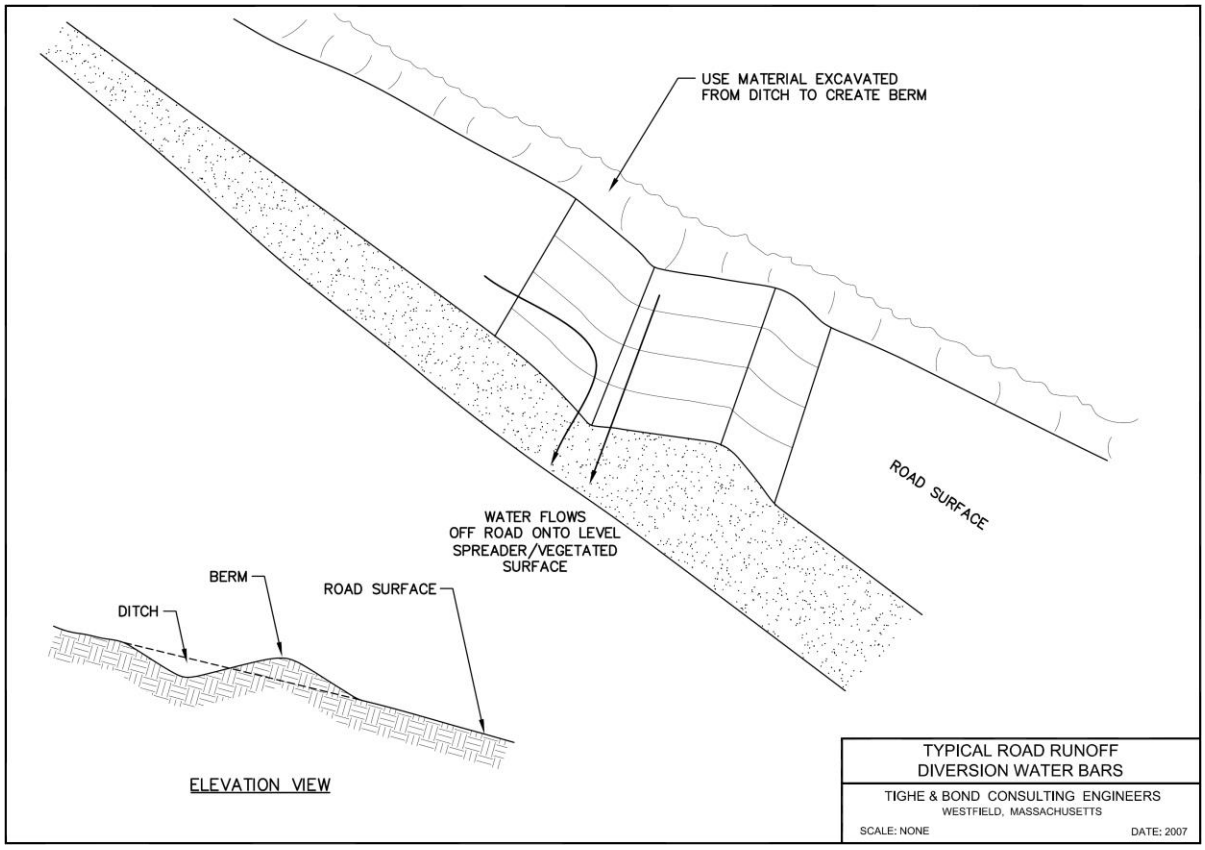
- Inspect each week and after rain events. Repair damage caused by construction traffic or erosion.
- Remove accumulated sediment and debris from the trench and stabilize outlets.
- If necessary, repair ridge to a positive grade and cross section, and add gravel at crossing areas.
- Use routine inspections to determine if the original spacing is adequate or if additional water bars need to be constructed.

Additional Comments:

Water bars may include the use of hardwood logs to provide structural stability.



Diversion waterbar.


USE MATERIAL EXCAVATED
FROM DITCH TO CREATE BERM
ROAD SURFACE
WATER FLOWS
OFF ROAD ONTO LEVEL
SPREADER/VEGETATED
SURFACE
BERM
ROAD SURFACE
DITCH
ELEVATION VIEW
TYPICAL ROAD RUNOFF
DIVERSION WATER BARS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

Drainage Swales

Applications: Convey stormwater away from work area and/or improve water quality and reduce peak runoff.

Limitations:

- Vegetated swales need to have adequately established vegetation before flow is diverted to them.
- Need to have adequate bottom stabilization to prevent scouring.

Overview:

Drainage swales usually consist of a ditch that is either vegetated or lined with rip rap, erosion control blankets, or other materials. They are natural or constructed waterways/outlets that intercept, redirect, and convey stormwater away from the work area to a stable location and are used in areas where concentrated runoff would otherwise cause erosion/flooding. Swales can be used to reduce erosion in uplands and/or prior to discharge of stormwater flows to natural receiving waters (e.g., wetlands or streams). They also help to reduce surface flow velocity and turbidity.

Grass Lined Channels (Stabilized with vegetation)

- Use where vegetative lining will provide sufficient stability, slopes are less than 5%, and space is available for large cross section.

Installation:

- Remove trees, brush and stumps.
- Excavate and shape channel to dimensions on plans. Overcut 0.2 ft for vegetative growth.
- Install temporary liner or riprap at inflows and stabilize outlets.
- Vegetate immediately after construction and divert water until grass establishes. Install matting if flow cannot be diverted.
- Install sod rather than seeding where slopes approach 5%.
- Spread topsoil to a minimum of 4 inches where soil conditions are unfavorable. Seeded channels should be mulched.

Vegetated Swales (Stabilized with dense vegetation)

- Use for water quality improvement and peak runoff reduction. Applicable for small drainage areas with relatively small amount of impervious cover. The grassed waterway is used to convey runoff at a non-erosive velocity. Dense vegetation can be established and a stable outlet constructed.

Installation:

- General design parameters are as follows: minimum capacity 10-year, 24-hour storm; design slopes to prevent erosion during the 2-year storm event; maximum side slopes 3:1; bottom width 2 to 8 feet.
- Vegetate with water resistant grasses and divert flow until established.

Riprap Lined Channels (Contains lining of riprap or stone)

- Use on sites where channel flow velocities exceed those acceptable for grass lined waterway. Applicable where vegetative establishment is not possible or there are steep grades, wetness, highly erodible soils, seepage or prolonged base flow.

Installation:

- Remove trees, brush, and vegetation from channel area.
- Stabilize inlets and install outlet protection.
- Construct channel and install filter and lining as shown on plan.
- Use the maximum stone size for riprap plus thickness of filter.

Maintenance:

- Swales need to be routinely maintained to prevent brush/sediment buildup. Inspect swale regularly and after every rain event (0.25 inches or greater). Repair and/or re-seed rill or gully erosion. Remove accumulated sediments and brush before it reaches a depth of six inches.

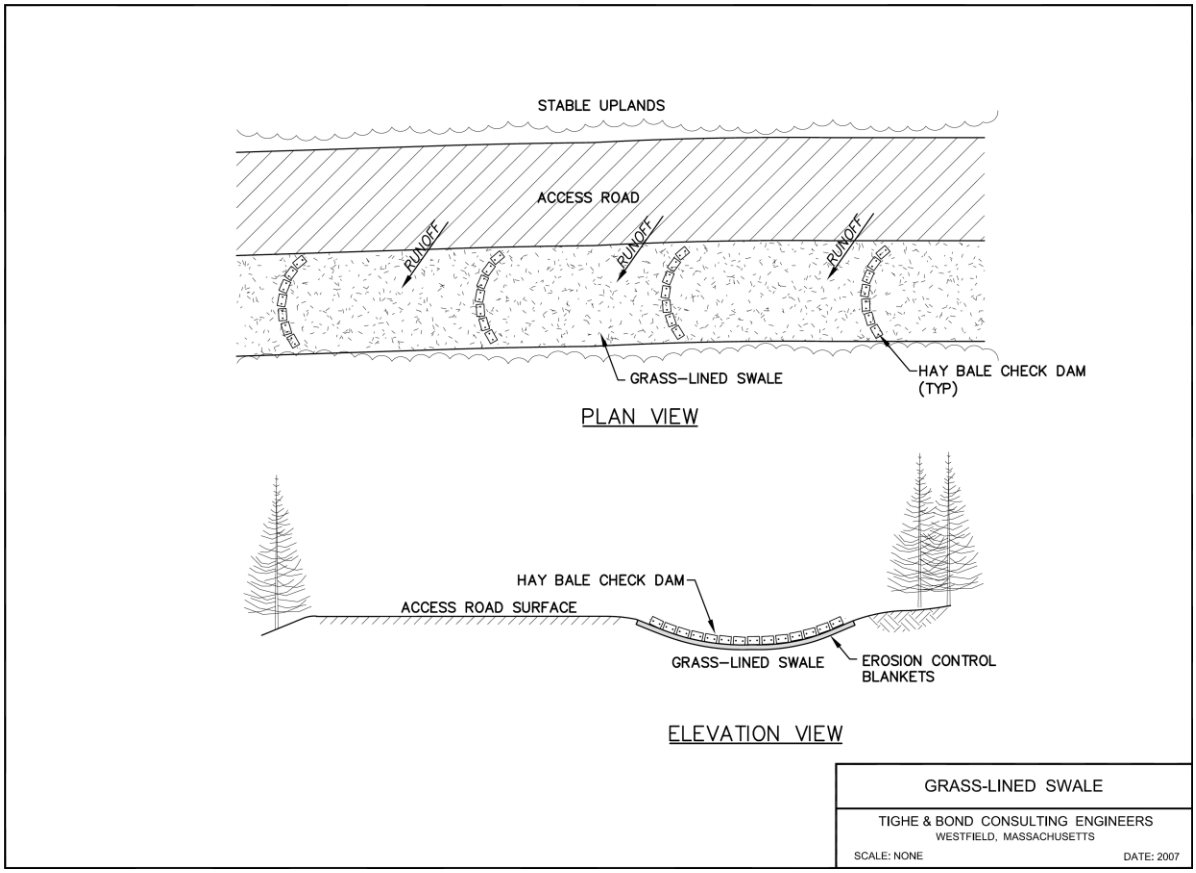
Additional Comments:

- Depth and spacing of swales should be dependent on runoff conditions of the specific site.
- If required, install check dams constructed of rip rap or other materials to slow flows along certain reaches of a swale.
- Remove temporary swales once construction is complete or areas are stabilized. If leaving swales in place will allow for long-term benefits and be compatible with the ultimate use of the site, then they may remain in place.



Photo provided courtesy of Tighe & Bond, Inc.

Grass-lined swale underlain with erosion control blanket and containing hay bale check dams; used to quickly stabilize soils along a construction access road subjected to significant stormwater runoff. Blue arrow indicates direction of flow.



Sedimentation Basins

Applications: Erosion and sedimentation control

Limitations:

- Traps and basins need to be adequately sized based on expected rain events and the contributing drainage area.

Overview:

Sediment traps and basins are used to filter and settle out sediment in stormwater runoff before water is released into a wetland or other unprotected and/or sensitive area. A sediment trap is a temporary measure installed during construction to detain runoff, while a basin is a more permanent measure. Basins are also used where other erosion control measures are not adequate to prevent off-site sedimentation.

A sediment traps and basins should have three components: a forebay, a check dam, and a basin. Debris and some sediments begin to settle out of the water in the forebay. The stone or hay bale check dam filters more sediments as water flows through. The actual basin is a low velocity pool where sediments settle out of the water column before the water is released at the outlet.

Based on the size of the project area, a qualified engineer may be required to calculate the appropriate size of the basin. State-specific guidance for basin sizing can be found in the following locations:

- *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas* (Page 140); http://www.mass.gov/eea/docs/dep/water/esfull.pdf
- *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* (Section 5-11-1); http://www.ct.gov/dep/cwp/view.asp?A=2720&Q=325660.

Installation:

Drainage area of 5 acres or less

- Install to direct stormwater runoff to the sedimentation trap or basin. Form basin by excavating a depression similar to a small pond or by placing an earthen embankment across an existing drainage swale or naturally low area.
- The ratio between the basin length and width should be greater than 3:1 (L:W). A ratio of 9:1 is recommended.
- Clear, grub, and strip all vegetation and root material from area of embankment and place embankment fill in lifts (<9″/lift, max). Compact fill and construct side slopes 2:1 or flatter. Excavate rectangular outlet section from compacted embankment.
- Filter fabric may be installed on bottom and sides of basin and covered by riprap.
- Extend outlet apron/spillway below toe of dam on level grade until stable conditions are reached (5 feet minimum). Cover inside face of stone outlet section with a 1-foot layer of ½- to ¼-inch aggregate.
- Use permanent or temporary seeding to vegetate embankments, spillways, and disturbed areas downgradient of the basin.

Drainage area of 10 acres or less

- Locate the basin in an easily accessible upland area, not a wetland area.
- Install the basin so that it intercepts the largest possible amount of runoff from the disturbed area.
- Divert sediment-laden water to the upper end of the sediment pool to improve trapping effectiveness.
- Basin should have a minimum volume based on ½-inch of storage for each acre of drainage area.
- Size basin to provide a minimum detention of 12 to 24 hours at the maximum runoff quantity expected for the duration of the basin's use.

Maintenance:

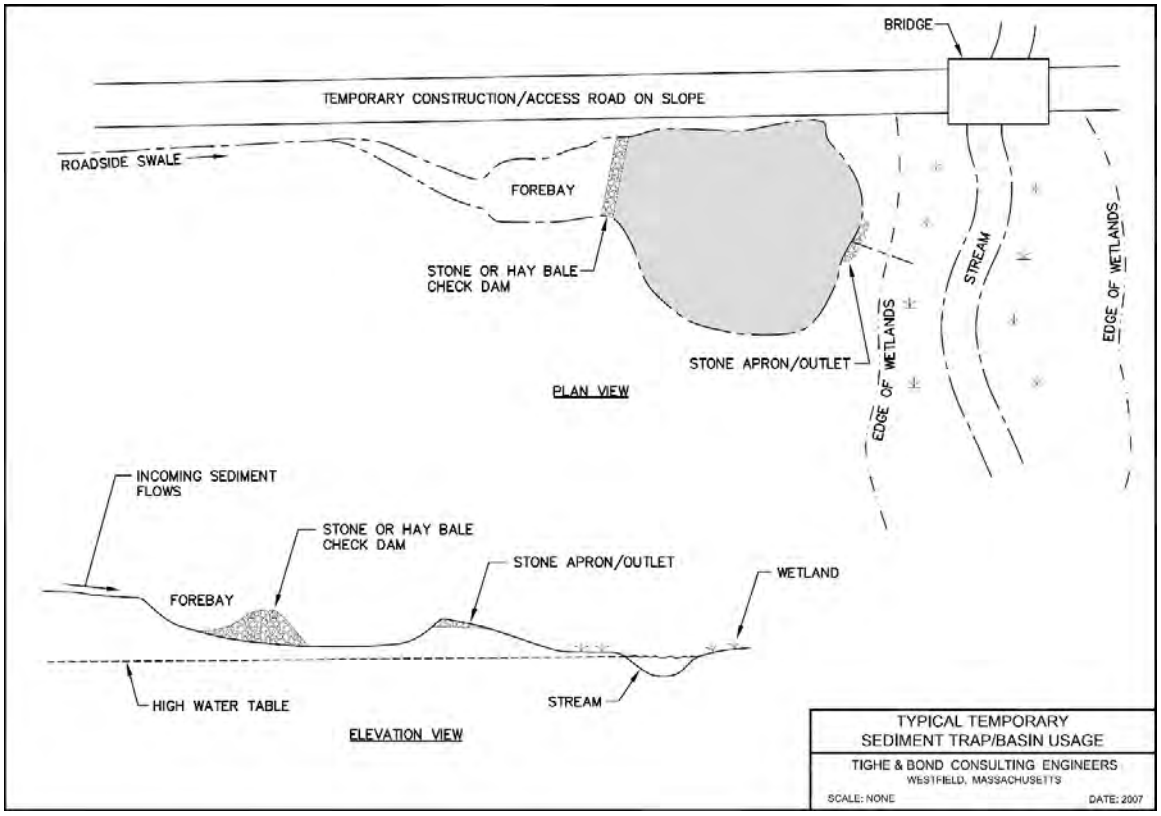
- Monitor the amount of sedimentation in the trap/basin. Install a stake with a marking at half the design depth. Remove sediment when it reaches this mark.
- Inspect after every rain event.
- Clean or replace the spillway gravel and re-seed/plant vegetation, as needed.
- Monitor embankment, spillway, and outlet for erosion. Repair erosion problems immediately.

Additional Comments:

Construction of sediment traps and/or basins should occur before primary construction on a project begins. They are often a critical stormwater management component for larger construction sites and/or those with poorly drained upland soils. If compatible with the post-construction site use, it may be appropriate to leave sediment basins in place indefinitely.



Sedimentation basin with hay bale filters.



3.4.3 Construction in Wetlands

Access roads that are constructed in or across wetlands require the following considerations in addition to the considerations for access roads in uplands:

- Construction of new access roads in wetlands, whether temporary or permanent, that do not utilize construction mats (e.g., earthen and/or rock fill roads, corduroy roads) require considerable project specific permitting and design. These kinds of projects should comply with project specific permits and plans, while only using this BMP manual as a general reference source. Permits often also require wetlands replication when permanent new access roads are constructed in wetlands.
- Avoid putting the construction access road in a wetland whenever practicable. Explore all feasible and prudent alternatives before determining that a wetland crossing is necessary. When avoidance is not practicable, consider crossings that will result in the least amount of disturbance. This may involve locating the construction access road so that it crosses the wetland at its narrowest width or uses areas previously disturbed for access or other purposes.
- Minimize the width of the temporary construction access road through the wetlands (generally no wider than 16 feet when using construction mats). It is preferable to have a passing point created before and after the wetland crossing, but internal passing points may be needed if the crossing is very long or critical sight line restrictions exist.
- Construct access roads so that wildlife is able to pass under or go through the road. In areas where the road is only one construction mat thick, allow for passageways or "gaps" between construction mats. In locations where the access road is greater than one mat thick, install elevated construction mat road crossings or "bridges." Gaps and/or bridges are to be placed along the access road at intervals no less than 50 feet.
- Consider the soil conditions. Expect deep organic wetland soils to require geotextiles, construction mats, or other materials during use to keep imported road materials separated from wetland soils. In shallow organic or saturated soils, thick plywood sheets or AlturnaMATS® may be sufficient to support a stable travel surface for small, lightweight vehicles. In addition, in areas which are inundated or have deep organic wetland soils, it may be necessary to use more than one layer of construction mats.
- Prevent obstructions to surface and subsurface flow across and through the construction access road. Provide adequate drainage. This may require the use of crushed stone, a layer of log corduroy, construction mat bridges, or multiple cross culverts, particularly if the wetland does not contain a well-defined watercourse channel and/or the wetland crossing is long. If the wetland soils are susceptible to seasonal high groundwater tables or flooding, then give additional consideration for maintaining flows across and/or over the construction access road without causing erosion or siltation during such times.
- Plan in advance how the construction access road will be removed and the wetland restored. A road stabilization geotextile can facilitate the segregation of imported soils and crushed stone and/or log corduroy from the native wetland soils and make wetland restoration easier. However, after the end of an extensive project and a highly traveled crossing, stone removal from the wetland surface will still usually have to occur, even when placed in conjunction with geotextile.

In some cases, access roads may not need to be constructed in a wetland to get access into or through a wetland if the work can be designed such that disturbance to the wetland are avoided or negligible. Options to be considered are presented below.

Equipment Selection and Usage

- **Low ground pressure equipment**. Using equipment that reduces the pressure it exerts on the ground can minimize disturbance to sensitive areas. Employing the use of equipment with wide tires, rubberized tracks, and low ground pressure (<3 psi) can help minimize soil compaction.
- **Wide tires**. Increasing the width of tires will increase traveling surface area and therefore reduce the amount of ground compaction that the equipment will cause. Ultimately, this will reduce rutting, and allow for easier maneuvering of the vehicle. However, wide tires may be costly and will require a wider travel area.
- **Rubberized tracks**. Equipment with rubberized tracks spreads the weight of the vehicle over a much larger surface, reducing ground pressure and enabling the vehicle to move more freely through wet substrates. Each track can be between 1.5 and 3 feet wide, length depending on the width of the vehicle. This can greatly reduce rutting and allow the vehicle to move with less difficulty through wet substrates.
- **Lightweight equipment**. Disturbance in a wetland area can be lessened by reducing the size of equipment (e.g., ORVs, Gator™) used in sensitive areas. This reduces the amount of pressure to the travel surface as well as the necessary width of access ways.



Equipment with rubberized tracks.

Timing of Work

- **Work during frozen conditions**. Activities conducted once wetland areas are frozen can minimize rutting and other disturbance to the surrounding environment. Work during this time also generally reduces disturbance of aquatic and terrestrial wildlife movement by avoiding sensitive breeding and nesting seasons.
- **Work during the "low flow" period**. Conducting work during the low flow period can reduce disturbance to surface water and generally avoids spawning and breeding seasons of aquatic organisms. The United States Army Corps of Engineers defines the low-flow periods for streams as follows:
    - Connecticut streams—July 1 through September 30
    - Massachusetts non-tidal streams—July 1 through September 30
    - Massachusetts tidal streams—November 16 to February 15
    - New Hampshire streams—July 15 through October 1

Alternate Access

- **Manual access.** Consider accessing work areas on foot through terrestrial areas and/or by boat through open water or ponded areas. Smaller projects (e.g., repairs

to individual structures or parts of structures) do not categorically require the use of heavy machinery and should be accessed manually to the extent practicable.

- **Limit trips.** Multiple trips through a wetland have shown to increase the potential for damage and requirement for matting. Try to limit trip to one in and one out.

Use of overhead/aerial access (e.g., helicopters)

- Using overhead or aerial equipment can be expensive and is not always feasible, but it may be appropriate in some situations in order to get vehicles and other equipment to a site that may be otherwise very difficult to access. The use of overhead and/or aerial equipment may be beneficial for work in areas where large water bodies, deep crevices, or mountainous areas hinder ground access.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during new access road construction by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Straw wattles, Geotextile silt fencing** and **hay/straw bale barriers** may be installed at the edges of earthen roads or construction mat roads to prevent erosion of soil into wetlands from the road fill or tracked soil on construction mats.
- In areas where silt fencing is required for more than one activity season, **syncopated silt fencing** may be installed to permit animal crossings.
- Side slopes of earthen roads can be protected by installing **erosion control blankets** and **seeding** the area with a fast-growing native or annual grass mix.
- **Dust control** should be employed as necessary when construction access road conditions create airborne dust when necessary.

3.4.3.1 Best Management Practices – Construction in Wetlands

The following are BMPs that are applicable to new access roads in wetlands and are described at the following tab:

Construction Mats (includes Elevated Construction Mats and AlturnaMATs) – Tab 2A

Permeable Road- Tab 2B

Dewatering – Appendix A Section II

TAB 2A

Construction Mats (i.e., timber or swamp mats)

Applications: Wetland crossings, rut minimization

- Used for access where the ground surface is unstable due to shallow, standing water, saturated soils, or other substrates not suitable for heavy vehicles.

Limitations:

- Only for temporary use. Generally mats should be removed upon construction completion.
- May float away in high water conditions.
- Need to be installed with heavy machinery.
- AlturnaMATs® limited to smaller vehicles and equipment.
- Equipment operators should remain cautious so as not to drive off or slip off the side of the mats.
- In winter, mats must be plowed and sanded or heated to prevent equipment from sliding off mats. Use of a deicing agent requires approval by the Environmental Licensing and Permitting Group.

Installation:

- Place mats along the travel area without any gaps and so that each board is positioned perpendicular to the direction of traffic. Position mats so that they are offset far enough from the resource area so that ruts are not created when equipment enters and exits a sensitive area.
- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils.
- Clean mats after use to remove any invasive plant species seed stock. Cleaning methods may include, but are not limited to, shaking or dropping mats in a controlled manner with a piece of machinery to knock off attached soil and debris, spraying with water or air, sweeping, or exposing the mats to high temperatures.
- Clean mats that were used in wetlands dominated by invasive species using brooms, shovels, and compressed air, if needed.

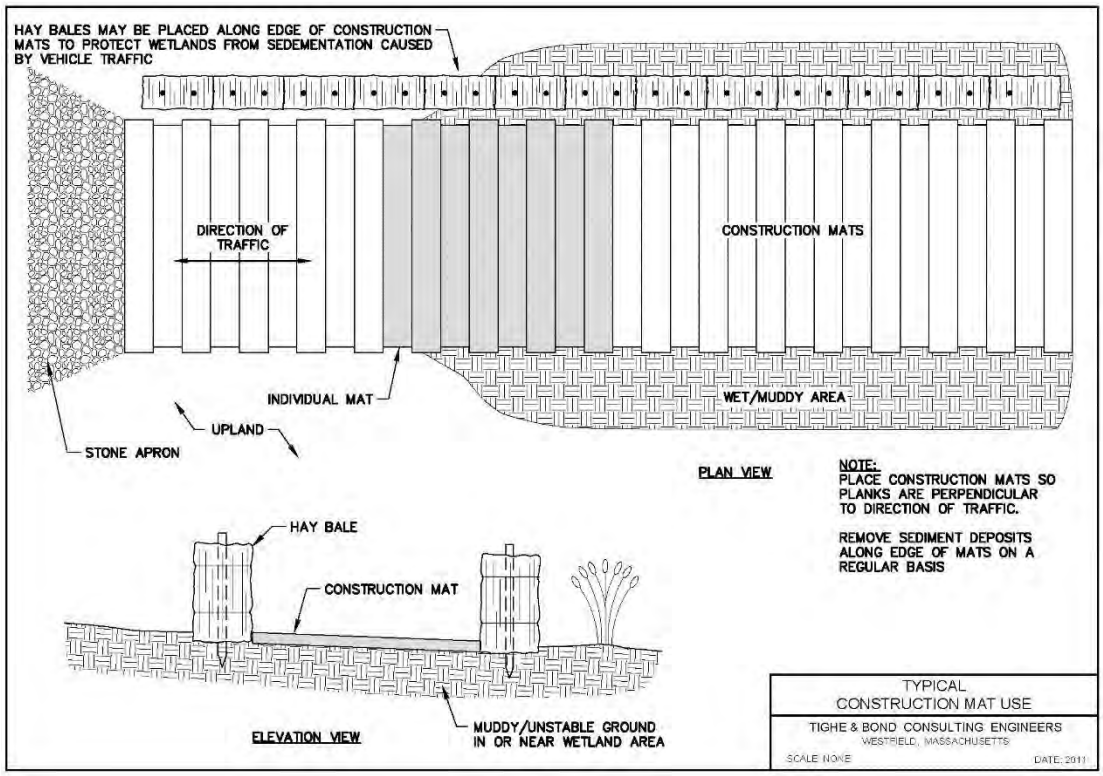
Additional Comments:

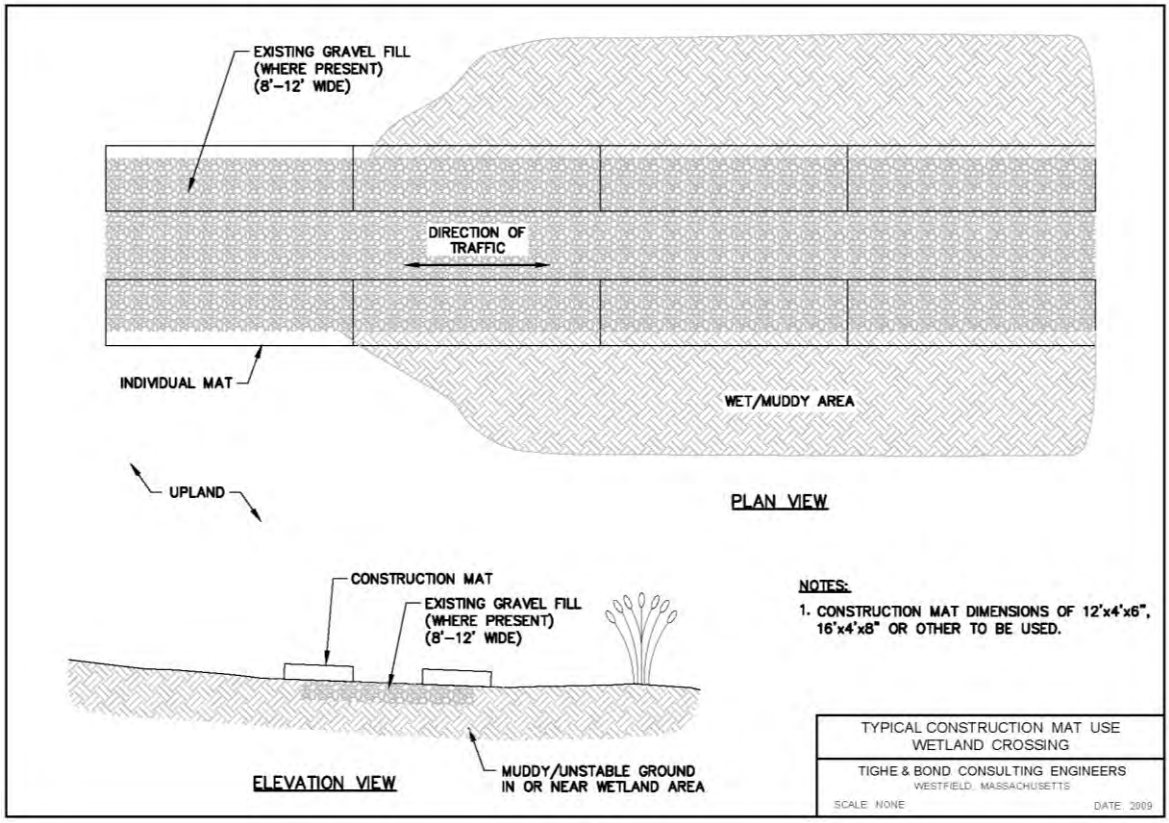
Lightweight, easy to maneuver alternatives to traditional mats are available. For example, AlturnaMATS® are half-inch thick polyethylene slip-resistant ground protection mats available in dimensions up to 4 feet by 8 feet and weigh between 21.5 and 86 pounds.

See photograph and typical sheet on following pages.



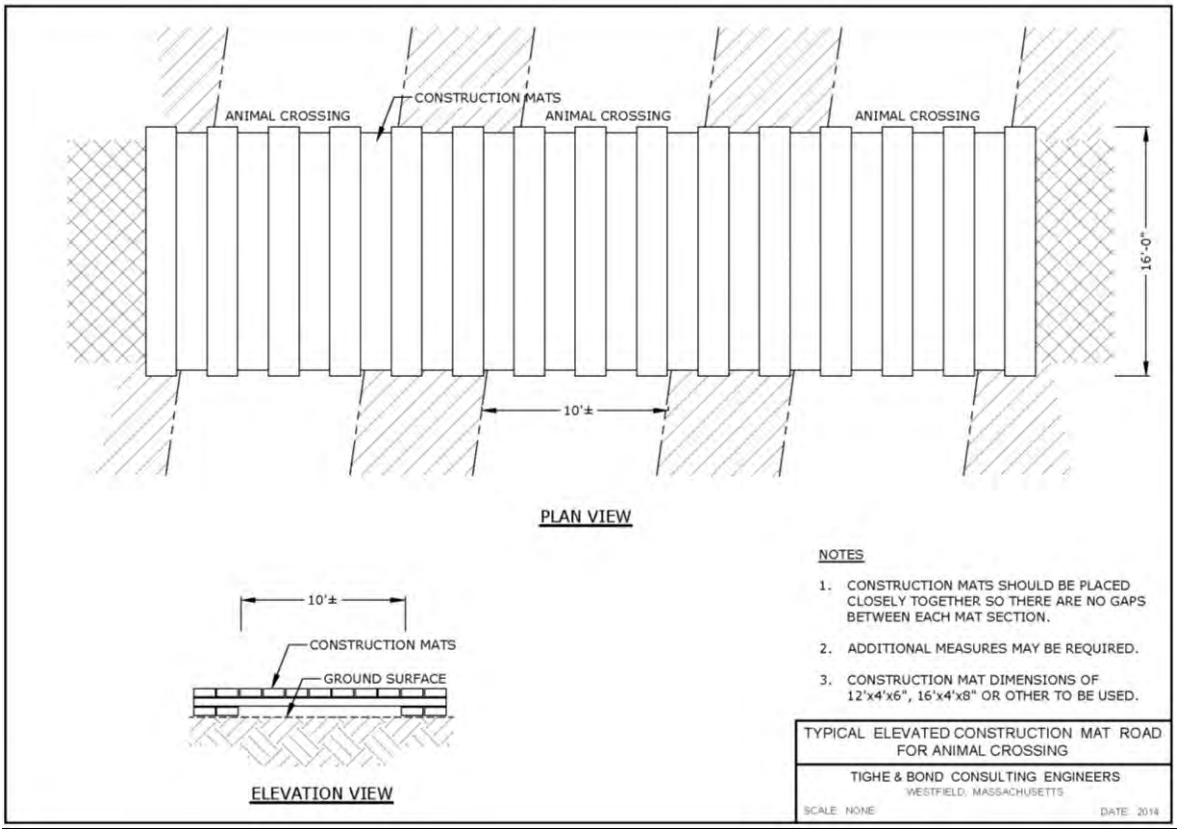
Construction mat access road.




EXISTING GRAVEL FILL
(WHERE PRESENT)
(8'–12' WIDE)
DIRECTION OF
TRAFFIC
INDIVIDUAL MAT
WET/MUDDY AREA
UPLAND
PLAN VIEW
CONSTRUCTION MAT
EXISTING GRAVEL FILL
(WHERE PRESENT)
(8'–12' WIDE)
ELEVATION VIEW
MUDDY/UNSTABLE GROUND
IN OR NEAR WETLAND AREA
NOTES:
1. CONSTRUCTION MAT DIMENSIONS OF 12'x4'x6",
16'x4'x8" OR OTHER TO BE USED.
TYPICAL CONSTRUCTION MAT USE
WETLAND CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2009

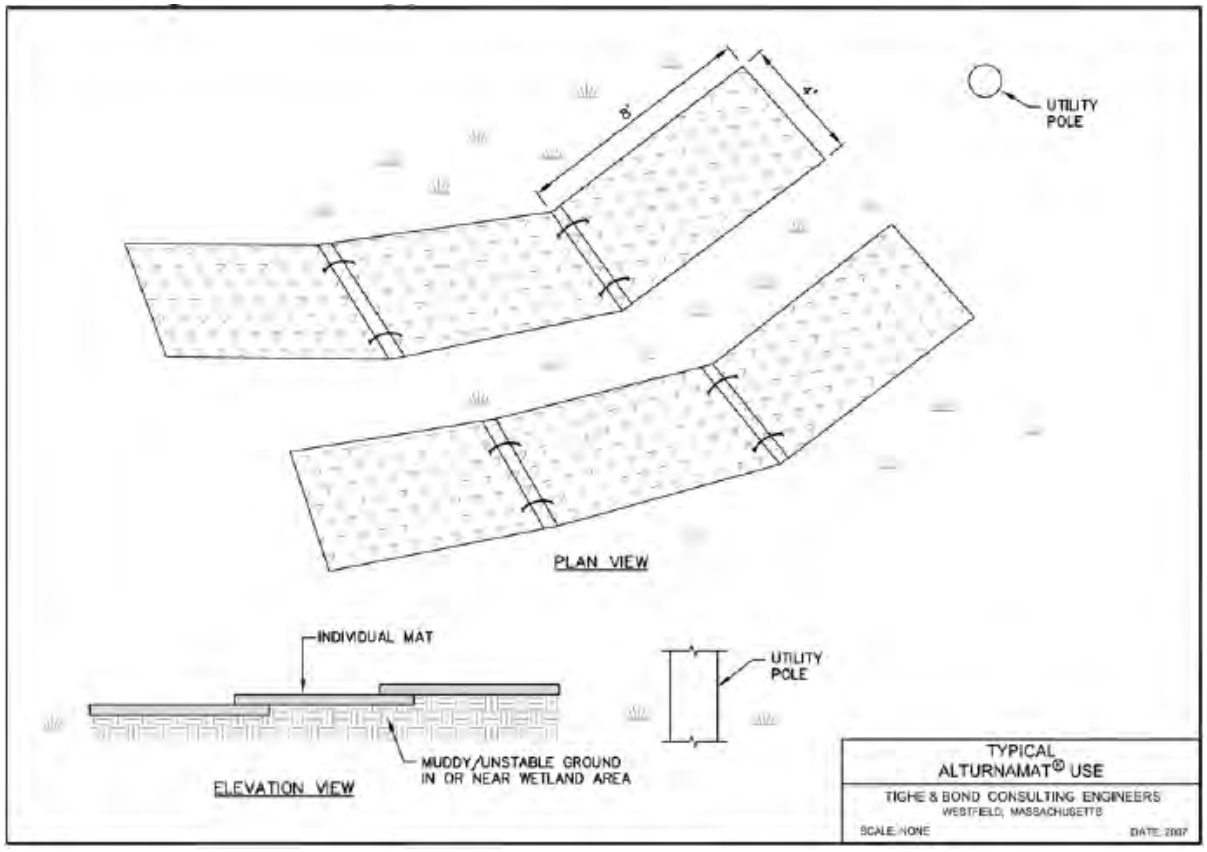


Elevated construction mat road with bridging for animal crossing.





AlturnaMAT® tracks to utility pole in wetland.



TAB 2B

Permeable Road (i.e., rock sandwich, French Mattress, or road with continuous cross-drainage)

Applications: Wetland crossings, rut minimization

Limitations:

- Not appropriate for areas where concentrated, high volume and/or velocity water flow will intersect the road (i.e., stream crossings).
- Need to be installed with heavy machinery.
- Equipment operators should remain cautious so as not to drive or slip off the side of the road.

Overview:

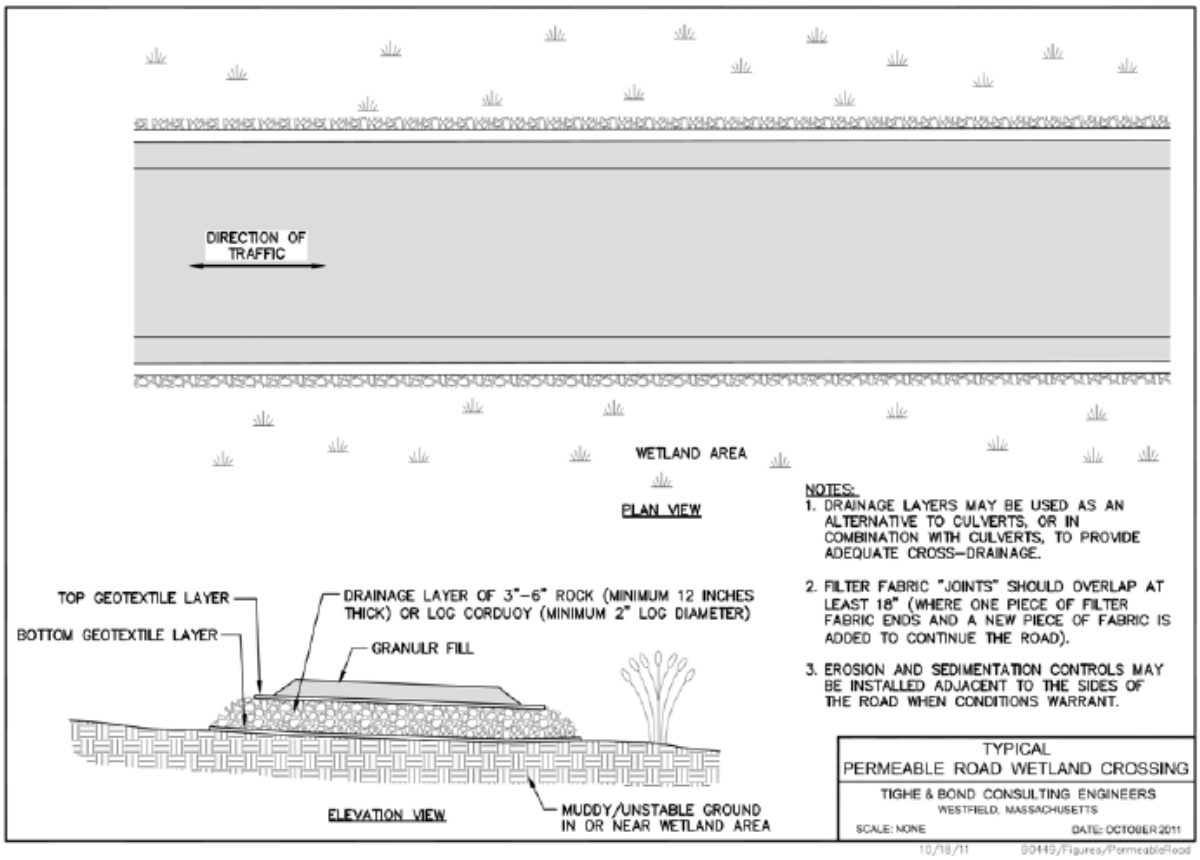
Permeable roads are used for access in situations not suitable for heavy vehicle use often due to unstable ground surfaces with shallow standing water, saturated soils, or other unstable substrate. Installation of a permeable road can also help reduce the potential for frost action and pothole creation by preventing groundwater from wicking up into the road fill material.

Installation:

- Cover existing soil with a geotextile fabric prior to road construction. Excavation of existing soil is generally not recommended in order to minimize impacts to the resource area. Construct road on top of the soil surface, as shown on the typical on the next page. Drainage layer materials include 3- to 6-inch rock (12-inch minimum depth) or log corduroy (2-inch minimum diameter).
- Install the road so that it is offset far enough from the resource area so that ruts are not created when equipment enters and exits a sensitive area.
- Remove road by "backing" out of the site and removing road one section at a time. Regrade soils to pre-existing contours while taking care not to compact soils.

Maintenance:

- Regularly inspect and clean edges of cross-drainage layer along the sides of the road to prevent clogging by debris, leaf litter, sediment, etc.


DIRECTION OF TRAFFIC
WETLAND AREA
PLAN VIEW
NOTES:
1. DRAINAGE LAYERS MAY BE USED AS AN ALTERNATIVE TO CULVERTS, OR IN COMBINATION WITH CULVERTS, TO PROVIDE ADEQUATE CROSS-DRAINAGE.
2. FILTER FABRIC "JOINTS" SHOULD OVERLAP AT LEAST 18" (WHERE ONE PIECE OF FILTER FABRIC ENDS AND A NEW PIECE OF FABRIC IS ADDED TO CONTINUE THE ROAD).
3. EROSION AND SEDIMENTATION CONTROLS MAY BE INSTALLED ADJACENT TO THE SIDES OF THE ROAD WHEN CONDITIONS WARRANT.
TOP GEOTEXTILE LAYER
BOTTOM GEOTEXTILE LAYER
DRAINAGE LAYER OF 3"-6" ROCK (MINIMUM 12 INCHES THICK) OR LOG CORDUOY (MINIMUM 2" LOG DIAMETER)
GRANULR FILL
ELEVATION VIEW
MUDDY/UNSTABLE GROUND IN OR NEAR WETLAND AREA
TYPICAL
PERMEABLE ROAD WETLAND CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: OCTOBER 2011
10/18/11
S0449/Figures/PermeableRoad

3.4.4 Watercourse Crossings

There are a number of BMPs that can be used to minimize disturbance to streams. For each application, consider the site and project needs to select a method that is cost effective and will incur the fewest secondary disturbances. Additional erosion and sedimentation controls (e.g., hay or straw bales) may be required in conjunction with the stream crossing BMPs to protect sensitive areas. The stream crossing methodology chosen will depend largely on the equipment required for a particular task, the existing environmental conditions, and the duration of the crossing. In constructing any stream crossing, care should be taken to limit disturbance to the extent practicable within 100 feet of the stream banks (the riparian area). The riparian area provides habitat to a number of species and provides protection and shading to the stream.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during new watercourse crossings by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Straw wattles, Geotextile silt fencing** and **hay/straw bale barriers** may be installed at the edges of earthen roads or construction mat roads to prevent erosion of soil into watercourses from the road fill or tracked soil on construction mats. These controls however should generally not be placed within a watercourse.
- Side slopes of earthen roads can be protected by installing **erosion control blankets** and **seeding** the area with a fast-growing native or annual grass mix.

3.4.4.1 Best Management Practices – Watercourse Crossings

The following are BMPs that are applicable to new access roads watercourse crossings and are described at the following tabs:

Stream Crossings without Bridges (includes limiting turbidity and stone crossing) – Tab 3A

Bridged Crossings (includes construction mat bridges and rail car frame bridges) – Tab 3B

Culverts – Tab 3C

Poled Fords – Tab 3D

Dewatering – Appendix A Section II

TAB 3A

Stream Crossings Without Bridges: Limiting Turbidity

Applications: Stream crossing, turbidity control

Limitations:

- Limited to areas where stream banks and bottoms will not be significantly damaged by the crossing.

Overview/Use:

- In some situations, such as routine or emergency maintenance with small ORVs, pickup trucks or tracked equipment, it may be acceptable for equipment to simply travel (perpendicularly) through a stream.
- Crossings are generally considered acceptable in situations where there is an existing or historic access road, a stable rock or sand/gravel stream bottom, and/or the crossing is at a relatively narrow reach of the stream and any adjacent wetlands.
- Cross streams slowly to minimize in-stream turbidity.

Stream Crossings Without Bridges: Stone Crossings

Applications: Stream crossing, turbidity control

Limitations:

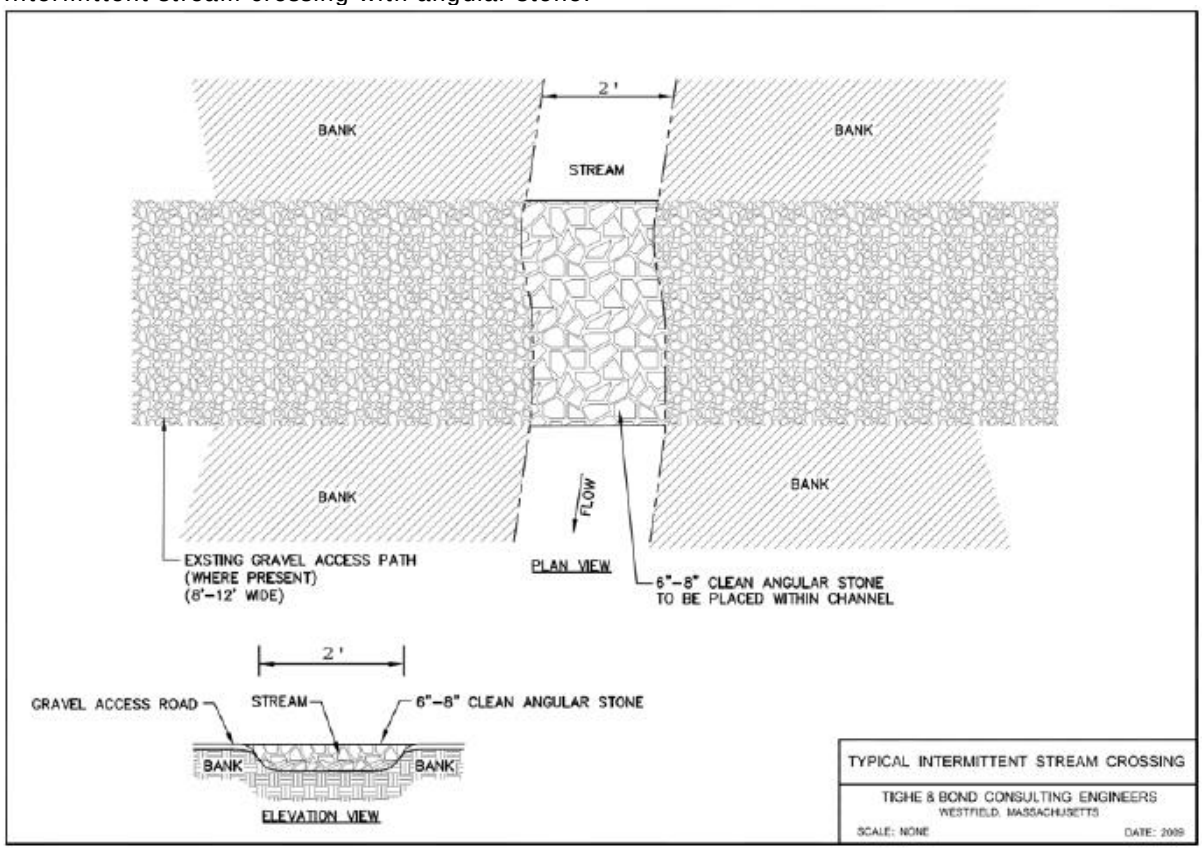
- Only use in small (less than 2-feet wide or braided) intermittent streams which do not appear on USGS topographic maps, and have a downstream section with a gradient greater than 20%.
- Not suitable in areas where there could be a potential for fish passage.
- Stone size should be sufficient to allow for macroinvertebrate passage.
- Not preferred for new access road crossings. Generally is a BMP more suitable for existing access road crossings.

Overview/Use:

- Use to cross small streams with stable stream bottoms.
- Carefully place 6-inch to 8-inch clean angular stone within stream at crossing. Limit width of stone to that needed for widest vehicle/equipment to crossing the stream.
- Drive over stone slowly.
- Leave riprap in intermittent streams for future use. More damage will occur by removing stone.



Intermittent stream crossing with angular stone.



TAB 3B

Bridged Crossings: Construction Mats as Temporary Bridge

Applications: Watercourse crossings

Limitations:

- Installation requires machinery.
- May become unstable under high flows.

Overview/Use:

- Untreated wooden construction mats may be used as a temporary bridge over a stream to allow construction vehicles access to the work site. Construction mat bridging is suitable for crossing intermittent and perennial streams. Before constructing a stream crossing, confirm that the construction mats are capable of supporting the equipment to be used.
- Place small sections of matting on either side of the stream parallel to the flow of water at top of banks to act as supports. Then place mats perpendicular to the stream and resting on top of the initial construction mat supports.
- It may be necessary to place a large steel plate along the top of the construction mats for extra stability and to minimize the amount of sediment that could fall between the spaces of each timber.



Construction mat bridge.

Bridged Crossings: Rail Car Frame as Temporary Bridge

Applications: Watercourse crossings

Limitations:

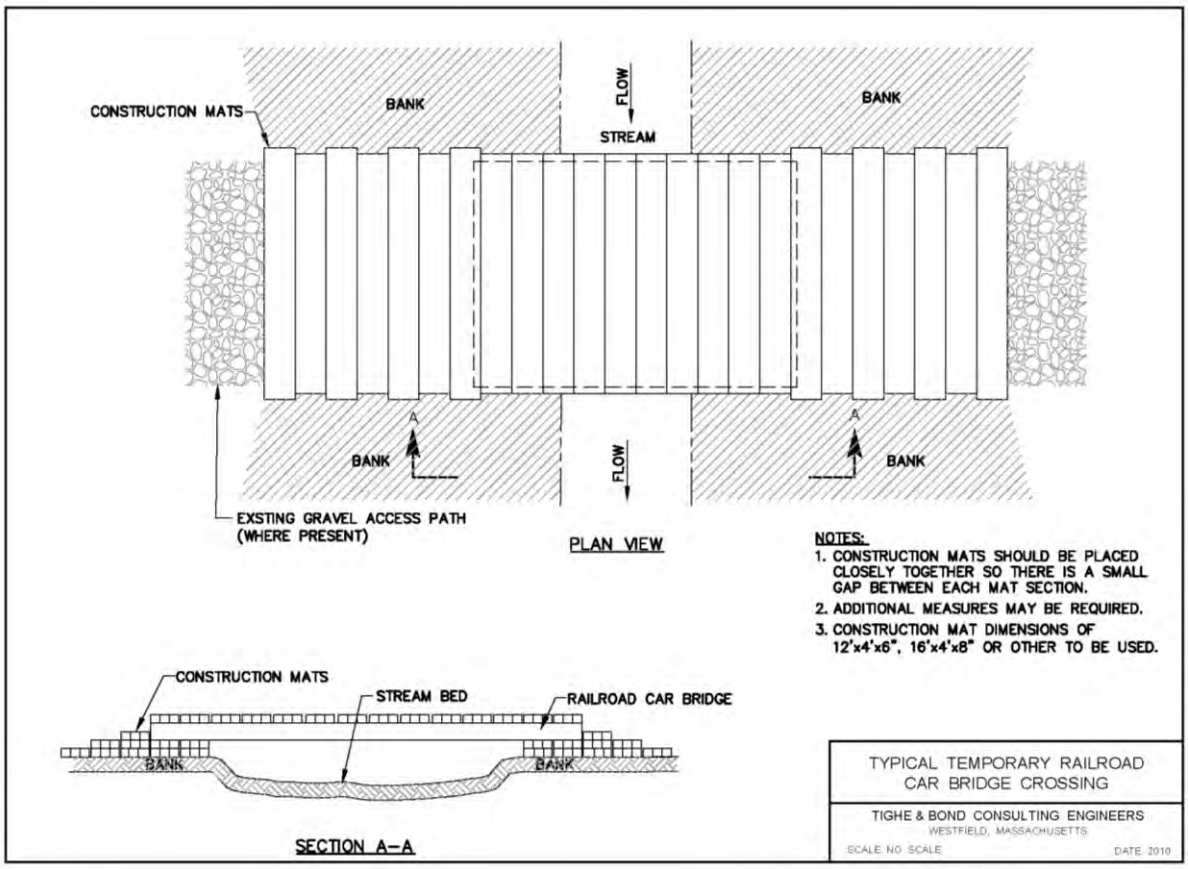
- Requires heavy equipment for transport and installation.
- Expensive.
- Banks must be stable to support heavy loads.

Overview/Use:

- Used rail car frames can be used for crossing larger and deeply incised streams where construction mats are unsuitable.
- Place the rail car frame perpendicular to the stream flow and between opposing banks. Use timber frame footings, if necessary. Next, place construction matting on the rail car frame to provide vehicle access.



Rail car frame bridge crossing.


CONSTRUCTION MATS
BANK
FLOW
STREAM
BANK
A
BANK
FLOW
A
BANK
EXSTING GRAVEL ACCESS PATH
(WHERE PRESENT)
PLAN VIEW
NOTES:
1. CONSTRUCTION MATS SHOULD BE PLACED CLOSELY TOGETHER SO THERE IS A SMALL GAP BETWEEN EACH MAT SECTION.
2. ADDITIONAL MEASURES MAY BE REQUIRED.
3. CONSTRUCTION MAT DIMENSIONS OF 12'x4'x6", 16'x4'x8" OR OTHER TO BE USED.
CONSTRUCTION MATS
STREAM BED
RAILROAD CAR BRIDGE
BANK
BANK
SECTION A-A
TYPICAL TEMPORARY RAILROAD CAR BRIDGE CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NO SCALE
DATE: 2010

TAB 3C

Culvert Installation/Repair/Replacement

***Contact Environmental Licensing and Permitting prior to performing any culvert installations or replacements.**

Applications: Stream and wetland crossings

Limitations:

- Permitting and design are required for new culvert installation or expansion of existing culvers over streams and wetlands. Significant regulatory requirements must be followed. Permitting restrictions on time of year use.
- Installation may require in-stream work; dewatering and sedimentation concerns.
- Culverts are susceptible to washouts, sedimentation, erosion, and failure during heavy wet-weather events and flooding.
- Culverts require routine and long-term maintenance because they often become clogged with debris or other obstructions.

Overview:

Culverts are installed to maintain wetlands or streams at road crossings. Hydraulic calculations are required at all crossings to determine the area that will drain to the culvert.

General Design Guidelines:

- Size culverts to handle the maximum expected flow of the wetland or watercourse. It is preferable to one large culvert rather than multiple culverts. Corrugated culverts are favored because they slow the water velocity. Plastic pipes are preferred to metal.
- Design culverts to withstand and accommodate high flows while maintaining existing low flows and not impeding on the movement of indigenous aquatic life. Culverts must be sized to accommodate flows from at least the 100-year storm and preferably 500-year storm.
- The maximum velocity at the culvert outlet should be consistent with the velocity of the natural channel. To mitigate higher velocities, use outlet protection measures, energy dissipation, and channel stabilization, if necessary.
- Refer to state specific stream crossing guidance documents for additional design requirements:
    - Connecticut: Stream Crossing Guidelines, CT DEEP, Inland Fisheries Division Habitat Conservation and Enhancement Program, February 26, 2008, www.ct.gov/deep/lib/deep/fishing/restoration/streamcrossingguidelines.pdf
    - Massachusetts: Massachusetts River and Stream Crossing Standards, River and Stream Continuity Partnership, March 1, 2006, Revised March 1, 2011, www.nae.usace.army.mil/Portals/74/docs/regulatory/StreamRiverContinuity/MA_RiverStreamCrossingStandards.pdf

Installation:

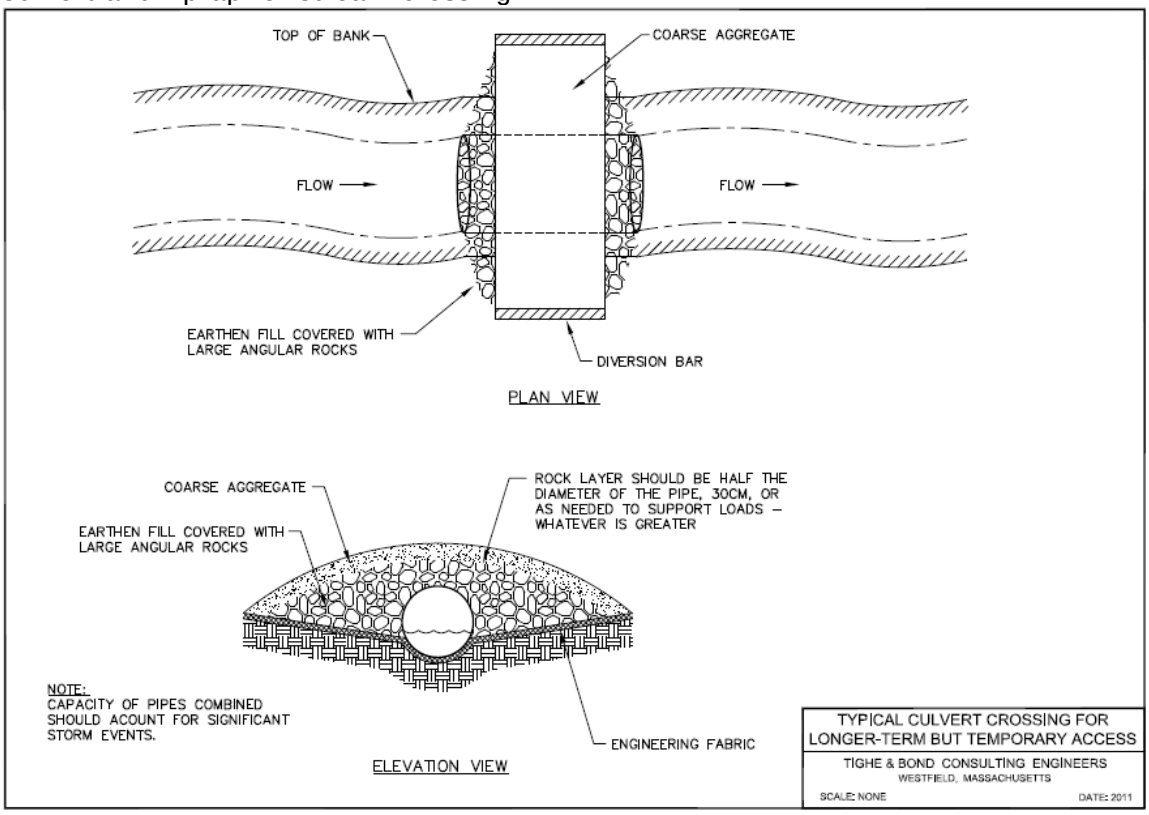
- Construction mats may be placed over culverts to provide structural protection from heavy loads.
- Backfill culverts with natural substrate matching the upstream and downstream streambed substrate, even when fish passage is not a concern. Other aquatic organisms rely on natural streambed sediment to aid their movement.
- Strive to install culverts with minimal disruption to the watercourse and riparian buffer zone.
- Culvert length should be as short in length as practicable. Cut culverts to size if they are protruding into the natural streambed.

Maintenance:

- Remove debris and sediment from culverts to maintain an open channel for flow. A clogged culvert could result in flooding and washout.

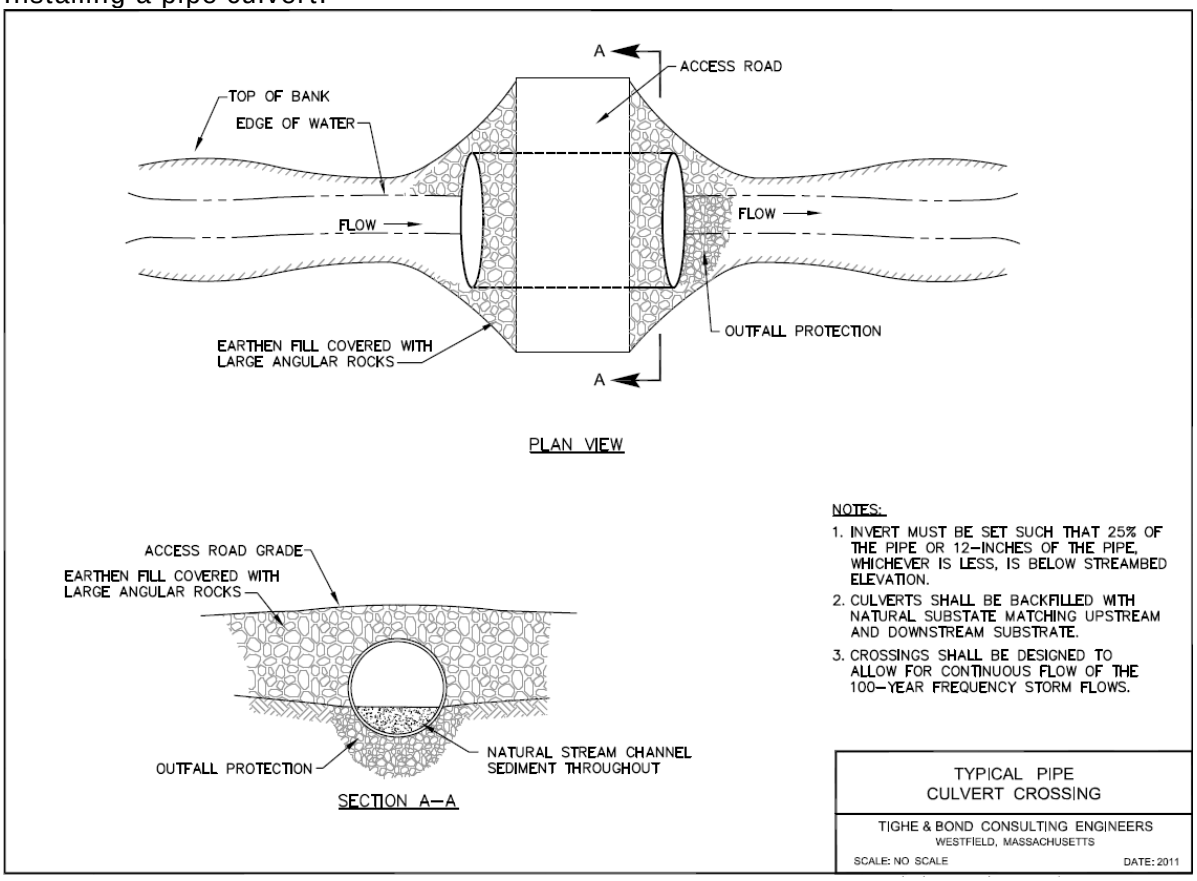


Culvert and riprap for stream crossing.



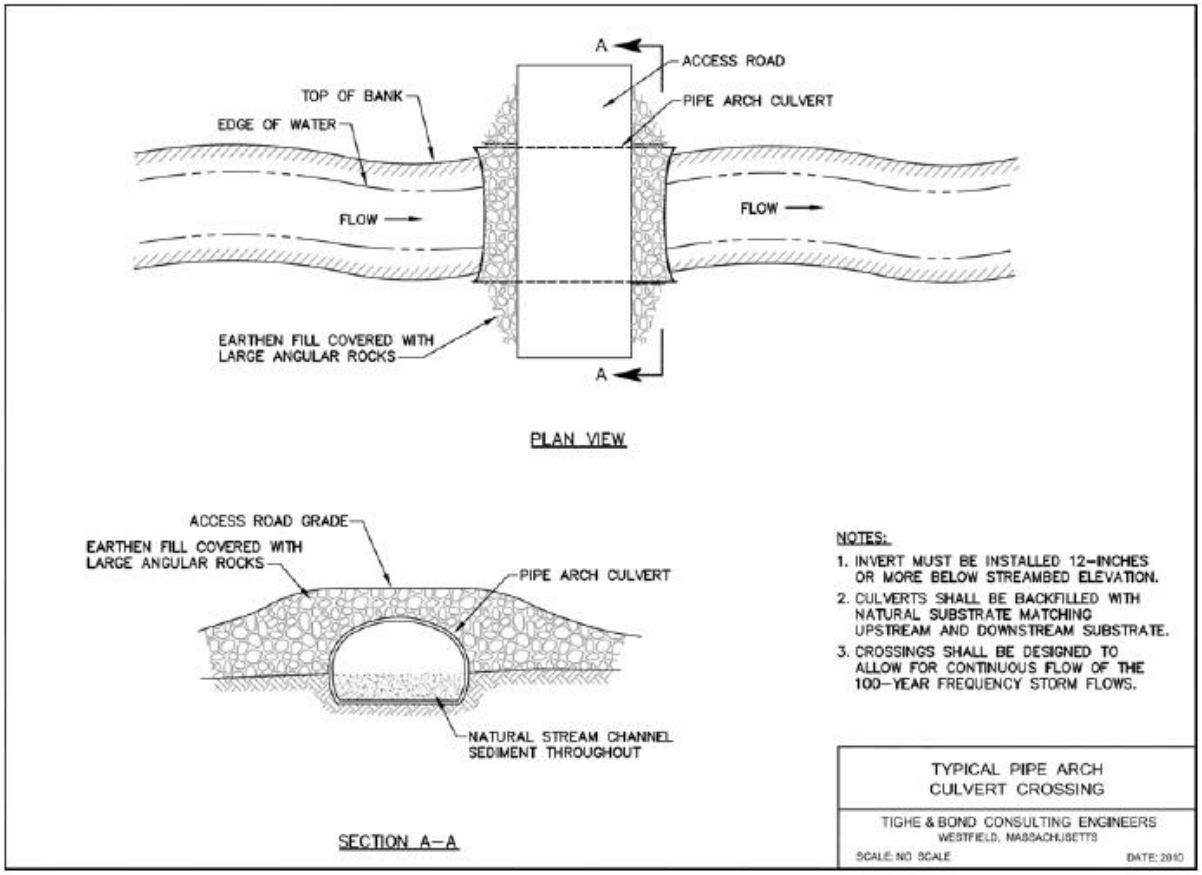


Installing a pipe culvert.



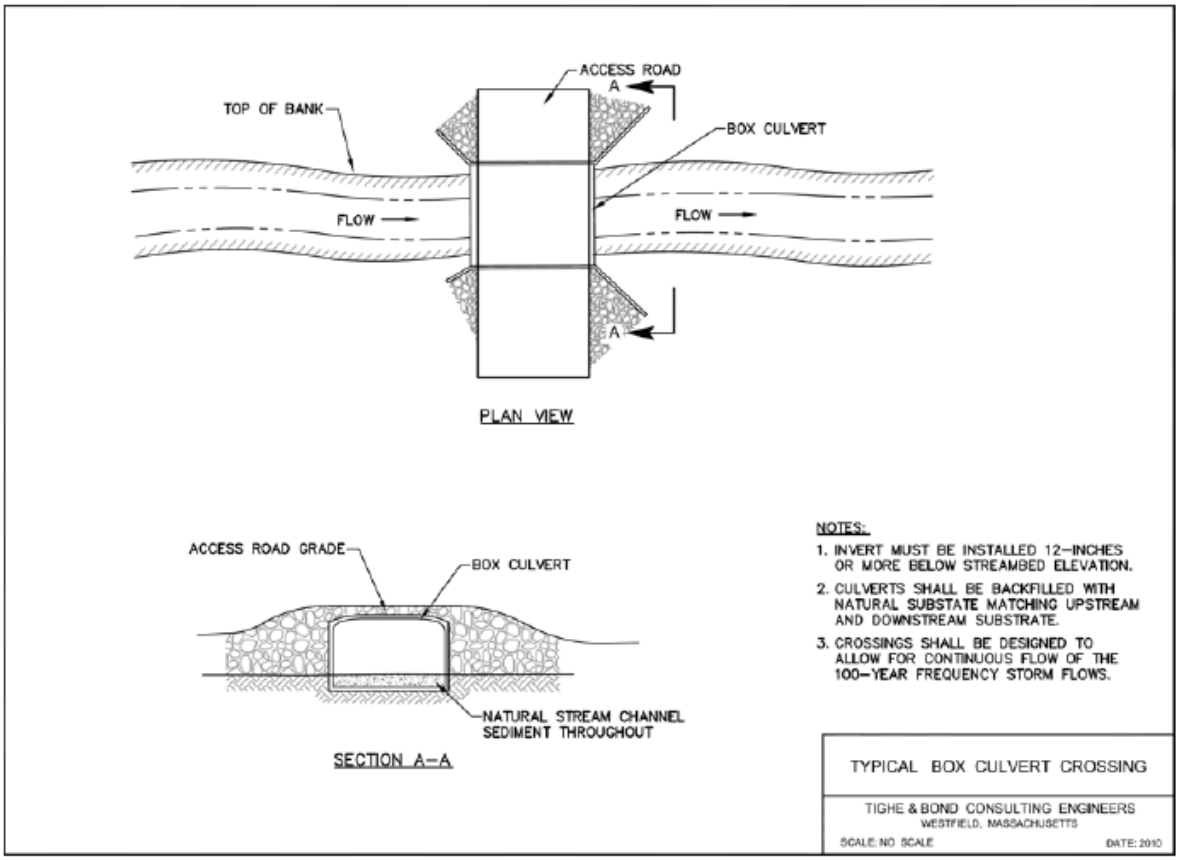


Pipe arch culvert.





Embedded box culvert with wing walls.



TAB 3D

Poled Fords

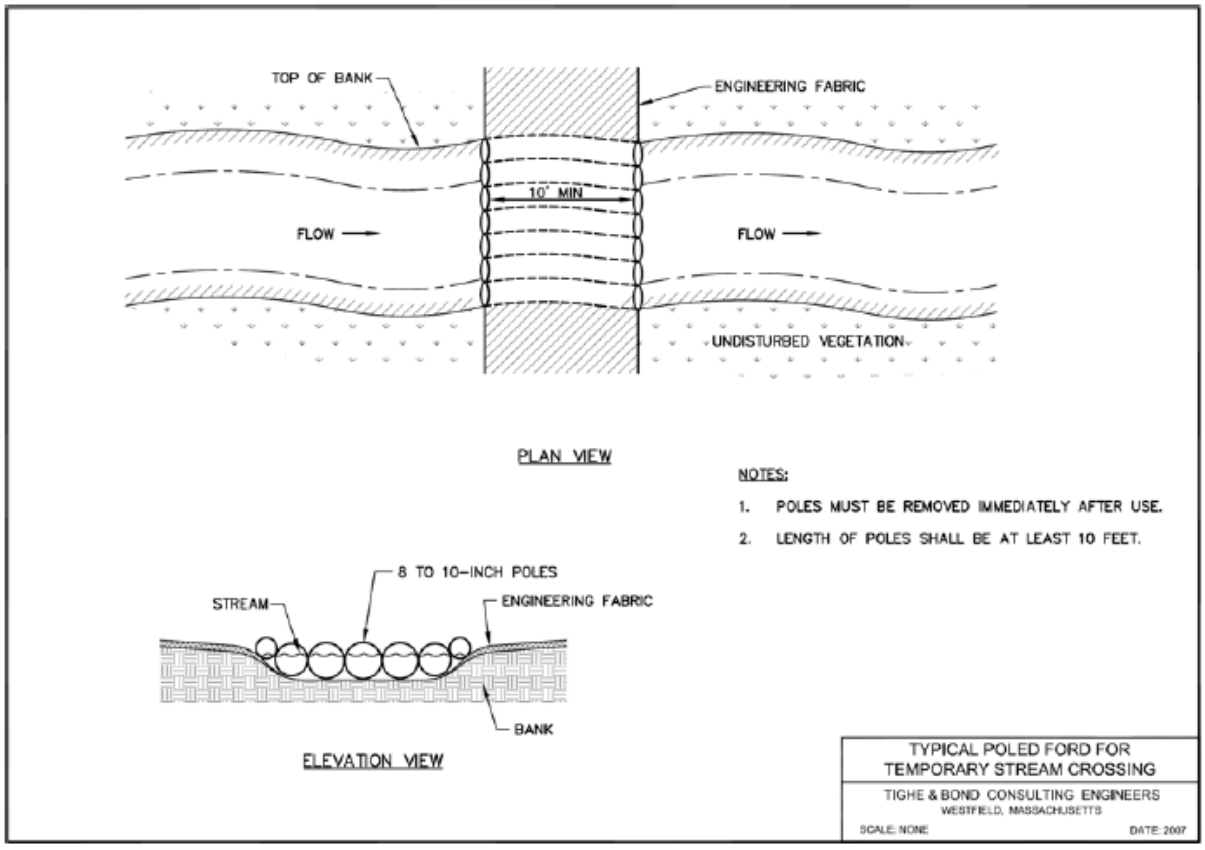
Applications: Stream Crossings

Limitations:

- Limited to streams with gently sloping adjacent land.

Overview/Use:

- Poled fords are used in remote locations where a stream crossing requires a functional BMP, but it is impractical to bring in larger materials. Sufficiently sized wood poles or saw logs of may be laid in the streambed parallel to the flow.
- Gently slope the road to and from the streambed at a maximum ratio of 1:5 (V:H). To limit disturbance to the riparian area, install engineering fabric and cover with an aggregate bed at the approach and exit.
- Use poles with a minimum length of ten feet.
- Remove poles immediately after use.



3.5 Slope Excavation

Engineering designs may be required for any upland changes that could potentially direct or channel water across the face of a terrace escarpment slope. No snow or soil piles, construction materials, or equipment should be stored in the immediate vicinity at the top of the terrace escarpment slope.

3.6 Vegetation Removal and Preservation

Care should be taken to limit disturbance to the extent practicable when removing vegetation. Grubbing is not preferred as it results in considerable erosion and should be avoided to the extent feasible. Utilize grubbing only when all other methods cannot be used to prepare stable and safe work areas. If grubbing is necessary, the area must be covered with seed and mulch to protect it prior to the end of the work day. During mowing and trimming, woody debris greater than two (2) inches in diameter should not be placed in wetlands, and no woody debris should be placed in standing water. All woody debris must be removed from wetlands if required by a permit condition. Mowing must be kept to a minimum, particularly at road crossings.

3.6.1 Right of Way (ROW) Vegetation and Eastern Box Turtle (EBT)

Eastern box turtles (EBT) are often found near small streams and ponds and inhabit old fields, deciduous forests, and logged woodlands. Adults are completely terrestrial, while the young may be semiaquatic and hibernate on land by digging down in the soil between October and April. EBTs have an extremely small home range and can usually be found in the same area year after year. EBT populations have been negatively impacted by the loss of suitable habitat. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated. Therefore, vegetation removal in ROWs should be performed in a manner that minimizes impacts to turtle populations.

Cleared and Maintained ROW—EBTs have been found to use existing ROWs for foraging and nesting. Whenever feasible, perform maintenance mowing in identified habitat during inactive periods (November 1 to April 1). If mowing during the active turtle season (April 1 to November 1) is required, mow vegetation to no lower than seven (7) inches. Use Brontosaurus or Fecon mower heads to minimize the impact to identified habitat areas. Do not used Flail-type mowers during the active season.

Uncleared ROW—When project work requires vegetation removal in an uncleared ROW, cut and mow uncleared portions of EBT habitat during the active season (April 1 to November 1). If clearing must be conducted during hibernation periods, pre-planning will involve conducting a turtle survey and the possible use of telemetry. Consult Environmental Licensing and Permitting before performing work because this activity may not be covered under the Operation and Maintenance Plan and may require a permit.

		Recommended Maintenance Activity if the Existing ROW is:	
Time Period	Turtle Status	Cleared and Maintained	Uncleared
April 1 to November 1	Active	*Perform only if required*—Mow vegetation no lower than seven (7) inches and use recommended mower heads	*Recommended*—Cut and mow uncleared areas
November 1 to April 1	Inactive	*Recommended*—Perform maintenance mowing	*Not recommended*—Requires turtle survey at minimum before removing vegetation

General Construction Recommendations –The following are general construction guidelines for protecting turtles:

- Install silt fencing around the work area prior to construction activity. Consider using syncopated silt fencing (Appendix A).
- Turtle training is required for all contractors. Apprise workers of the possible presence of turtles and provided a description of the species. Include a turtle sweep reminder on the Tail Board.
- Conduct a turtle sweep after installing silt fencing and before conducting work.
- Perform daily turtle sweeps in work areas before performing any work.
- Carefully move any turtles that are discovered to an area immediately outside of the fenced area. Position turtle in the same direction that it was walking.
- Perform work with caution during early morning and evening hours. Take special care not to harm basking or foraging individuals.
- Remove silt fencing after work is completed and soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.
- Return temporary cross country access routes to pre-construction grade, seed if adequate root and seed stock are absent, and mulch. Do not seed pre-existing sandy soils that are within mapped rare turtle habitats unless directed by Environmental Licensing and Permitting in order to avoid altering nesting habitat

3.6.2 Preservation of Existing Vegetation

Preserve the existing vegetation (i.e., groundcovers, vines, shrubs, trees) on a site when practicable to improve soil stability and decrease the runoff volume and velocity. Identify and protect specified trees for erosion and sediment control benefits and/or aesthetic purposes. Consider saving trees that provide shading or screening benefits, particularly in residential areas. Preserve existing vegetation by reducing the width of a cleared ROW at stream crossings. See Appendix A for preserving existing vegetation BMP.

3.7 Work Pads

3.7.1 De-Energized and Energized

Applications: Work in wetlands

- Reconnaissance of each workpad area in or adjacent to wetlands should be performed to determine if the construction mat workpad areas could be located outside of wetland resource areas. Wetland disturbances should be avoided or minimized where practicable. Contact Environmental Permitting and Licensing.

Limitations:

- Requires heavy machinery for installation.
- Significant amount of time required for installation and removal.
- Pads for live line work require a considerably larger footprint.
- Several layers of matting may be needed in deep, construction areas.
- Animals may be injured or killed when attempting to cross workpads.
- May not be suitable in deep/open water wetlands.

How to Use:

- Work at structures may require placement of construction mats to provide safe and stable workpad areas for employees and contractors.
- Live line work, which is work that is done while the line is energized, requires a much larger workpad area. Efforts should be made to stay out of wetland areas to the extent practicable.
- Sizes of workpads vary based on the type of work being proposed.
- Workpad areas may extend into wetlands where structures that require maintenance either fall within or are in close proximity to wetlands. In these cases, untreated wooden construction mats shall be used to limit disturbance.
- Install silt fencing around work pads in identified amphibian and reptile priority habitat and where matting is greater than one mat thick. The exclusionary silt fencing will deter animals from moving across workpads and reduce the likelihood of being crushed by heavy equipment.
- Following construction activities all mats at each workpad and vehicle access locations must be removed.
- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils.
- In areas with invasive species, plant material should be removed from mats following removal from the infested area to prevent the spread of invasive species.

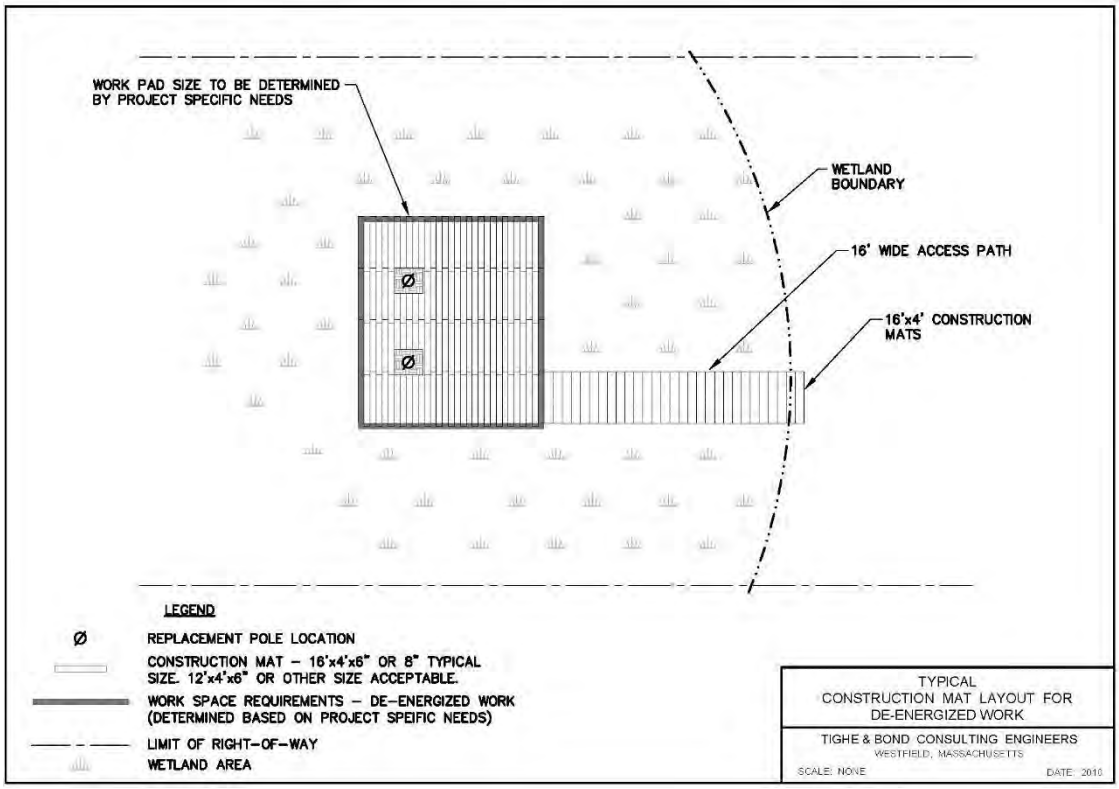
3.7.1.1 Best Management Practices – Work Pads

De-energized work requires small workpad areas, while live line work (i.e., work that is done while the line is energized) requires a much larger workpad areas.

De-energized construction mat workpads – Tab 4A

Energized construction mat workpads – Tab 4B

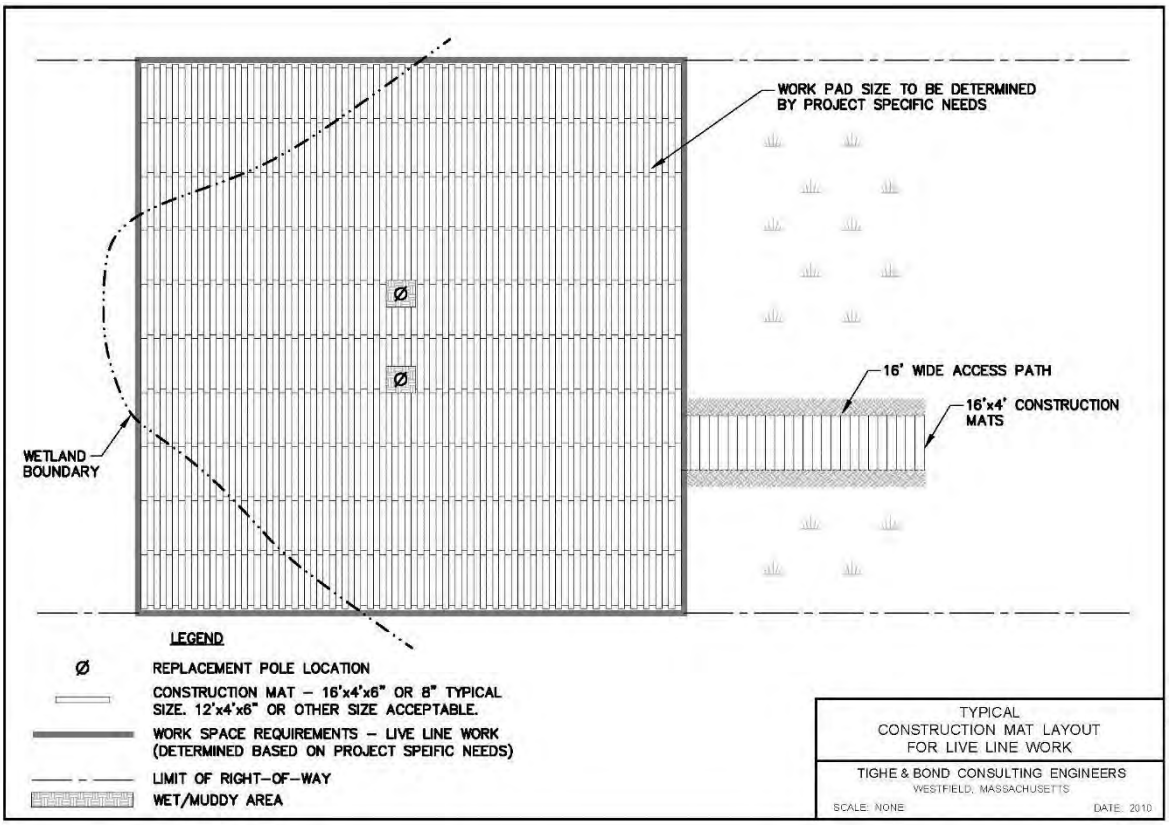
TAB 4A





Construction mat wetland work-pad for de-energized work.

TAB 4B





Construction mat wetland workpad for live line work.

3.8 Structure-Related Work

3.8.1 Wetland

Structure-related activities that may occur in wetlands include structure replacement/ installation (including casing installation), guy wire anchor installation, counterpoise installation, and pole butt removal. Access to these areas and completion of the activities can cause disturbance to wetland vegetation and soils. Therefore, structure-related activities in wetlands should entail use of adequately sized work-pads and proper dewatering methods. Inspection of the construction access and associated dewatering measures should occur daily during construction to ensure that controls are in working order, and repairs to damaged/deteriorating controls are made in a timely matter. Repairs may include regrading the traveled surface to eliminate ruts as well as those repairs required by each erosion and sedimentation measure used.

Structure Replacement/Installation

Structure replacement may require impacts to wetlands to install new poles and their casings. Poles that are significantly damaged must be replaced to comply with engineering and safety standards. Not replacing damaged structures could result in the eventual failure of one or more structures within or adjacent to wetlands.

Replacement structures will often be replaced within a few feet of the original structure to maintain the required distances and line sags between other existing structures. Therefore, options for relocating proposed replacement structures are limited. Pole replacement will also require placement of construction mats in wetlands to provide a safe workpad for the required structure replacement activities. Usually, there are no alternatives to conduct this work from nearby upland areas or to install the replacement structures in upland areas. Each structure replacement area should be assessed to determine the required footprint needed for construction mat workpads. Typical installation is as follows:

- At each pole location, remove wetland topsoil with an excavator and stockpile.
- If a borehole is drilled, collect and dispose of drilling spoils in an upland area.
- A galvanized steel casing is then driven into place at least 12 inches below the ground surface. The new pole is installed within the casing with a crane. The casing is then backfilled with crushed rock and compacted.
- Stockpiled wetland topsoil is placed above the casing to the ground surface. No net fill in wetlands occur, as the original poles are removed.
- Following installation of the new structures, the old structures are removed. Each pole is cut with a chainsaw and allowed to fall to the ground, which in wetland areas is protected by construction mats. Pole butts will remain in place; if removing the pole butt will cause more damage than if left in place.
- Remove the pole and all appurtenant accessories (e.g., cross-arms, insulators) and properly dispose off-site. Remove each pole butt by pulling with an excavator positioned on a construction mat. If it is apparent that pole removal will compromise the integrity of the new pole installation, or that removal will result in additional disturbance to wetland areas, cut off the old pole at least 12 inches below ground level.

Guy Wire Anchor Installation

Guy wire anchors supporting the structures may also require replacing. There are two types of anchors: 1) helical and 2) plate type. The helical anchor is preferred over the plate anchor because the installation of the helical anchor results in less disturbance to the wetland.

- Load test the existing anchor to 15,000 pounds to determine whether it will support the pole structure. In the event the existing anchor cannot be re-used, remove it and install a new anchor.
- Screw in place a special triple helix ("screw type") anchor with 1 ½-inch square rods with an anchor installation rig operated from the matting area. Add rod sections in five foot increments as needed until proper holding capacity of the anchor is achieved.
- Helical anchors are turned into the ground with only the rods protruding. Disturbance to the wetland from the helical anchor is minimal.
- Plate anchors are used in wetlands when proper holding cannot be achieved with screw anchors. To install a plate anchor, a pit is excavated to a sufficient depth and if necessary a concrete footing would be installed several feet below surface grade.
- When excavating to install plate anchors, segregate the top 12 inches of wetland topsoil from the underlying material. When the plate anchor has been set, backfill the excavation with underlying material. Then following the backfilling of underlying material return the segregated topsoil to the surface of the excavation.

Counterpoise Installation/Grounding

To install grounding equipment in wetlands, use hand digging or minimally invasive methods to dig around the structure and restore soil to previous grades. In some cases, grounding rods can be driven directly into the ground with hand tools. Where work is occurring in the vicinity of wetland areas, sedimentation and erosion controls will be used to limit disturbance to wetlands.

Underground facility repair/replacement

Underground facilities such as cables and conduits may be present beneath wetland areas. In the event underground facilities require repair, BMPs are required for both access and construction. Construction mats are used for access where warranted, and sedimentation and erosion controls are used to isolate the work area. During excavation activities, excavate wetland topsoil and store separately from subsurface soils. Dewatering is often required during excavation and repair activities.

An alternative to repairing a subsurface line by excavation would be to install a new line via trenching or horizontal directional drilling. The decision to use one of these alternatives is made on a case by case basis. Consult with Environmental Licensing and Permitting to determine if any permits will be needed.

Pole Butt Removal

When transmission poles are decommissioned or otherwise taken out of service, in most cases the entire pole shall be removed. Treated wood pole butts shall be removed completely from the ground and properly disposed at an off-site location. Locations where

the removal of pole butts may cause significant disturbance to wetlands or other sensitive areas will be considered for exception to this practice on a site-by-site basis. The Transmission Line Construction and Maintenance Manager, in consultation with Environmental Licensing and Permitting, will be responsible for determining if a pole butt can be removed if located in a sensitive area.

All pole butt holes must be backfilled and compacted (every 3') with appropriate fill material. Existing material on-site can be reused if it does not include materials that can rot (e.g., vegetation) and cause sink holes.

Disposal

Treated and non-treated wood products owned by the Transmission Group shall be stored in an area(s) designated by the Transmission Line Construction/Contract Field Services Supervisor until collected by an approved disposal vendor.

3.9 Gas Piping-Related Work

Gas piping-related activities will typically occur within roadways or along roadway shoulders. There may be some instances where wetland permitting is required when wetlands are located adjacent to or in the vicinity of roadways. However, when work is performed within the roadway/shoulder, no permitting is typically required. In all cases, BMPs should be followed to ensure environmental compliance.

Roadways and Shoulders

When working in roadways, particularly in residential areas, the following activities should be performed in addition to standard construction BMPs:

- Repave disturbed paved areas and return to original elevations on the same day that construction is performed.
- Restore all non-paved areas to preexisting or better conditions. Replace any sod or other plantings in kind or with an acceptable alternative.
- Employ dust control as necessary to minimize airborne dust.

Under certain circumstances, gas piping must be installed beneath existing culverts within roadways. Take care to ensure that any saturated material excavated from the trench be properly stored and disposed as to not cause sedimentation issues. Implement dewatering methodologies, as required.

There may be cases where a drainage ditch or swale must be crossed to gain construction access from paved roads onto ROWs along the roadway shoulder. Install construction mats, mat bridges, or temporary culverts, as necessary, to facilitate access. Culverts should be for temporary use, sized for peak flow, and removed after construction is complete. Consult with Environmental Licensing and Permitting prior to installation.

Bridges and Culverts

Attachment of gas piping to bridges or culverts is the environmentally preferable method for crossing a wetland or watercourse. Consult with the appropriate people (engineers,

the Department of Transportation (DOT), etc.) to determine if attachment to a bridge or culvert is a technically feasible option at the desired crossing location. Environmental Licensing and Permitting should also evaluate the impacts to FEMA flood storage quantities and potential Coast Guard permitting requirements. Ensure that proper erosion and sedimentation controls are in place on either side of the bridge or culvert throughout construction.

Rivers and Streams

There are two primary approaches for crossing a river or stream with a gas pipeline: direct bury (open trenching) and trenchless methods (e.g., horizontal directional drilling, standard bore/pipe jacking).

Direct bury methods involve erecting a coffer dam to isolate the work area and redirecting water flow using gravity or pumping to move water from one side of the work area to the other. Direct bury methods have larger direct environmental impacts than trenchless methods. Typical coffer dam examples are included in Appendix A.

Trenchless methods use specialized equipment to install piping beneath a waterbody (or a major roadway, railroad, etc.). The most common method used for gas piping is horizontal directional drilling (HDD) which uses remote controlled, steerable drilling equipment to install pipe along a long arc alignment. The drilling process can be divided into three steps: pilot, reaming, and pull-in. The first step is to drill a pilot bore-hole. Next, a larger diameter fly cutter is used to enlarge the opening. A specialized bentonite slurry drilling fluid is injected into the bore-hole to stabilize the surrounding soil and to lubricate and cool the drill bit. For the final step, a barrel reamer is used to further enlarge the bore-hole and to pull the pipe into place.

A notable environmental concern with HDD is called "frac-out." This occurs when drilling fluid breaks through the soil surface and into the waterbody. Regulatory agencies may require a "frac-out plan" which details preventative controls and response measures should frac-out occur. A typical frac out plan is included in Appendix D.

3.10 Construction Material along the Right of Way (ROW)

Once a site is prepared by clearing and/or installing erosion and sediment controls, materials may be stored along the ROW prior to the start of construction. Such materials may include the following: piping, poles, cross-arms, cable, insulators, stone, and other engineered backfill materials. In general, the stockpiling of stone and other unconsolidated material on construction mats should be avoided. If it is determined necessary due to access and workpad constraints, the material should be placed on a geotextile fabric and be properly contained with a sedimentation barrier such as straw wattle or hay bales. No construction materials should be placed in wetlands or other sensitive resource areas.

3.11 Winter Construction

3.11.1 Snow Management

Snow should not be stockpiled or disposed in any waterbody or near water supply sources. These include wetlands, rivers/streams, the ocean, reservoirs, ponds, stormwater catch basins, wellhead protection area, in high or medium yield aquifer, or within 200 feet of a

private well. In addition to water quality impacts and flooding, snow disposed in surface water can cause navigational hazards when it freezes into ice blocks. Maintain a minimum buffer of 25 feet between any snow disposal area and the high water mark of any surface water. A silt fence or equivalent barrier should be installed between the snow storage area and the high water mark of rivers, streams, ponds, or the ocean. Consult with Environmental L&P regarding any specific state and local snow management requirements.

Avoid disposing of snow on top of storm drain catch basins or in storm water drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system and cause localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water and could also result in fines or a violation.

All debris in a snow storage area should be cleared from the site and properly disposed of no later than May 15th of each year. Care shall be taken not to plow road materials away when removing snow.

3.11.2 De-Icing

Where permitted, calcium chloride is the preferred de-icing agent when applied according to manufacturer's guidelines in upland areas. Sand should be used on construction mats through wetland areas. Consult with Environmental Licensing and Permitting on de-icing agents when working in a facility or substation near resource areas. Many municipalities have specific de-icing agent requirements for work within 100 feet of wetland resources and other sensitive areas.

3.11.3 Snow and Ice Management on Construction Mats

Promptly and properly remove snow from construction mats to avoid ice formation. Remove snow from construction mats before applying sand to avoid forming ice. A round street sweeping brush mounted on the front of a truck may be an effective way to remove snow from construction mats. Propane heaters may also be suitable solutions for snow removal and/or de-icing of construction mats. Sand should be collected from the construction mats and disposed of in an upland area prior to removing construction mats from wetlands. Once construction mats are removed, wetlands shall be inspected for sand buildup that may have fallen through construction mats.

3.12 Dust Control

Dust control measures are used to reduce surface and air movement of dust from exposed soil surfaces during land disturbance, demolition, and construction activities. These practices reduce the amount of dust in the air and decrease the potential for accidents, respiratory problems, and airborne sedimentation. Construction activities should be scheduled appropriately to minimize the amount of site surface exposed at one time in order to reduce the amount of areas requiring dust control. Use dust control measures on disturbed soil surfaces and exposed soil surfaces, especially during hot or dry weather periods and in areas with excessively well-drained soils. Repetitive treatments should be used as needed, or required by permits, and until the surface is permanently stabilized.

Type	Description/Use
Vegetative Cover	• Most effective and practical method. • Use in disturbed areas not subject to traffic. • Follow seeding requirements as directed by local guidelines or permit requirements.
Stone	• Cover soil surface with crushed stone/coarse gravel.
Water/Sprinkling	• Sprinkle exposed soils until wet (Water trucks may be used depending on size of the site). • Do not excessively wet the soil as this causes run-off and also wastes water.
Barriers	• Board fences, wind fences, and sediment fences control air currents and blowing soil. • Wind barriers protect soil downgradient for a distance of ten times the barrier height. • Perennial grasses and stands of existing trees also serve as wind barriers, stressing the importance of planning work phasing properly and minimizing the amount of exposed soil.
Plastic Covering	• Cover soil piles with sheets of plastic/tarp to minimize dust.
Calcium Chloride	• Loose, dry granules of calcium chloride may be applied with a mechanical spreader. • Apply at a rate that keeps the surface moist but not high enough to cause water pollution or plant damage. This method should be done under consultation with an expert in order to maintain this balance and to determine if the site is applicable.

3.13 Soil Stockpile Management

Some projects may involve excavation and stockpiling of soil. Stockpiles should be located outside sensitive areas to the extent practicable and managed to prevent erosion and sedimentation of adjacent areas. Typical measures include the installation of protective measures (e.g., siltation fence and/or hay bales) around the perimeter of the stockpile. The stockpile must be seeded if left in place for more than 30 days. No snow or soil piles, construction materials, or equipment should be stored in the immediate vicinity at the top of a terrace escarpment slope.

When polluted/contaminated soil is encountered, it must be handled in accordance with the appropriate regulatory requirements. In addition to the measures discussed above, contaminated soils should be stockpiled on and covered by polyethylene sheeting. Sheeting used to cover the stockpile should be weighted down to prevent the wind migration of contaminated dust.

For soil stockpiles in substations, contact Environmental Licensing and Permitting. If soil/water must be stored and/or disposed, comply with existing soil and groundwater management guidelines. Coordinate with the Environmental Affairs Department (EAD) to ensure appropriate procedures are followed.

3.13.1 Best Management Practices – Soil Stockpile Management

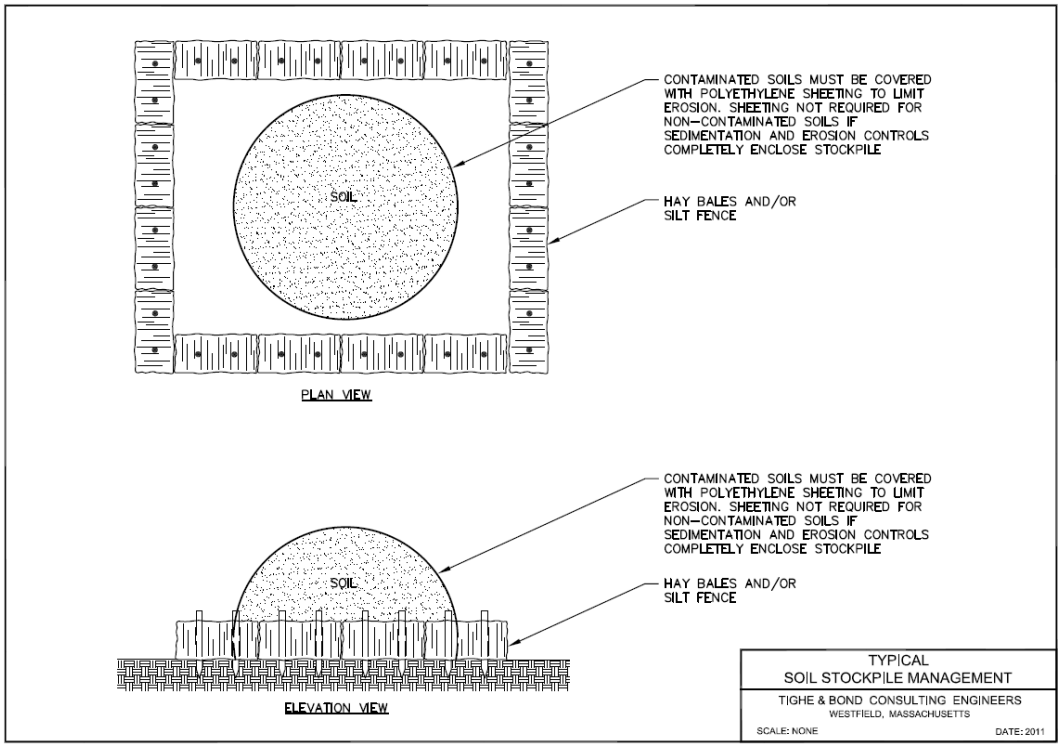
The following BMP is applicable to soil stockpile management and is described at the following tab:

Soil Stockpile Management – Tab 5A

TAB 5A



Soil stockpile management.



Section 4
Inspection and Maintenance

A pre-construction meeting will be held to discuss how often and who will be checking that all erosion and sedimentation controls are in working order. All BMPs will be inspected at least once per week during construction and at least once per month during restoration. Construction sites will be inspected after major storm events (rainfall events greater than 0.25 inches).

4.1 During Construction

Construction sites, construction access roads, and the associated erosion and sedimentation controls should be inspected by the person(s) designated at the pre-construction meeting, as required by permit conditions. Any damage observed must be repaired in a timely matter, at least within 48 hours of observation. Repairs may include regrading and/or top dressing the surface with additional aggregate to eliminate ruts as well as those repairs required by each erosion and sedimentation measure used.

All inspections will be documented in the project folder.

4.1.1 Maintenance of E&S Controls

Spare erosion and sedimentation control materials such as straw wattles, hay/straw bales and silt fencing should be kept on site or readily available so they may be replaced if they become non-functional due to deterioration or damaged during a storm, extreme water or wind, or other unexpected events.

4.1.2 Rapid Wetland Response Restoration

In the event of unintended discharges of sediment into wetlands, Eversource will quickly control, contain and remove sediment using non- or marginally invasive methods. Responding quickly to unintended discharges minimizes the difficulty and cost of restoration if the sediment is left in place for an extended period of time. Eversource will conduct sediment removal activities at the time of discharge and will notify the appropriate regulators of the discharge and the restoration process.

4.1.3 Vehicle Storage

All storage and refueling of vehicles and other equipment must occur outside of and as far away as practical from sensitive areas such as wetlands, unless specifically agreed by the Project Team and an alternate protocol is developed and approved internally. Refueling for larger, less mobile equipment such as drill rigs or large cranes, may be allowed within wetland resources only with prior approval and if specified precautions and protocols are followed. A proper location for refueling should be identified and designated before site work begins. The recommended minimum distance from wetland areas for storage of fuel and refueling is 100 feet. Additionally, equipment should be checked regularly for evidence of leaks. Construction material storage should also be located at least 100 feet from wetlands.

4.1.4 Spills

Spill kits consist of emergency cleanup and spill containment materials that can be used in the event of a fuel or other chemical spill. Spill kits must be kept on site and accessible at all times in case of an emergency spill. Such kits should generally contain multiple absorbent socks and/or pillows and wipes and temporary disposal bags. Follow the applicable Eversource Contractor Work Rules.

4.1.5 Post Construction

Post-construction inspections of restored areas will be conducted at regular intervals throughout the growing season, as required by any applicable permits, and/or after major storm events. Sites should be inspected for success or failure of revegetation, invasive species colonization, and erosion and sedimentation. In the event additional measures are required to achieve site restoration and stabilization, corrective actions shall be identified and implemented.

All information collected during inspections, regular maintenance, and repair procedures should be documented in project folders. In addition, photographic or diagrammatic logs may be kept to help record certain events and for documentation of project progress and any noteworthy observations.

The construction work is not complete until all areas are restored.

Section 5
Rehabilitation and Restoration

5.1 Restoration

All areas disturbed by construction, repair, and maintenance activities shall be substantially restored to pre-construction conditions. Please refer to Appendix A Section I for photos and typicals for loaming, seeding, and mulching. Prompt restoration minimizes the extent and duration of soil exposure and protects disturbed areas from stormwater runoff. Stabilization should be conducted as soon as practicable. Where appropriate, it is preferable to allow wetlands to naturally revegetate.

5.1.1 Seed Mixes

Several different seed mixes are available for upland and wetland restoration. State-specific comprehensive summaries of seed mixes for both temporary and permanent seeding of disturbed sites can be found within the following documents:

- Massachusetts: Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, page 157: http://www.mass.gov/eea/docs/dep/water/essec1.pdf

- Connecticut: 2002 Connecticut Guidelines for Soil and Erosion Sediment Control, page 5-3-8: http://www.ct.gov/deep/cwp/view.asp?A=2720&Q=325660

Upland Seed Mix: If significant grading or upland alteration has occurred, annual rye grass seed shall be placed following manufacturer's recommendations after regrading activities.

Wetland Seed Mix: If significant grading or wetland alteration has occurred, a wetland seed mix shall be placed following manufacture's recommendations after regrading activities.

5.1.2 Upland

The following restoration techniques apply to restoration projects in upland areas.

- Soil excavated during construction and not used as backfill must be evenly spread onto disturbed areas to restore grades. Topsoil shall be stripped and separated to the extent practical, for re-use. Permanent soil protection shall be provided for all areas disturbed by construction activities. All areas will be seeded either by Hydro-seeding or broadcast seeding. If areas cannot be seeded due to the time of year, then mulch (hay or straw) is still required prior to the next precipitation event.
- Topsoil removed during construction activities will be replaced, seeded, and mulched.
- All areas that are broadcast seeded shall be treated with a layer of mulch, such as hay, but preferably straw, up to one inch thick to enhance moisture retention, dissipate disturbance from precipitation, and detract birds foraging on broadcast seed.

- Rehabilitation of access routes and other areas must be performed as soon as practicable after construction is completed, including reestablishment of water bars or other BMPs to control erosion of the access road, and the removal and restoration of temporary wetland or waterway crossings.
    - Temporary breaks in construction activities may warrant seeding and mulching of disturbed areas as interim erosion control measures.
- Erosion control measures shall remain in place until soils are clearly stabilized. Once soils are stable, erosion controls – especially silt fence, which presents an obstacle to movement of small animals shall be removed and properly disposed. Stakes should be removed from hay bales and spread as mulch to remove barriers to wildlife movement.
- Straw is preferred over hay to prevent the spread of invasive plant species seed stock.
- If a grading operation at a site shall be suspended for a period of more than 29 consecutive days, the disturbed area shall be stabilized by seeding, mulching, and/or other appropriate means within the first 7 days of the suspension of grading.
- Within 7 days after a final grade is established in any grading operation the disturbed area shall be stabilized by seeding, loaming, and/or other appropriate means.

5.1.3 Wetland/Watercourses

Regrading of Ruts: Upon removal of construction mats, or other BMPs, the wetland resource area should be inspected for rutting or disturbance from eroded upland soils. Any rutting should be regraded to pre-existing contours and upland soils removed from wetland areas while taking care not to compact soils.

The following restoration techniques apply to restoration project in wetlands:

Maintenance, Repair, and Emergency Projects (When No Permit is Required)

- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils.
- Soils excavated from wetland areas shall be segregated and stockpiled separately (i.e., topsoil/muck apart from mineral subsoil) in a dry/upland area at least 100 feet from wetland boundaries unless other provisions have been made to facilitate restoration activities.
- Excavated wetland soils that have been stockpiled during underground utility installations within wetlands shall be replaced in the same order (i.e., mineral subsoil beneath organic topsoil/muck) to the extent practicable and restored to pre-disturbance grades.
    - Grading activities should include the elimination of ruts within the area to be restored.
- If replacement of soil associated with temporary wetland or watercourse crossings for access roads is necessary, disturbed areas must be restored to pre- disturbance grades, either seeded and mulched, or allowed to revegetate from the natural seed bank.

- Disturbed wetland areas shall generally be allowed to revegetate from the natural seed bank. Measures to discourage the establishment or spread of plant species identified as non-native, invasive species by federal or state agencies shall be utilized. Environmental Licensing and Permitting can evaluate whether to let the wetland vegetate naturally.
- Any restoration plantings or seed mixes used in restoration shall consist of species native to the project area and, if feasible, from local nursery stock.
- Any stream banks and beds damaged shall be restored through use of geotextile erosion control blankets, and/or coir logs.
- All seeded areas shall be treated with a layer of mulch (i.e., hay, but preferably straw) up to one inch thick to enhance moisture retention, dissipate disturbance from precipitation, and detract songbirds foraging on broadcast seed.

5.2 Private Property

5.2.1 Improved Areas

Access to and along the ROW over private property must be improved to the extent necessary to ensure suitable passage for construction equipment, provide erosion control, and maintain proper drainage. Upon completion of construction activities, altered yards, lawns, agricultural areas, and other improved areas must be restored to a condition equal to or better than before their use for the construction project. If access is over a property off the transmission easement, then it is the responsibility of a construction representative to determine if legal access rights are available to cross the property.

5.2.2 Overall Work Site

Construction personnel should remove all work-related trailers, buildings, rubbish, waste soil, temporary structures, and unused materials upon satisfactory completion of work. All areas should be left clean, without any litter or equipment (wire, pole butts, anchors, insulators, cross-arms, cardboard, coffee cups, water bottles, etc.) and restored to a stable condition and close to the original condition. Debris and spent equipment should be returned to the operating facility or contractor staging area for disposal or recycling as appropriate.

5.2.3 Material Storage/Staging and Parking Areas

Upon completion of all work, all material storage yards, staging areas, and parking areas shall be completely cleared of all waste and debris. Unless otherwise directed or unless other arrangements have been made with an off ROW or off-property owner, material storage yards and staging areas shall be returned to the condition that existed prior to the installation of the material storage yard or staging area. Regardless of arrangements made with a landowner, all areas shall be restored to their pre-construction condition or better. Also any temporary structures erected by the construction personnel, including fences, shall be removed by the construction personnel and the area restored as near as possible to its original condition, including seeding and mulching as needed.

5.3 Work in Agricultural Lands

Transmission lines often cross agricultural lands. In some instances, this may affect ongoing agricultural activities in and around the ROWs. If a construction or maintenance project occurs on agricultural lands, Eversource will work closely with landowners, licensees and stakeholders to minimize agricultural impacts. Whenever practical, Eversource will make reasonable efforts to coordinate the schedule of construction-related activities around the growing and harvest seasons to minimize the impacts on agricultural operations. When this is not practical, Eversource will pursue reasonable measures to mitigate any impacts.

Eversource recognizes that disturbed soils, or soils compacted by heavy construction equipment, may affect the soil's ability to support certain agricultural activities. Eversource will take reasonable steps to avoid or minimize soil compaction, and will restore soils that are compacted by construction equipment. Eversource will also work with affected landowners to determine the appropriate method for restoring the soils, and is open to discussing and implementing the landowners' alternative restoration suggestions. After the transmission improvement is complete, Eversource will remove all construction-related equipment and debris from the ROW.



Tighe&Bond

APPENDIX A

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Tighe&Bond

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Introduction

Adequate erosion and sedimentation control management measures shall be installed and properly maintained to reduce erosion and retain sediment on site during and after construction. These devices shall be capable of preventing erosion, collecting sediment (suspended and floating materials) and filtering fine sediment. Sediments collected by these devices shall be removed and placed in an upland location beyond buffer zones/upland review areas and any other regulatory setbacks preventing later migration into a waterway or wetland. Once work has been completed, all areas shall be stabilized with erosion control blankets and/or robust vegetation and erosion control devices shall then be removed. Erosion and sedimentation controls are provided in Section I of this Appendix. Note that stormwater management is an important part of erosion and sedimentation control. Accordingly, temporary stormwater management measures are outlined in Section II of this Appendix. Please refer to the below table for a complete list of BMP typicals and photos provided in this appendix.

Appendix A

Section I

Section 1
Erosion and Sedimentation Controls

1.1 Preservation of Existing Vegetation

Applications: Erosion and sedimentation control, habitat and aesthetic preservation, reduce landscaping and restoration costs

Limitations:

- Access needs on ROWs.
- Required distances between underground utilities and mature trees.

Overview:

Examine the area to identify vegetation (i.e., groundcovers, vines, shrubs, trees) that may be saved. Focus on preserving vegetation on steep slopes, near drainage ways, and/or drainage swales in order to help increase soil stability and decrease runoff volume and velocity. Use construction phasing to preserve vegetation in areas where activities are not scheduled to occur or will occur at a later time.

Identify and protect specified trees for erosion and sediment control benefits and/or aesthetic purposes. Consider saving trees that provide shading or screening benefits, particularly in residential areas.

Installation:

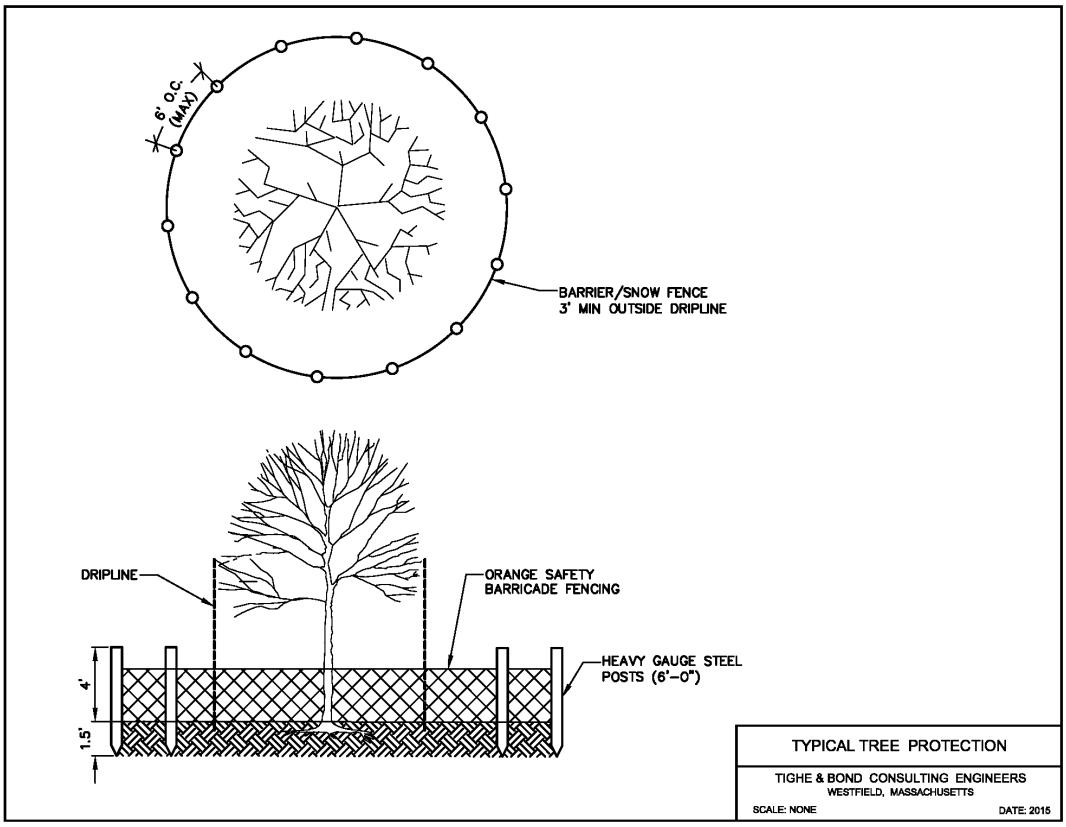
- Select healthy, relatively young trees (less than 40 years old) and vegetation that will not interfere with the installation or maintenance of utilities. Pay attention to the aesthetics of trees along roadways and preserve wherever practicable.
- Place barriers around trees least three feet from the drip line or five feet from the trunk (whichever is greater) using wooden and wire fencing made from scrap lumber or snow fencing. If fencing is not feasible, mark the selected trees with bright flagging.
- Construct the barrier (or place the flags) before heavy equipment arrives to the site and leave in place until the last piece of machinery is gone.
- Dig trenches as far from the trunks and outside of the canopy drip line as practicable. If large roots are encountered, consider trenching under them.
- The width of the ROW will vary depending on the corridor's designated use. Federal guidelines suggest that 15 feet on either side of a buried pipeline should remain clear of mature trees.

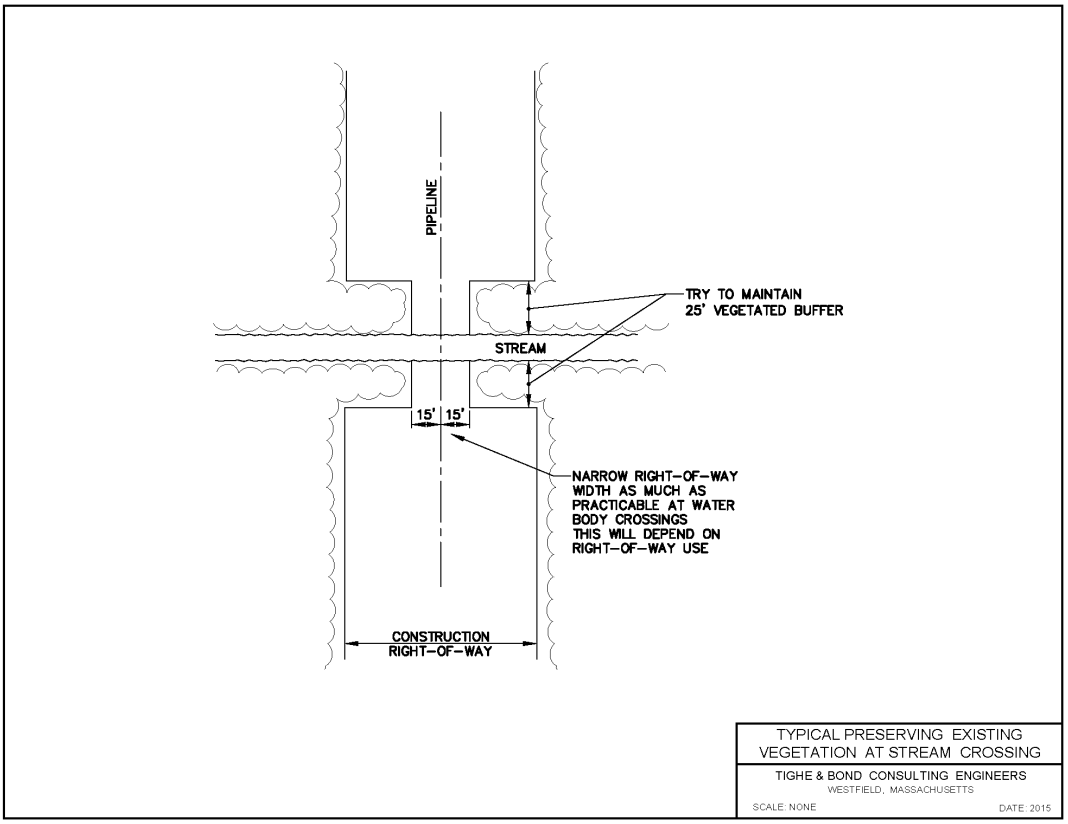
Maintenance:

- Inspect flagged and/or barricaded areas throughout construction. Replace flagging and repair/replace barriers as needed.
- Inspect exposed tree roots. Re-cover or re-seal roots that have been exposed and/or injured by construction activity.

Additional Comments:

When approaching a stream crossing, limit the amount of clearing of the existing stream bank and riparian vegetation to only the areas essential for construction and maintenance. Maintain a 25-foot wide vegetated buffer between the stream bank and the cleared ROW, except in locations where the line is directly installed.




PIPELINE
TRY TO MAINTAIN
25' VEGETATED BUFFER
STREAM
15'
15'
NARROW RIGHT-OF-WAY
WIDTH AS MUCH AS
PRACTICABLE AT WATER
BODY CROSSINGS
THIS WILL DEPEND ON
RIGHT-OF-WAY USE
CONSTRUCTION
RIGHT-OF-WAY
TYPICAL PRESERVING EXISTING
VEGETATION AT STREAM CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015

1.2 Topsoil Segregation for Work in Wetlands and Agricultural Areas

Applications: During excavation in wetlands and agricultural areas

Limitations:

- May be site-specific limitations; otherwise none.

Overview:

The top 12 inches of soil are the most important for providing nutrients and a suitable growth medium to the existing vegetative cover in an area, as well as containing the root stock and seed bank of the plant community. Topsoil segregation is recommended for the first 12 inches of soil in all wetlands and agricultural land, but is also a good practice in any area, including uplands in order to provide a suitable growth medium and more rapid revegetation and restoration of the original plant species.

When digging a trench for installation or maintenance of a pipeline or conduit, or excavating for the installation or replacement of the base of a utility pole, it is good practice to segregate the first 12 inches of topsoil and stockpile it separately from the subsoil until the layers can replaced into the excavation in the proper order. In some cases, it may be necessary to strip topsoil off the areas where the subsoil will be stockpiled as well. Additional topsoil can also be brought into an upland or residential area if necessary where the existing soil is too shallow to provide adequate rooting depth, moisture and nutrients, or too much topsoil was lost during construction.

Installation:

- Set up proper erosion control (i.e., hay bales, silt fence) around the work area before beginning any excavation near wetland areas.
- Identify the stockpile locations near the trench or excavation.
- Locate stockpiles from active work areas to the extent practicable.
- Remove the top 12 inches of topsoil from the trench or excavation. If less than 12 inches are available, remove the entire layer of soil.
- Place the topsoil in a separate stockpile than the layers of excavated subsoil.
- Place additional lines of erosion control around the stockpiles to control sedimentation, if necessary.
- Side slopes of soil stockpiles should not exceed 2:1.
- Stabilize stockpiles with temporary seeding or plastic covering if they will remain exposed for more than 21 days.
- Backfill the trench with the proper soil layers, subsoil followed by topsoil, when work activities are completed. Backfilling should take place immediately after activities are completed, and grading and site stabilization should take place within 10 days following backfilling.

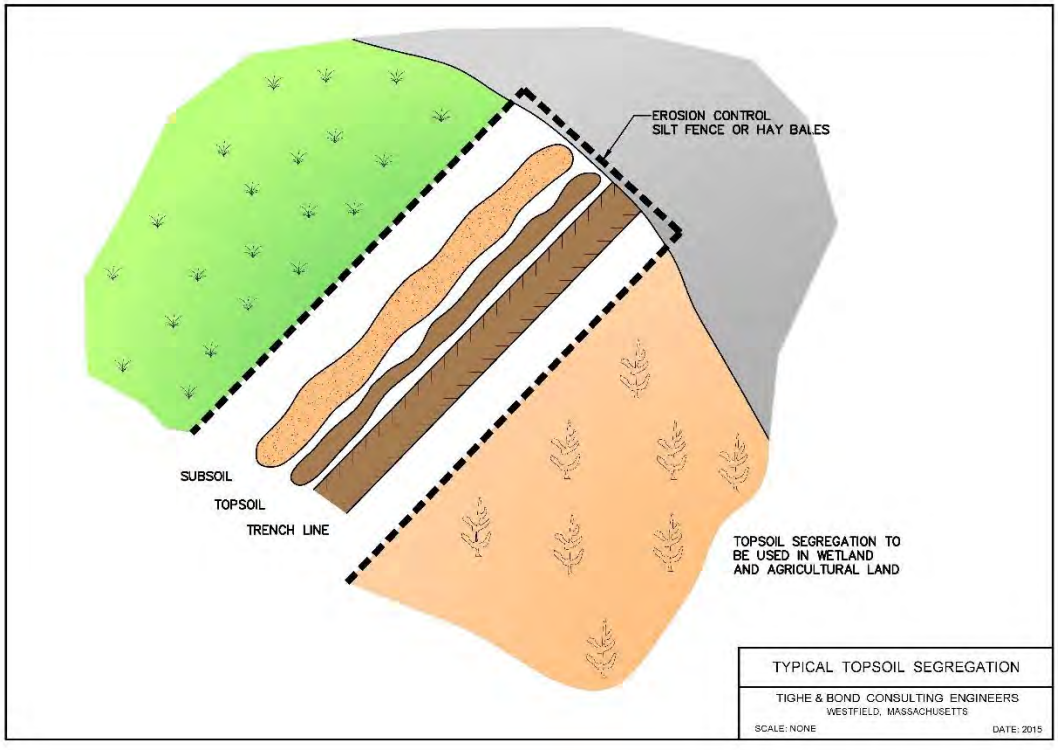
Maintenance:

- Inspect and maintain erosion control on a regular basis and observe the stockpiles for any signs of sedimentation or mixing.
- In residential and agricultural areas, make a reasonable effort to remove all rocks larger than 4 inches in diameter from the topsoil that have been turned up during construction.

Additional Comments:

If the topsoil and subsoil stockpiles are mixing:

- The piles are located too close together. Try placing the separate stockpiles on opposite sides of the trench or work area.
- The topsoil stockpile could also be individually enclosed in hay bales or silt fence. This will help create a barrier, keeping it separate from the subsoil.
- Avoid working with large amounts of trench or excavation open when heavy rains are predicted.
- If polluted/contaminated soil is encountered, handle in accordance with appropriate regulatory requirements. Stockpile contaminated soil on and cover with polyethylene sheeting. Weigh down sheeting covering contaminated soil to prevent the wind migration of contaminated dust.



1.3 Straw (or Hay) Bales

Applications: Erosion and sedimentation control, mulch

Limitations:

- Hay bales degrade quickly.
- Hay bale height can provide an obstacle to movement of smaller wildlife.
- Should not be used as a temporary check dam/ stormwater control within waterways.
- Difficult to install during frozen conditions.
- Generally only effective for 3-6 months (hay) or 6-12 months (straw) before replacement.

Overview:

Hay/straw bales should be placed end-to-end to form a temporary sedimentation control barrier. This barrier should run perpendicular to the slope and direction of runoff, and should be installed downgradient of the disturbed site (i.e., construction area). Hay/straw bales are intended to slow flow velocity and trap sediments to prevent siltation in sensitive areas, specifically downgradient areas with open and/or flowing water. Barriers should be removed once the project is complete and soils are stabilized with erosion control blankets and/or well-established vegetation.

Installation:

- Install hay/straw bales end-to-end lengthwise along the toe of a slope or along a slope contour being sure the bales are butted tightly against each other without gaps between them. The outer ends of the barrier should be turned slightly upslope.
- Entrench to a minimum depth of 4 inches and backfill around the base of the bale. If additional protection is needed, backfill both upslope and downslope to create better ground contact and reduce sediment passage through or beneath hay/straw bales.
- Stake each hay/straw bale into the ground by two stakes each approximately 3 feet long
- If a silt fence is being used with the hay/straw bale barrier, position the silt fence downgradient of the hay/straw bales (hay bales filter first).
- Since hay/straw bales degrade quickly, check barriers often and replace as needed. Routinely remove and dispose of sediment buildup in a stable upland area.
- The hay/straw bale barrier should be as far away from downgradient sensitive areas, and as close to the work areas as construction limitations allow, in order to minimize the total work area and disturb as little area as possible.
- Once the project is complete and soils are stabilized, hay/straw bales should generally be compacted and allowed to decay in place, as their height can provide an obstacle to movement of smaller wildlife. Spreading hay bales around a site as mulch could introduce weed seeds. Using hay/straw as mulch is not generally

problematic if the site is already colonized by invasive species. Plastic bailing twine should be removed from hay/straw bales. Wooden stakes should also be removed.

Maintenance:

- Inspect before a forecasted storm event and daily during a prolonged rain event.
- Remove accumulated sediment and properly disposed outside sensitive areas when it has reached a thickness of ½ to ⅔ the height of the bale.
- Replace rotted or sediment-covered bales when necessary.

Additional Comments:

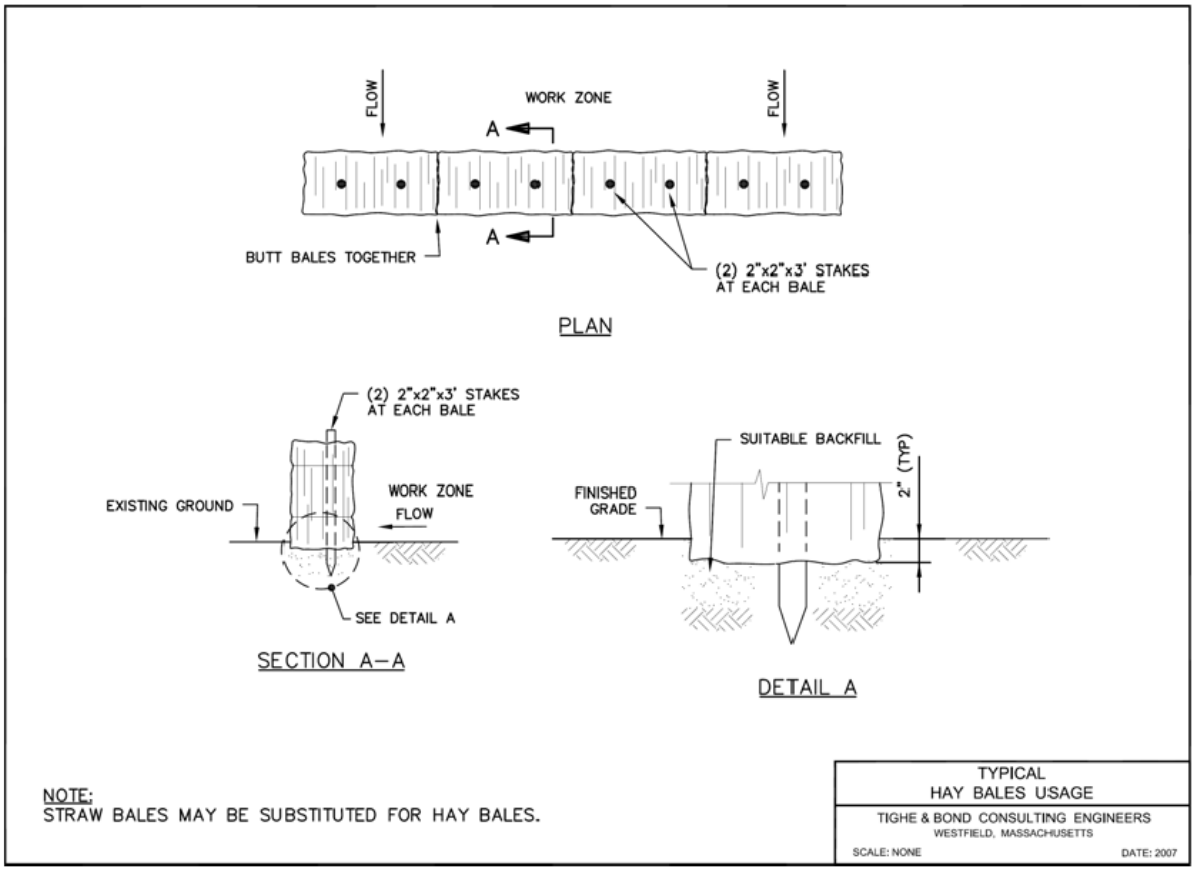
Straw bales are favored over hay bales for use as erosion control barriers. Since straw bales are composed of the dried stalks left over after a grain is harvested, they do not contain the plant's seeds and therefore will not spread growth of such species, some of which may be exotic, invasive or otherwise undesirable. Hay bales are generally less expensive, but consist of the seed heads and the upper, thinner portion of the stems which generally decay faster than straw.



Properly installed hay bale barrier with silt fence.



Properly installed hay bale barrier with silt fence.



1.4 Silt Fence

Applications: Sedimentation control, work limits, temporary animal barrier, slows flow on steep slopes

Limitations:

- Frozen or rocky ground (for installing stakes).
- May prevent critical movements of sensitive wildlife species.
- Disposal.

Overview:

Silt fence is constructed of a permeable geotextile fabric secured by wooden stakes driven into the ground. It is installed as a temporary barrier to prevent sediments from flowing into an unprotected and/or sensitive area from a disturbed site. A silt fence should be installed downgradient of the work area. Once the project is complete and soils are stabilized, silt fence materials (i.e., geotextile fabric and wooden stakes) must be removed and properly disposed off-site (see environmental scientist to determine if area is stabilized).

Installation:

- Install silt fence along the toe of a slope or along a fairly level contour with the outermost ends directed upslope. The fabric should be laid into a 6-inch wide by 6-inch deep trench dug on the upslope side of the fence and tamped down with fill material to ensure a sturdy base and so sediments will not flow beneath the fabric. Use of a Ditch Witch® or similar equipment is suggested for this task.
- Drive the silt fence stakes into the ground until secure (≥6 inches below grade).
- If a hay bale or straw bale barrier is being used with the silt fence, position the silt fence downgradient of the bales.
- The silt fence should be as far away from downgradient sensitive areas, and as close to the work areas as construction limitations allow, in order to disturb as little area as possible.

Maintenance:

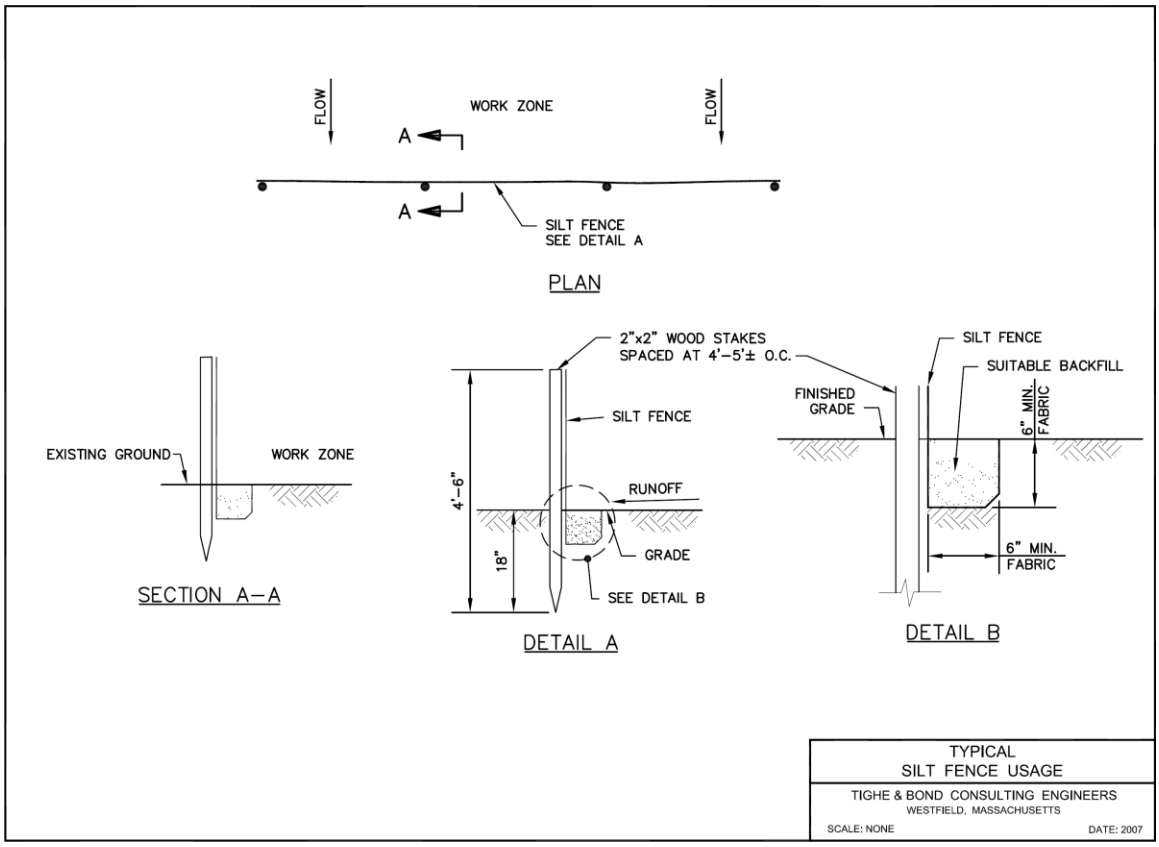
- Inspect frequently and replace or repair as needed, especially during long-term projects.
- Routinely remove and properly dispose of sediment buildup in a stable upland area, outside of sensitive areas. Remove sediment when it has accumulated to a thickness of ½ the height of the silt fence.

Additional Comments:

A silt fence must be installed in an excavated trench and located where shallow pools can form so sediment can settle. The fence must be placed along the contour. If placed otherwise, water may concentrate to a low point and is likely to flow beneath the fence.



Properly installed and functioning silt fence. Direction of flow indicated by blue arrow.


FLOW
WORK ZONE
FLOW
A
A
SILT FENCE
SEE DETAIL A
PLAN
EXISTING GROUND
WORK ZONE
SECTION A–A
2"x2" WOOD STAKES
SPACED AT 4'–5'± O.C.
SILT FENCE
4'–6"
18"
RUNOFF
GRADE
SEE DETAIL B
DETAIL A
SILT FENCE
SUITABLE BACKFILL
FINISHED
GRADE
6" MIN.
FABRIC
6" MIN.
FABRIC
DETAIL B
TYPICAL
SILT FENCE USAGE
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

1.5 Syncopated Silt Fence

Applications: Sedimentation control, work limits, slow flows on steep slopes, and permit wildlife movement.

Limitations:

- Frozen or rocky ground (for installing stakes).
- Complex installation compared to standard silt fence.
- Disposal.

Overview:

Syncopated silt fence refers to silt fence that is installed in a specific layout that permits wildlife movement. Many construction projects continue over at least one wildlife activity season, and silt fence may impede the movement of animals. Syncopated silt fencing is to be installed in areas where silt fencing may impede wildlife access to a resource (i.e., vernal pool, wooded area). These areas will be identified when developing wetland protection measures.

Installation:

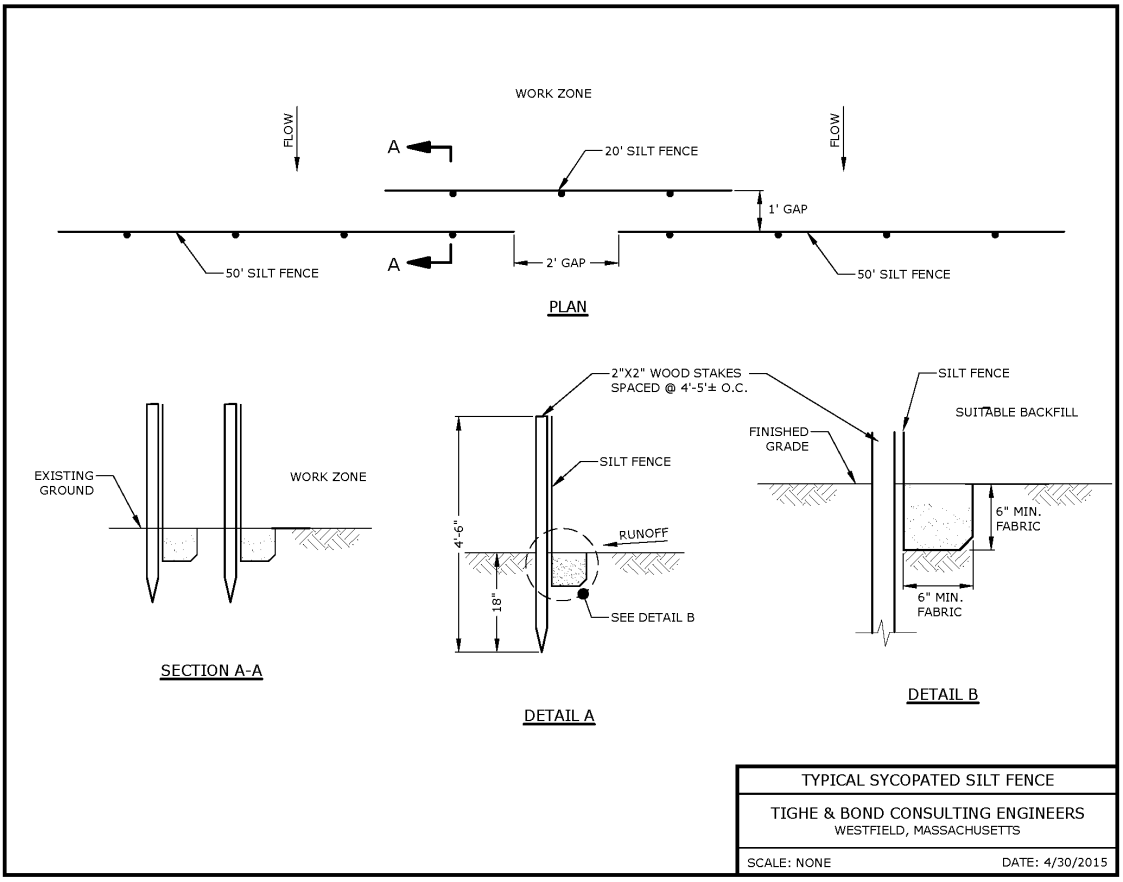
- The syncopated silt fence layout is shown on the typical below. For every 50 feet of siltation fence installed, allow for a gap of two feet before installing the next section. The gap allows wildlife movement One foot behind the main silt fence line, install a second row of silt fence approximately 20 feet in length and centered at the gap.
- Install silt fence along the toe of a slope or along a fairly level contour with the outermost ends directed upslope. The fabric should be laid into a 6-inch wide by 6-inch deep trench dug on the upslope side of the fence and tamped down with fill material to ensure a sturdy base and so sediments will not flow beneath the fabric. Use of a Ditch Witch® or similar equipment is suggested for this task.
- Drive the silt fence stakes into the ground until secure (≥6 inches below grade).
- If a hay bale or straw bale barrier is being used with the silt fence, position the silt fence downgradient of the bales.
- The silt fence should be as far away from downgradient sensitive areas, and as close to the work areas as construction limitations allow, in order to disturb as little area as possible.

Maintenance:

- Inspect frequently and replace or repair as needed, especially during long-term projects.
- Routinely remove and properly dispose of sediment buildup in a stable upland area, outside of sensitive areas. Remove sediment when it has accumulated to a thickness of ½ the height of the silt fence.

Additional Comments:

A silt fence must be installed in an excavated trench and located where shallow pools can form so sediment can settle. The fence must be placed along the contour. If placed otherwise, water may concentrate to a low point and is likely to flow beneath the fence.



1.6 Erosion Control Blankets

Applications: Slope stabilization, erosion and sedimentation control

Limitations:

- Can be used on steep (i.e. greater than 45°) slopes but not on rocky soils.
- Mulches may be more cost effective on flatter areas.

Overview:

Erosion control blankets are generally composed of biodegradable or synthetic materials and are used as a temporary or permanent aid in the stabilization of disturbed soil on slopes. These blankets are used to prevent erosion, stabilize soils, and protect seeds from foragers while vegetation is recolonized.

Installation:

- Always follow manufacturer's instructions for properly installing erosion control blankets. Different composition blankets are recommended for site-specific conditions (slope grades, contributing watershed areas) and use requirements (biodegradable, photodegradable, non-biodegradable).
- Prior to installation, clear the slope of any rocks, branches, or other debris.
- Rolled out blankets in a downward direction starting at the highest point of installation. Secure blankets above the crest of the slope using a berm tamped down along the top of the disturbed area.
- Tack down blankets with stakes or staples every 11 to 12 inches (or closer) horizontally and every 3 feet (or closer) vertically. Biodegradable staples are preferred.
- Overlap each blanket section horizontally with the next section by approximately 2 or 3 inches. Vertical overlaps should be approximately 6 inches, with the upslope section overlaying that of the down-slope section.

Maintenance:

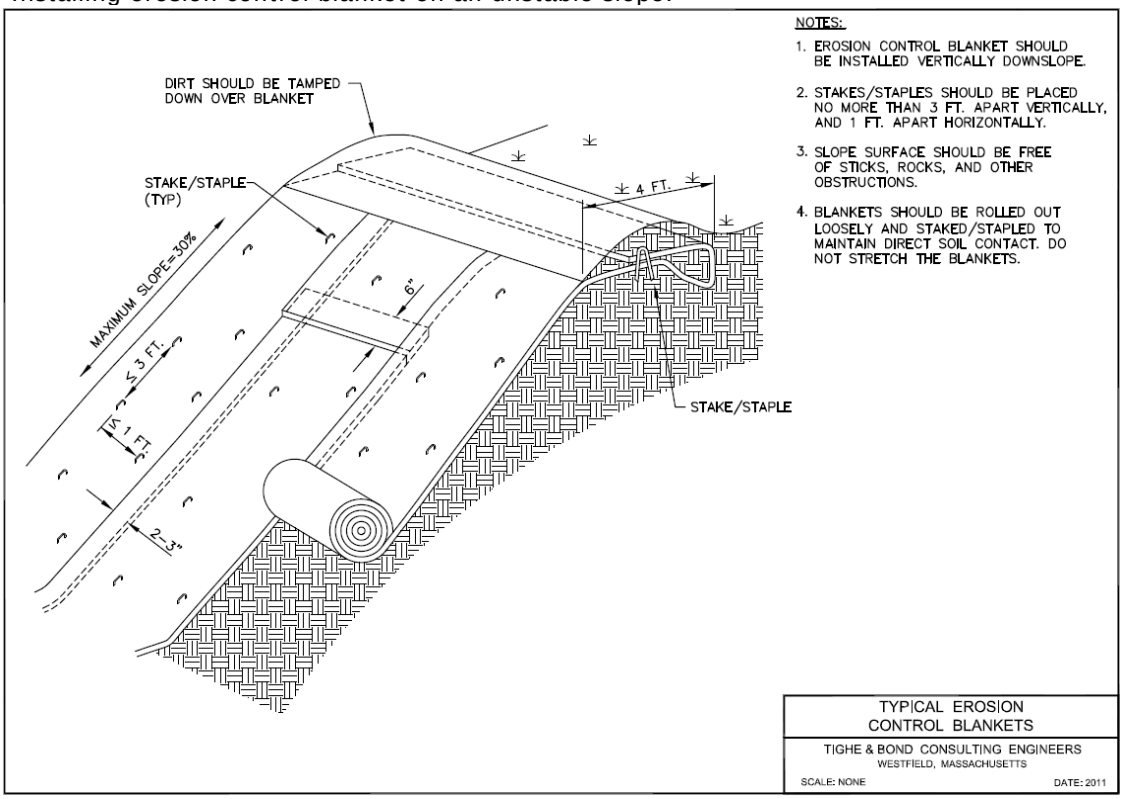
- Inspect for movement of topsoil or erosion weekly and after major precipitation events. Inspect until vegetation is firmly established.
- Repair surface, reseed, replace topsoil, and install new netting if washout, breakage, or erosion occurs.

Additional Comments:

Additional materials used for erosion control with a continuous sheet or material include Jute Mats (sheets of woven jute fiber) and Turf Reinforcement Matting (geotextile matrix most effective for channels).



Installing erosion control blanket on an unstable slope.



1.7 Straw/Compost Wattles

Applications: Erosion and sedimentation control, work limits

Limitations:

- Not recommended for steep slopes.

Overview:

Straw wattles are used as an erosion control device to slow runoff velocities, entrain suspended sediments, and promote vegetation growth until an area is stabilized. They are not generally intended for steep slopes, but rather, to stabilize low to moderate grades where there is a broad area of disturbance. Straw wattles may also be used along small stream banks to protect areas before vegetation has stabilized the soils. The wattles are constructed from a biodegradable netting sock stuffed with straw and may be left to biodegrade in place once a project is complete.

Wattles should be placed lengthwise, perpendicular to the direction of runoff. The wattles are typically spaced about 10 to 40 feet apart, depending on the slope angle. Additionally, the soil texture should be considered – for soft, loamy soils, wattles should be placed closer together; for coarse, rocky soils, they may be placed further apart.

Installation:

- Install prior to disturbing soil in the upgradient drainage area.
- Install so that the ends of each row of wattles on a slope are slightly turned downhill to prevent ponding behind them.
- Where straw wattles are installed end-to-end, butt the wattles tightly together so as not to allow water/sediments to flow between them.
- Place straw wattles in a shallow trench to assure stabilization and soil should be packed against the wattle on the uphill side.
- Securely stake straw wattles to the ground by driving a stake directly through the wattle approximately every four feet. A portion of each stake should remain approximately 2 to 3 inches above the wattle.
- Use *without* silt fence reinforcement: at the base of shallow slopes, on frozen ground, bedrock, and rooted, forested areas.
- Use *with* silt fence reinforcement: at low points of concentrated runoff, below culvert outlets, at the base of slopes more than 50 feet long, and in places where standalone mulch wattles have failed.

Maintenance:

- Routinely inspect wattles and after rain events. Repair as needed with additional wattles and/or stakes.
- Remove sediment deposits when they reach half the height of the wattle. Repair or reshapes wattles when they have eroded or have become sediment clogged or ineffective.

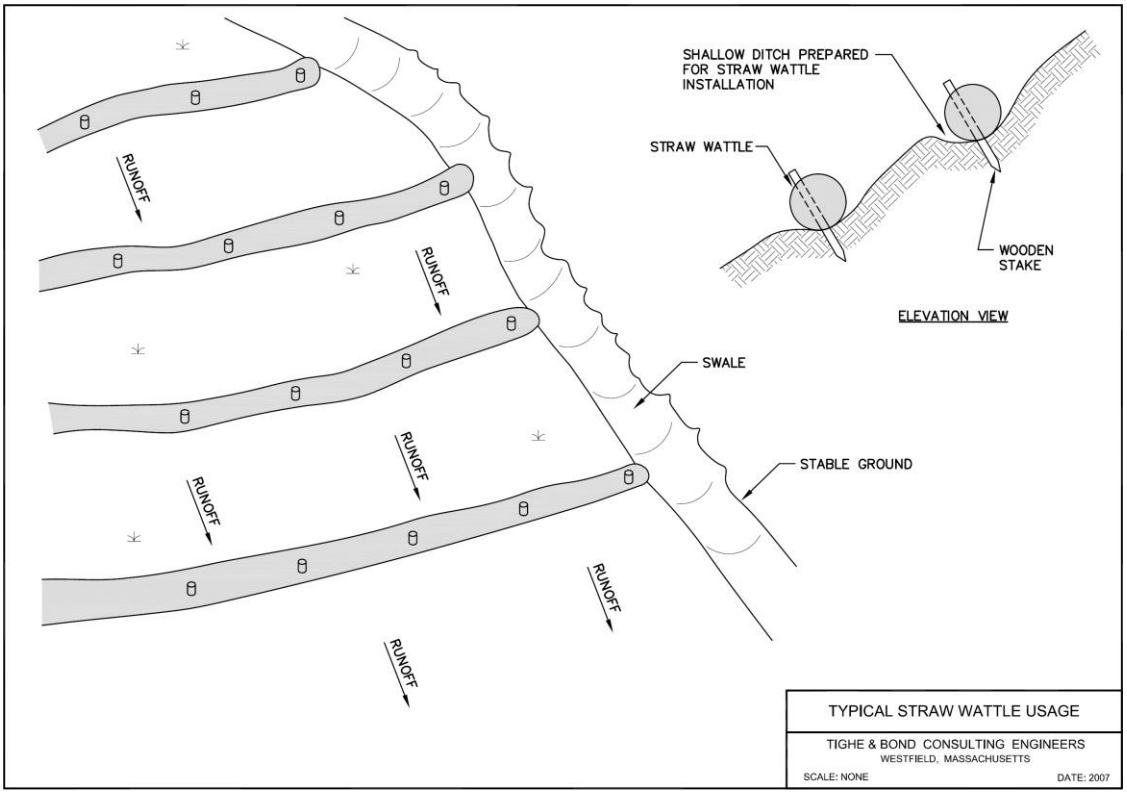
- If flow is evident around the edges, extend the barriers or evaluate replacing them with temporary check dams.

- Reinforce the berm with an additional sediment control measure, such as silt fence or a temporary rock check dam, if there is erosion or undercutting at the base or sides of the berm or if large volumes of water are being impounded behind the berm.

Additional Comments:

Woody vegetation and tall grasses may need to be removed before installing the berm to prevent voids that allow sediment under the berm. Wattles can also be planted with woody vegetation and seeded with legumes for additional stability.




SHALLOW DITCH PREPARED FOR STRAW WATTLE INSTALLATION
STRAW WATTLE
WOODEN STAKE
ELEVATION VIEW
RUNOFF
SWALE
STABLE GROUND
TYPICAL STRAW WATTLE USAGE
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

1.8 Wood Chip Bags

Applications: Erosion and sedimentation control, mulch

Limitations:

- Frozen or rocky ground (for installing stakes).
- Can pose a barrier to small animal movements.
- Requires close attention for maintenance and repair.

Overview:

Wood chip bags are perimeter barriers that intercept, filter, and reduce the velocity of stormwater run-off. They may be used separately or in conjunction with hay/straw bales and are installed and maintained in a similar manner. Wood chip bags should be staked in a line around perimeters of disturbed areas, especially those adjacent to wetlands, waterways, roadways or at the base of slopes.

Installation:

- Install wood chip bags end-to-end lengthwise in a single row along the toe of a slope or along a slope contour. Ensure that the bags are butted tightly against each other without gaps between them.
- Entrench to a minimum depth of 4 inches and backfill around the base of the bag.
- Stake each hay/straw bale into the ground using two stakes each that are approximately 3 feet long.

Maintenance:

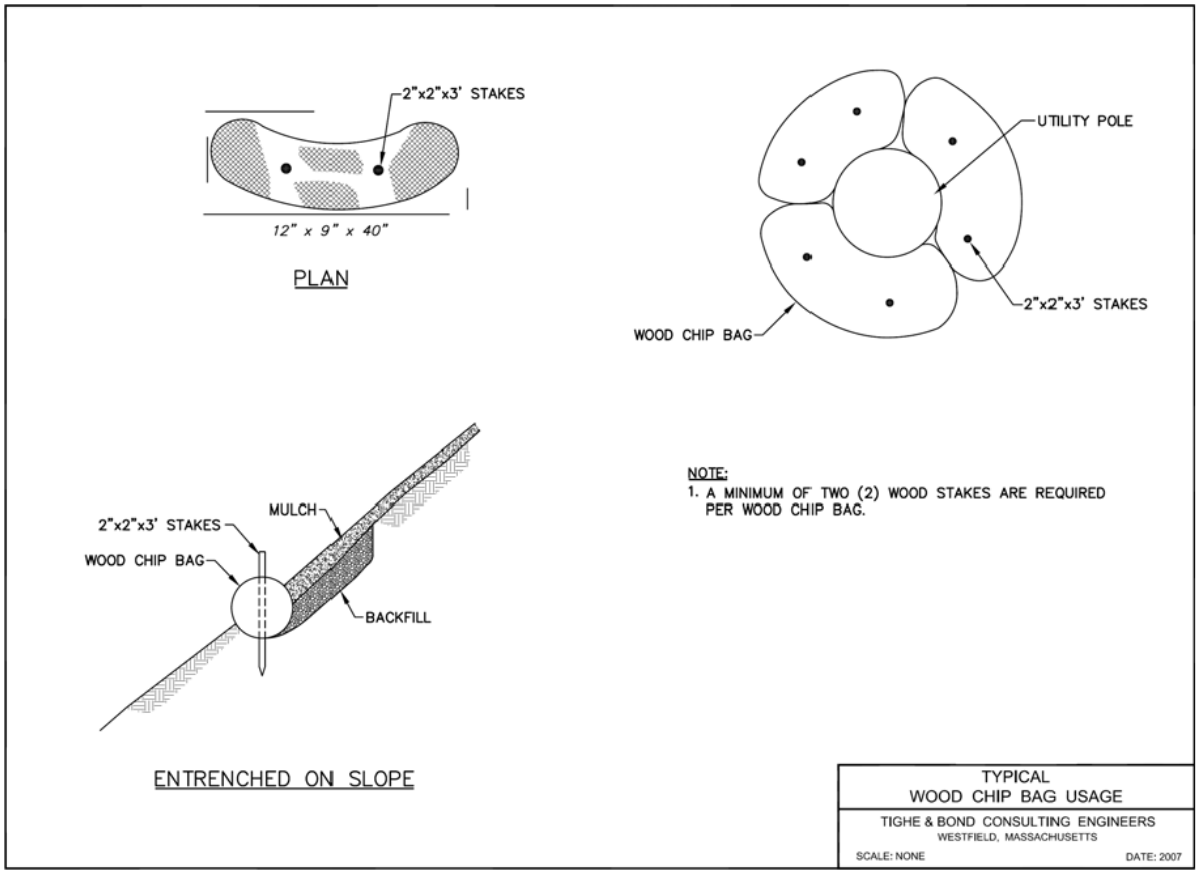
- Inspect before a forecasted storm event and daily during a prolonged rain event.
- Remove accumulated sediment and properly disposed outside sensitive areas when it has reached a thickness of ½ to ⅔ the height of the bag.
- Replace rotted or sediment-covered bag when necessary.

Additional Comments:

Wood chip bags can stabilize soils in a number of applications. They may be left in place as they eventually photo-degrade, as long as they do not pose a barrier to small animal movements.



Wood chips in photo-degradable bags used to stabilize soils.



1.9 Catch Basin Protection

Applications: Erosion and sedimentation control

Limitations:

- For small quantity and low velocity stormwater flows.
- Hay/straw bales hard to stake into paved areas.
- Ineffective for very silty water.
- May require authorization from local government for discharge to municipal system.
- Fabric drop inlet should be used where stormwater runoff velocities are low and where the inlet drains a small, nearly level area.
- Undercutting and erosion under filter fabric if fabric is not buried at bottom.

1.9.1 Hay/Straw Bales, Filter Fabric, and Filter Baskets

Overview:

Hay bales, filter fabric, and filter baskets are all temporary devices placed around and within existing catch basin inlets to protect the stormwater management system from high sediment loads and high velocities during construction. Use in areas where stormwater runoff is relatively small and velocities are low and where shallow sheets of run-off are expected.

Hay/Straw Bales Installation: Hay/straw bales are recommended for areas which have the storage space to allow temporary ponding since they are one of the least permeable protection methods.

- Installation is similar to perimeter hay/straw bale barriers.
- Use bales that are wire bound or string tied. Place bales so that the bindings are on the sides of the bales rather than against the ground.
- Install hay/straw bales in a box configuration around the drop inlet with the ends of the bales placed tightly against each other.
- If the area is unpaved, anchor bales using two stakes driven through the bale and into the ground.
- Hay bales can be placed around the perimeter of the inlet in order to extend the life of the filter fabric and/or basket by removing much of the sediment before-hand.

Filter Fabric Installation: Filter fabric is used to protect catch basins from excessive sediment.

- Cut fabric from a single roll.
- Place fabric beneath catch basin grate.
- Avoid setting top of fabric too high, which will lead to flow bypassing the inlet.

Filter Baskets/Bags Installation: Install filter baskets/bags within catch basins in combination with hay bales, fabric, stone or sod drop inlets. They may be used alone where drainage area is small with shallow flows.

- Install per manufacturer's instructions.
- Filter baskets typically consist of a porous fabric bag which is fitted under the catch basin grate.
- Sediments are filtered out of the stormwater and accumulate in the basket or bag.

Maintenance:

- Inspect weekly and after each major rain event.
- Remove accumulated sediment on a regular basis.
- Replace or make repairs as needed.
- Remove after area is permanently stabilized.

Additional Comments:

Discharge of clean water into municipal system catch basins may be an option for certain sites. However, this activity must be coordinated with the municipality and shall not occur without their written consent.

1.9.2 Sod or Stone Mound Drop Inlets

Overview:

Sod or stone mound drop inlets are temporary devices placed around and within existing catch basin inlets to protect the stormwater management system from high sediment loads and high velocities. They are used in areas where stormwater run-off is relatively heavy and overflow capacity is necessary. Sod should only be used in well vegetated areas and when the general area around the inlet is planned for vegetation and is well suited for lawns. Stone mounds are well suited for the heaviest flows.

Installation:

- For Sod: Place a mound of permanently vegetated sod around the perimeter of the inlet to a minimum height of 6 inches.
- For Stone: Stone can be used alone or in combination with stacked concrete blocks. Gravel alone will slow drainage time and increase settlement.
- Place wire mesh with ½" openings over the inlet with 1 foot extending on each side. Overlay with filter fabric.
- Surround inlet with mound of gravel, 1" diameter or smaller, to a minimum height of 6", placed over the mesh.
- If blocks are used, stack them around the inlet, between 12 and 24" high, place mesh over the openings and pile the gravel against the outside face of the blocks.

Maintenance:

- Inspect weekly and after each major rain event.
- Remove accumulated sediment when it reaches ½ of the height of the filter mound. Stone especially must be regularly maintained.

- Repair erosion as necessary.
- If the storm flow bypasses inlet and causes erosion, the top of the structure is too high.
- If the trap is not efficient and/or there is sediment overload, the drainage area is too large to handle load. Consider constructing a temporary sediment trap.
- If scour holes develop (if blocks are being used), blocks are not placed snugly against the inlet grate.

Filter Baskets/Silt Bags

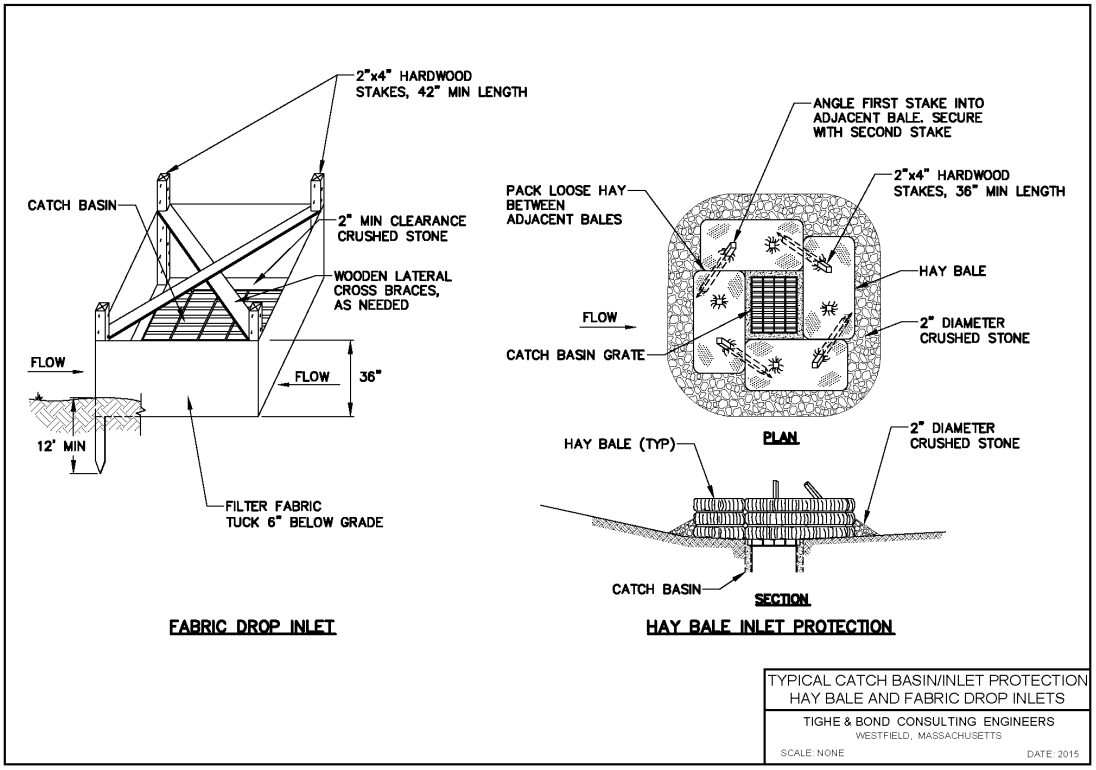
Filter baskets/silt bags are installed within catch basins in combination with hay bales, fabric, stone or sod drop inlets. They can potentially be used alone where drainage area is small with shallow flows. They may cause ponding or may rip under heavier flows without the additional external filtering method.

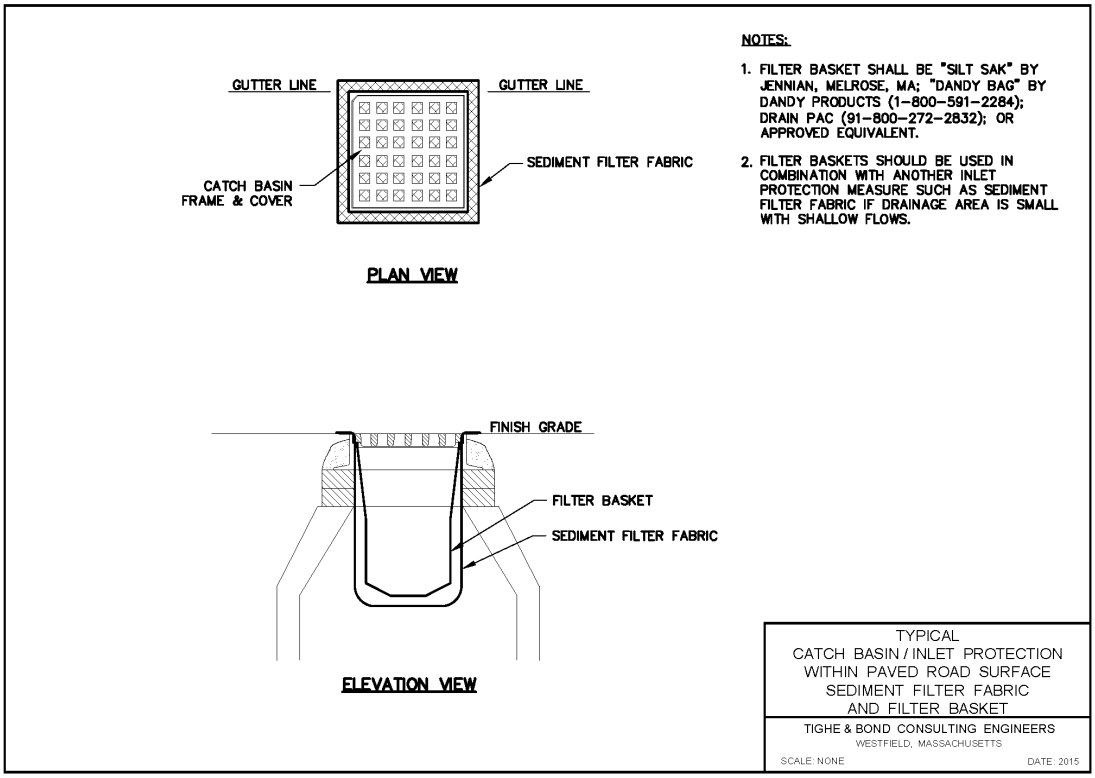
Installation:

- Several trademarked/name brand filter/silt bags exist and should be installed per the manufacturer's instructions. Almost all consist of a porous fabric bag which is fitted under the catch basin grate. Sediments are filtered out of the stormwater and accumulate in the bag.

Maintenance:

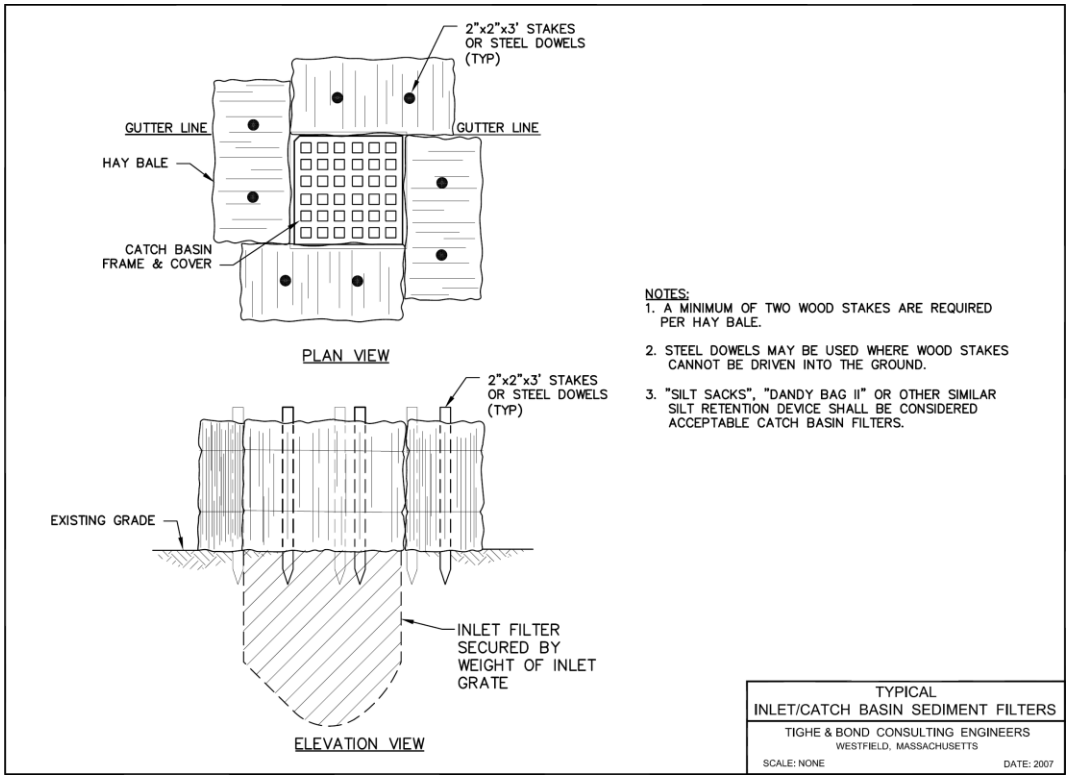
- Inspect inlet and fabric weekly and after each major rain event.
- Remove sediment when the bag is halfway full.
- Replace bags as necessary due to wear or ripping.







Catchbasin protected from sedimentation by filter fabric.


2"x2"x3' STAKES
OR STEEL DOWELS
(TYP)
GUTTER LINE
GUTTER LINE
HAY BALE
CATCH BASIN
FRAME & COVER
PLAN VIEW
2"x2"x3' STAKES
OR STEEL DOWELS
(TYP)
EXISTING GRADE
INLET FILTER
SECURED BY
WEIGHT OF INLET
GRATE
ELEVATION VIEW
NOTES:
1. A MINIMUM OF TWO WOOD STAKES ARE REQUIRED PER HAY BALE.
2. STEEL DOWELS MAY BE USED WHERE WOOD STAKES CANNOT BE DRIVEN INTO THE GROUND.
3. "SILT SACKS", "DANDY BAG II" OR OTHER SIMILAR SILT RETENTION DEVICE SHALL BE CONSIDERED ACCEPTABLE CATCH BASIN FILTERS.
TYPICAL
INLET/CATCH BASIN SEDIMENT FILTERS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

1.10 Loaming and Seeding

Applications: Erosion control, soil stabilization, site restoration

Limitations:

- May be site specific limitations (e.g. permit or State requirements).
- Applies to upland areas only.

Overview:

Permanent seeding is appropriate for vegetated swales, steep slopes, or filter strips. Temporary seeding is used if construction has ceased and if an area will be exposed.

Installation:

- Apply loam/ topsoil prior to spreading seed mix per manufacturer's recommendations. Apply water, fertilizer, and mulch to seedbed, as needed.
- Plant native species of grasses and legumes where practicable.

Maintenance:

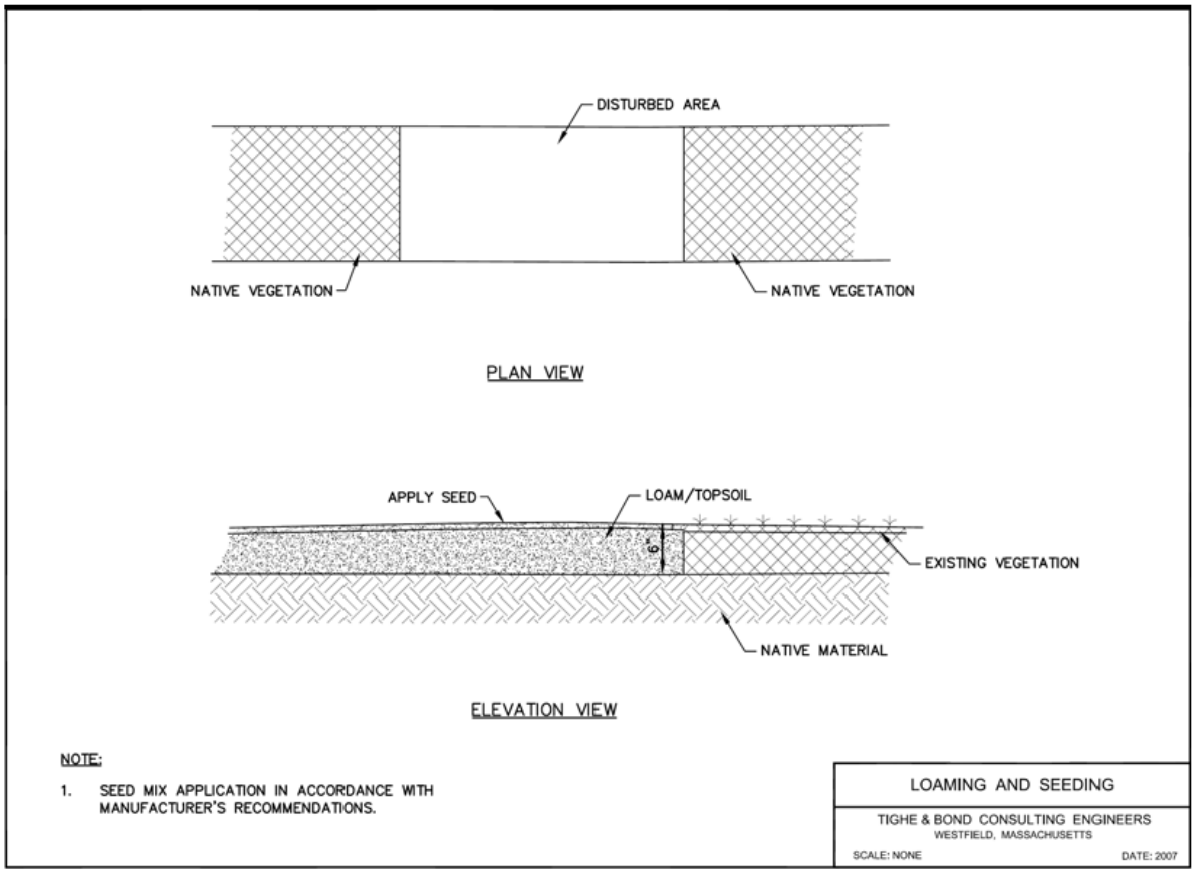
- Inspect on regular basis until vegetation has established.
- If washout or erosion occurs, repair surface, re-seed, re-mulch and install new netting.
- Follow permit requirements regarding use of wetland seed mix in wetlands where required.

Additional Comments:

Cool Season Grasses	Warm Season Grasses
• Best growth in the cool weather of fall and spring, set seed in June and July. • Seed April 1-May 31 and Aug 1-Sept 10.	• Growth begins in the spring, accelerates in the summer, and plants set seed in the fall. • Seed April 1-May 15, dormant seeding Nov 1-Dec 15.



Loaming and seeding of recently disturbed right of way.



1.11 Mulching with Hay/Straw/Woodchips

Applications: Erosion control, soil stabilization, site restoration

Limitations:

- May be site specific limitations (e.g. permit or State requirements).
- Applies to upland areas only.
- Thick mulch may prevent seed germinations.
- Mulch on steep slopes must be secured with netting to prevent it from being washed away.

Overview:

Mulching consists of an application of a protective blanket of straw or other plant residue, gravel, or synthetic material to the soil surface to provide short term soil protection. It enhances plant establishment by conserving moisture and moderating soil temperatures, and anchors seed and topsoil in place. Mulch also reduces stormwater runoff velocity.

Application rates and technique depend on material used. Select mulch material based on soil type, site conditions and season. Straw/hay provides the densest cover if applied at the appropriate rate (at least ½ inch) and should be mechanically or chemically secured to the soil surface. Woodchip application can be less expensive if on-site materials are used.

Installation:

- Use in areas which have been temporarily or permanently seeded.
- Use mulch netting on slopes greater than 3% or in concentrated flows.
- Mulch prior to winter (ideally in mid-summer).

Maintenance:

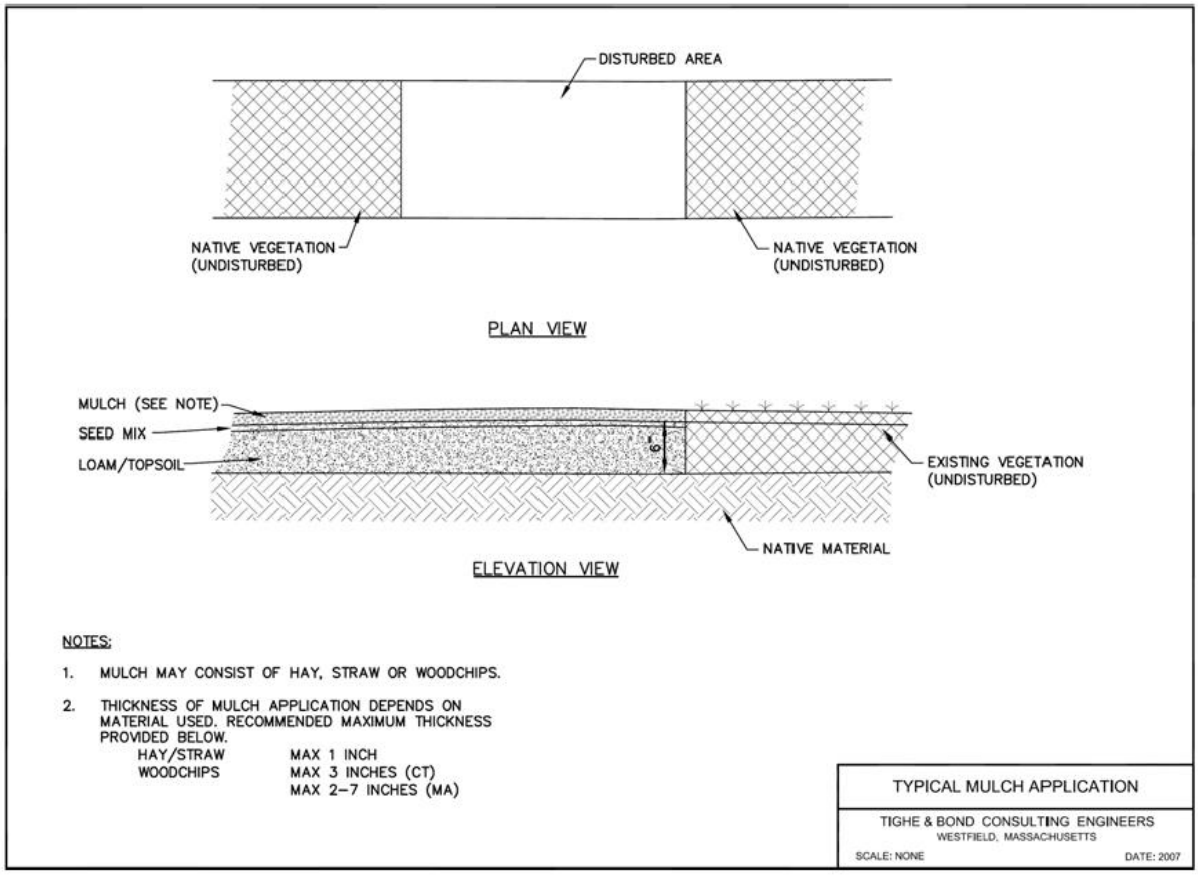
- Inspect on regular basis until vegetation has established.
- If washout or erosion occurs, repair surface, re-seed, re-mulch, and install new netting.

Additional Comments:

Type	Description/Use
Straw/Hay	• Straw or hay applied to surface at 2-4 tons per acre • Mechanically or chemically secured to soil surface • Provides the densest cover to protect soil and seeds
Wood Fiber/Hydraulic Mulch	• Chopped up fibers applied to the soil surface with a hydroseeder • Tackifier when necessary can be applied with fiber, seeds and fertilizer in one step. This is best when done with fast growing seeds
Compost	• Compost acts as a soil amendment but is more expensive than most mulches • Its efficiency is comparable to wood fiber
Wood Chips	• Use of wood chips as a mulch saves money if on-site materials are used • Effective when applied at high levels (6 tons per acre) and on up to 35% slopes



Typical view of light mulching atop unstable, seeded soils.



1.12 Coir Log Use for Bank Stabilization

Applications: Bank stabilization, wetlands and watercourse restoration

Limitations:

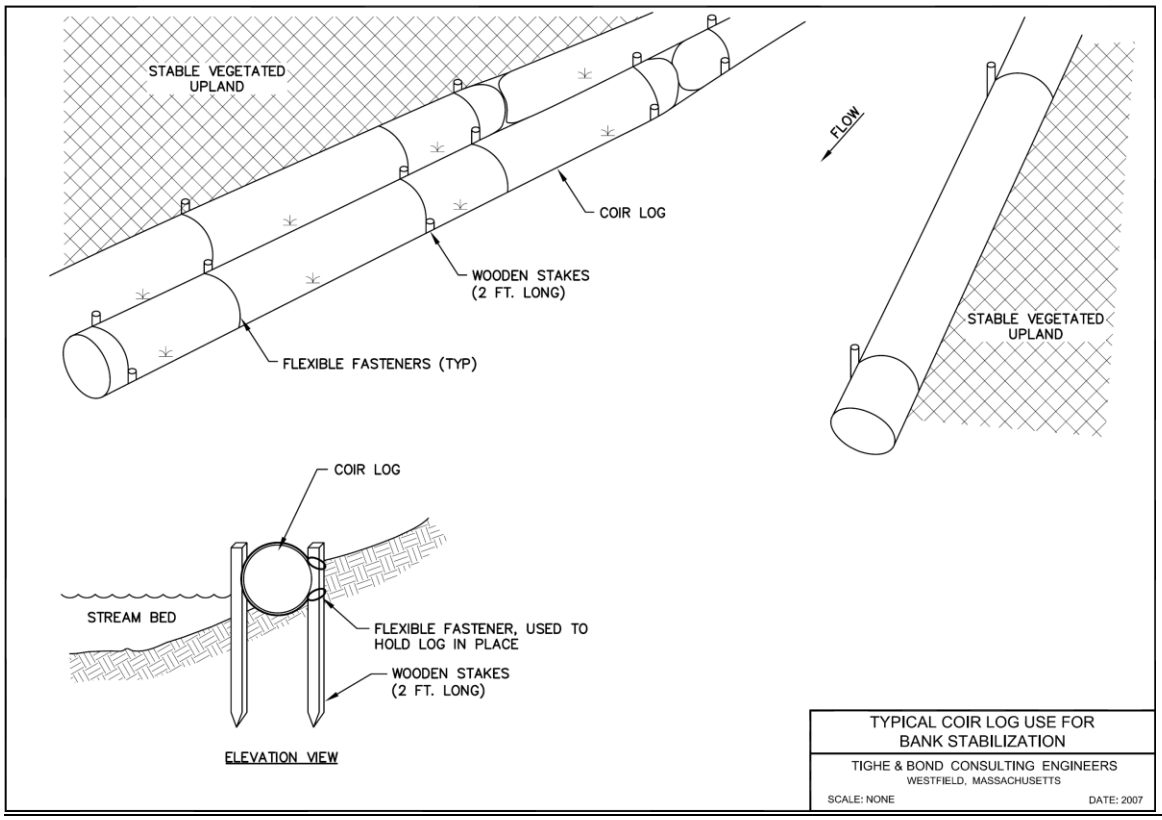
- Moderately expensive.

Overview:

- Refer to permit requirements (if applicable) and manufacturer's specifications.
- Install along banks between upland and watercourse using wooden stakes (2 foot long) and flexible fasteners (to hold log in place).



Coir logs used to restore a stream bed and banks.



1.13 Level Spreader

Applications: Erosion and sedimentation control

Limitations:

- Downgradient area must be adequately vegetated and have minimum width of 100 feet before surface water
- No vehicle traffic over level spreader

Overview:

Level spreaders, also called grade stabilization structures, are excavated depressions constructed at zero percent grade across a slope. They convert concentrated flow into sheet flow and discharges to stable areas without causing erosion.

Level spreaders are not applicable at all locations. Some general site requirements include:

- Drainage area of 5 acres or less
- Undisturbed soil (not fill)
- A level lip that can be installed without filling
- Area directly below is stabilized by existing vegetation
- At least 100 feet of vegetated area between the spreader and surface waters
- Slope of the area below the spreader lip is uniform and a 10% grade or less
- Water won't become concentrated below the spreader and can be released in sheet flow down a stabilized slope without causing erosion
- There will be no construction traffic over the spreader

Installation:

- Set the channel grade to be no steeper than 1% for the last 20 feet entering the level spreader.
- Install level spreader using the suggested dimensions: length—5 to 50 feet, width—at least 6 feet, and depth—approximately 6 inches (measured from the lip) and uniform.
- Stabilize the level spreader with an appropriate grass seed mixture and mulch, if necessary. Protect the level lip with an erosion stop and jute netting/excelsior matting. The downgradient area should have stable, complete, erosion resistant vegetative cover.

Maintenance:

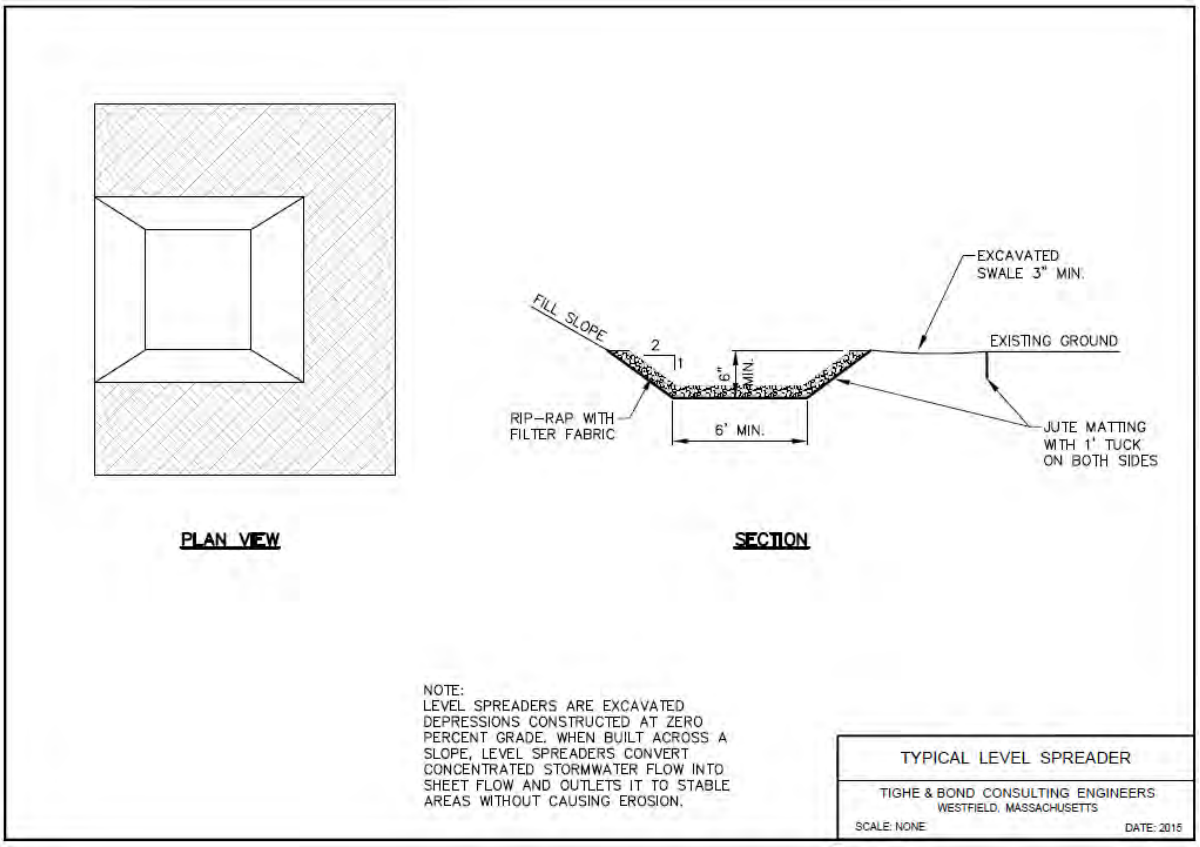
- Inspect after every rain event and remove accumulated sediment. Repair erosion damage and re-seed as necessary.

- Mow vegetation occasionally to control weeds and the encroachment of woody vegetation.

Additional Comments:

If channels form and erosion is evident in level spreader, the level spreader is not uniformly flat. Repair the low spots in the level spreader.

If erosion is occurring downgradient of the level spreader, the level spreader is not long enough or not wide enough. Alternatively, the vegetation is not stable. Re-seed the area.



1.14 Check Dams

Applications: Stormwater management, erosion control

Limitations:

- Need to be adequately sized based on expected rain events.

Overview:

Check dams are porous physical barriers placed across a drainageway to reduce the velocity of concentrated stormwater flows and erosion. Check dams also temporarily pond stormwater runoff to allow sediment in the water column to settle out. Permanent or long-term check dams are typically constructed of rip rap or other stone material. Short-term check dams can be constructed of rip rap. Rip rap check dams are preferred over hay bales.

Installation:

- Place stone by hand or machine, making side slopes no steeper than 1:1 and with a maximum height of 3 feet at the center of the check dam. A geotextile may be used under the stone to provide a stable foundation and/or to facilitate removal of the stone.
- The minimum height of the check dam shall be the flow depth of the drainageway, but shall not exceed 3 feet at the center.
- Install the check dam so that it spans the full width of the drainageway, plus 18 inches on each side. Leave the center of the check dam approximately 6 inches lower than the height of the outer edges.
- The maximum spacing between check dams should be such that the toe of the upstream check dam is at the same elevation as the top of the center of the downstream check dam.

Maintenance:

- For permanent stone check dams, inspect and maintain the check dam in accordance with the standards and specifications provided in the design for the site.
- For temporary check dams, inspect at least once per week and within 24 hours of the end of a precipitation event of 0.5 inches or more to determine maintenance needs.
- Maintenance may include, but are not limited to, the replacement of stone, repair of erosion around or under the structure, and/or the removal and proper disposal of accumulated sediment.

Problem	Solution/Explanation
Stone displaced from face of dam	Stone size too small and/or face too steep
Erosion downstream from dam	Install stone lined apron
Erosion of abutments during high flow	Rock abutment height too low
Sediment loss through dam	Inadequate layer of stone on inside face or stone too coarse to restrict flow through dam



Stone check dams at construction site.



Stone check dam at construction site.

1.15 Temporary and Permanent Diversions

Applications: Stormwater management, erosion control

Limitations:

- Need to be adequately sized based on expected rain events and the contributing drainage area.

Overview:

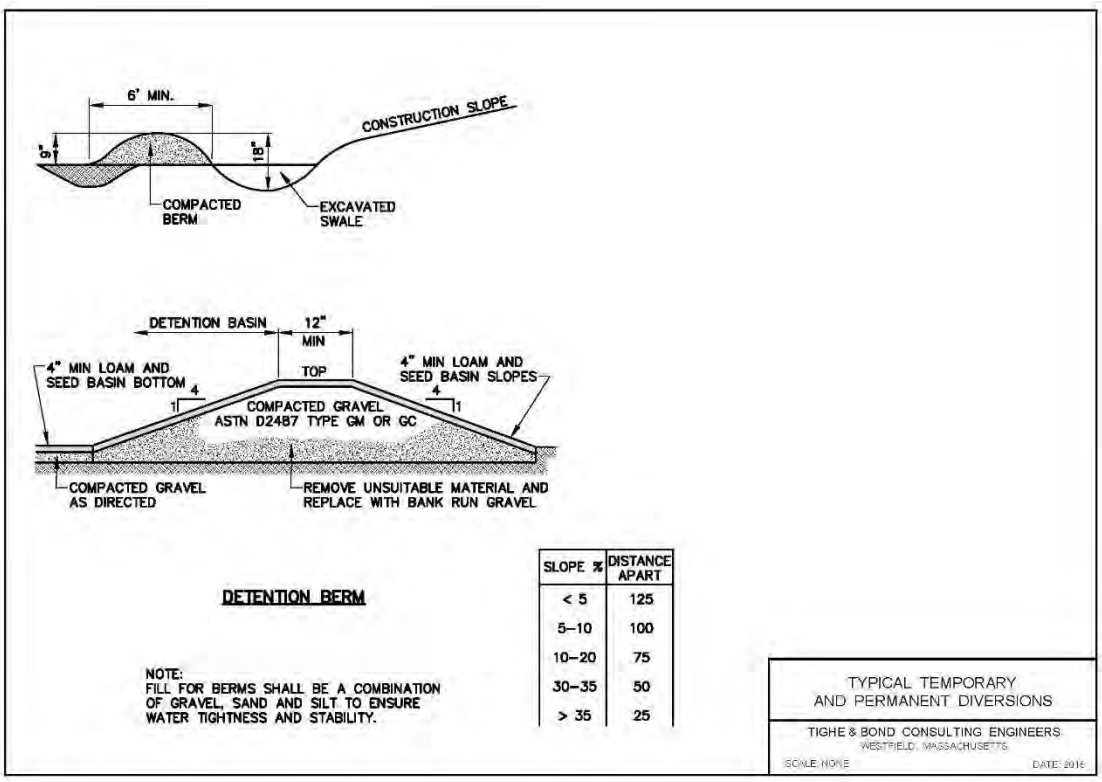
Temporary and permanent diversions are ridges or channels constructed across steep slopes that convey the runoff to a stable outlet at a non-erosive velocity. Use permanent diversions on slopes with high runoff velocities to break up concentrated flow. They can be installed as temporary diversion and completed as permanent when the site is stabilized or can be installed in the final form initially.

Installation:

- Remove woody vegetation and fill and compact the ditches and gullies that must be crossed before construction.
- Remove vegetation around the proposed location of the base of the diversion ridge to form a strong bond between the ground and fill material.
- Stabilize the outlet of the diversion channel using sediment traps, natural or constructed vegetated outlets, or level spreaders.
- Stabilize the diversion channel with riprap, vegetation, paving, or stone.
- Install a filter strip of close growing grass above the channel to prevent sediment accumulation.
- Seed and mulch diversions that are intended for use for more than 30 days.
- After the area has been permanently stabilized, remove the ridge and channel to blend with the natural ground level.

Maintenance:

- Inspect bi-weekly and repair any erosion problems.
- Remove accumulated sediment and debris.



DETENTION BERM

SLOPE %	DISTANCE APART
< 5	125
5–10	100
10–20	75
30–35	50
> 35	25

NOTE:
FILL FOR BERMS SHALL BE A COMBINATION OF GRAVEL, SAND AND SILT TO ENSURE WATER TIGHTNESS AND STABILITY.

TYPICAL TEMPORARY AND PERMANENT DIVERSIONS

TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE DATE: 2016

1.16 Temporary and Permanent Trench Breakers (Trench Plugs)

Applications: Keeping work areas dry, long-term stabilization of soil (prevents sinkholes)

Limitations:

- Water that accumulates behind the trench breaker requires pumping to a filtering device, preferable in a well-vegetated, upland area.

Overview:

Trench breakers (trench plugs) are temporary or permanent measures used to slow the movement of groundwater and surface runoff within a trench. They are often used when runoff draining to downgradient work areas causes problems within the trench. Trench breakers may be placed adjacent to waterways and wetlands to prevent water from seeping into work areas or disrupting the hydrology of the resource areas. They can be used on slopes throughout all types of land uses (including agricultural and residential). Trench breakers should be installed upslope of each permanent slope breaker or waterbar.

Temporary Trench Breakers (Trench Plugs)

Temporary trench plugs may consist of hard or soft plugs. Hard plugs leave small portions of the ditch unexcavated at certain intervals. Soft plugs involve placing compacted subsoil or sandbags into the ditch following excavation.

Installation:

- Install temporary trench plugs at the same intervals as temporary slope breakers or water bars (see table).

Maintenance:

- Inspect trench breakers regularly for signs of any instability, and repair any erosion problems.
- If water accumulates behind the trench breaker, pump to a filtering device, preferably in a well-vegetated, upland area.

Permanent Trench Breakers

Permanent trench breakers are left in the trench and backfilled to slow the movement of subsurface water along the trench. This helps prevent undermining the stability of the right of way that may lead to sinkholes or erosion.

Installation:

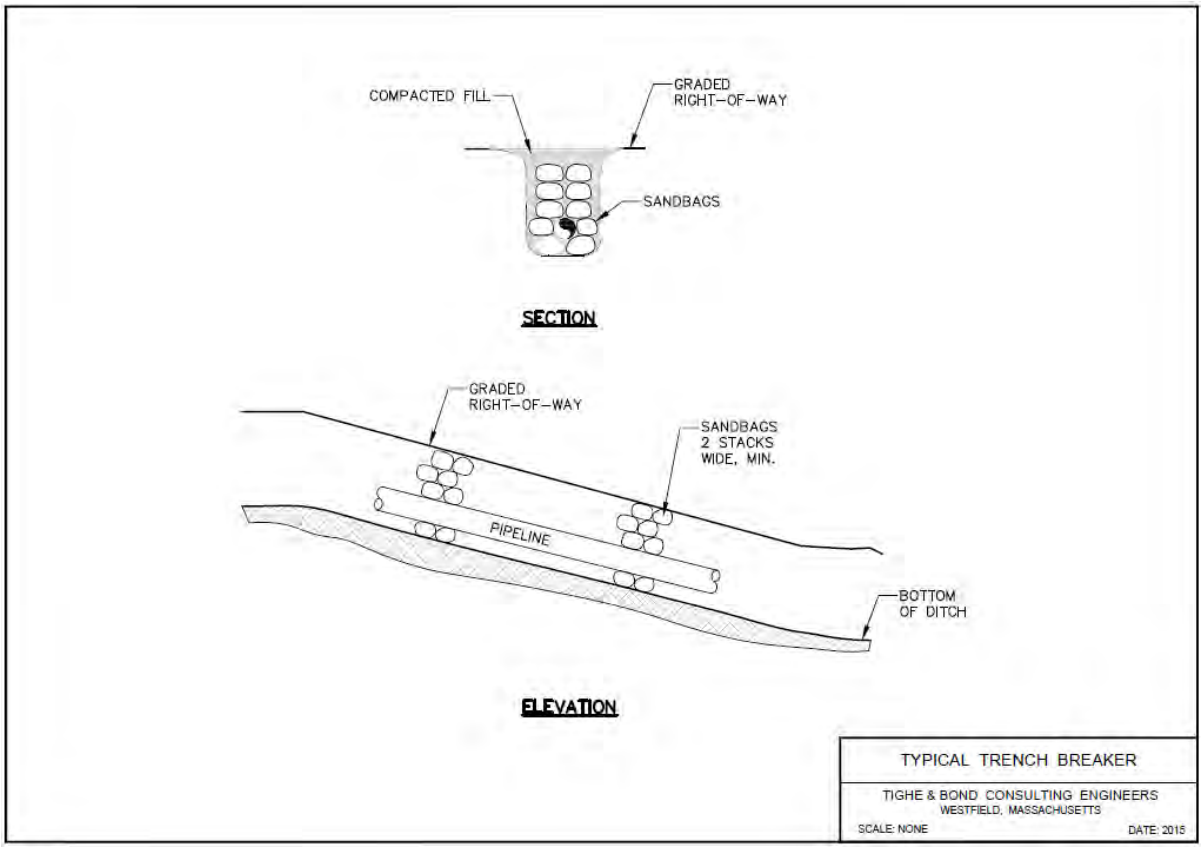
- Trench breakers can be composed of sandbags or polyurethane foam. Do not use topsoil to construct trench breakers.
- Build the trench breaker under and around the pipeline at intervals specified by the local soil conservation service or as shown in the table below.
- Install temporary trench plugs at the same intervals as temporary slope breakers or water bars (see table).
- When using sandbags, construct the trench breakers to be a minimum of two bags wide.
- Backfill the top of the trench breakers along with the rest of the trench. Grade the entire area to the original contours and stabilize.

Maintenance:

- Inspect trench breakers for stability and effectiveness before the trench is backfilled.
- During future inspections of the completed right of way, observe the ditch line for any unusual settling or erosion.
- Inspect wetlands and waterways for any change to their original hydrology.

Additional Comments:

Recommended Spacing	
Land Slope	**Spacing (ft)**
5-15%	300
>15-30%	200
>30%	100


COMPACTED FILL
GRADED
RIGHT–OF–WAY
SANDBAGS
SECTION
GRADED
RIGHT–OF–WAY
SANDBAGS
2 STACKS
WIDE, MIN.
PIPELINE
BOTTOM
OF DITCH
ELEVATION
TYPICAL TRENCH BREAKER
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015

Appendix A

Section II

Section 2
Water Control

Several methods exist for temporarily diverting and dewatering surface water from work areas. No untreated groundwater shall be discharged to wetlands or water bodies. A variety of methods may be employed to prevent sedimentation due to dewatering. These methods, which are primarily appropriate during construction of capital projects, are described below.

2.1 Dewatering Activities

Applications: Dewatering

Limitations:

- Overland flow limited to sites with appropriate upland area.
- Frac tanks have limited capacity and are expensive.
- Pumps require oversight at all times.
- Filter bags clog and require replacement.

Overview:

Dewatering activities may be necessary to expose the ditch line and provide drier workspace when high groundwater or saturated soil is present. This condition often occurs in wetlands or near streambanks during excavation activities for installing or replacing utility poles or natural gas pipelines. *Under no circumstances should trench water or other forms of turbid water be directly discharged onto exposed soil or into any wetland or waterbody.*

2.1.1 Overland Flow

Applications: Dewatering

Limitations:

- Space constraints and adjacent wetlands or watercourses may prevent use of this dewatering method.

Overview:

Overland Flow may be used if a discharge location is available where there is no potential for discharged water to flow overland into wetlands or waterbodies. Discharge water overland without any filtering to well-drained, vegetated upland areas and allow to naturally infiltrate into soils.

2.1.2 Frac Tank

Applications: Dewatering, managing contaminated groundwater

Limitations:

- Expensive
- May be site specific limitations (e.g. extremely unlevel ground)
- May require proper disposal at a regulated facility (in cases of contaminated groundwater)

Overview:

Frac Tanks are pre-fabricated and self-contained units that contain a series of baffles that allow fine materials to settle out of the water column. Use frac tanks when the work requires dewatering in an area with very silt laden water and/or contaminated groundwater.



Frac tank on-site for dewatering activities.

2.1.3 Filter Bags and Hay Bale Containment Area

Applications: Dewatering

Limitations:

- Pumps require oversight at all times.
- Filter bags clog and require replacement.

Overview:

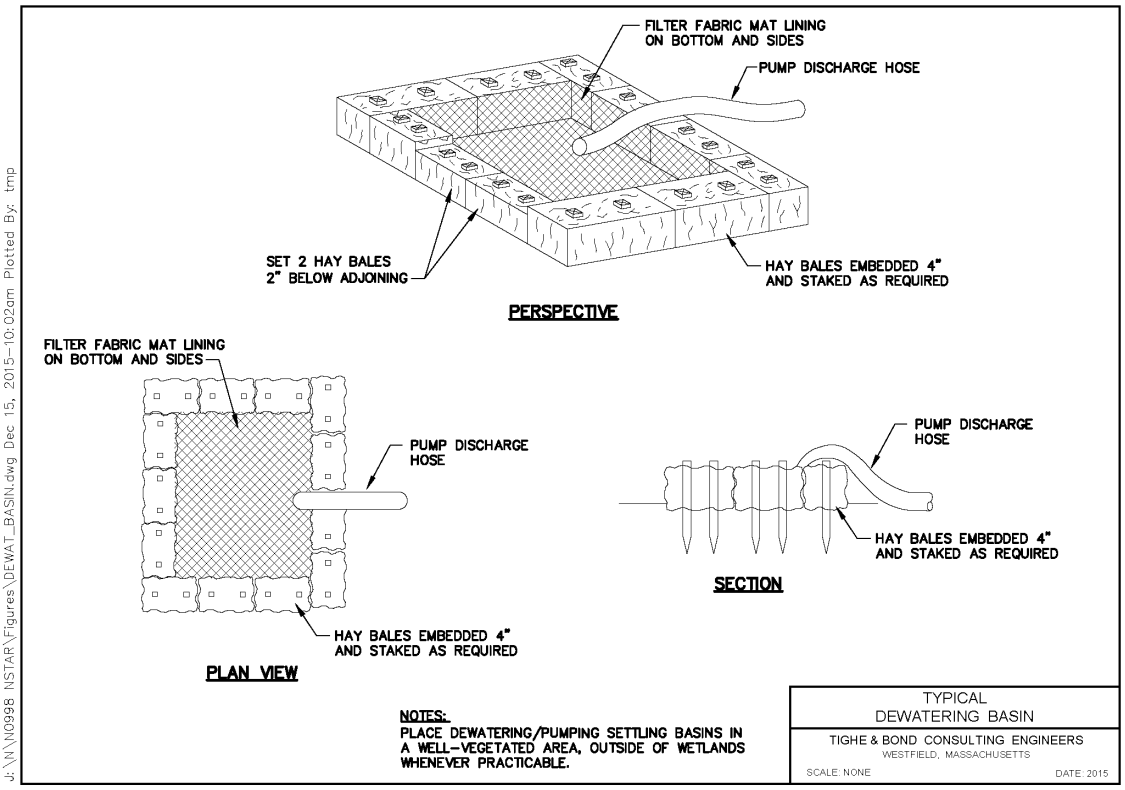
Use filter bags with hay bale containment area for dewatering when there is the potential for discharged water to flow overland into wetlands or waterbodies. Locate dewatering sites in well-vegetated areas within the right of way or approved work areas. Locate discharges outside of wetlands and over 100 feet from a streambank or waterbody, if practicable.

Installation:

- Place pump in a containment structure (i.e., child-sized plastic pool) to avoid fuel leakage to the wetlands or waterways.
- Properly place the discharge hose into a pre-manufactured, geotextile filter bag per the manufacturer's instructions.
- Place the filter bag in a well-vegetated area outside of a wetland area and over 100 feet from a waterbody, if practicable.
- Elevate the intake hose off the trench bottom and create a sump with clean rock in order to avoid pumping additional sediment.
- Build a hay bale corral for the filter bag if the water must be discharged within 100 feet of a wetland, waterbody, or other sensitive area.
- Stake a double vertical line of hay bales in an "L" or "U" shape on the downgradient sides of the bag to further filter the discharge water.

Maintenance:

- Man the pump at all times.
- Refuel pump within a plastic containment structure and/or over 100 feet from the wetland or waterbody.
- Routinely check the filter bag during pumping activities to ensure that it is not reaching its holding capacity.
- If the bag appears to be nearing its limits, stop dewatering until more water has filtered out and the bag can be replaced.
- Properly dispose of used filter bags and trapped sediment.


FILTER FABRIC MAT LINING
ON BOTTOM AND SIDES
PUMP DISCHARGE HOSE
SET 2 HAY BALES
2" BELOW ADJOINING
HAY BALES EMBEDDED 4"
AND STAKED AS REQUIRED
PERSPECTIVE
FILTER FABRIC MAT LINING
ON BOTTOM AND SIDES
PUMP DISCHARGE
HOSE
HAY BALES EMBEDDED 4"
AND STAKED AS REQUIRED
PLAN VIEW
PUMP DISCHARGE
HOSE
HAY BALES EMBEDDED 4"
AND STAKED AS REQUIRED
SECTION
NOTES:
PLACE DEWATERING/PUMPING SETTLING BASINS IN
A WELL-VEGETATED AREA, OUTSIDE OF WETLANDS
WHENEVER PRACTICABLE.
TYPICAL
DEWATERING BASIN
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015
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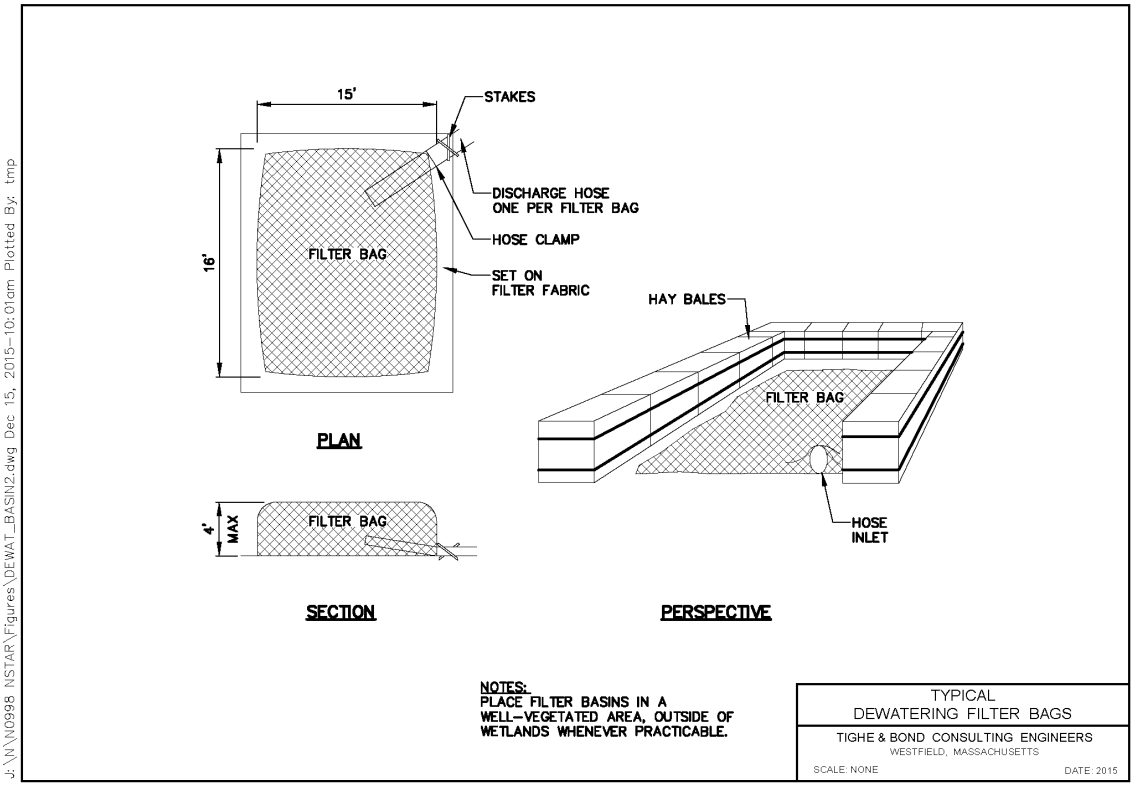
15'
STAKES
DISCHARGE HOSE
ONE PER FILTER BAG
HOSE CLAMP
16'
FILTER BAG
SET ON
FILTER FABRIC
PLAN
HAY BALES
FILTER BAG
HOSE
INLET
4'
MAX
FILTER BAG
SECTION
PERSPECTIVE
NOTES:
PLACE FILTER BASINS IN A
WELL-VEGETATED AREA, OUTSIDE OF
WETLANDS WHENEVER PRACTICABLE.
TYPICAL
DEWATERING FILTER BAGS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015
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2.1.4 Discharge Hose Filter Socks

Applications: Dewatering

Limitations:

- Ineffective for very silty water

Overview:

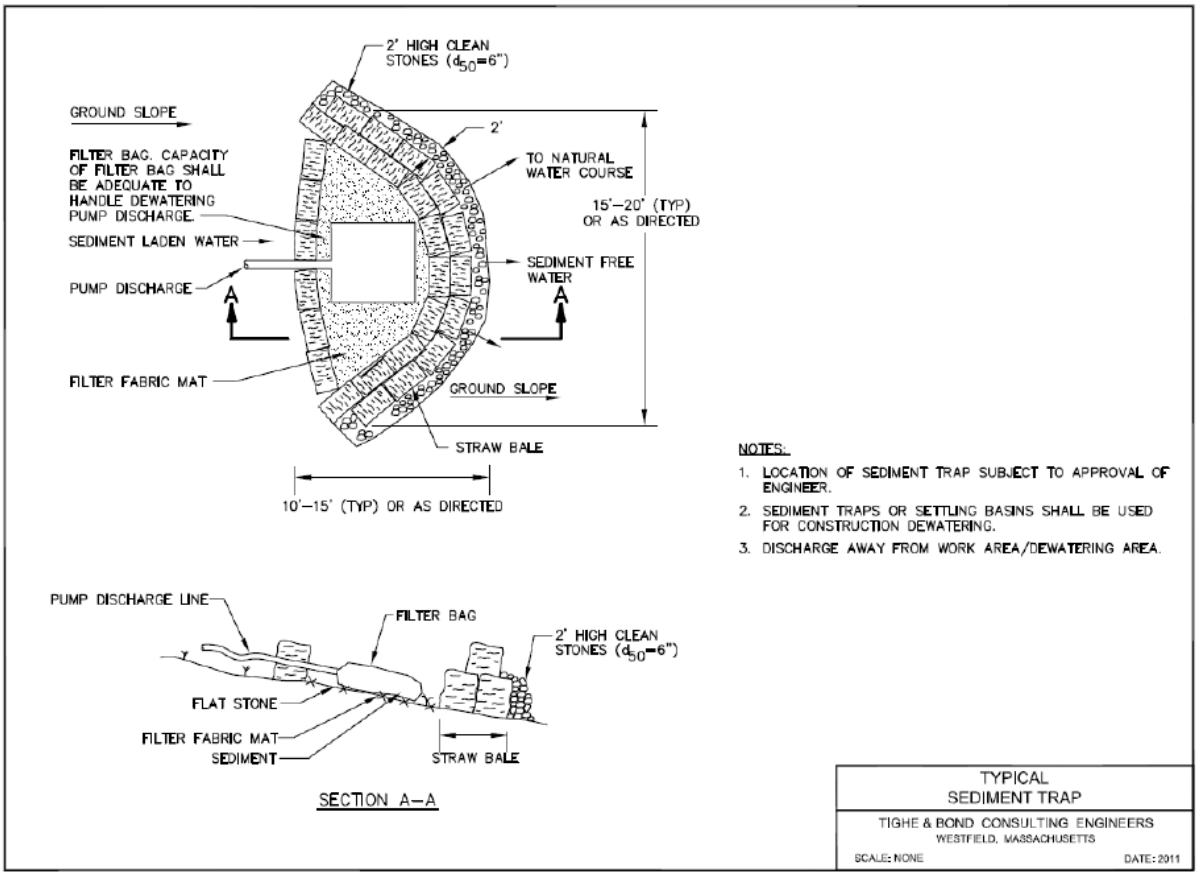
Use discharge hose filter socks at sites where there is insufficient space to construct sediment basins or enough suitable uplands for overland flow and infiltration. Filter "socks" or bags may be affixed to the end for the discharge hose of the pump and used for dewatering. It is important that enough socks be on hand at the site to accommodate the anticipated need, as they fill fast with more turbid water. Additional measures such as hay or straw bales can be installed around the filter device for added protection.



Dewatering to filter "sock" surrounded by hay bales.



Riprap underlain by geotextile fabric



2.2 Coffer Dam and Stream Bypass Pumping

Applications: Dewatering/water diversion, turbidity control

Limitations:

- Pipes need to be adequately sized to accommodate heavy rain events.
- Coffer dams require careful maintenance at all times.

Overview:

A coffer dam is a temporary structure used during instream work to enclose a work area by diverting stream flow using pumps (or gravity) while containing sediment and turbidity. Coffer dams make an impoundment upstream of a work area and then use pumps to remove the water from inside the dammed (isolated) area to beyond the work area. They are used in areas with high flows where siltation barriers are not effective. Coffer dams can consist of sandbags, concrete structures, or pre-manufactured products and should be used on a site-by-site basis according to engineering specifications and/or manufacturer's instructions.

Dewatering measures may be necessary if groundwater is encountered within an excavation (e.g., during installation or repair of a buried cable, footings, foundations or structure replacement) or other area if the presence of water is incompatible with construction. In rare cases, surface water diversions will be necessary in order to create dry working conditions for subsurface work in water bodies.

Installation:

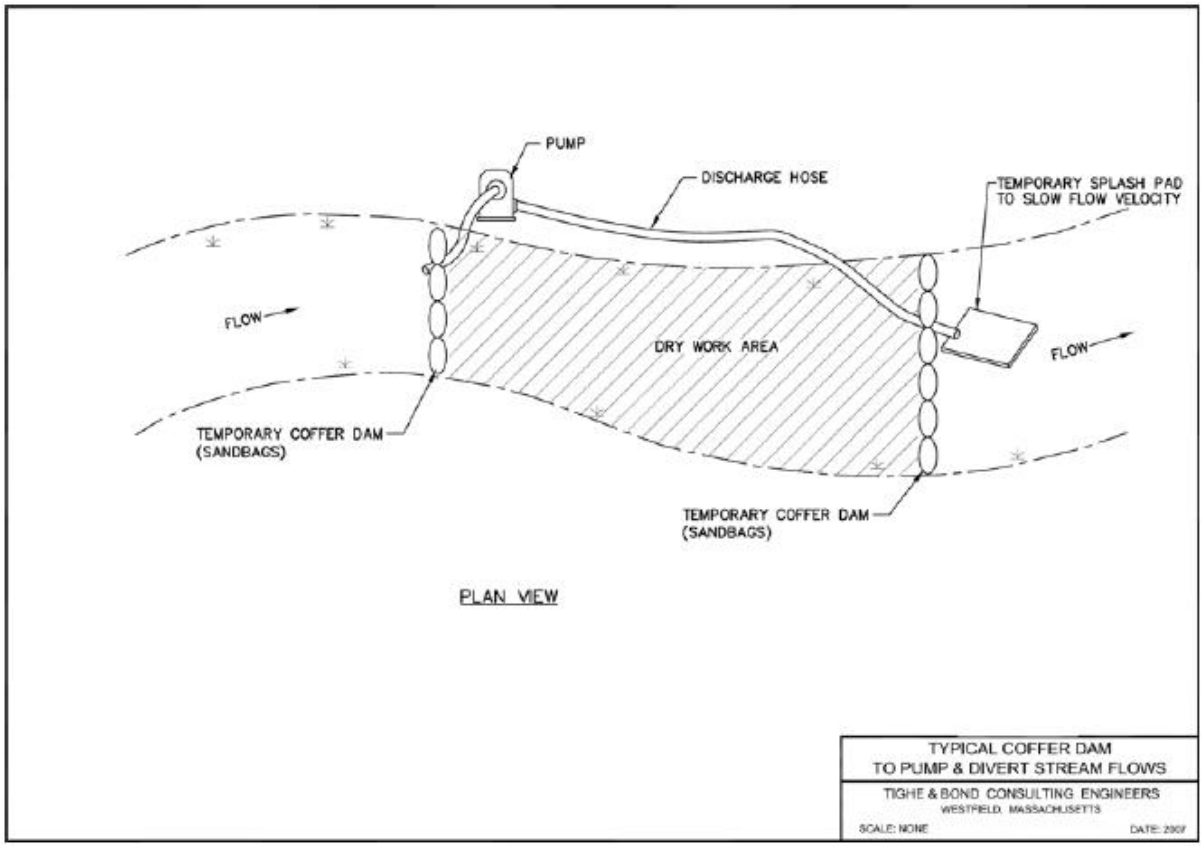
- All cofferdam installations should be designed and approved by engineering staff following geotechnical and hydrological studies. If using a pre-fabricated product, follow manufacturer's instructions and engineer's guidance.
- Place hay bales or silt fence along the streambanks approaching the edges of the workspace.
- Coffer dams should be a semicircle or U-shaped and lined with a geotextile. Use clean durable rockfill or large pre-cast concrete blocks for construction.
- Locate the geotextile outside of the dam for the upstream half and inside for the downstream half to prevent displacement of the geotextile. Place the geotextile with a short flap (1 foot) at the base of the dam, weighted down with clean rockfill.
- Dewatering of the isolated work area may or may not be necessary or even possible. If dewatering is necessary, install an impermeable liner or clay plug.
- After the sediment in suspension has settled out, remove the cofferdam carefully so that sediment disturbance is minimized.
- Do not install in channels where dams would hinder the passage of boats or fish.

Maintenance:

- Cofferdams require careful maintenance at all times.
- Observe the stream flow for any turbidity as a result of the construction activities.

Additional Comments:

Where use of pumps is impractical, coffer dams and temporary pipes can be used to divert flows via gravity and dry out a work area. The instream constriction caused by the cofferdam should be small in order to avoid generating unacceptable scour velocities in the remaining channel section.



2.3 Coffer Dam and Stream Bypass via Gravity

Applications: Dewatering/water diversion, turbidity control

Limitations:

- Pipes need to be adequately sized to accommodate heavy rain events.
- Coffer dams require careful maintenance at all times.

Overview:

A coffer dam is a temporary structure used during instream work to enclose a work area by diverting stream flow via gravity (or using pumps) while containing sediment and turbidity. Coffer dams make an impoundment upstream of a work area and then use a piping and gravity to remove the water from inside the dammed (isolated) area to beyond the work area. They are used in areas with high flows where siltation barriers are not effective. Coffer dams can consist of sandbags, concrete structures, or pre-manufactured products and should be used on a site-by-site basis according to engineering specifications and/or manufacturer's instructions.

Dewatering measures may be necessary if groundwater is encountered within an excavation (e.g., during installation or repair of a buried cable, footings, foundations or structure replacement) or other area if the presence of water is incompatible with construction. In rare cases, surface water diversions will be necessary in order to create dry working conditions for subsurface work in water bodies.

Installation:

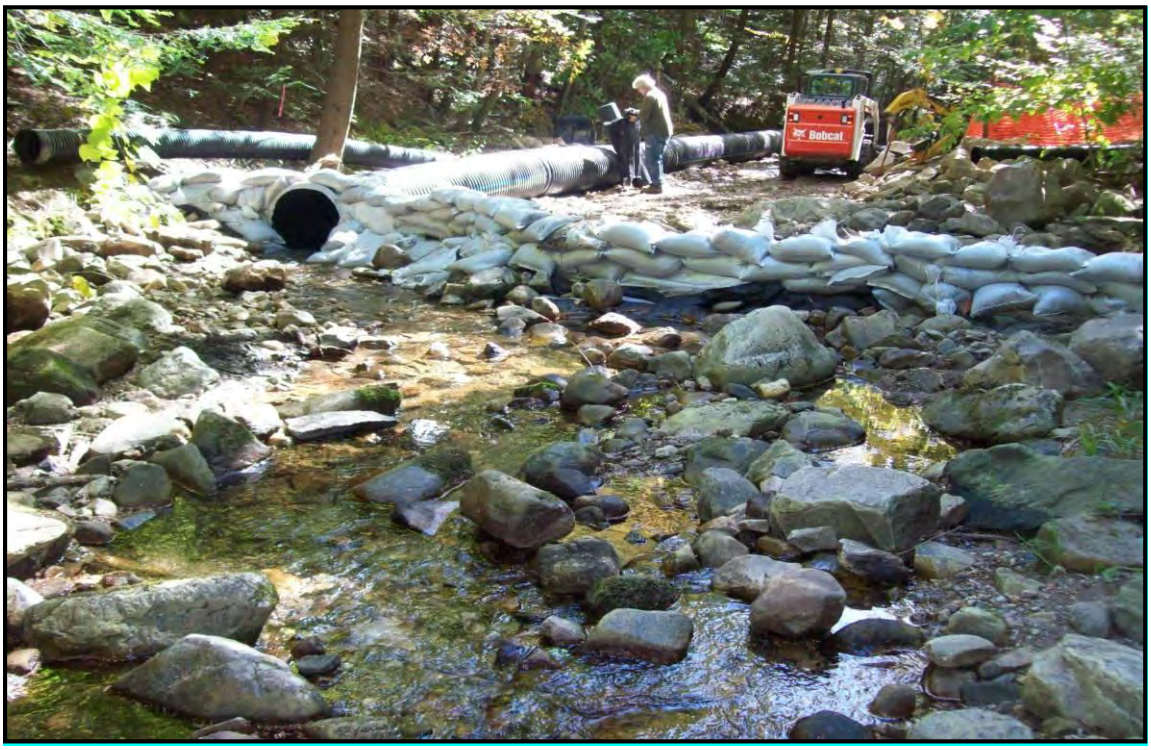
- All cofferdam installations should be designed and approved by engineering staff following geotechnical and hydrological studies. If using a pre-fabricated product, follow manufacturer's instructions and engineer's guidance.
- Place hay bales or silt fence along the streambanks approaching the edges of the workspace.
- Coffer dams should be a semicircle or U-shaped and lined with a geotextile. Use clean durable rockfill or large pre-cast concrete blocks for construction.
- Locate the geotextile outside of the dam for the upstream half and inside for the downstream half to prevent displacement of the geotextile. Place the geotextile with a short flap (1 foot) at the base of the dam, weighted down with clean rockfill.
- Dewatering of the isolated work area may or may not be necessary or even possible. If dewatering is necessary, install an impermeable liner or clay plug.
- After the sediment in suspension has settled out, remove the cofferdam carefully so that sediment disturbance is minimized.
- Do not install in channels where dams would hinder the passage of boats or fish.

Maintenance:

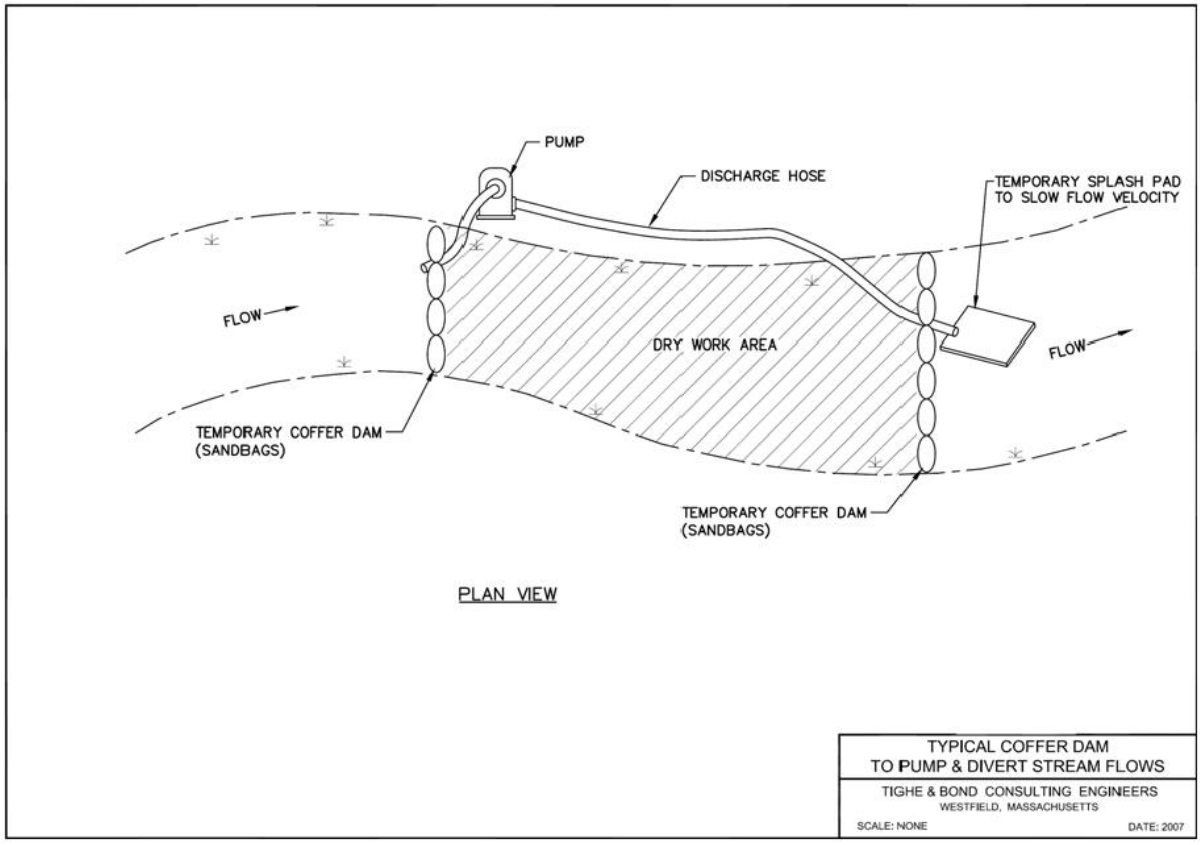
- Cofferdams require careful maintenance at all times.
- Observe the stream flow for any turbidity as a result of the construction activities.

Additional Comments:

Where gravity flows cannot be circumvented through a coffer dam and temporary flexible pipe via gravity, use a pump, discharge hose and downstream temporary splash pad to slow flow velocity can be used. The instream constriction caused by the cofferdam should be small in order to avoid generating unacceptable scour velocities in the remaining channel section.



Sand bag coffer dam and streamflow gravity bypass.


PUMP
DISCHARGE HOSE
TEMPORARY SPLASH PAD
TO SLOW FLOW VELOCITY
FLOW
DRY WORK AREA
FLOW
TEMPORARY COFFER DAM
(SANDBAGS)
TEMPORARY COFFER DAM
(SANDBAGS)
PLAN VIEW
TYPICAL COFFER DAM
TO PUMP & DIVERT STREAM FLOWS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

2.4 Silt Barriers

Applications: Turbidity control

Limitations:

- Must be rated to withstand anticipated flow velocity and quantity.

Overview:

Staked and floating silt barriers are temporary flexible barriers used within a waterbody to separate or deflect natural flow around a work area. Barriers are placed around the sediment source to contain the sediment-laden water, allowing suspended soil particle to settle out of suspension and stay in the immediate area. The staked barrier consists of geotextile fabric attached to support posts and a wire support fence and a chain sewn into a sleeve along the bottom edge to allow the barrier to conform to the channel.

The floating silt barriers are often called silt or turbidity curtains, and can be purchased from manufacturers or can be made on site. Construction generally includes a skirt (geotextile fabric) that forms the barrier, flotation segments such as styrofoam sealed in a seam along the top of the fabric, a ballast chain sealed into a sleeve along the bottom edge of the fabric, a loadline built into the barrier above or below the floatation segments, and piles or posts tied back to underwater or on shore anchor points.

Staked Silt Barriers

- For installations which only isolate a part of the stream, barriers can be used in higher flows (shallow streams with currents less than 0.5 ft/s).
- Do not use in streams/river with strong currents, strong waves, ice, floating debris, or boats and do not place barriers completely across stream channels unless they are minor or intermittent streams with negligible flow.

Installation:

- Place the staked barrier and wire support fence at least 1 foot above the waterline. Do not install in a waterbody deeper than 4 feet.
- Place support stakes 10 feet apart and drive them 2 feet into the channel bottom.
- Fasten the wire mesh securely against the fabric with heavy duty wire staples at least 1″ long. If possible, use a continuous roll of fabric and fasten securely to the posts with heavy duty staples with a maximum spacing of 2″.
- Where possible, prefabricate a staked barrier on shore. Carefully roll it up lengthwise and move it into place.
- Secure the bottom edge of fabric to the channel bottom by placing a heavy chain into a sewn sleeve along the fabric edge, or by placing clean rockfill over the edge.

Floating Silt Barriers

- Use only in negligible or low flow conditions. Can be used for instream areas between 2.6 feet and 6 feet deep and with waves potentially up to 10 feet.

- Do not use to stop, divert, or filter a significant volume of water.

Installation:

- Purchasing a pre-manufactured silt curtain such as Siltmaster® will save time constructing the barrier. Follow manufacturer's advice for the area.

- Enclose the smallest area as practicable. Locate the barrier far enough away from construction equipment to avoid damage.

- Launch the furled barrier from a ramp, pier or shore. Set the shore anchor points and tie off one end of the barrier to the stream anchor point and the downstream end to a boat. Bring to the downstream point to be anchored.

- Anchor the barrier in the desired formation and make sure the skirt is not twisted around the flotation.

- Cut the furling ties and let the ballast sink to its maximum depth.

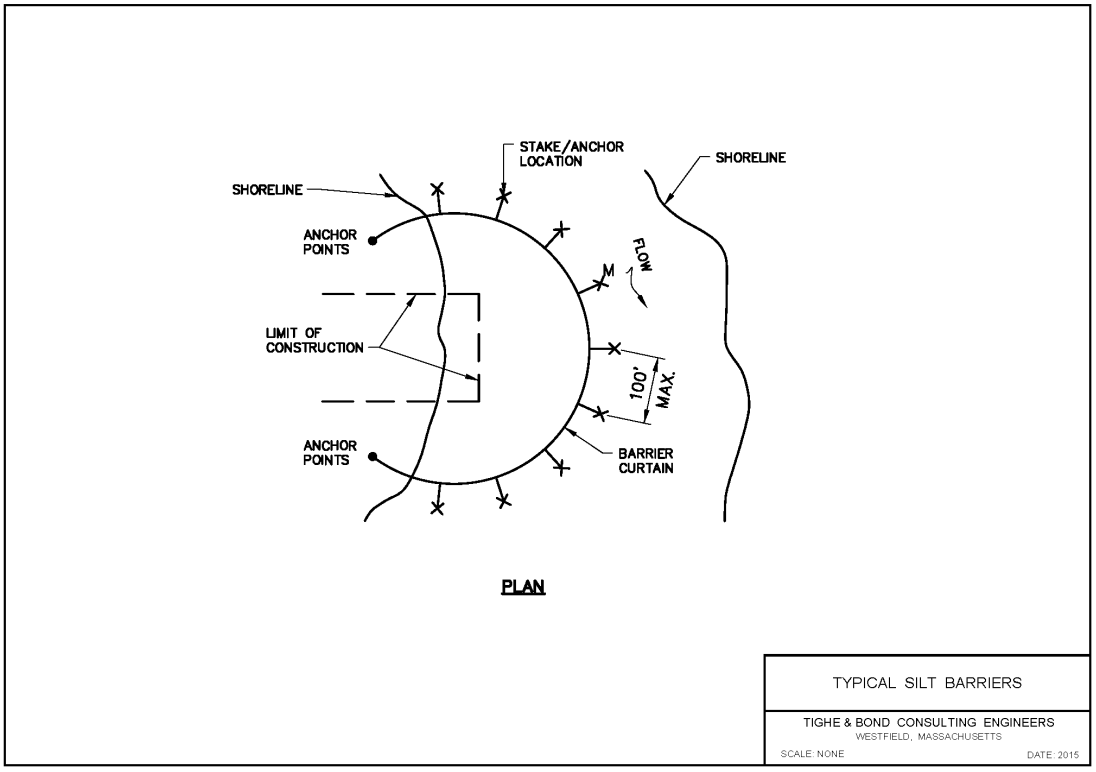
- Slant the barrier at an angle, not perpendicular to the flow. If the barrier will be exposed to reversing currents, anchor it on both sides.

Maintenance for both:

- Inspect daily for any rips or tears or turbidity in the stream flow. Repair immediately with overlapping pieces of geotextile fabric.

- Remove accumulated sediment from the base of the barrier. If necessary, dewater turbid water to an onshore filter bag before removing the barrier.

- Remove the barrier carefully when the work is completed and after suspended sediments have time to settle out.


STAKE/ANCHOR LOCATION
SHORELINE
SHORELINE
ANCHOR POINTS
FLOW
LIMIT OF CONSTRUCTION
100' MAX.
ANCHOR POINTS
BARRIER CURTAIN
PLAN
TYPICAL SILT BARRIERS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015

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APPENDIX B

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Appendix B

B.1 Applicable Laws/Regulations

In Connecticut, there are no fewer than eight potentially pertinent regulatory programs associated with activities proposed in environmentally sensitive areas. The following list of laws and regulations are most likely to apply to electrical utility projects in the State.

- Connecticut Inland Wetlands and Watercourses Act (C.G.S. §§ 22a-36 through 22a-45a)
- Municipal inland wetland and zoning regulations
- Connecticut General Permit for Water Resource Construction Activities (C.G.S. §§ 22a-6, 22a-45a and 22a-378a)
- Connecticut Environmental Policy Act (C.G.S. §§ 22a-1a through 22a-1h)
- Connecticut Coastal Management Act (C.G.S. §§ 22a-359 through 22a-363; 22a-28 through 22a-35; 22a-90 through 22a-112; 33 U.S.C. § 1314)
- Connecticut Water Diversion Policy Act (C.G.S. §§ 22a-365 through 22a-379)
- Connecticut Endangered Species Act (C.G.S. §§ 26-303 through 26-315)
- Section 10 of the Rivers and Harbors Act of 1899 (C.G.S. §§ 22a-426; 33 U.S.C. § 403)
- Section 401 of the Clean Water Act (33 U.S.C. § 1251)
- Section 404 of the Clean Water Act (33 U.S.C. § 1344)

B.2 Geographic Areas Subject to Jurisdiction

The following areas are subject to regulatory jurisdiction by at least one of the regulatory programs discussed in this section: It is important to note that more than one jurisdictional resource type may be present at any given location.

- Inland wetlands, watercourses (rivers, streams, lakes, ponds), and floodplains
- Areas subject to municipal wetlands bylaws or ordinances. (These vary by town.)
- Coastal Resource Areas (beaches, dunes, bluffs, escarpments, coastal hazard areas, coastal waters, nearshore waters, offshore waters, estuarine embayments, developed shorefront, intertidal flats, islands, rocky shorefronts, shellfish concentration areas, shorelands, and tidal wetlands)
- Navigable waters
- Essential Fish Habitat (EFH)
- Rare species habitat as mapped by the Connecticut Natural Diversity Database

B.3 Applicable Regulatory Agencies

Activities subject to jurisdiction under the above-referenced programs will generally be subject to review by one or more regulatory agencies (refer to list below). Most stream and wetland crossings will require notification or consultation with municipal Inland Wetland and Watercourses Agencies, and may require permitting with the U.S. Army Corps of Engineers (Corps) and Connecticut Department of Energy & Environmental Protection (CT DEEP) under Sections 404 and 401 of the Clean Water Act. Coordination with CT DEEP may also be required for projects located within areas mapped by the Connecticut Natural Diversity Database. For work within tidal, coastal or navigable waters or in tidal wetlands, permitting will be required with the Connecticut Department of Energy & Environmental Protection (CT DEEP) Office of Long Island Sound Program (OLISP).

- Municipal Conservation Commissions
- Connecticut Department of Energy & Environmental Protection (CT DEEP) Bureau of Water Management, Inland Water Resources Division
- CT DEEP Wildlife Division
- CT DEEP Office of Environmental Review
- CT DEEP Office of Long Island Sound Programs (OLISP)
- United States Army Corps of Engineers (Corps) New England District

The State of Connecticut and the Federal Government define wetlands differently. According to the Inland Wetlands and Watercourses Act, inland wetlands are defined as "land, including submerged land, not regulated pursuant to Sections 22a-28 through 22a-35 of the Connecticut General Statutes, as amended, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soil Survey, as it may be amended from time to time by the United States Department of Agriculture Natural Resource Conservation Service. Such areas may include filled, graded, or excavated sites which possess an aquic (saturated) soil moisture regime as defined by the National Cooperative Soil Survey." State wetland identification is based solely on the presence of these soil types.

"Watercourses" means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon this state or any portion thereof. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation.

The Federal Government defines wetlands as "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Federal wetland identification is based on a three parameter approach, where a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology is used to make a wetland determination.

B.4 Maintenance, Repair, or Emergency Projects

Most regulatory programs contain provisions that allow normal maintenance of existing structures and/or response to emergency situations that require immediate attention.

Prior to commencement of new construction, all jurisdictional wetland areas within the work corridor should be delineated by a qualified wetland and soil scientist. The specialist shall delineate areas in accordance with the General Statutes of Connecticut (revised January 1, 2007) as set forth at Title 22a Chapter 440 "Inland Wetlands and Watercourses Act", the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual, and any local inland wetland regulations, ordinances or bylaws that may exist. Refer to each set of regulations regarding applicable wetland definitions. Wetland areas shall be clearly demarcated using appropriate flagging tape or similar means. It is important to note that certain jurisdictional wetland areas in Connecticut can actually occur in uplands, such as floodplains. In addition, Upland Review Areas generally apply to work activities and vary in each community. This makes consultation with a wetland specialist particularly important.

B.4.1 Maintain, Repair and/or Replace

Exemptions or considerations for maintenance, repair, and/or replacement of existing electrical utility structures exist in some environmental regulations, but not all. The exemptions are limited to work related to existing and lawfully located structures where no change in the original structure or footprint is proposed. It is not for the selected contractor of a particular project to make a determination as to whether an activity is exempt. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

These exemptions/considerations are afforded at:

- CT Inland Wetlands & Watercourses Act (RCSA § 22a-39-4)
- CT General Permit (Section 3)
- CT Coastal Management Act (RCSA § 22a-363b)
- CT GP [33 CFR 323.4(a)(2)]
- CT Water Diversion Policy Act (RCSA § 22a-377(b)1)

B.4.2 Emergency Projects

Emergency provisions are generally afforded to activities that need to abate conditions that pose a threat to public health or safety. These provisions generally do not allow work beyond what is necessary to abate the emergency condition, and will generally require an after-the-fact permit. It is not for the selected contractor of a particular project to make a determination as to whether an activity is an emergency. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

It is important to note that invocation of an emergency provision does not release the project proponent from reporting requirements.

Emergency provisions are afforded at:

- CEPA (RCSA § 22a-1a-3)
- CT Coastal Management Act (RCSA § 22a-29)
- CT GP [33 CFR Part 323.4(a)(2)]

B.5 Municipal Permitting

Work within wetlands, watercourses and designated Upland Review Areas typically requires notification to municipal staff, (Department of Public Works and/or the Inland Wetland and Watercourse Agency staff). In October 1996 the Connecticut Department of Public Utility Control opened a docket (Docket Number 95-08-34) to conduct a generic investigation on the allocation of siting jurisdiction over utility plant facilities. This included an investigation as to whether local authorities (including local Inland Wetlands and Watercourses Agencies) have jurisdiction over public utility projects.

The investigation resulted in several orders which provide guidance on how public utility companies should coordinate with municipalities on the construction of new facilities, upgrades, significant maintenance activities, and routine maintenance activities.

- For the construction of new facilities, alterations to existing facilities (including upgrades) or significant maintenance involving substantial disturbance of soil, water or vegetation which would regularly fall under the review requirements of certain local authorities (ie. Planning and Zoning Authority; Inland Wetlands Commission; Public Works Department; Historic District Commission), the utility shall at least notify and consult with such local authority, or its designated agent or staff, toward the development of mutually agreeable schedules and procedures for the proposed activity.
- For routine maintenance activities or alterations to existing facilities (including upgrades) involving minor disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities, the utility shall make local authorities or their designated agent or staff aware of such ongoing activities.

B.6 CT Department of Energy & Environmental Protection

If the project requires formal permitting with the Corps (Category 2 or Individual Permit), copies of the application should be forwarded to CT DEEP for review under Section 401 of the Clean Water Act. The CT DEEP requires that a GP Addendum form be completed and submitted along with the Corps application. If the project qualifies as Category 1 under the Corps GP, the project also is granted authorization (Water Quality Certification, WQC) with no formal application under Section 401 of the Clean Water Act, provided the project meets the additional WQC general conditions. The general conditions commonly applicable to utility projects include:

- Prohibiting dumping of any quantity of oil, chemicals, or other deleterious material on the ground;

- Immediately informing the CT DEEP Oil and Chemical Spill Response Division at (860) 424-3338 (24 hours) of any adverse impact or hazard to the environment including any discharge or spillage of oil or chemical liquids or solids;

- Separating staging areas at the site from the regulated areas by silt fences or stray/hay bales at all times;

- Prohibiting storage of any fuel and refueling of equipment within 25 feet from any wetland or watercourse;

- Following the document "Connecticut Guidelines for Soil and Erosion Control," inspecting employed controls at least once per week, after each rainfall, and at least daily during prolonged rainfall, and correcting any deficiencies within 48 hours of being found.

- Prohibiting the storage of any materials at the site which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, or which could in the event of a flood be injurious to human, animal or plant life, below the elevation of the 500 year flood. Any other material or equipment stored at the site below this elevation must be firmly anchored, restrained or enclosed to prevent flotation. The quantity of fuel for equipment at the site stored below such elevation shall not exceed the quantity of fuel that is expected to be used by such equipment in one day.

- Immediately informing DEEP at (860) 424-3019 and the Corps at (617) 647-8674 of the occurrence of pollution or other environmental damage in violation of the WQC, and within 48 hours support a written report including information specified in the general conditions.

If the project falls within areas mapped by the Connecticut Natural Diversity Database, or is less than 0.50 miles upstream or downstream of a mapped area, a data request and possible coordination will be required with the Natural Diversity Database.

If a project is located within tidal, coastal or navigable waters of the state or in tidal wetlands, permitting may be required with the CT DEEP OLISP. For the routine maintenance of previously permitted structures or structures that were in place prior to June 24, 1939, no permitting is required. For significant maintenance of previously permitted structures or structures that were in place prior to June 24, 1939, a Certificate of Permission is required. For new projects a Structures, Dredging and Fill Permit and/or a Tidal Wetlands Permit may be required. The CT DEEP OLISP should be consulted prior to preparing permits to conduct a pre-application meeting and determine the appropriate permitting route.

B.7 U.S. Army Corps of Engineers

Work within wetlands and waters of the United States is subject to jurisdiction under Section 404 of the Clean Water Act, which is administered by the Corps. Work within navigable waters is also administered by the Corps under Section 10 of the Rivers and Harbors Act of 1899. The Corps has issued a General Permit (GP) which establishes categories for projects based on their nature of impacts. The current permit was issued on July 15, 2011, and expires on July 15, 2016. The permit will be reissued by July 15, 2016 for another five years. Applications are not required for Category 1 projects, but

submittal of a Category 1 Form before the work occurs and submittal of a Compliance Certification Form within one month after the work is completed is required. The Category 1 Form and Compliance Certification Form entails self-certification by applicants that their project complies with the terms and conditions of Category 1 of the GP. Category 2 projects require the submittal of an application to the Corps, followed by a screening of the application by the Corps, the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, National Marine Fisheries Service and CT DEEP, and consultation with the Connecticut Commission on Culture and Tourism and Tribal Historic Preservation Officers. Category 2 projects may not proceed until written approval from the Corps is received. Written approval is generally provided within 45 days of the multi-agency screening. After written approval is received, a Work-Start Notification Form must be submitted before the work occurs, and a Compliance Certification Form must be submitted within one month after the work is completed.

For work proposed within a FEMA floodway or floodplain, the Corps recommends that the applicant apply for and receive a Flood Management Certification (if required), prior to applying to the Corps. Additionally, applications for Category 2 inland projects that propose fill in Corps jurisdiction must include an Invasive Species Control Plan (ISCP), unless otherwise directed by the Corps.

An Individual Permit requires a formal permit application to be submitted to the Corps. The application is reviewed in detail by both state and federal agencies, and a Public Notice is released for public comment. Projects which trigger an Individual Permit generally result in significant impacts to wetlands and/or watercourses.

Stream and wetland crossings are only subject to jurisdiction under the Corps if there is **a discharge of dredge or fill material into wetlands or waters of the United States**. Equipment access through a stream or wetland with no structural BMP is not regulated by the Corps if there is no discharge of dredge or fill material (note that equipment rutting as a result of not using an appropriate BMP can be considered a "discharge of dredge material"). Similarly, the use of a timber or rail car bridge that extends from bank to bank with no stream impacts is not regulated by the Corps. Additionally, the use of timber mats and stone is considered "fill material" by the Corps, and must be calculated to determine overall impacts. Temporary mats are not counted towards the 1 acre threshold under Category 2 if they are adequately cleaned after previous use, removed immediately after completion of construction and disposed of at an upland site.

Maintenance, including emergency reconstruction of currently serviceable structures, is exempt from Corps jurisdiction and does not require formal permitting. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs to qualify for this exemption.

Stream and wetland crossings that involve the discharge of dredge and fill material may be conducted under Category 1 if the work complies with the general conditions and Category 1 criteria of the GP. The following are Category 1 criteria that are commonly applicable to stream and wetland crossings in utility rights of way. See Section 1.8 for additional criteria for culvert crossings:

- The work results in less than 5,000 square feet of impacts to wetlands or waters of the United States. Replacement of utility line projects with impacts solely

within wetlands greater than 5,000 square feet may be eligible for Category 1 Authorization after consultation with the Corps about the specific project;

- Temporary fill, with the exceptions of swamp and timber mats, discharged to wetlands shall be placed on geotextile fabric laid on the pre-construction wetland grade. Unconfined temporary fill discharged into flowing water (rivers and streams) shall consist only of clean stone. All temporary fill shall be removed as soon as it is no longer needed, and disposed of at an appropriate upland site.
- Any unconfined in-stream work, including construction, installation or removal of sheet pile cofferdam structures, is conducted during the low-flow period between July 1 and September 30. However, installation of cofferdams, other than sheet pile cofferdams, is not restricted to the low-flow period;
- No work will occur in the main stem or tributary streams of the Connecticut River watershed that are being managed for Atlantic salmon (*Salmo salar*). (Work of this nature requires screening for potential impacts to designated Essential Fish Habitat.);
- The work does not result in direct or secondary impacts to Special Wetlands, Threatened, Endangered or Special Concern Species, or Significant Natural Communities identified by the Connecticut Natural Diversity Database. Work within 750 feet of vernal pools shall be minimized;
- The project does not require a Corps permit with associated construction activities within 100 feet of Special Wetlands;
- The project does not result in fill placed within a FEMA established floodway, unless the applicant has a State of Connecticut Flood Management Certification pursuant to Section 25-68d of the Connecticut General Statutes;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands;
- The project is not located in a segment of a National Wild and Scenic River System (includes rivers officially designated by Congress as active study status rivers for possible inclusion) or within 0.25 miles upstream or downstream of the main stem or tributaries to such a system;
- The project has no potential for an effect on a historic property which is listed or eligible for listing in the National Register of Historic Places;
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service;
- Section 106 needs to be taken into account for all work that requires federal permitting – including Category 1;
- The project does not use slip lining, plastic pipes, or High Density Polyethylene Pipes (HDPP).
- Appropriate BMPs are employed in regards to heavy equipment in wetlands (General Condition 16) and sedimentation and erosion controls (General Condition 20).

- Disturbed inland wetland areas are restored in accordance with General Condition 18.

Stream and wetland crossings that involve the discharge of dredge and fill material may be conducted under Category 2 if the work complies with the general conditions and Category 2 criteria of the GP. The following are Category 2 criteria that are commonly applicable to stream and wetland crossings in utility right of ways. See Section 1.8 for additional criteria for culvert crossings:

- The work results in less than one acre of impacts to wetlands or waters of the United States;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands.
- Temporary fill, with the exceptions of swamp and timber mats, discharged to wetlands shall be placed on geotextile fabric laid on the pre-construction wetland grade. Unconfined temporary fill discharged into flowing water (rivers and streams) shall consist only of clean stone. All temporary fill shall be removed as soon as it is no longer needed, and disposed of at an appropriate upland site.
- Appropriate BMPs are employed in regards to heavy equipment in wetlands (General Condition 16) and sedimentation and erosion controls (General Condition 20).
- Disturbed inland wetland areas are restored in accordance with General Condition 18.

Stream and wetland crossings that cannot meet Category 1 or Category 2 criteria may require review under an Individual Permit. The Corps should be consulted before assuming an Individual Permit will be required, as exceptions can be made under certain circumstances.

B.8 Culvert Installation

New culvert installation or existing culvert replacements will require notification or consultation with municipal staffers which might include the Department of Public Works and/or the inland wetlands officer, and may require permitting with the Corps under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899, and the CT DEEP under Section 401 of the Clean Water Act. Coordination with CT DEEP may also be required for projects located within areas mapped by the Connecticut Natural Diversity Database. For work within tidal, coastal or navigable waters or in tidal wetlands, permitting will be required with the CT DEEP Office of Long Island Sound Program (OLISP).

B.8.1 Municipal Permitting

See Section 1.5 for general local permitting guidance.

- For the installation of new culverts and the replacement of culverts that involve substantial disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities (ie.

Planning and Zoning Authority; Inland Wetlands Commission; Public Works Department; Historic District Commission), the utility shall at least notify and consult with such local authority, or its designated agent or staff, toward the development of mutually agreeable schedules and procedures for the proposed activity.

- For the replacement of culverts involving only minor disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities, the utility shall make local authorities or their designated agent or staff aware of such ongoing activities.

B.8.2 CT Department of Energy & Environmental Protection

If the project requires formal permitting with the Corps, copies of the application should be forwarded to CT DEEP for review under Section 401 of the Clean Water Act. The CT DEEP requires that a PGP Addendum form be completed and submitted along with the Corps application.

If a culvert project falls within areas mapped by the Connecticut Natural Diversity Database, or falls within 0.50 miles upstream or downstream of a mapped area, a data request and possible coordination will be required with the Natural Diversity Database.

If a culvert project is located within tidal, coastal or navigable waters of the state or in tidal wetlands, permitting will be required with the CT DEEP OLISP. For new projects a Structures, Dredging and Fill Permit and/or a Tidal Wetlands Permit will be required. For replacement structures which were previously permitted, or which were in place prior to June 24, 1939, a Certificate of Permission may only be required, which entails a shorter permitting process.

B.8.3 U.S. Army Corps of Engineers

See Section 1.7 for general Corps permitting requirements. Open bottom arches, bridge spans or embedded culverts are preferred over traditional culverts and are required for Category 1 projects. However, where site constraints make these approaches impractical, the Corps should be consulted.

New bridge or open-bottom structure crossings may be conducted under Category 1 or Category 2 if the following criteria are met in addition to meeting any applicable general criteria listed in section 1.7 of this manual:

- The work spans at least 1.2 times the watercourse bank full width;
- The structure has an openness ratio equal to or greater than 0.25 meters;
- The structure allows for continuous flow of the 50-year frequency storm flows.

New culvert installations may be conducted under Category 1 if the work complies with the general conditions and Category 1 criteria of the GP. The following are Category 1 criteria that are commonly applicable to new culvert installations in utility right of ways:

- Work is conducted in accordance with the design requirements listed in Section 3.1.3 of the Best Management Practices Manual;
- Plastic and High Density Polyethylene Pipes (HDPE) are not used;

- The work results in less than 5,000 square feet of impacts to wetlands or waters of the United States;
- Any unconfined in-stream work, including construction, installation or removal of sheet pile cofferdam structures, is conducted during the low-flow period between July 1 and September 30, except in instances where a specific written exception has been issued by the Connecticut Department of Energy & Environmental Protection. However, installation of cofferdams, other than sheet pile cofferdams, is not restricted to the low-flow period;
- No open trench excavation is conducted within flowing waters. Work within flowing waters can be avoided by using temporary flume pipes, culverts, cofferdams, etc. to isolate work areas and maintain normal flows;
- The tributary watershed to the culvert does not exceed 1.0 square mile (640 acres);
- The culvert gradient (slope) is not steeper than the streambed gradient immediately upstream or downstream of the culvert;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than 25% of the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The structure does not otherwise impede the passage of fish and other aquatic organisms;
- The structure allows for continuous flow of the 50-year frequency storm flows;
- The work does not result in direct or secondary impacts to Special Wetlands, Threatened, Endangered or Special Concern Species, or Significant Natural Communities identified by the Connecticut Natural Diversity Database. Work within 750 feet of vernal pools shall be minimized;
- The project does not require a Corps permit with associated construction activities within 100 feet of Special Wetlands;
- The project does not result in fill placed within a FEMA established floodway, unless the applicant has a State of Connecticut Flood Management Certification pursuant to section 25-68d of the Connecticut General Statutes;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands;
- The project is not located in a segment of a National Wild and Scenic River System (includes rivers officially designated by Congress as active study status

rivers for possible inclusion) or within 0.25 miles upstream or downstream of the main stem or tributaries to such a system;

- The project has no potential for an effect on a historic property which is listed or eligible for listing in the National Register of Historic Places;
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service.
- Appropriate BMPs are employed in regards to sedimentation and erosion controls (General Condition 20).

New culvert installations may be conducted under Category 2 if the work complies with the general conditions and Category 2 criteria of the GP. The following are Category 2 criteria that are commonly applicable to new culvert installations in utility right of ways:

- Work is conducted in accordance with the design requirements listed in Section 3.1.3 of the Best Management Practices Manual;
- The work results in less than one acre of impacts to wetlands or waters of the United States;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- There is no practicable alternative location for the crossing that would have less environmental impacts;
- The use of a bridge or open-bottom structure is determined to be not practicable;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The culvert has an openness ratio equal to or greater than 0.25 meters;
- The structure does not result in a change in the normal water surface elevation of the upstream waters or wetlands;
- The structure allows for continuous flow of the 50-year frequency storm flows;
- Appropriate BMPs are employed in regards to sedimentation and erosion controls (General Condition 20).

New culvert installations that cannot meet Category 1 or Category 2 criteria may require review under an Individual Permit. The Corps should be consulted before assuming an Individual Permit will be required, as exceptions can be made under certain circumstances.

In-kind replacement of culverts using the same materials is exempt from Section 404 of the Clean Water Act, and does not require permitting with the Corps. The Corps, however, should be consulted before assuming an activity is exempt from their jurisdiction. Consult with Siting and Permitting.

Bridge or open-bottom structure replacements may be conducted under Category 1 if the conditions for a new bridge or open-bottom structure replacement have been met. In addition, bridge or open-bottom structure replacements should not result in a change in the normal surface elevation of the upstream waters or wetland, and the replacement structure should have a riparian bank on one or both sides for wildlife passage. Culvert replacements may be conducted under Category 1 if the conditions for new culvert installation are met.

Bridge or open-bottom structure replacements may be conducted under Category 2 if the conditions for a new bridge or open-bottom structure replacement have been met. Culvert replacements may be conducted under Category 2 if the following conditions are met:

- The work results in 5,000 square feet to less than one acre of impacts to wetlands or waters of the United States;
- The use of a bridge or open-bottom structure is determined to be not practicable;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The culvert has an openness ratio equal to or greater than 0.25 meters;
- The structure does not result in a change in the normal water surface elevation of the upstream waters or wetlands;
- The structure allows for continuous flow of the 50-year frequency storm flows.
- Appropriate BMPs are employed in regards to sedimentation and erosion controls (General Condition 20).

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Appendix C

C.1 Applicable Laws/Regulations

In Massachusetts, there are no fewer than seven potentially pertinent regulatory programs associated with activities proposed in environmentally sensitive areas. The following list of laws and regulations are most likely to apply to electrical utility projects in the Commonwealth.

- Massachusetts Wetlands Protection Act (M.G.L. 131 § 40) (MA WPA)
- Municipal wetland bylaws (varies by town)
- Massachusetts Endangered Species Act (M.G.L. 131A) (MESA)
- "Chapter 91" Public Waterfront Act (M.G.L. c. 91 §§ 1 through 63)
- Massachusetts Environmental Policy Act (M.G.L. c. 30 §§ 61 through 62H) (MEPA)
- Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403)
- Section 401 of the Clean Water Act (33 U.S.C. § 1251)
- Section 404 of the Clean Water Act (33 U.S.C. § 1344)
- Massachusetts Watershed Protection Act (M.G.L. 92A §1/2) (MA WsPA)

C.2 Geographic Areas Subject to Jurisdiction

The following areas are subject to regulatory jurisdiction by at least one of the regulatory programs discussed in this section: It is important to note that more than one jurisdictional resource type may be present at any given location. Further, while coastal wetland resource areas are jurisdictional under the Massachusetts Wetlands Protection Act (MAWPA), Eversource's territory does not extend into these areas at the present time. Therefore, these areas are not discussed in detail below.

- Massachusetts Wetlands Protection Act Resource Areas:
    - (Inland). Bordering Vegetated Wetland; Bank; Land Under Water Bodies and Waterways; Land Subject to Flooding; 200-foot Riverfront Area and associated 100-foot Buffer Zones.
- Areas subject to municipal wetlands bylaws or ordinances. (These vary by town.)
- Estimated and/or Priority Habitat of State-listed Rare Species
- Outstanding Resource Waters (ORWs = certified vernal pools and public surface drinking waters)
- Essential Fish Habitat (EFH)
- Cold Water Fisheries Resources (CFRs)
- Areas of Critical Environmental Concern (ACECs)
- Great Ponds
- Navigable waterways

- Quabbin Reservoir, Ware River and Wachusett Reservoir watersheds

C.2.1 Endangered Species

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) maintains the current list of rare and endangered species and species of special concern in Massachusetts. Publically available data only allows for identification of Priority Habitats for the listed species, not specific species information. Priority Habitat location information is available on the NHESP website.

Species specific information is provided for planned linear maintenance activities which are submitted to NHESP in WMECO's annual O&M Plan. Projects/ activities which are not covered in the O&M Plan must file an independent request for information.

Applicable regulations and agency are listed below:

- Massachusetts Endangered Species Act: 321 CMR 10.00 – Division of Fish and Wildlife – NHESP

C.2.2 Vernal Pools

NHESP maintains a database of certified and potential vernal pools in Massachusetts. These data are available on the NHESP website and MassGIS. Certified vernal pools are considered Outstanding Resource Waters. The Corps' GP modified July 28, 2011 includes provisions for protection of certified vernal pools and potential vernal pools, including the vernal pool depression, the vernal pool envelope (area within 100 feet of the vernal pool depression's edge), and the critical terrestrial habitat (area within 100-750 feet of the vernal pool depression's edge). Temporary impacts associated with timber (construction) mats in previously disturbed areas of existing utility projects rights-of-way are exempt from GP requirements regarding work in the vernal pool envelope or critical terrestrial habitat, provided that a Vegetation Management Plan exists that avoids, minimizes and mitigates impacts to aquatic resources. Applicable regulations and agencies for certified vernal pools are listed below:

- Wetlands Protection Act: 310 CMR 10.00 – MassDEP and local Conservation Commissions

- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP

- Department of the Army General Permit Commonwealth of Massachusetts - Corps

C.2.3 Essential Fish Habitat and Wild & Scenic River Designation

Essential Fish Habitat is a habitat essential for spawning, breeding, feeding, or growth to maturity of federally managed species. This website provides more information: www.greateratlantic.fisheries.noaa.gov/habitat. Consultation with the Corps is recommended to confirm the location of Essential Fish Habitat with respect to a proposed project.

Currently portions of the Westfield River and its tributaries, the Farmington River, West Branch, portions of the Sudbury, Assabet, and Concord Rivers, and the Taunton River are designated as National Wild and Scenic Rivers (www.rivers.gov/wildriverslist.html) in

Massachusetts. The Lower Farmington and Salmon Brook and Nashua Rivers are under study to determine consideration for National Wild and Scenic designation (www.rivers.gov/study.html). The Corps reviews projects for impacts to both Essential Fish Habitat and National Wild & Scenic Rivers.

- Department of the Army General Permit Commonwealth of Massachusetts – Corps

C.2.4 Cold Water Fisheries Resources

The Massachusetts Division of Fisheries and Wildlife maintains a list of waters that are known to have cold water fisheries resources (CFRs). This list is useful in highlighting environmental sensitive areas which could be avoided during project planning. The MassDEP reviews projects for potential impacts to CFRs.

- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP

C.2.5 Outstanding Resource Waters

Outstanding Resource Waters include Certified Vernal Pools (CVPs), surface drinking water supplies and tributaries to surface drinking water supplies. CVPs are determined by NHESP and locations are available through MassGIS. Locations of surface water supplies and other Outstanding Resource Waters are also available through MassGIS. The applicable regulations and agency are listed below:

- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP

C.2.6 Historic and Cultural Resources

The Massachusetts Historic Commission (MHC) is the State Historic Preservation Office (SHPO) and is responsible for protecting the state's historic and cultural resources. In addition, four Native American tribes have interests in Massachusetts, and the Board of Underwater Archaeological Resources (BUAR) protects underwater resources in Massachusetts' lakes, ponds, rivers and coastal waters. Historic and cultural concerns are typically associated with maintenance activities that may require excavation (i.e. new poles, new roads, guy wire installations, etc.).

C.3 Applicable Regulatory Agencies

Activities subject to jurisdiction under the above-referenced programs will generally be subject to review by one or more regulatory agencies (refer to list below). New stream and wetland crossings not related to maintenance will require permitting with municipal Conservation Commissions, and may require permitting with the U.S. Army Corps of Engineers (Corps) and Massachusetts Department of Environmental Protection (MassDEP) under Sections 404 and 401 of the Clean Water Act. Any non-maintenance work within Land Under Water will require permitting with the MassDEP Wetland and Waterways Division. Coordination with the NHESP may also be required for projects located within areas mapped as priority and/or estimated habitat for state-listed rare species. For work within navigable waters, consultation may be required with the Massachusetts Office of Coastal Zone Management (MA CZM).

- Municipal Conservation Commissions
- Massachusetts Department of Environmental Protection (MassDEP) Wetlands and Waterways Program
- Massachusetts Division of Fish and Wildlife: Natural Heritage and Endangered Species Program (NHESP)
- Massachusetts Executive Office of Environmental Affairs (EOEA)
- United States Army Corps of Engineers (Corps) New England District
- Massachusetts Office of Coastal Zone Management (MA CZM)
- Massachusetts Division of Conservation and Recreation (MA DCR)

C.4 Maintenance, Repair, or Emergency Projects

Most regulatory programs contain provisions that allow normal maintenance of existing structures and/or response to emergency situations that require immediate attention.

C.4.1 Maintain, Repair and/or Replace

Exemptions or considerations for maintenance, repair, and/or replacement of existing electrical utility structures exist in some environmental regulations, but not all. The exemptions are limited to work related to existing and lawfully located structures where no change in the original structure or footprint is proposed. It is not for the selected contractor of a particular project to make a determination as to whether an activity is exempt. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

These exemptions/considerations are afforded at:

- MAWPA (M.G.L Chapter 131, § 40, paragraph 1)
- MAWPA regulations for Riverfront Area (310 CMR 10.58(6))
- MEPA regulations (301 CMR 11.01(2)(b)(3))
- 33 CFR Part 323.4(a)(2)
- MA 401 WQC (314 CMR 9.03(1))
- MESA (M.G.L. Chapter 131A, § 3; 321 CMR 10.14(5-7) and (12)
- MAWPA (350 CMR 11.05(11) and (12))
- National Pollutant Discharge Elimination System (NPDES), Construction General Permit (as modified effective February 16, 2012)

However, certain operations and maintenance activities which impact Waters of the United States are subject to Sections 401 and 404 of the Clean Water Act, per Sections 1.6 and 1.7 below.

C.4.2 Emergency Projects

Emergency provisions are generally afforded to activities that need to abate conditions that pose a threat to public health or safety. These provisions generally do not allow work beyond what is necessary to abate the emergency condition, and will generally require an after-the-fact permit. It is not for the selected contractor of a particular

project to make a determination as to whether an activity is an emergency. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

It is important to note that invocation of an emergency provision does not release the project proponent from reporting requirements.

Emergency provisions are afforded at:

- MAWPA regulations (310 CMR 10.06)
- MEPA (301 CMR 11.00)
- MA 401 WQC (314 CMR 9.12)
- Chapter 91 (310 CMR 9.20)
- MESA (321 CMR 10.15)

C.5 Municipal Permitting

Work within wetlands, watercourses and Buffer Zones typically requires permitting with municipal Conservation Commissions. Work that entails "maintaining, repairing or replacing, but not substantially changing or enlarging, an existing and lawfully located structure or facility used in the service of the public and used to provide electric service" is exempt under the Massachusetts Wetlands Protection Act (MA WPA) per MGL Chapter 131 Section 40. However, individual municipalities may establish their own wetlands bylaws under Home Rule authority which could require permitting for operation and maintenance activities. The table below lists communities which have a wetland bylaw in which Eversource Energy operates and maintains infrastructure. Appropriate municipal permitting or notification should be completed in these towns as required prior to conducting operation and maintenance activities.

TABLE C-1
Eversource Energy Communities with Municipal Wetland Bylaws[1]

Community	Date of Bylaw	Utility Maintenance Exemption	Notification Required
Acton	7/8/2003	Yes	No
Amherst	9/27/2006	Yes	Yes
Ashland	5/6/2009	Yes	Yes
Auburn	5/1/2012	Yes	Yes
Bedford	1987/rev. 1995	Yes	Yes
Belchertown	5/3/2006	Yes	No
Bellingham	As of 12/2015	No	Yes
Bolton	5/7/2012	Yes	No
Brookline	12/2009 (regs)	Yes	Yes
Burlington	5/20/2013	Yes	Yes
Canton	4/29/1989	Yes	Yes
Carlisle	2009	Yes	No
Carver	As of 12/2015	Yes	Yes
Chicopee	4/3/2002	Yes	No
Chilmark	10/12/1993	No	Yes
Dedham	11/182013	Yes	Yes
Deerfield	11/6/1989	Yes	Yes
Dover	5/2/1994	Yes	Yes
East Longmeadow	10/1992	Yes	Yes
Framingham	4/26/2005	Yes	Yes
Grafton	5/11/1987	Yes	Yes
Greenfield	11/23/2001	Yes	No
Hadley	5/1/2008	No	Yes
Holden	2011	Yes	Yes
Hopkinton	5/2/1995	Yes	Yes
Hampden	8/5/1992	Yes	Yes
Holyoke	11/2005	Yes	Yes
Kingston	2004	No	Yes
Leicester	11/2015	Yes	Yes
Lexington	5/3/1982	No	Yes
Lincoln	3/24/2007	No	Yes
Longmeadow	10/2000	Yes	No
Ludlow	5/1/2002	Yes	No
Maynard	12/3/2005	Yes	Yes
Medway	7/2014	Yes	Yes
Milford	5/2010	Yes	No
Millis	5/13/1191	Yes	No
Millville	5/13/2013	Yes	Yes

Community	Date of Bylaw	Utility Maintenance Exemption	Notification Required
Natick	4/27/2000	Yes	No
Needham	9/1/1988	Yes	Yes
Norfolk	11/9/2010	Yes	Yes
Northampton	8/17/1989	Yes	Yes
Northborough	5/21/1990	Yes	Yes
Northbridge	5/6/2008	Yes	Yes
Pelham	5/2/1987	Yes	Yes
Pembroke	4/22/2008	Yes	No
Plympton	5/16/2012	Yes	Yes
Richmond	5/2015	Yes	Yes
Rochester	As of 12/2015	Yes	Yes
Sharon	As of 12/2015	Yes	No
Sherborn	2013	Yes	No
Shutesbury	5/2/1987	Yes	Yes
Southborough	4/10/1995	Yes	Yes
South Hadley	12/27/2005	No	Yes
Southwick	6/6/1989	Yes	Yes
Springfield	5/5/1993	Yes	Yes
Stoneham	4/2013	Yes	Yes
Stow	5/21/2003	No	Yes
Sunderland	4/27/1990	Yes	Yes
Sutton	5/11/2015	Yes	Yes
Truro	9/30/2010	No	Yes
Upton	2009	Yes	Yes
Walpole	2002	Yes	Yes
Wayland	5/1/2002	Yes	No
Wendell	3/10/1988	Yes	Yes
West Tisbury	6/3/2004	Yes	Yes
Westborough	10/20/2008	Yes	Yes
Westfield	5/20/2003	Yes	Yes
Westwood	1989	Yes	Yes
Wilbraham	5/27/1997	Yes	Yes
Worcester	7/1/2007	Partial	Yes

[1]According to Massachusetts Association of Conservation Commissions website as of December, 2015 and Town/City websites.
[2]Refer to municipal bylaws prior to conducting work in the community.

C.6 MA Department of Environmental Protection

Review and approval under the Commonwealth's Water Quality Certification Regulations is required for "*discharge of dredged or fill materials, dredging, and dredged material disposal activities in waters of the United States within the Commonwealth which require federal licenses or permits and which are subject to state water quality certification*

under 33 U.S.C. 1251, et seq. The federal agency issuing a permit initially determines the scope of geographic and activity jurisdiction" (314 CMR 9.01(2)). An individual Water Quality Certification is required from the Massachusetts Department of Environmental Protection (MassDEP) for any activity identified at 314 CMR 9.04. In accordance with 314 9.04 (4) activities which are exempt from MGL Chapter 131 Section 40 but are subject to 33 U.S.C. 1251, *et seq*., and will result in any discharge of dredge or fill material to bordering vegetated wetlands or land under water require an individual 401 Water Quality Certification. Temporary fill placed within an Outstanding Resource Water shall require the filing of an Individual WQC and a Variance Request when required pursuant to 314 CMR 9.06(3). Activities which are exempt from Section 404 of the Clean Water Act and any other federal permit or license do not require 401 authorization.

Work within certain Outstanding Resource Waters, such as certified vernal pools, are prohibited unless a variance is obtained under 314 CMR 9.08. However, under 314 CMR 9.06(3)(c), maintenance, repair, replacement and reconstruction but not substantial enlargement of existing and lawfully located structures or facilities including roads and utilities are allowed to occur within ORWs when authorized by a Water Quality Certification.

C.7 U.S. Army Corps of Engineers

Work within wetlands and waters of the United States is subject to jurisdiction under Section 404 of the Clean Water Act, which is administered by the Corps. Work within navigable waters is also administered by the Corps under Section 10 of the Rivers and Harbors Act of 1899. The Corps has issued a General Permits (GPs) for Massachusetts which establishes categories for projects based on their nature of impacts. The General Permits were issued on February 4, 2015, and expire on February 4, 2020. Certain minor activities are eligible for Self-Verification, which requires submittal of a Self-Verification Notification Form (SVNF) before the work occurs. Activities eligible for Self-Verification are authorized under the general permit and may proceed without written verification from the Corps as long as the SVNF has been submitted and the activity meets the terms and conditions of the applicable GPs. Activities requiring Pre-Construction Notification (PCN) require the submittal of an application to the Corps, followed by a screening of the application by the Corps, the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, National Marine Fisheries Service, MassDEP, and consultation with the Massachusetts Historical Commission, Tribal Historic Preservation Officers and the Massachusetts Board of Underwater Archaeological Resources (BUAR). PCN projects may not proceed until written verification from the Corps is received. An Individual Permit requires a formal permit application to be submitted to the Corps. The application is reviewed in detail by both state and federal agencies, and a Public Notice is released for public comment. Projects which trigger an Individual Permit generally result in significant impacts to wetlands and/or watercourses.

Corps permitting does not apply to activities that fall under the maintenance exemption set forth at 33 CFR 323.4(a)(2) – Discharges Not Requiring Permits:

"Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character,

scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption."

Maintenance projects that occurred prior to the Corps jurisdiction over fill activities, or that were properly permitted, can proceed under the maintenance exemption noted above, provided that the same temporary fill areas are used. However, it is recommended that a formal determination be requested from the Corps to confirm these activities are exempt. The repair, rehabilitation or replacement of a previously authorized, currently serviceable structure or fill (with some minor deviations in the structure's configuration or filled area) are regulated under GP1 and subject to Self-Verification or Pre-Construction Notification.

Also, operation and maintenance related activities that do not meet the above exemption may qualify for Self-Verification. In that case, it is recommended that a copy of the SVNF be submitted to MassDEP.

The Massachusetts General Permits are listed below. GPs specifically applicable to utility projects are bolded and italicized:

GP1. Repair, Replacement and Maintenance of Authorized Structures and Fills
GP2. Moorings
GP3. Pile-Supported Structures, Floats and Lifts
GP4. Aids to Navigation, and Temporary Recreational Structures
GP5. Dredging, Disposal of Dredged Material, Beach Nourishment, and Rock Removal and Relocation
GP6. Discharges of Dredged or Fill Material Incidental to the Construction of Bridges
GP7. Bank and Shoreline Stabilization
GP8. Residential, Commercial and Institutional Developments, and Recreational Facilities
GP9. Utility Line Activities
GP10. Linear Transportation Projects Including Stream Crossings
GP11. Mining Activities
GP12. Boat Ramps and Marine Railways
GP13. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
GP14. Temporary Construction, Access, and Dewatering
GP15. Reshaping Existing Drainage Ditches, New Ditches, and Mosquito Management
GP16. Response Operations for Oil and Hazardous Substances
GP17. Cleanup of Hazardous and Toxic Waste
GP18. Scientific Measurement Devices
GP19. Survey Activities
GP20. Agricultural Activities
GP21. Fish and Wildlife Harvesting and Attraction Devices and Activities
GP22. Habitat Restoration, Establishment and Enhancement Activities
GP23. Previously Authorized Activities

In general the following cumulative thresholds apply for determining the level of Corps permitting required:

Table C-2
Corps Permits Limits

Resources	SV Limits (SV Eligible)	PCN Limits (PCN Eligible)	IP Limits (IP Required)
Non-tidal waters of the US	0 to 5,000 sf	5,000 sf to 1 acre	>1 acre
Tidal waters of the US	Not eligible	All discharges ≤1/2 acre	>1/2 acre
SAS in tidal waters of the US excluding vegetated shallows	Not eligible	All discharges ≤1,000 sf	>1,000 sf
SAS in tidal waters of the US consisting of vegetated shallows only	Not eligible	All discharges ≤100 sf (compensatory mitigation is required	>100 sf

*Special Aquatic Sites (SAS) consist of wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230 Subpart E.

Stream and wetland crossings are only subject to jurisdiction under the Corps if there is **a discharge of dredge or fill material into wetlands or waters of the United States**. Equipment access through a stream or wetland with no structural BMP is not regulated by the Corps if there is no discharge of dredge or fill material (note that equipment rutting as a result of not using an appropriate BMP can be considered a "discharge of dredge material"). Similarly, the use of a timber or rail car bridge that extends from bank to bank with no stream impacts is not regulated by the Corps. The use of timber mats, stone, and log corduroy is considered "fill material" by the Corps MA GPs, and must be calculated to determine overall impacts.

Maintenance, including emergency reconstruction of currently serviceable structures, is exempt from Corps jurisdiction and does not require formal permitting. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs to qualify for this exemption.

New culvert installation or existing culvert replacements may require permitting with local Conservation Commissions under the MA WPA, and may also require permitting with the Corps under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899, and the MassDEP under Section 401 of the Clean Water Act.

Stream and wetland crossings (including culvert installations) that involve the discharge of dredge and fill material may be conducted under Self-Verification if the following criteria are met.

- The use of construction mats of any area can be used to conduct activities that were previously authorized, authorized under Self-Verification, or not subject to regulation. Other temporary or permanent fill and associated secondary impacts must meet the SV limits.
- Authorized construction mats must be removed immediately upon work completion, and the wetlands must be restored per the General Conditions.
- The project has no potential for an effect on a historic property within the permit area or any known historic property that may occur outside the permit area.

- Any in-water work is limited to Time of Year windows appropriate for the spawning, breeding and migration of present species specified by the Massachusetts Division of Marine Fisheries. The TOY restriction for any inland stream not specified by MA DMF is October 1 to June 30. Activities within water proposed during these TOY restrictions are ineligible for Self-Verification authorization.
- The work does not result in direct or secondary impacts to Special Aquatic Sites.
- No work occurs in navigable waters of the U.S.
- Span streams or size culverts or pipe arches such that they are wider than bankfull width (BFW). Spans are strongly preferred as they avoid or minimize disruption to the streambed, and avoid entire streambed reconstruction and maintenance inside the culvert or pipe arch, which may be difficult in smaller structures. Footings and abutments for spans and scour protection should be landward of 1.2 times BFW. The width of culverts and arches at bankfull elevation should be ≥1.2 times BFW.
- Embed culverts or pipe arches below the grade of the streambed. This is not required when ledge/bedrock prevents embedment, in which case spans are required. The following depths are recommended to prevent streambed washout, and ensure compliance and long-term success:
    - ≥ 2 feet for box culverts and pipe arches, or
    - ≥ 2 feet and at least 25% for round pipe culverts.
- Match the culvert gradient (slope) with the stream channel profile.
- Construct crossings with a natural bottom substrate within the structure matching the characteristics of the substrate in the natural stream channel and the banks (mobility, slope, stability, confinement, grain and rock size) at the time of construction and over time as the structure has had the opportunity to pass substantial high flow events.
- Construct crossings with appropriate bed forms and streambed characteristics so that water depths and velocities are comparable to those found in the natural channel at a variety of flows at the time of construction and over time. In order to provide appropriate water depths and velocities at a variety of flows and especially low flows, it is usually necessary to reconstruct the streambed (sometimes including a low flow channel), or replicate or preserve the natural channel within the structure. Otherwise, the width of the structure needed to accommodate higher flows will create conditions that are too shallow at low flows. Flows could go subsurface within the structure if only large material is used without smaller material filling the voids.
- Openness, which is the is the cross-sectional area of a structure opening divided by its crossing length when measured in consistent units, is > 0.82 feet (0.25 meters).
- Banks on each side of the stream inside the crossing matching the horizontal profile of the existing stream and banks outside the crossing are recommended. To prevent failure, all constructed banks should have a height to width ratio of no greater than 1:1.5 (vertical:horizontal) unless the stream is naturally incised. Tie these banks into the up and downstream banks and configure them to be stable during expected high flows.

- The project is not located within a vernal pool depression, or vernal pool envelope, and does not individually or cumulatively impact greater than 25% of the vernal pool critical terrestrial habitat. It is feasible for some temporary impacts associated with the use of construction mats in previously disturbed right-of-ways to occur within the vernal pool envelope or critical terrestrial habitat if a Vegetation Management Plan demonstrates avoidance, minimization and mitigation impacts to aquatic resources.
- Culvert extensions do not qualify for Self-Verification.
- Culvert projects using slip lining do not qualify for Self-Verification, either as new work or maintenance activities.
- No open trench excavation in flowing waters. No work in riffles and pools.
- The project does not entail stream relocation.
- Work is not conducted within riffles or pools.
- Normal flows within the stream boundary's confines must be maintained, i.e., temporary flume pipes, culverts, cofferdams, etc.
- Water diversions (i.e., bypass pumping or water withdrawals) may be used immediately up and downstream of the work footprint.
- The project is (a) not located in the designated main stem of, or within 0.25 miles up or downstream of the designated main stem of, or in tributaries within 0.25 miles of the designated main stem of a National Wild and Scenic River System; (b) not in "bordering or contiguous wetlands" that are adjacent to the designated main stem of a National Wild and Scenic River; or (c) does not have the potential to alter flows within a river within the National Wild and Scenic River System.
- The project is not located within areas containing USFWS or National Marine Fisheries Service (NMFS)-listed species or critical habitat. The project is not "likely to adversely affect" listed species or habitat per the federal Endangered Species Act (ESA) or result in a "take" of any federally-listed threatened or endangered species of fish or wildlife.
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service.
- The project is not located on Corps properties and Corps-controlled easements.
- The project does not propose temporary or permanent modification or use of a federal project beyond minor modifications required for normal operation and maintenance.
- The project minimizes use of heavy construction equipment, and, where required, either has low ground pressure (typically less than 3 psi) or it must be placed on construction mats.
- Construction mats must be placed in the wetland from the upland or from equipment positioned on swamp mats if working within a wetland.
- Temporary fill must be stabilized. Unconfined, authorized temporary fill must consist of clean material that minimizes impacts to water quality. Temporary fill

placed during the growing season must be removed before the beginning of the next growing season. If temporary fill is placed during the non-growing season, it may remain throughout the following growing season but must be removed before the beginning of the next growing season.

- Appropriate erosion, sedimentation and turbidity controls are used and maintained during construction.

- Appropriate measures must be taken to minimize flooding to the maximum extent practicable.

Wetland and stream crossings may be authorized under Pre-Construction Notification if the following criteria are met:

- The work results in less than one acre of impacts to inland, non-tidal, wetlands or waters of the United States.

Stream and wetland crossings that cannot meet Self-Verification or Pre-Construction Notification criteria may require review under an Individual Permit. The Corps should be consulted before assuming an Individual Permit will be required, as exceptions can be made under certain circumstances.

C.8 Temporary Stream Crossings

C.8.1 U.S. Army Corps of Engineers

See Section C.7 for general Corps permitting requirements for stream crossings. To qualify for Self-Verification, temporary stream crossings (typically culverts) that are not spans must be designed in accordance with below.

1) Installed outside of the TOY restrictions and must be removed before the beginning of the TOY restriction of that same season. Temporary crossings that must remain into the TOY restriction will require Pre-Construction Notification review.

2) Impacts to the streambed or banks require restoration to their original condition (see "Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings," for stream simulation restoration methods). Use geotextile fabric or other appropriate bedding for stream beds and approaches where practicable to ensure restoration to the original grade. The requirements in GCs 17, 18 and 19 are particularly relevant.

3) Avoid excavating the stream or embedding crossings.

4) For Culverts:

    a. The water height should be no higher than the top of the culvert's inlet and the culvert is large enough to pass debris.

    b. Install energy dissipating devices downstream if necessary to prevent scour.

c. The TOY restrictions in GC 18 and the restrictions in GC 17(f) are particularly relevant.

5) Removed upon the completion of work. Impacts to the streambed or banks requires restoration to their original condition using stream simulation methods.

In-kind repair, replacement and maintenance of currently serviceable, authorized fills are eligible for Self-Verification. However, the conditions of the original authorization apply, and minor deviations in fill design are allowed. In-kind repair and maintenance of culverts that includes an expansion or change in use requires Pre-Construction Notification. Replacement of non-serviceable fills, including an expansion or change in use, also requires Pre-Construction Notification. In-kind replacement using the same materials is exempt from Section 404 of the Clean Water Act, and does not require permitting with the Corps. The Corps, however, should be consulted before assuming an activity is exempt from their jurisdiction.

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Tighe&Bond

APPENDIX D

Horizontal directional drilling (HDD) for subsurface utility installations is considered to be the most effective and least environmentally damaging technique when compared to traditional mechanical dredging and trenching. This method ensures the placement of the pipeline at the target burial depth with no wetland or water body disturbance. HDD installation is the preferred method for crossing sensitive resources–the alternative is open cut trenching.

The HDD procedure uses bentonite slurry, a fine clay material as a drilling lubricant. Directional drilling has the small potential to release bentonite slurry into the surface environment through frac-outs. This term describes the situation caused when the drilling head and its accompanying inert clay lubricant slurry, hits a subterranean fractured substrate. When the pressurized lubricant slurry reaches the fracture it can follow the fracture up or otherwise force itself to the surface or into the water if drilling is occurring under a waterbody. If a "frac-out" occurs under these water features, the potential exists for the inert clay (a non-toxic bentonite-based substance) to be released into the water column. In large quantities, the release of drilling mud into a waterbody could affect fisheries or other aquatic organisms by settling and temporarily inundating the habitats used by these species. Properly monitoring the slurry pressures and amounts significantly decreases risk of significant quantities of drilling fluid being released into the environment.

Frac-out is most likely to occur near the bore entry and exit points where the drill head is shallow. Should a frac-out occur during HDD operations, the following measures will be taken.

- Temporarily suspend forward drilling progress.
- Monitor frac-out for 4 hours to determine if the drilling mud congeals. (Bentonite will usually harden, effectively sealing the frac-out location.)
- If drilling mud congeals, take no other action that would potentially suspend sediments in the water column.
- If drilling mud does not congeal, erect appropriate isolation/containment measures (i.e. turbidity curtains and/or underwater boom and curtain).
- If the fracture becomes excessively large, a spill response team would be called in to contain and clean up excess drilling mud in the water. Phone numbers of spill response teams in the area will be on site.
- Following containment, evaluate the current drilling profile (i.e. drill pressures, pump volume rates, drilling mud consistency) to identify means to prevent further frac-out events.
- If the fracture is mitigated and controlled, forward progress of the drilling may resume.

APPENDIX E BELL ROCK SUBSTATION WETLAND AND STREAM DELINEATION REPORT

October 02, 2018

NEW ENGLAND POWER COMPANY (NEP)
d/b/a NATIONAL GRID

Bell Rock Substation Rebuild Project
Fall River, Massachusetts

Wetland and Stream Delineation Report

PROJECT NUMBER:
146770

PROJECT CONTACT:
Karen Hanecak
EMAIL:
Karen.Hanecak@powereng.com
PHONE:
(774) 643-1821

POWER ENGINEERS

Bell Rock Substation Rebuild Project
Fall River, Massachusetts

Wetland and Stream Delineation Report

PREPARED FOR: NEW ENGLAND POWER COMPANY
d/b/a NATIONAL GRID

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

BVWs	Bordering Vegetated Wetlands
Bioreserve	Southeastern Massachusetts Bioreserve
CMR	Code of Massachusetts Regulations
CVP	Certified vernal pool
CWA	Clean Water Act
FAC	Facultative
FACW	Facultative Wetland
FEMA	Federal Emergency Management Act
FIRM	Flood Insurance Rate Map
GIS	Geographic Information Systems
GPS	Global Positioning System
HUC	Hydrologic Unit Code
IB	Inland Bank
ISO	Independent System Operator
ISO-NE	Independent System Operator, New England
kV	kilovolt
LUW	Land Under Water Bodies and Waterways
MA DCR	Massachusetts Department of Conservation and Recreation
MassDEP	Massachusetts Department of Environmental Protection
Montaup	Montaup Electric Company
NHD	National Hydrography Dataset
NHESP	Natural Heritage and Endangered Species Program
NEP	New England Power
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
ORW	Outstanding Resource Water
PEM	Palustrine Emergent
PFO	Palustrine Forested
POWER	POWER Engineers, Inc.
Project	NEP's Bell Rock Substation Rebuild Project
PSS	Palustrine Scrub-Shrub
PVP	Potential vernal pool
RHA	Rivers and Harbors Act
ROW	right-of-way
SEMA-RI	Southeastern Massachusetts and Rhode Island
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
WPA	Massachusetts Wetlands Protection Act

1.0 INTRODUCTION

The New England Power Company d/b/a National Grid (NEP) is planning substation upgrades at the existing Bell Rock Substation located at 181 Bell Rock Road in the city of Fall River. The Bell Rock Substation lies within NEP's existing 2.75 acre substation easement. NSTAR Electric Company d/b/a Eversource Energy (Eversource) holds a 1.06 acre easement adjacent (south) to the NEP easement (Figure 1). All substation improvements will be made within the existing substation and transmission line right-of-way (ROW) easements. The purpose of the Bell Rock Substation Rebuild Project (Project) is to improve the reliability and operability of the substation, and to expand the substation to accommodate new equipment. The Project involves the rebuild and expansion of certain equipment and facilities at the substation, and will primarily include multiple elements, as described below (refer to Figure 2-2 and 2-3 in Appendix A):

1) Expand the existing substation footprint by approximately 0.51 acres (22,000 square feet);
2) Expand the existing substation perimeter security fence line;
3) Install a new control building to replace the existing control building;
4) Install new substation-related equipment;
5) Upgrade the stormwater management system;
6) Temporarily reroute the existing M13 115 kilovolt (kV) transmission line to bypass the existing substation to the south for the purposes of facilitating the rebuild of the substation; and
7) Complete additional minor transmission line reconfigurations to connect the lines back into the rebuilt substation.

POWER Engineers, Inc. (POWER) conducted field assessments within the limit of work activities associated with the rebuild and expansion of the Bell Rock Substation as well as historical access to the transmission line facilities (hereafter referred to as the "Survey Area"). Wetland field assessments occurred in November 2015, September 2017, and May 2018 and vernal pool surveys were conducted during the spring of 2015, 2016, 2017, and 2018. This report discusses the methods used to identify and delineate the wetlands within the Survey Area and summarizes the findings of these surveys. During the field investigations, six wetlands, one intermittent watercourse, and one vernal pool were identified and delineated within the Survey Area. Representative photographs of delineated wetlands and the watercourse appear in Attachment A. Attachments B and C, respectively, contain the United States Army Corps of Engineers (USACE) wetland data sheets and MassDEP field data forms used to document wetland delineations.

1.1 Site Description

The existing Bell Rock No. 118 Substation occupies on an existing approximately 2.75 acre portion of property by virtue of an easement originally granted by the current owner of the property, the city of Fall River. Several NEP 115 kV transmission line rights-of-way (ROWs) enter and exit the Substation to the east, west, and south. These lines include the existing N12 and M13, L14 and M13, and D21 115 kV transmission lines (Figure 2). These ROWs are located on easements similarly granted by the city of Fall River. According to the City of Fall River zoning information, the Property is located in the Water Resource District and the Watershed and Water Supply Protection Overlay District. This is due to the proximity of the site to North Watuppa Pond, classified as a Class A Public Drinking Water Supply,

which is located approximately 1,800 feet to the southwest. In addition, the Survey Area includes historical access to the transmission line facilities from Blossom Road.

The Project is surrounded by dense upland and wetland forest, providing a large expanse of unfragmented forest habitat. The Survey Area is located within the Southeastern Massachusetts Bioreserve (Bioreserve). The Bioreserve is located to the north and east of the substation property, and consists of approximately 13,600 acres of protected open space. The 5,150 acre Freetown-Fall River State Forest is part of the Bioreserve. The Bioreserve is jointly managed by the City of Fall River Water Division, the Massachusetts Department of Conservation and Recreation (MA DCR), the Massachusetts Division of Fisheries and Wildlife, and the Trustees of Reservations. The location of the Bioreserve in southeastern Massachusetts serves as vital habitat since this area is one of the fastest growing regions in the state with residential, commercial, and industrial zones.

For background informational purposes, the Montaup Electric Company (Montaup) obtained property rights, in the form of an easement, from the city of Fall River by deed in June 1960. NEP is the successor in interest to Montaup pursuant to Articles of Merger filed with the Massachusetts Secretary of State's office in May 2000. NEP is now the legal holder of the property easement granted by the City of Fall River. In March 2009, the city of Fall River granted a conservation restriction to the MA DCR and at the time, the Massachusetts Department of Fish and Game by way of a conservation easement. The substation easement predates the conservation restriction and therefore NEP maintains the rights "…to construct, maintain, renew, replace and operate a switching station on that portion of said easement heretofore described bounded westerly on Bell Rock Road…"

The Project lies within the major basin of Buzzards Bay (USDA NRCS 2005). Watersheds within the Buzzards Bay basin are further delineated into smaller watersheds identified by a unique Hydrologic Unit Code (HUC). The Project is located within the Quequechan River (HUC 12# 010900040803) watershed. One intermittent watercourse was identified within the Survey Area. Wetlands adjacent to and surrounding the Bell Rock Substation drain either to Queen Gutter Brook or North Watuppa Pond. Queen Gutter Brook and its associated wetlands are tributaries to North Watuppa Pond which is classified as a Class A Public Drinking Water Supply, and are therefore considered Outstanding Resource Waters (ORWs) (MassDEP 2015).

Vegetation management is typically performed on a five-year cycle, therefore the ROW and area surrounding the Station site is generally dominated by deciduous shrubs, grasses and other dense herbaceous vegetation compatible with operation and maintenance of the transmission lines.

2.0 METHODS

2.1 Analysis of Existing Data

Prior to the commencement of the wetland field investigation/delineation, existing information was reviewed to determine the potential extent of wetlands within the survey area. These source materials included:

- United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle Map - Fall River, Massachusetts (USGS 1985)
- Massachusetts Department of Environmental Protection (MassDEP)Wetland Data (MassDEP 2009)

- Natural Heritage and Endangered Species Program (NHESP) Certified Vernal Pool Maps (NHESP 2015-2018)
- NHESP Potential Vernal Pool Maps (NHESP 2000)
- United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) 2015 - 2016 Web Soil Survey (USDA NRCS 2015-2016)
- USDA NRCS HUC Basins (8,10,12) (NRCS 2005)
- USDA NRCS National Agriculture Imagery Program (USDA NRCS 2015)
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Wetlands Mapper (USFWS 2007)
- USGS National Hydrography Dataset Viewer (USGS 2014)
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Bristol County, Massachusetts Map No. 25005C0352F (FEMA 2009)
- MassDEP ORW (MassDEP 2010)

The information was compiled and synthesized into a geographic information system (GIS) geo-referenced database and used in the field to assist wetland scientists in the location and identification of wetland systems in the survey area.

2.2 Wetland Delineation Methodology/Procedure

During the 2015, 2017, and 2018 field surveys, wetlands were identified and delineated in accordance with requirements of the following jurisdictions:

- Clean Water Act (CWA) (33 United States Code [U.S.C.] §§ 1251 et seq., Section 404 and Section 401)
- Massachusetts Wetland Protection Act (WPA) (M.G.L. c. 131, § 40) and associated Regulations (310 Code of Massachusetts Regulations [CMR] 10.00)

Most wetlands, including isolated wetlands and waterbodies are considered "waters of the United States" and are subject to the Federal CWA. Evidence indicative of wetland from three parameters – predominance of wetland vegetation, hydric soils and hydrology – was used to identify and delineate the wetlands in accordance with the 1987 *United States Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the subsequent *Regional Supplement to the United States Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012). With the exception of unusual or atypical situations, evidence of wetland must be exhibited by all three parameters for an area or position to be designated as wetland.

The field teams also used established delineation procedures as outlined in MassDEP's *Handbook on Delineating Bordering Vegetated Wetlands* (Jackson 1995). Locally, the city of Fall River's Conservation Commission regulates activities in and adjacent to wetlands under the provisions of the WPA administered by MassDEP. Fall River has not adopted a local wetlands protection bylaw and therefore local jurisdiction of activities in or adjacent to wetlands is limited to the WPA.

In order to identify and quantify the number of wetlands, each wetland was numbered and classified by USFWS NWI codes[1] that make use of the *Classification of Wetlands and Deepwater Habitats of the United States* to differentiate wetland cover types (Cowardin et al. 1979). Two wetland community types were identified in the Survey Area: Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO).

Photographs were taken of each wetland (Attachment A), with other additional observations and descriptive information recorded for each wetland including: location, wetland classification, vegetative community, wetland functions and values, and general wildlife use. Detailed information was collected at paired data plots in the wetland and upland along each side of the boundary from representative wetlands to document the vegetation, soils and hydrology criteria used to establish wetland boundaries. This information appears on USACE Wetland data sheets and MassDEP Bordering Vegetated Wetlands field data forms completed for delineated wetlands and watercourses (Attachments B and C, respectively). The wetland boundaries were marked with consecutively numbered pink flagging hung on vegetation at approximately 15- to 30-foot intervals.

In addition to wetland surveys, vernal pool surveys were also conducted. The WPA defines vernal pool habitat as confined basin depressions that typically hold water for two continuous months during the spring and are free of adult fish populations. These areas provide essential breeding habitat for a variety of amphibian species such as wood frogs (*Lithobates sylvatica*) and the spotted salamander (*Ambystoma maculatum*). Certified vernal pools (CVPs) are those that have been certified by the NHESP according to the Guidelines for Certification of Vernal Pool Habitat (NHESP 2015-2018) and are protected if they fall under the jurisdiction of the WPA. CVPs are also afforded protection under Section 401 of the federal CWA, the Massachusetts Surface Water Quality Standards that relate to Section 401, and the Massachusetts Forest Cutting Practices Act. No CVPs are identified to occur in the Survey Area (NHESP 2015). Potential vernal pools (PVPs) have also been mapped by NHESP but do not receive protection under the WPA or under any other state or federal wetlands protection laws (NHESP 2013).

Streams and drainage ways were examined for the presence/absence of an Ordinary High Water Mark (OHWM) and defined bed (refer to "LUW" below) and bank (refer to "IB" below). Generally, if these characteristics were observed along a waterway, it was determined to be a regulated stream but if absent, or atypical circumstances existed, these areas were determined to be a drainage way, swale, ditch, or other erosional feature, and likely not a CWA-regulated feature (i.e., not a "water of the United States"). Any streams encountered were classified based on the observed flow and channel characteristics at the time of the field review. Watercourses were delineated with blue flagging.

Wetland and watercourse flag positions and data point locations were recorded using a Trimble Geo XT mapping-grade Global Position System (GPS) unit with positional data post-processed to sub-meter accuracy for transfer onto GIS-based mapping of the Project footprint.

2.3 Post-Survey Analysis

The field survey data was differentially corrected and post-processed using Trimble Pathfinder Office software (version 5.81). The corrected GPS data was then exported from Pathfinder Office as shapefiles for use on Project aerial-based field survey mapping. The locations of the wetland boundaries were then reviewed and confirmed by POWER's wetland scientists and are displayed in Figure 3.

[1] https://www.fws.gov/wetlands/data/wetland-codes.html

3.0 RESULTS

POWER conducted wetland delineations of the Survey Area in November 2015 and more detailed information was collected at paired data plots in the wetland and upland along each side of the wetland boundaries in September 2017. An additional survey was conducted in May 2018 on a historical access area to the transmission line facilities.

Three Resource Areas subject to the WPA have been field delineated or identified to occur in the Survey Area:

- Bank (310 CMR 10.54)
- Bordering Vegetated Wetlands (310 CMR 10.55)
- Land under Waterway (310 CMR 10.56)

Inland Bank

Inland Bank (IB) is defined as the portion of the land surface which normally abuts and confines a water body (310 CMR 10.54(2)(a)(c)). IB occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, the IB occurs between a water body and upland. An IB may be partially or totally vegetated, or it may be comprised of exposed soil, gravel, or stone. The upper boundary of an IB is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of an IB is the mean annual low flow level. A 100-foot-wide buffer zone extends from the upper boundary of an IB and therefore is typically encompassed within Riverfront Area described below.

Bordering Vegetated Wetlands

BVWs are defined as freshwater wetlands which border on creeks, rivers, streams, ponds and lakes (310 CMR 10.55(2)(a)). BVWs are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The ground and surface water regime and the vegetation community which occur in each type of freshwater wetland (wet meadows, marshes, swamps and bogs) area are specified in the WPA. A 100-foot-wide buffer zone is associated with BVW.

Land Under Water Bodies and Waterways

Land Under Water Bodies and Waterways (LUW) is defined as the land beneath any creek, river, stream, pond, or lake and the boundary of an LUW is the mean annual low water level. LUW may be composed of muck or peat, fine sediments, rocks, or bedrock (310 CMR 10.56(2)).

As illustrated in Table 1, a total of six wetlands were identified in the Survey Area. One vernal pool met the specific vernal pool criteria during the 2015, 2016, 2017, and 2018 field surveys.

3.1 Watercourses

The one stream (SL3) in the Survey Area is displayed on Figures 3 and 4, and a representative photograph of the stream appears in Appendix A. The stream is determined to be intermittent based on seasonal flow.

This intermittent stream flows through wetland system L3 which crosses the historical access road to the transmission line facilities off Blossom Road. The stream flows to the south through a culvert beneath the

historical access route to North Watuppa Pond. The culvert, shallow, narrow, and intermittent channel, and dense vegetation prevent the stream from being navigable by canoes, kayaks or other watercraft.

3.2 Wetlands

The six wetlands identified in the Survey Area are displayed on Figures 3 and 4 and representative photographs of the wetlands appear in Attachment A. Four wetlands (M1, M2, L1, and L1A) continue off the NEP ROW and are associated with Queen Gutter Brook, thereby establish the "bordering" connection definitive of BVWs. Two wetlands (L2 and L3) continue off the NEP ROW and "border" an unnamed drainage course located outside the NEP corridor that flows to North Watuppa Pond.

3.2.1 Wetland Vegetation

As discussed above, NWI codes were used to classify the wetlands delineated for the Project. As a result of regular vegetation maintenance within the existing transmission line corridor, the wetlands are generally represented by a deciduous PSS community dominated by a dense community of highbush blueberry (*Vaccinium corymbosum*) and sweet pepperbush (*Clethra alnifolia*), with young shrubs under 3.28 feet in height comprising the sparse herbaceous understory. Uncleared or treed wetland areas such as adjacent to the maintained corridor and to the south of the Bell Rock Substations are for the most part represented by a deciduous PFO community dominated by red maple (*Acer rubrum*) and black tupelo (*Nyssa sylvatica*) with a shrub understory of highbush blueberry and sweet pepperbush.

All of the above listed plants in the six wetlands are identified as Facultative Wetland (FACW) or Facultative (FAC) indicators of wetland by the 2016, State of Massachusetts National Wetland Plant List prepared by the USACE and are therefore hydrophytes.

3.2.2 Wetland Soils

Soils beneath the delineated wetlands are mapped by the USDA NRCS (2015) to be very poorly drained in wetlands M1, L1, and L1A to the north and east of the Bell Rock Substation and are therefore hydric or indicative of wetlands (Figure 4). These wetlands are underlain by very poorly drained Swansea muck (51A) and Whitman fine sandy loam (73A). Wetland M2 to the west of Bell Rock Substation and wetland L2 to the south of Bell Rock Substation are mapped as well drained and underlain by Paxton fine sandy loam (307B). Wetland L2 also is underlain by Woodbridge fine sandy loam (311 B). However, hydric soils were found in these areas during the wetland delineation. Wetland L3 also is comprised of two different soils units that include Whitman fine sandy loam and Ridgebury fine sandy loam (71B). A hand auger was used to document the presence of hydric soils beneath the delineated wetlands in shallow soil profiles.

Site specific soil information for representative delineated wetlands, along with detailed documentation of vegetation and hydrologic indicators appear on data forms in Attachments B and C.

TABLE 1 WETLANDS WITHIN SURVEY AREA

WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	STATE-REGULATED WETLAND BUFFER AREA
	NWI	State		
M1	PFO/PSS	BVW	Federal and State	100 feet

WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	STATE-REGULATED WETLAND BUFFER AREA
M2	PSS	BVW	Federal and State	100 feet
L1	PFO/PSS	BVW	Federal and State	100 feet
L1A	PFO/PSS	BVW	Federal and State	100 feet
L2	PSS/PEM/PFO	BVW	Federal and State	100 feet
L3	PSS/PEM/PFO	BVW	Federal and State	100 feet

[1] Wetlands were classified according to Cowardin et al. (1979). PSS = palustrine scrub-shrub wetland; PFO = palustrine forested wetland; PEM = palustrine emergent wetland.

[2] Please note that the determination of each wetland's isolated or connected status represents the professional opinion of POWER. Final determination of jurisdictional status is the purview of the USACE.

3.2.3 Bell Rock Substation and L14/M13 Transmission Line Wetlands

Six wetlands occur in the Survey Area to the north, south, and west of the Bell Rock Substation. Wetlands M1, M2, L1, and L1A are segments of a larger wetland system that continues off the NEP ROW and eventually "borders' Queen Gutter Brook. Wetlands L2 and L3 are segments of another larger system to the south of Bell Rock Substation that also continue off the NEP ROW and eventually "border" North Watuppa Pond via an unnamed intermittent stream.

M1 lies predominately to the north of Bell Rock Substation and is part of a larger PFO1 wetland system that "borders" Queen Gutter Brook. NHESP CVPs are located approximately 400 feet to the southwest of wetland M1. No pool in wetland M1met the specific vernal pool criteria during the spring 2015, 2016, 2017, and 2018 surveys.

M2 lies to the west of Bell Rock Substation and also "borders" Queen Gutter Brook downstream of where Queen Gutter Brook crosses under the transmission line service road through a culvert. Wetland segment M2 is located on the north side of this access road and is dominated by broad-leaved deciduous wetland shrubs (PSS1) since this wetland is in a maintained portion of the M12/N13 ROW. No pool in wetland M2 met the specific vernal pool criteria during the spring 2016, 2017, and 2018 surveys.

L1 lies to the east of Bell Rock Substation and contains a PSS1 community under the D21 transmission line. Heading southwest the wetland becomes a broad-leaved deciduous forest (PFO1). Wetland L1 is part of a larger PFO1 system to the north that "borders" Queen Gutter Brook off the NEP ROW. One pool (LP-1) in wetland L1 met the specific vernal pool criteria during the spring 2016 and 2018 surveys. Wood frog (*Lithobates sylvatica*) egg masses were observed in a depression around a steel pylon associated with D21 Structure #29 to the east of Bell Rock Substation during the May 2016 and April 2018 surveys. Over 50 wood frog tadpoles were found in numbers sufficient to be indicative of a vernal pool. However, no evidence of obligate or facultative indicators were observed during the May 2017 survey.

L1A lies to the south of Bell Rock Substation and is a segment of wetland L1 which lies to the northeast. Wetland L1A contains a PSS1 community under the L14/M13 transmission lines. In the non-maintained portion of this ROW, wetland L1A is a broad-leaved deciduous forest community (PFO1). No pool in wetland L1A met the specific vernal pool criteria during the spring 2015, 2016, 2017, and 2018 surveys.

L2 lies to the south of Bell Rock Substation and contains a mixture of PSS1and PEM1 communities under the L14/M13 transmission lines. In the non-maintained portion of this ROW, wetland L2 is a broad-leaved deciduous forest (PFO1) community.

L3 lies to the south of Bell Rock Substation and contains a mixture of PSS1and PEM1 communities under the L14/M13 transmission lines. Wetland L3 continues off ROW in the non-maintained portion of the ROW and is a broad-leaved deciduous forest (PFO1) community. This forested portion of wetland L3 also continues to the west of the L14/M13 Lines and crosses the historical access area which is located off Blossom Road. An intermittent stream (SL3) flows through the forested portion of wetland L3 under the historical access road.

3.3 Summary

Freshwater wetlands and streams in the Survey Area are regulated by the USACE under the provisions of Section 401 and 404 of the federal Clean Water Act (33 U.S.C. §§ 1251 et seq.), and by the MassDEP and the City of Fall River under the Massachusetts Wetlands Protection Act (MGL Ch. 131§40).

In November 2015, POWER identified and field delineated six wetlands, one intermittent stream, and one vernal pool in the Survey Area subject to regulation by the USACE, MassDEP and the City of Fall River. In 2018 an additional wetland and intermittent stream were identified and delineated along an area used as historical access to the transmission line facilities. Field boundaries of wetlands and the watercourse were located with sub-meter accuracy GPS from which post-processed information related to location and extent of the wetlands were entered into a GIS geo-referenced database. This data, along with other relevant NEP infrastructure information, were used for the purpose of designing permitting the Project.

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FIGURES

FIGURE 1 PROJECT OVERVIEW: TOPOGRAPHIC MAP



Legend

- Existing Substation Site
- Proposed Bell Rock Substation Expansion
- Existing Transmission Line

Commonwealth of Massachusetts

Bristol County
City of Fall River

Figure 1

Project Overview: Topographic Map

Bell Rock Substation
Rebuild Project

NAD 1983 UTM Zone 18N USFt

0 1,000 2,000 3,000
Feet

1:24,000

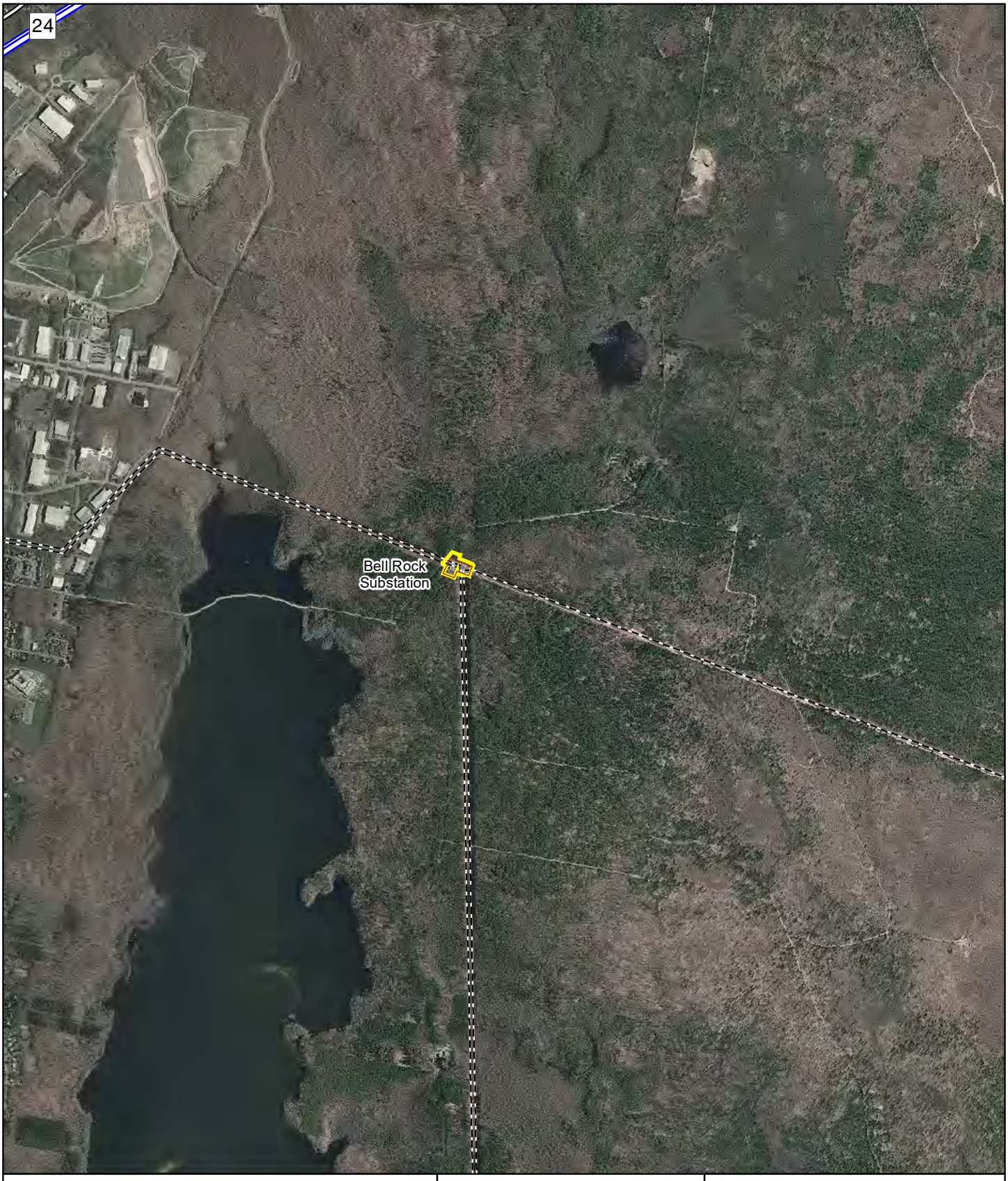
POWER ENGINEERS

nationalgrid

Date: 6/22/2018

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\Bell_Rock\Wetlands_Report\Bell_Rock_Fig_1_Locus_24K_Topo.mxd

FIGURE 2 PROJECT OVERVIEW: AERIAL PHOTOGRAPHY



Legend

- Existing Substation Site
- Proposed Bell Rock Substation Expansion
- Existing Transmission Line

Commonwealth of Massachusetts

Bristol County
City of Fall River

Figure 2

Project Overview: Aerial Photography

Bell Rock Substation
Rebuild Project

NAD 1983 UTM Zone 18N USFt

0 1,000 2,000 3,000

Feet

1:24,000

POWER ENGINEERS

nationalgrid

Date: 6/22/2018

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\Bell_Rock\Wetlands_Report\Bell_Rock_Fig_2_Locus_24K_Aerial.mxd

FIGURE 3 EXISTING CONDITIONS

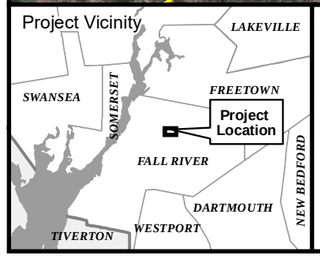
Refer to Appendix A, Project Figures, of the MEPA EENF

For the Figure 3 Plan Set

FIGURE 4 SOIL UNIT BOUNDARIES WITH ENVIRONMENTAL CONSTRAINTS

File Location: W:\140869_140884_SEMA_RI_Step_2B\Apps\Bell_Rock\Wetlands_Report\Bell_Rock_Fig_4_Soils_Map.mxd Date Saved: 7/26/2018 9:25:33 AM





Legend

- Steel Pole
- Wood Pole
- Existing Transmission Line
- Parcel Boundary
- Edge of ROW
- Existing Fence
- Existing Building
- Fire Road Access
- Local Road
- Field Identified Vernal Pool
- Culvert
- Wetland Flag
- Observed Area of Inundation
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Riverfront Area
- 100 ft Buffer Wetland
- Field Delineated Wetland*
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Outstanding Resource Waters (All of view extent)
- MA-NHESP Priority Habitats Rare Species (All of view extent)

N

1 inch = 200 feet

0 100 200

Feet

Indicates Layers Set to Transparency

BELL ROCK SUBSTATION REBUILD PROJECT

Figure 4 Soil Unit Boundaries with Environmental Constraints

Commonwealth of Massachusetts
City of Fall River

Imagery Source: National Map Server 2013-2015 High Resolution Orthoimagery

nationalgrid POWER ENGINEERS

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.

ATTACHMENT A STREAM AND WETLAND PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland M1.

Photo No.	**Date:**
1	09-08-17

Direction Photo Taken:

North

Description:

Northward view of the dense shrub understory under a forest canopy of red maple and black tupelo. The site lies to the northeast of Bell Rock Substation.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland M1.

Photo No.	**Date:**
2	04-24-18

Direction Photo Taken:

North

Description:

Northward view of an amphibian breeding area (MP-1) located within in an ATV tire rut. Wood frog egg masses were observed in 2015 and 2016 and spotted salamander egg masses were observed in April 2018.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland M2.

Photo No.	**Date:**
3	09-13-17

Direction Photo Taken:

West

Description:

View to the west of the shrub dominated wetland M2, which is comprised of highbush blueberry and sweet pepperbush. N12 Structure #27 is in the background of the photo.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland M2.

Photo No.	**Date:**
4	09-13-17

Direction Photo Taken:

Southeast

Description:

Southeastward view of wetland M2. N12 Structure #28 is the background of the photo.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L1.

Photo No.	**Date:**
5	09-08-17

Direction Photo Taken:

East

Description:

Eastward view of the forested portion of wetland L1. Red maple and white pine are the dominant trees in this wetland.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L1.

Photo No.	**Date:**
6	04-24-18

Direction Photo Taken:

West

Description:

View to the west of an isolated pool. Two unidentified adult frogs were observed in 2016 but no species were observed in 2015, 2017, and 2018.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L1A.

Photo No.	**Date:**
7	09-08-17

Direction Photo Taken:

North

Description:

Northward view of dense shrubs (highbush blueberry and sweet pepperbush) located to the south of the Bell Rock Substation.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L1A.

Photo No.	**Date:**
8	04-24-18

Direction Photo Taken:

North

Description:

View to the north of an amphibian breeding area (LP-3) where two wood frogs were observed during the April 2016 survey and one green frog was observed during the May 2017 survey.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L2.

Photo No.	**Date:**
9	03-28-18

Direction Photo Taken:

North

Description:

View to the north of the shrub dominated wetland L2, which is dominated by willows and sweet pepperbush. Bell Rock Substation is in the background of the photo.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L2.

Photo No.	**Date:**
10	11-19-15

Direction Photo Taken:

North

Description:

View to the north of wetland L2 with Bell Rock Substation in the background. The invasive common reed is shown in the foreground of the photo.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L3.

Photo No.	**Date:**
11	05-31-18

Direction Photo Taken:

Southeast

Description:

Southeastward view of wetland L3, which is predominately a red maple swamp with a shrub understory of sweet pepperbush. This forested section of L3 crosses the historical access route onto the M13/L14 Lines.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L3.

Photo No.	**Date:**
12	11-19-15

Direction Photo Taken:

North

Description:

View to the north of the dense shrub and emergent dominated wetland on the M13/L14 corridor.



PHOTOGRAPHIC LOG

Site Location: Intermittent Stream.

Photo No.	**Date:**
13	05-31-18

Direction Photo Taken:

North

Description:

View to the north of the shallow intermittent stream (SL3) flowing through wetland L3. The stream has a dense canopy of sweet pepperbush.



PHOTOGRAPHIC LOG

Site Location: Intermittent Stream.

Photo No.	**Date:**
14	05-31-18

Direction Photo Taken:

North

Description:

Northward view of the culvert underneath the historical access route off Blossom Road where an intermittent stream (SL3) flows through wetland L3.



ATTACHMENT B USACE WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-L1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.736966 Long: -71.086108 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No ____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No ____	**Is the Sampled Area within a Wetland?**	**Yes X**	**No** ____
Hydric Soil Present?	Yes **X**	No ____			
Wetland Hydrology Present?	Yes **X**	No ____	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X**	Water-Stained Leaves (B9)	**X** Drainage Patterns (B10)
____ High Water Table (A2)	____	Aquatic Fauna (B13)	**X** Moss Trim Lines (B16)
____ Saturation (A3)	____	Marl Deposits (B15)	____ Dry-Season Water Table (C2)
____ Water Marks (B1)	____	Hydrogen Sulfide Odor (C1)	____ Crayfish Burrows (C8)
____ Sediment Deposits (B2)	____	Oxidized Rhizospheres on Living Roots (C3)	____ Saturation Visible on Aerial Imagery (C9)
____ Drift Deposits (B3)	____	Presence of Reduced Iron (C4)	____ Stunted or Stressed Plants (D1)
____ Algal Mat or Crust (B4)	____	Recent Iron Reduction in Tilled Soils (C6)	**X** Geomorphic Position (D2)
____ Iron Deposits (B5)	____	Thin Muck Surface (C7)	____ Shallow Aquitard (D3)
____ Inundation Visible on Aerial Imagery (B7)	____	Other (Explain in Remarks)	**X** Microtopographic Relief (D4)
____ Sparsely Vegetated Concave Surface (B8)			____ FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)
____ Surface Soil Cracks (B6)

Field Observations:

Surface Water Present?	Yes ____	No **X**	Depth (inches): ____	
Water Table Present?	Yes ____	No **X**	Depth (inches): ____	
Saturation Present? (includes capillary fringe)	Yes ____	No **X**	Depth (inches): ____	**Wetland Hydrology Present?** **Yes X** **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Mound and pool topography.

Due to the presence of a histic epipedon, soils are most likely saturated earlier in the growing season.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-L1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Yes	FAC
2. *Pinus strobus*	30	Yes	FACU
3. *Betula lenta*	10	No	FACU
4.			
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	20	Yes	FAC
2. *Vaccinium corymbosum*	10	Yes	FACW
3. *Acer rubrum*	10	Yes	FAC
4.			
5.			
6.			
7.			
	40	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **86%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**10**	x 2 =	**20**
FAC species	**90**	x 3 =	**270**
FACU species	**40**	x 4 =	**160**
UPL species	**0**	x 5 =	**0**
Column Totals:	**140** (A)		**450** (B)

Prevalence Index = B/A = **3.21**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Sphagnum moss cover in herb stratum is ~ 50%.

SOIL

Sampling Point: **WET-L1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5							Organic-fibric	
5-8							Organic-hemic	
8-12							Organic-sapric	
12-20	2.5Y 3/1	100	None	—	—	—	Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-L1/L1A
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-5
Subregion (LRR or MLRA): LRR R Lat: 41.736895 Long: -71.086228 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-L1/L1A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Betula lenta*	50	Yes	FACU
2. *Acer rubrum*	25	Yes	FAC
3. *Pinus strobus*	15	No	FACU
4.			
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	60	Yes	FAC
2. *Vaccinium corymbosum*	10	No	FACW
3. *Betula lenta*	5	No	FACU
4.			
5.			
6.			
7.			
	75	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**10**	x 2 =	**20**	
FAC species	**115**	x 3 =	**345**	
FACU species	**70**	x 4 =	**280**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**195**	(A)	**645**	(B)

Prevalence Index = B/A = **3.31**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

SOIL

Sampling Point: **UPL-L1/L1A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-5	10YR 2/1	100	None	—	—	—	Silt Loam	
5-9	2.5Y 4/2	100	None	—	—	—	Fine Sand	
9-15	10YR 4/6	100	None	—	—	—	Loamy Sand	Coarse gravels ~15%
								Cobbles ~20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-L1A
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.736839 Long: -71.086383 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?**	**Yes X** **No ____**
Hydric Soil Present?	Yes X	No ____		
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	X	Water-Stained Leaves (B9)	X Drainage Patterns (B10)
____ High Water Table (A2)	____	Aquatic Fauna (B13)	____ Moss Trim Lines (B16)
____ Saturation (A3)	____	Marl Deposits (B15)	____ Dry-Season Water Table (C2)
____ Water Marks (B1)	____	Hydrogen Sulfide Odor (C1)	____ Crayfish Burrows (C8)
____ Sediment Deposits (B2)	____	Oxidized Rhizospheres on Living Roots (C3)	____ Saturation Visible on Aerial Imagery (C9)
____ Drift Deposits (B3)	____	Presence of Reduced Iron (C4)	____ Stunted or Stressed Plants (D1)
____ Algal Mat or Crust (B4)	____	Recent Iron Reduction in Tilled Soils (C6)	X Geomorphic Position (D2)
____ Iron Deposits (B5)	____	Thin Muck Surface (C7)	____ Shallow Aquitard (D3)
____ Inundation Visible on Aerial Imagery (B7)	____	Other (Explain in Remarks)	____ Microtopographic Relief (D4)
____ Sparsely Vegetated Concave Surface (B8)			X FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____	
Water Table Present?	Yes ____	No X	Depth (inches): ____	
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____	**Wetland Hydrology Present? Yes X No ____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-L1A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	35	Yes	FACW
2. *Clethra alnifolia*	30	Yes	FAC
3. *Kalmia latifolia*	5	No	FACU
4.			
5.			
6.			
7.			
	70 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Juncus marginatus*	15	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**50**	x 2 =	**100**	
FAC species	**30**	x 3 =	**90**	
FACU species	**5**	x 4 =	**20**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**85**	(A)	**210**	(B)

Prevalence Index = B/A = **2.47**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Plot is within a maintained ROW.

Species within the Shrub/Sapling stratum which have less than 5% cover include: Pinus strobus and Acer rubrum.

Species within the Herb stratum which have less than 5% cover include: Vaccinium corymbosum.

Sphagnum moss cover in herb stratum is ~ 10%.

SOIL

Sampling Point: **WET-L1A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic-fibric	
2-3	N2.5Y/	100	None	—	—	—	Mucky Silt Loam	
3-6	2.5Y 5/1	100	None	—	—	—	Silt Loam	
6-16	2.5Y 6/1	100	None	—	—	—	Fine Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

Soils are most likely saturated earlier in the growing season. Therefore, A2 is being used as a hydric soil indicator.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 11/19/2015
Applicant/Owner: National Grid State: MA Sampling Point: WET-L2
Investigator(s): Morgan Melekos Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.736340 Long: -71.086680 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?**	**Yes X** **No ____**
Hydric Soil Present?	Yes X	No ____		
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	X Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)	
X High Water Table (A2)	____ Aquatic Fauna (B13)	____ Surface Soil Cracks (B6)	
X Saturation (A3)	____ Marl Deposits (B15)	X Drainage Patterns (B10)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Moss Trim Lines (B16)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Dry-Season Water Table (C2)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Crayfish Burrows (C8)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Saturation Visible on Aerial Imagery (C9)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	____ Stunted or Stressed Plants (D1)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	X Geomorphic Position (D2)	
____ Sparsely Vegetated Concave Surface (B8)		____ Shallow Aquitard (D3)	
		X Microtopographic Relief (D4)	
		X FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____	
Water Table Present?	Yes X	No ____	Depth (inches): 4	
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0	**Wetland Hydrology Present? Yes X No ____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-L2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2. *Salix discolor*	25	Yes	FACW
3. *Lindera benzoin*	20	Yes	FACW
4.			
5.			
6.			
7.			
	75 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Phalaris arundinacea*	80	Yes	FACW
2. *Woodwardia virginica*	10	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**10**	x 1 =	**10**	
FACW species	**125**	x 2 =	**250**	
FAC species	**30**	x 3 =	**90**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**165**	(A)	**350**	(B)

Prevalence Index = B/A = **2.12**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Sphagnum moss cover in herb stratum is ~ 15%.

SOIL

Sampling Point: **WET-L2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100					Muck	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- **X** Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 11/19/2015
Applicant/Owner: National Grid State: MA Sampling Point: UPL-L2
Investigator(s): Morgan Melekos Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.736430 Long: -71.086680 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-L2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	80	Yes	FAC
2. *Pinus strobus*	10	No	FACU
3.			
4.			
5.			
6.			
7.			
	90 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Carex*	60	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**140**	x 3 =	**420**
FACU species	**10**	x 4 =	**40**
UPL species	**0**	x 5 =	**0**
Column Totals:	**150** (A)		**460** (B)

Prevalence Index = B/A = **3.07**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Carex sp. was identified but an indicator of FAC is being used since the specific species is not known.

SOIL

Sampling Point: **UPL-L2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 4/3	100					SaL	
2-5	10YR 5/8	100					SaL	
5-18	10YR 5/6	100					SaL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

Soils are most likely saturated earlier in the growing season. Therefore, A2 is being used as a hydric soil indicator.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 05/03/2018/
Applicant/Owner: National Grid State: MA Sampling Point: WET-L3
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.734676 Long: -71.087876 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- **X** Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **2**	
Water Table Present?	Yes **X** No _____	Depth (inches): **0**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-L3**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	55	Yes	FAC
2. *Quercus alba*	10	No	FACU
3. *Pinus strobus*	5	No	FACU
4. *Fagus grandifolia*	5	No	FACU
5. *Betula lenta*	5	No	FACU
6.			
7.			
	80	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	50	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	30	Yes	FAC
2.			
3.			
4.			
	30	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**150**	x 3 =	**450**
FACU species	**25**	x 4 =	**100**
UPL species	**0**	x 5 =	**0**
Column Totals:	**175** (A)		**550** (B)

Prevalence Index = B/A = **3.14**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Shrub/Sapling stratum which have less than 5% cover include: Vaccinium corymbosum

Sphagnum moss cover in herb stratum is ~ 35%.

SOIL

Sampling Point: **WET-L3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8							Organic-fibric	
8-11							Organic-hemic	
11-16	2.5Y 5/2	100					FSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- **X** Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 05/03/2018
Applicant/Owner: National Grid State: MA Sampling Point: UPL-L3
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.734686 Long: -71.087961 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-L3**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Quercus alba*	40	Yes	FACU
2. *Acer rubrum*	25	Yes	FAC
3. *Fagus grandifolia*	15	No	FACU
4. *Betula lenta*	5	No	FACU
5. *Pinus strobus*	5	No	FACU
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	50	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	50	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	20	Yes	FAC
2. *Smilax rotundifolia*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	35	Yes	FAC
2.			
3.			
4.			
	35	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **83%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**135**	x 3 =	**405**
FACU species	**65**	x 4 =	**260**
UPL species	**0**	x 5 =	**0**
Column Totals:	**200** (A)		**665** (B)

Prevalence Index = B/A = **3.33**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Shrub/Sapling stratum which have less than 5% cover include: Fagus grandifolia

Sphagnum moss cover in herb stratum is ~ 85%.

SOIL

Sampling Point: **UPL-L3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	
4-6	2.5Y 2.5/1	100					SiL	
6-16	2.5Y 5/2	80					FSa	
	10YR 3/2	20					LFSa	Occurs in pockets

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-M1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.737739 Long: -71.085959 Datum: WGS-84
Soil Map Unit Name: Swansea muck, 0 to 1 percent slopes NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Mound and pool topography. Depressions are filled with Sphagnum moss.

Soils are most likely saturated earlier in the growing season.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-M1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Nyssa sylvatica*	50	Yes	FAC
2. *Acer rubrum*	40	Yes	FAC
3. *Pinus strobus*	5	No	FACU
4.			
5.			
6.			
7.			
	95	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	25	Yes	FACW
2. *Clethra alnifolia*	15	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	40	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Vaccinium corymbosum*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**30**	x 2 =	**60**
FAC species	**105**	x 3 =	**315**
FACU species	**5**	x 4 =	**20**
UPL species	**0**	x 5 =	**0**
Column Totals:	**140** (A)		**395** (B)

Prevalence Index = B/A = **2.82**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Shrub/Sapling stratum which have less than 5% cover include: Nyssa sylvatica.

Sphagnum moss cover in herb stratum is ~ 85%.

SOIL

Sampling Point: **WET-M1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8							Oi Fibric	
8-11							Oa	No Coarse Sediments
11-13	N 2.5/	100	None	—	—	—	Mucky SiL	No Coarse Sediments
13-15	7.5YR 3/1	100	None	—	—	—	SiCL	No Coarse Sediments
15-19	2.5Y 6/1	100	None	—	—	—	FSa	No Coarse Sediments

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

Soils are most likely saturated earlier in the growing season. Therefore, A2 is being used as a hydric soil indicator.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-M1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-10
Subregion (LRR or MLRA): LRR R Lat: 41.737908 Long: -71.086449 Datum: WGS-84
Soil Map Unit Name: Swansea muck, 0 to 1 percent slopes NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-M1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Yes	FAC
2. *Pinus strobus*	30	Yes	FACU
3. *Quercus rubra*	15	No	FACU
4. *Betula lenta*	5	No	FACU
5.			
6.			
7.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	60	Yes	FACU
2. *Clethra alnifolia*	35	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	95	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**95**	x 3 =	**285**
FACU species	**110**	x 4 =	**440**
UPL species	**0**	x 5 =	**0**
Column Totals:	**205** (A)		**725** (B)

Prevalence Index = B/A = **3.54**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Herbaceous stratum which have less than 5% cover include: Pinus strobus and Grass sp.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

SOIL

Sampling Point: **UPL-M1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/3	100	None	—	—	—	LSa	gravels at 15% cobbles at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 15

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

This upland island appears to be a gravel mound that was hauled in during the past. Uniform soils and cobbles are throughout the soil pit.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/13/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-M2
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.738082 Long: -71.088171 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No **X** (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No ____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No ____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** ____
Hydric Soil Present?	Yes **X**	No ____		
Wetland Hydrology Present?	Yes **X**	No ____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X**	No ____	Depth (inches): **3**	
Water Table Present?	Yes ____	No **X**	Depth (inches): ____	
Saturation Present? (includes capillary fringe)	Yes ____	No **X**	Depth (inches): ____	**Wetland Hydrology Present?** **Yes X** **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

Site had water in a depression during the May 2017 vernal pool survey. No egg masses or wildlife species were observed in the depression.

No water was present in the depression in Sept. 2017, but ~ 3" of water were observed in the wetland during the vernal pool surveys.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-M2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vaccinium corymbosum*	35	Yes	FACW
2. *Clethra alnifolia*	30	Yes	FAC
3. *Acer rubrum*	15	No	FAC
4. *Kalmia angustifolia*	10	No	FAC
5.			
6.			
7.			
	90 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**35**	x 2 =	**70**
FAC species	**55**	x 3 =	**165**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**90** (A)		**235** (B)

Prevalence Index = B/A = **2.61**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Clethra alnifolia, Kalmia angustifolia, and Grass sp.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

Bare patch around herb plot. Sphagnum moss covers 15% of Herb plot.

SOIL

Sampling Point: **WET-M2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Oi	Fibric
2-7	10YR 2/1	100	None	—	—		Mucky SiL	No coarse fragments
7-10	2.5Y 2.5/1	100	None	—	—	—	SiL	No coarse fragments
10-16	2.5Y 3/1	100	None	—	—	—	SiL	No coarse fragments

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- **X** Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/13/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-M2
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.738135 Long: -71.088251 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____ No X	Depth (inches): ____	
Water Table Present?	Yes ____ No X	Depth (inches): ____	
Saturation Present? (includes capillary fringe)	Yes ____ No X	Depth (inches): ____	**Wetland Hydrology Present?** Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-M2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	40	Yes	FACW
2. *Clethra alnifolia*	35	Yes	FAC
3. *Quercus ilicifolia*	30	Yes	UPL
4. *Acer rubrum*	5	No	FAC
5.			
6.			
7.			
	110 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Kalmia latifolia*	30	Yes	FACU
2. *Vaccinium corymbosum*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**50**	x 2 =	**100**
FAC species	**40**	x 3 =	**120**
FACU species	**35**	x 4 =	**140**
UPL species	**30**	x 5 =	**150**
Column Totals:	**155** (A)		**510** (B)

Prevalence Index = B/A = **3.29**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Corylus americana and Lyonia ligustrina.

Species within the Herbaceous stratum which have less than 5% cover include: Clethra alnifolia and Quercus ilicifolia.

SOIL

Sampling Point: **UPL-M2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-5	2.5Y 3/1	100	None	—	—	—	FSaL	
5-16	10YR 4/6	100	None	—	—	—	Fsa	small cobbles @ 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

ATTACHMENT C MA DEP WETLAND FIELD DATA FORMS

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River; Wetland L1 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation | Observation Plot Number: L1 | Transect Number: | Date of Delineation: 9/08/2017

	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Acer rubrum FAC* Pinus strobus FACU Betula lenta FACU	50* 30* 10			
Sapling/Shrub	Clethra alnifolia FAC* Vaccinium corymbosum FACW* Acer rubrum FAC*	20* 10* 10*			
Herbaceous	Smilax rotundifolia FAC*	5*			
Vines	Smilax rotundifolia FAC*	5*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 6 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey- Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0-3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-5		
Oe	5-8		
Oa	8-12		

Remarks:

A 12-20" (2.5Y 3/1)

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Histic epipedon is the Army Corps of Engineers hydric soils indicator.

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position and microtopographic relief

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland L1A DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: L1A		Transect Number:	Date of Delineation: 9/08/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	No trees in the maintained portion of the right-of-way				
Sapling/Shrub	Vaccinium corymbosum FACW* Clethra alnifolia FAC* Kalmia latifolia FACU	35* 30* 5			
Herbaceous	Juncus marginatus FACW*	15*			
Vines	None observed				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey- Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0-3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-2		
A	2-3	N2.5/	None
Bg1	3-6	2.5Y 5/1	None

Remarks:

Bg2 6-16" (2.5Y 6/1)

Depleted below dark surface is Army Corps of Engineers hydric soils indicator.

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Melekos Project location: Fall River, Wetland L2 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: M2		Transect Number:	Date of Delineation: 11/19/15
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: No trees in the maintained portion of the right-of-way				
Sapling/Shrub: Clethra alnifolia FAC* Salix discolor FACW* Lindera benzoin FACW*	30* 25* 20*			
Herbaceous: Phalaris arundinacea FACW* Woodwardia virginica OBL	80* 10			
Vines: None observed				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey- Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0-3% slopes, extremely stony

hydric soil inclusions: NO

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-10	10YR 2/1	None

Remarks:

Black Histic indicator under Army Corps of Engineers Hydric Soils Indicators

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 4" _____
- ☑ Depth to soil saturation in observation hole: 0" _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
  _____
  _____
  _____
- ☐ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland L3 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: M2		Transect Number:	Date of Delineation: 5/31/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC* Quercus alba FACU Pinus strobus FACU Fagus grandifolia FACU Betula lenta FACU	55* 10 5 5 5			
Sapling/Shrub: Clethra alnifolia FAC*	50*			
Herbaceous: Clethra alnifolia FAC*	15*			
Vines: Smilax rotundifolia FAC*	30*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey- Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 3-8% slopes, extremely stony

hydric soil inclusions: NO

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-8		
Oe	8-11		
Bw	11-16	2.5Y 5/2	None

Remarks:

Dark surface indicator under Army Corps of Engineers Hydric Soils Indicators

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 2 inches
- ☑ Depth to free water in observation hole: 0 inches
- ☑ Depth to soil saturation in observation hole: 0 inches
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position and microtopographic relief

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland M1 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: M1		Transect Number:	Date of Delineation: 9/08/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Nyssa sylvatica FAC* Acer rubrum FAC* Pinus strobus FACU	50* 40* 5			
Sapling/Shrub	Vaccinium corymbosum FACW* Clethra alnifolia FAC*	25* 15*			
Herbaceous	Vaccinium corymbosum FACW*	5*			
Vines	None observed				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐
title/date: Web Soil Survey- Bristol County, MA S. Part, 2017
map number:
soil type mapped: Swansea muck, 0-1 percent slope
hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-8		
Oa	8-11		
A	11-13	N2.5/	None

Remarks:
Bw: 13-15" (2.5Y 3/1)
Bg: 15-19 " (2.5Y 6/1)

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Histic epipedon and depleted matrix are Army Corps of Engineers hydric soil indicators

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position, microtopographic relief

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland M2 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: M2		Transect Number:	Date of Delineation: 9/13/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	No trees in the maintained portion of the right-of-way				
Sapling/Shrub	Vaccinium corymbosum FACW* Clethra alnifolia FAC* Acer rubrum FAC Kalmia angustifolia FAC	35* 30* 15 10			
Herbaceous	None observed				
Vines	None observed				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 2 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey- Bristol County, MA S. Part, 2017

map number:

soil type mapped: Paxton fine sandy loam, 0-8% slopes, extremely stony

hydric soil inclusions: NO

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-2		
A	2-7	10YR 2/1	None
Bw1	7-10	2.5Y 2.5/1	None

Remarks:

Bw2: 10-16" (2.5Y 3/1)

Dark surface indicator under Army Corps of Engineers Hydric Soils Indicators

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 3 inches
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

APPENDIX F BELL ROCK WILDLIFE HABITAT EVALUATION

October 18, 2018

NEW ENGLAND POWER COMPANY
d/b/a NATIONAL GRID

Bell Rock Substation Rebuild Project

Wildlife Habitat Evaluation

PROJECT NUMBER:
146770

PROJECT CONTACT:
Karen Hanecak
EMAIL:
Karen.Hanecak@powereng.com
PHONE:
(774)-643-1821

POWER ENGINEERS

Bell Rock Substation Rebuild Project

Wildlife Habitat Evaluation

PREPARED FOR: NEW ENGLAND POWER COMPANY
d/b/a NATIONAL GRID

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

Bioreserve	Southeastern Massachusetts Bioreserve
BMP	Best Management Practices
BVWs	Bordering Vegetated Wetlands
CMR	Code of Massachusetts Regulations
dbh	diameter at breast height
MassDEP	Massachusetts Department of Environmental Protection
MESA	Massachusetts Endangered Species Act
NEP	New England Power Company
NHESP	Natural Heritage and Endangered Species Program
NWI	National Wetlands Inventory
PFO	Palustrine Forested
POWER	POWER Engineers, Inc.
Project	Bell Rock Substation Rebuild Project
PSS	Palustrine Scrub-Shrub
ROW	Right-of-Way
SEMA-RI	Southeastern Massachusetts - Rhode Island
USFWS	United States Fish and Wildlife Service
VMP	Vegetation Management Plan
WPA	Massachusetts Wetlands Protection Act

1.0 INTRODUCTION

The New England Power Company d/b/a National Grid (NEP) is planning substation upgrades at the existing Bell Rock Substation located at 181 Bell Rock Road in the city of Fall River. The Bell Rock Substation lies within NEP's existing 2.75 acre substation easement (Figure 1). NSTAR Electric Company d/b/a Eversource Energy (Eversource) holds a 1.06 acre easement adjacent (south) to the NEP easement. All substation improvements will be made within the existing substation and transmission line right-of-way (ROW) easements. The purpose of the Bell Rock Substation Rebuild Project (Project) is to improve the reliability and operability of the substation, and to expand the substation to accommodate new equipment. The Project involves the rebuild and expansion of certain equipment and facilities at the substation, and will primarily include multiple elements, as described below:

1) Expand the existing substation footprint by approximately 0.51 acres (22,000 square feet);
2) Expand the existing substation perimeter security fence line;
3) Install a new control building to replace the existing control building;
4) Install new substation-related equipment;
5) Upgrade the stormwater management system;
6) Temporarily reroute the existing M13 115 kilovolt (kV) transmission line to bypass the existing substation to the south for the purposes of facilitating the rebuild of the substation; and
7) Complete additional minor transmission line reconfigurations to connect the lines back into the rebuilt substation.

On behalf of NEP, POWER Engineers, Inc. (POWER) conducted field assessments within the limit of work activities associated with the rebuild and expansion of the Bell Rock Substation as well as historical access to the transmission line facilities. Wetland field assessments occurred in November 2015, September 2017, and May 2018 and vernal pool surveys were conducted during the spring of 2015, 2016, 2017, and 2018. Additional detailed wildlife habitat evaluation data was collected in September 2017 and March 2018. In addition, constructability reviews were conducted of proposed construction activities in an effort to further minimize impacts to resource areas. As a result, the layout of Project facilities (including temporary M13 bypass, access routes, and construction work envelopes) were adjusted in several instances, resulting in a Project that avoids and minimizes impacts to the maximum extent practicable.

2.0 DETAILED WILDLIFE HABITAT EVALUATION

This document presents the results of a wildlife habitat evaluation conducted pursuant to the Massachusetts Wetland Protection Act (MA WPA) (M.G. L. ch 131 §40) Regulations addressing Wildlife Habitat Evaluations (310 Code of Massachusetts Regulations [CMR] 10.60) and the procedures and methods detailed in MassDEP's *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands* (Guidance, MassDEP 2006).

The Project does not exceed review thresholds for wildlife habitat alteration under the MA WPA, as implemented by the Wetlands Regulations (310 CMR 10.00). Cumulatively, anticipated impacts to Bordering Vegetated Wetland (BVW) are less than 5,000 square feet due to temporary (construction) impacts associated with construction mats and permanent impacts associated with the Substation expansion. However, NEP has elected to proactively undertake an Appendix B Detailed Wildlife Habitat

Evaluation for areas affected by the Project. This documentation is consistent with the standards of the MassDEP Guidance

NEP has consulted with the Massachusetts Natural Heritage and Endangered Species Program (NHESP) on the occurrence of state-listed species and critical habitats known to occur in the Project area. Through consultation and review of the NHESP data, NEP identified two NHESP state-listed species and priority habitats of rare species are located within the vicinity of the Project. The eastern whip-poor-will (*Caprimulgus vociferous*) and eastern box bat

(*Terrapene carolina*) are the state-listed species of special concern. Based on the information provided by NHESP, the Project site, or a portion thereof, is located within Priority Habitat 517 and Estimated Habitat 449 as indicated in the *Massachusetts Natural Heritage Atlas (14th Edition)*. The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and it's implementing regulations (321 CMR 10.00). State-listed wildlife is also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and it's implementing regulations (310 CMR 10.00). Projects and activities located within Priority and/or Estimated Habitat must be reviewed by the Division for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Habitat features or characteristics were evaluated in the Survey Area based on characteristics identified on the Guidance detailed data form (Attachment A). Important wildlife habitat features found during the field analyses include:

- Upland/wetland food plants (hard mast and fruit)
- Standing dead trees (snag)
- Dense herbaceous cover
- Large woody debris on ground
- Depressions that may serve as amphibian breeding areas
- Standing water present at least part of the growing season

Representative photographs of habitat characteristics within each resource area are presented in Attachment B, and Table 2 includes additional wildlife observations or signs collected during the field wildlife habitat evaluations.

The remainder of this document includes: Best Management Practices (BMPs) which will be used throughout the course of Project activities (Section 4.0), anticipated Project impacts to wildlife habitat with potential mitigation actions listed to offset Project impacts (Section 5.0), and an adverse effect analysis and conclusion (Section 6.0).

3.0 EXISTING HABITAT CONDITIONS

3.1 Important Habitat Features

Wildlife habitat features and characteristics identified by the MassDEP Guidance were evaluated in every BVW (M1 and L1A) to be impacted by the Project and documented on the detailed data forms (Attachment A). Project impacts include: tree clearing and filling of both forested and shrub wetland adjacent to the existing Bell Rock Substation to accommodate the expansion. Temporary Project impacts

include: work pads and access routes, as well as the installation of temporary structures on the M13 transmission line bypass located south of the Substation. Where multiple sites of impact would take place in a wetland resource area, a representative site was selected to document wildlife habitat characteristics. Wildlife habitat information was collected at a total of four locations.

Based on the USFWS National Wetlands Inventory (NWI) classification system (Cowardin et al. 1979), wetlands to be impacted by the Project within the existing NEP easements are predominately forested wetlands (PFO) and scrub-shrub wetlands (PSS).

A variety of suburban wetland wildlife species utilize these habitats including an assemblage of chiefly small mammals (other than white-tailed deer (*Odocoileus virginianus*) and Eastern coyote (*Canis latrans* var.)), songbirds, reptiles, amphibians, and invertebrates. These wetland habitats provide feeding, nesting, breeding, and cover opportunities for wildlife, where the wetlands are already embedded in a large area of natural habitat. Characteristics of the forest and shrub wetlands which provide necessary resources for wildlife include: berry-producing shrubs for food sources, young, developing shrubs providing an understory for cover, localized areas of surface water in the form of depressions, and standing dead trees offering the potential for cavities and perches.

Summarized below in Table 1 are the wildlife habitat characteristics observed at the two sites during the field surveys. The listed habitat characteristics are those identified on the MassDEP detailed habitat evaluation data forms that are relevant to Project wetland resource areas. Therefore, Table 1 is a summary of these data forms (Attachment A) and presents a comprehensive overview of the wildlife habitat evaluation for the Project. Following the table is a detailed description of each of the listed habitat characteristics.

In addition to the site specific habitat characteristics, the MassDEP Guidance more broadly addresses landscape context such as habitat continuity and connectivity, as well as the effects of existing habitat degradation. These attributes are evaluated following the descriptions of habitat characteristics listed in Table 1.

TABLE 1 EXISTING WILDLIFE HABITAT FEATURES

HABITAT CHARACTERISTICS	WETLAND RESOURCE AREA	EXISTING HABITAT FEATURES	NOTES/COMMENTS
Wildlife Food: Upland/wetland food plants (hard mast and fruit)	BVW M1	Present	Existing Plants: highbush blueberry, greenbrier, red oak.
	BVW L1A	Present	Existing Plants: highbush blueberry, maleberry, greenbrier, willow.
Standing Dead Trees			
6-12” dbh	BVW L1A	1 tree	Tree species unknown. Woodpecker holes.
	BVW M1	3 trees	Tree species unknown. Woodpecker holes.
12-18” dbh	BVW M1	2 trees	Tree species unknown. Woodpecker holes.
18-24” dbh	BVW M1	2 trees	Tree species unknown. Woodpecker holes.
Dense herbaceous cover	BVW L1A	Present	Existing Plants: greenbrier and sweet pepperbush
Large woody debris on ground	BVW L1A	Present	Medium-sized timber slash (tree logs).

HABITAT CHARACTERISTICS	WETLAND RESOURCE AREA	EXISTING HABITAT FEATURES	NOTES/COMMENTS
Depressions that may serve as seasonal ponds.	Amphibian Breeding Area MP-1	Present	- 3 wood frog egg masses found in an ATV rut in April and May 2015. - 20 wood frog egg masses found in the ATV run in April 2016. - Spring peepers were found in April 2016. - Two spotted salamander egg masses were found in April 2018.
	Amphibian Breeding Area LP-2	Present	- 2 strands of American toad egg masses were found in the amphibian breeding habitat during the May 2017 survey
	Amphibian Breeding Area LP-3	Present	- Two wood frogs were observed during the April 2016 survey. - One green frog was observed during the May 2017 survey.
Standing water present at least part of the growing season suitable for use by non-breeding amphibians (foraging, rehydration).	- BVW L1A - BVW M1 - Amphibian Breeding Areas MP-1, LP-2, and LP-3	Present	All pockets of standing water present are suitable for foraging and rehydration of non- breeding amphibians. Pockets of standing water are present either as an amphibian breeding areas (MP-1, LP-2, and LP-3) and isolated depressions within the wetlands.

TABLE 2 WILDLIFE OBSERVATIONS AND SIGNS

WETLAND RESOURCE AREA	OBSERVED WILDLIFE SPECIES	OBSERVED WILDLIFE SIGNS
BVW M1	- Gray catbird - Eastern towhee	- White-tailed deer droppings
BVW L1A	- Gray catbird - Eastern towhee	- White-tailed deer droppings
Amphibian Breeding Area MP-1	~ 3 wood frog egg masses in April and May 2015 ~ 20 wood frog egg masses in April 2016 - Spring peepers in April 2016 - 2 spotted salamander egg masses in April 2018	- No observations at times of site visits
Amphibian Breeding Area LP-2	~ 2 strands of American toad egg masses in May 2017	- No observations at times of site visits
Amphibian Breeding Area LP-3	- Two wood frogs in April 2016 - One green frog in May 2017	- No observations at times of site visits

3.1.1 Upland / Wetland Food Plants (Hard Mast and Fruit)

A variety of predominately native shrubs and woody vines in the Survey Area provide fruit and seeds for wildlife food, particularly to birds and mammals inhabiting and using the Survey Area. Native shrubs serving as a wildlife food source in all four wetlands include highbush blueberry (*Vaccinium corymbosum*) and maleberry (*Lyonia ligustrina*). Red oak (*Quercus rubra*) saplings are scattered in wetland M1 providing hard mast for mammals such as the Eastern gray squirrel (*Sciurus carolinensis*) and white-tailed deer. A native woody vine providing fruit for wildlife is roundleaf greenbrier (*Smilax rotundifolia*).

3.1.2 Standing Dead Trees (Snag)

Standing dead trees, also known as snags, provide feeding, nesting, denning, roosting, or perching areas for wildlife. Seven snag trees were identified on the edge of BVW M1. These standing dead trees had several class ranges for diameter at breast height (dbh). Three snag trees were recorded with a dbh range of 6 to 12 inches. Two snag trees within the 12 to 18 inch dbh range and two snag trees within the 18 to 24 inch dbh range were recorded. One snag tree (6 to 12 inch dbh range) was recorded within BVW L1A.

Woodpeckers such as the downy woodpecker (*Picoides pubescens*) or the hairy woodpecker (*Picoides villosus*) feed on wood-boring larvae beetles found in snags; thereby creating holes or nesting cavities in snag trees while trying to access the beetles. Holes were found throughout the existing snags in the Survey Area. Smaller snags provide nesting or feeding sites for such suburban birds as the black-capped chickadee (*Poecile atricapillus*), tufted titmouse (*Baeolophus bicolor*), and white-breasted nuthatch (*Sitta carolinensis*). Small mammals, such as the Eastern gray squirrel may den in tree cavities during the winter (DeGraaf and Yamasaki 2001).

3.1.3 Dense Herbaceous Cover

Dense herbaceous cover is predominately present as sweet pepperbush (*Clethra alnifolia*) shrubs under three feet in height and roundleaf greenbrier, not yet meeting the height requirements for a woody vine. These young shrubs and vines provide a thick cover of woody vegetation under the established overstory of trees and shrubs.

3.1.4 Large Woody Debris on Ground

Large woody debris on the ground was identified in wetland L1A. Medium-sized timber slash, or cut trees, were on the ground on the edge of wetland L1A. These fallen trees provide potential denning sites within the decaying interior of the logs (Hagan and Grove 1999). Decaying logs also provide food sources for a variety of insects residing within the decaying logs, and cover for specific woodland amphibian species including the red-back salamander (*Plethodon cinereus*) (DeGraaf and Yamasaki 2001).

3.1.5 Depressions that may serve as Vernal Pools/Amphibian Breeding Areas

The WPA defines vernal pool habitat as confined basin depressions that typically hold water for two continuous months during the spring and are free of adult fish populations. These areas provide essential breeding habitat for a variety of amphibian species such as wood frogs (*Lithobates sylvatica*) and the spotted salamander (*Ambystoma maculatum*). Certified vernal pools (CVPs) are those that have been certified by the Massachusetts NHESP according to the Guidelines for Certification of Vernal Pool Habitat (NHESP 2018) and are protected if they fall under the jurisdiction of the WPA. CVPs are also

afforded protection under Section 401 of the Federal CWA, the Massachusetts Surface Water Quality Standards that relate to Section 401, and the Massachusetts Forest Cutting Practices Act. No CVPs are identified to occur in the Survey Area (NHESP 2015). Potential vernal pools (PVPs) have also been mapped by NHESP but do not receive protection under the WPA or under any other state or federal wetlands protection laws (NHESP 2013).

Amphibian breeding area refers to areas where signs of amphibian breeding (obligate and/or facultative species) have been observed, but the overall habitat of the area did not meet the specific vernal pool criteria. If the depression had less than 12 inches of water the pool was classified as an amphibian breeding area due to the unlikelihood of water persisting through the duration of the egg mass development and maturation thus causing the viability of successful amphibian breeding success improbable. An adequate hydroperiod of 3 to 5 months allows for a greater chance of the successful development of amphibian species using the pool. This water depth was also based upon field observations during the 2017 and 2018 field seasons where hydroperiods were observed approximately 2 months after the vernal pool and amphibian breeding habitat surveys were conducted. A majority of the pools with a maximum water depth less than 12 inches were completely dry with dead tadpoles observed in mid-June 2018.

Discretion was also used for classifying vernal pools versus amphibian breeding areas based upon the location of the pool. For example, depressions (e.g., deep tire ruts) located within and along an existing access road or all-terrain vehicle (ATV) trail that were observed to provide amphibian breeding habitat were classified as amphibian breeding areas if they were isolated and not connected to wetland system. The majority of these isolated depressions within or along anthropogenic areas are located within maintained ROWs in areas with full sun and little or no shrub canopy. There is the likelihood of high evapotranspiration rates within these isolated depressions, causing water levels to decrease. As a result, the depressions may not provide adequate water levels to support the development of obligate vernal pool species.

No pools in the Survey Area met the specific vernal pool criteria during the 2015, 2016, 2017, and 2018 field surveys. Two depressions (LP-2 and LP-3, respectively) were identified in BVW L1A and are classified as amphibian breeding areas, while one depression (MP-1) was identified in BVW M1 and is also classified as an amphibian breeding area.

The two amphibian breeding habitats in BVW L1A were surrounded by wetland shrubs and both pools had mud/muck bottoms. Sphagnum moss was within and surrounding both depressions. During the April 2016 vernal pool survey, two wood frogs were observed in LP-3 and during the May 2017 vernal pool season, a green frog (*Lithobates clamitans*) was observed in this same depression. Two strands of American toad (*Anaxyrus americanus*) egg masses were observed in LP-2 during the May 2017 survey. No species were observed during the 2018 vernal pool survey. The pool had an average depth of six inches of standing water.

The amphibian breeding area (MP-1) in BVW M1 is located within a deep ATV rut where three wood frog masses were observed in April and May 2015 surveys and 12 wood frog egg masses were observed in April 2016. No egg masses were observed during the May 2017 survey; however, three spotted salamander egg masses were observed during the April 2018 survey. Spring peepers (*Pseudacris crucifer*) were also observed in 2016. The ATV rut had a maximum water depth of approximately 12 inches. The depression is surrounded by a mixture of upland and wetland broad-leaved deciduous forest and shrub. A leaf litter bottom was present in the amphibian breeding area.

3.1.6 Standing Water Present at Least Part of the Growing Season

Shallow pockets of standing water occur throughout the two BVWs in the Survey Area. These water-filled depressions provide non-breeding amphibians foraging and rehydration opportunities. Water was present in interspersed pockets in early summer 2017 while conducting wetland delineations. However, a majority of the depressions were dry in early September 2017.

3.2 Landscape Context

The utility rights-of-way (ROWs) in the Survey Area serve as a connector to adjacent areas of habitat and are, therefore, important for connectivity with adjoining natural habitats. The Project area is surrounded by dense upland and wetland forest, providing a large expanse of unfragmented forest habitat. The Project site is located within the Southeastern Massachusetts Bioreserve (Bioreserve), with over 13,600 acres of protected land in Fall River and Freetown that lies to the east of downtown Fall River. The Bioreserve is managed by the Commonwealth of Massachusetts, the City of Fall River, and the Trustees of Reservation and offers diverse habitats and natural communities. The location of the Bioreserve in southeastern Massachusetts serves as vital habitat since this area is one of the fastest growing regions in the state with residential, commercial, and industrial zones. Wildlife currently inhabiting the Project area are accustomed to the existing utility infrastructure in the area. The existing ROWs extending to the west, south, and east of the existing substation provide natural shrubland habitats embedded within large tracts of continuous and connected forest habitats.

The Project is not anticipated to permanently impact the integrity of the adjacent ROWs or the Bioreserve land bordering the Bell Rock Substation as a wildlife habitat connector to the adjacent forests. After Project completion the ROWs will continue to serve a role as a landscape connector to wildlife habitats, as well as providing habitats for wildlife species.

3.3 Habitat Degradation

The representative wetland impact areas reviewed during the wildlife habitat evaluation have all been subject to previous alterations, predominately from the existing NEP infrastructure and mild habitat degradation as a result of recreation activities, including ATV usage. However, these two wetlands have very minor invasions of exotic plants. No observations of chemical contamination or erosion and sedimentation problems were observed within the Survey Area while conducting the wildlife habitat evaluation.

All wetlands along the NEP ROW have been altered to some degree, chiefly by removal of trees. Temporary disturbances will continue to occur around the perimeter of the Station yard and along the existing transmission line ROWs, since NEP conducts a regular vegetation maintenance program of the existing transmission line ROWs. The vegetation maintenance cycle follows a five-year timeline. NEP's ROW vegetation practices encourage the growth of low-growing shrubs and other vegetation which provide a degree of natural vegetation control. Vegetation management is necessary to ensure the reliable and safe delivery of electric services to NEP customers. This is accomplished by allowing for the proper clearance between vegetation and electrical conductors and supporting structures. Vegetation maintenance will continue to occur in accordance to National Grid's 2014-2018 Vegetation Management Plan (VMP), which is in compliance with the Massachusetts Rights-of-Way Management regulations (333 CMR 11.00) administered by the Massachusetts Department of Agricultural Resources) (National Grid 2013).

Tree clearing, earth-disturbing work, and the filling of wetlands will be required as a result of the Project.

4.0 BEST MANAGEMENT PRACTICES

Throughout the planning and design process for the Project, wetland impacts have been minimized to the greatest extent practicable by utilizing an existing substation site (Bell Rock Substation) and existing access roads. However, given the landscape setting of the Project, certain wetland impacts associated with the expansion of the existing substation cannot be avoided. Construction of the Project will result in temporary, permanent, and secondary impacts to wetland resources. Secondary impacts generally involve the conversion of forested wetland habitat to scrub-shrub or emergent wetland habitat, whereby the cover type changes but results in a no net-loss of wetlands.

Temporary impacts to BVWs are anticipated due to the placement of temporary timber construction mats used for temporary access roads to mobilize construction equipment as well as for temporary construction areas. Construction mats will be used in areas where permanent access is not required and access is only needed for such activities as tree clearing, vegetation removal, and for upgrades or maintenance. After work has been completed, the mats will be removed and the temporarily impacted areas restored.

Permanent fill will be placed in BVWs and this fill is required for the expansion of the Bell Rock Substation. The Bell Rock Substation permanent impacts to BVWs include the actual footprint of the Station including required grading resulting in permanent contour changes.

Tree removal will result in the conversion of forested wetlands to either scrub-shrub or emergent BVW. Forest area in Wetland L1A and M1 will be cleared to accommodate the expansion of Bell Rock Substation and the temporary M13 bypass.

BMPs, as detailed in National Grid's Environmental Guidance document *EG-303NE* (Appendix C), will be employed to minimize disturbances to wetlands during construction of the Project. The boundaries of the wetlands in the Project area would be clearly demarcated by a qualified wetland scientist prior to the commencement of work. NEP will implement a Wetland Invasive Species Control Plan during the construction of the Project to minimize the spread of invasive plant species in wetland resource areas.

NEP will comply with all applicable wetland regulatory permit requirements and conditions, as well as the associated Project plans and specifications submitted in support of these permit applications.

4.1 The Temporary M13 Bypass

Specific measures will be taken when installing the temporary M13 bypass. Temporary soil erosion and sedimentation controls will be installed around the work sites near wetlands to minimize the potential for soil erosion and sedimentation. The temporary M13 bypass installation in wetlands has been avoided; however, certain construction work pads will be installed in BVWs in order to perform the work. All soil erosion and sediment controls, and other applicable construction BMPs will be inspected and maintained on a routine basis. Excess soil will be spread in upland locations, where possible, or removed from the site for proper disposal.

Woody species with a mature height greater than 10 feet will be cleared; low-growing tree species, shrubs, and grasses will only be removed/mowed along access roads and at pole locations. To avoid disturbing the root mat, tree stumps will be left in place except at structure locations and or construction work pads.

4.2 Access Roads

Existing access roads will be used to the extent practicable during the construction phase of the Project to minimize access through wetlands. Where access roads must be improved or developed in certain sections, the roads will be designed (where practical) so as not to interfere with surface water flow or the functions of the wetland. The type of stabilization measures to be used in wetlands will depend on soil saturation and depth of organic matter. All temporary access roads through wetlands will be restored following the completion of installation activities by removing the construction mats, re-grading the area to pre-construction elevations to the extent practicable, and allowing the wetlands to re-vegetate. If necessary, vegetation will also be restored within the wetland through native seeding.

4.3 Construction Areas

The size, shape, location, and configuration of work pads were evaluated to minimize impacts to wetlands and watercourses to the extent practicable. Temporary construction matting will be placed on the existing wetland vegetation where wetland impacts could not be avoided. The type of work pad material chosen will depend upon soil saturation and depth of organic matter in the wetland. Temporary construction matting and other possible construction area materials will be removed upon completion of the Project. Wetlands will be restored to pre-construction configuration and elevations to the extent practicable, and allowing the wetlands to re-vegetate. If necessary, vegetation will also be restored within the wetland through native seeding.

4.4 Soil Erosion and Sediment Control, and Stormwater Pollution Prevention Plans

Soil erosion and sediment control devices will be installed along the perimeter of the identified wetland resource areas prior to the onset of soil disturbance activities to ensure that excess soil piles and other impacted soil areas are confined and do not result in downslope sedimentation of sensitive areas. Along the M13 temporary bypass, woody species with a mature height greater than 10 feet will be cleared; low-growing tree species, shrubs, and grasses will only be removed/mowed along access roads and at pole locations. To avoid disturbing the root mat, tree stumps will be left in place except at structure locations and or construction work pads. Sediment controls will be inspected on a regular basis and maintained or replaced as necessary.

4.5 Wetland Mitigation

In order to reduce the impacts associated with the construction and operation of the Project, NEP incorporated design measures to minimize Project impacts. These measures, which include alignment of existing and proposed structure locations, structure design and configuration, and the use of existing access roads, where possible, have resulted in the avoidance and minimization of impacts to wetlands and wildlife to the greatest extent practicable.

For those wetlands having permanent impacts, NEP will provide appropriate mitigation. While mitigation plans are currently in the preliminary phases of development, NEP is committed to working with the USACE, MassDEP, and the City of Fall River Conservation Commission to develop an appropriate mitigation package so there is no net loss of wetland functions and values as a result of the Project. Examples of wetland mitigation include wetland restoration, targeted property acquisition for land preservation and participation in the USACE Massachusetts in-lieu fee program. In order to offset environmental impacts associated with the Project, appropriate compensatory mitigation (in collaborative

consultation with local, state, and federal resource agencies and other stakeholders) will be provided, as a component of the final Project design.

The 401 Water Quality Certification Regulations at 314 CMR 9.06(2)(a) requires "For discharges to bordering or isolated vegetated wetlands, such steps shall include a minimum of 1:1 restoration or replication." NEP and its representatives have had preliminary discussions with representatives of the Watuppa Reservation to identify and inventory potential wetland restoration and enhancement opportunities. Mitigation for impacts to wetlands and ORW will be finalized through permitting with the Fall River Conservation Commission and MassDEP.

4.6 Wildlife Mitigation and Wildlife Habitat Enhancement

In areas where trees will be cleared there are several wildlife habitat mitigation activities which can be performed to enhance wildlife habitat in the surrounding area. Such activities may include: seeding disturbed areas with a conservation seed mix, leaving woody debris to create cover for wildlife, and leaving snag trees as potential wildlife habitat.

5.0 PROJECT IMPACTS AND MITIGATION

Throughout the planning and design process for the Project, wetland impacts have been minimized to the greatest extent practicable by utilizing an existing substation site (Bell Rock Substation) and existing access roads. However, given the landscape setting of the Project, certain wetland impacts associated with the expansion of the existing substation cannot be avoided. Construction of the Project will result in temporary, permanent, and secondary impacts to wetland resources. Secondary impacts generally involve the conversion of forested wetland habitat to scrub-shrub or emergent wetland habitat, whereby the cover type changes but results in a no net-loss of wetlands. This section also addresses the associated impacts which are most likely to occur to wildlife as a result of the Project and potential mitigation actions which could be implemented.

5.1 Secondary Impacts and Mitigation

Tree removal will result in the conversion of forested wetlands to either scrub-shrub or emergent BVW in several locations. Forest area in Wetland L1A will be cleared to accommodate the expansion of Bell Rock Substation and the temporary M13 bypass. However, tree removal will result in the conversion of forested wetlands to either scrub-shrub or emergent BVW in several locations.

5.2 Temporary Habitat Impacts and Mitigation

Wildlife currently using forested areas adjacent to the substation will be temporarily impacted by construction of the Project, but large blocks of intact woodland will continue to remain along both sides of the substation easement. Larger, more mobile species such as white-tailed deer and Eastern coyote are expected to temporarily relocate from the construction area, but are unlikely to be permanently impacted by the displacement. Small mammals such as gray squirrels (*Sciurus carolinensis*), woodchucks (*Marmota monax*), skunks, and raccoons, as well as herpetofauna are also likely to move away from areas of construction activity. Depending upon the time of year, some avifauna may also be temporarily displaced, possibly impacting breeding and nesting activities, but are otherwise likely to return after construction and in subsequent years. In wetlands which will have temporary work pads or temporary construction access, the disturbed areas will be restored to pre-existing grade where necessary and allowed to revegetate.

5.3 Permanent Habitat Impacts and Mitigation

The removal of mature trees in forested areas as a result of Project construction is unlikely to impact local wildlife populations utilizing these mature trees due to the availability and abundant extent of forest habitats. Vegetation on the existing ROW is managed in accordance with the NEP vegetation management program (National Grid 2013); accordingly, trees that could interfere with the operation of the substation or associated transmission lines are routinely removed from the ROW and trees along the edges are periodically pruned or removed. Vegetation will be maintained as low-growth shrubs or grasses and herbs. NEP designed the Project to first avoid and then minimize permanent impacts to wetlands to the extent practicable, but unavoidable permanent fill of 0.08 acres will be required for the substation expansion. With respect to the surrounding available wetland wildlife habitat resources associated with the transmission line ROWs and the Bioreserve, it is not expected that this small area of permanent fill would result in a long-term negative impact on the ability of the area to provide valuable wildlife habitat for the existing assemblage of wetland-dependent species.

In areas where trees will be cleared there are several mitigation activities which can be performed to enhance wildlife habitat as a result of tree loss. Such activities may include: seeding disturbed areas with a conservation seed mix, leaving woody debris to create cover for wildlife, and leaving snag trees as potential wildlife habitat.

5.4 State-Listed Species Impacts and Mitigation

NEP has consulted with the NHESP on the occurrence of state-listed species and critical habitats known to occur in the Project area. Specific mitigation measures recommended by the NHESP, for the eastern whip-poor-will and the eastern box turtle, will be followed within the vicinity of the Project.

Grassland and shrub land birds (the eastern whip-poor-will) are very sensitive to disturbance throughout their breeding season from the 1st of May through 15th of August. All tree clearing will be completed outside of the breeding season. Work within the substation yard expansion area is expected to be ongoing from spring 2020 through winter of 2021. Construction work crews will be trained to identify the calls and visual characteristics of the eastern whip-poor-will. Any work within the substation expansion area during the breeding season will be within limits of the perimeter sediment controls around the cleared and grubbed expansion area. In the event the species is observed, a report will be submitted to NHESP describing the siting and will avoid work in observed nesting areas.

Prior to construction, the construction work crews will receive turtle training to be educated on the visual characteristics of the eastern box turtle and reminded of the mitigation measures. Extra care will be used when using heavy machinery or traveling in vehicles through mapped areas, especially from the 1st of April through the 1st of November. NEP has an on-going radio telemetry program for the Eastern box turtle. In advance of tree clearing and earth disturbance at the substation, the Project area will be monitored for turtles outfitted with a transmitter and any remaining turtles would be identified through turtle sweeps by trained biologists and removed the proposed construction area. Silt fencing/ turtle exclusion fencing will be installed, monitored and maintained throughout construction to reduce the risk of turtles entering into the active work site. Any silt fencing used in these areas will be removed as soon as site stabilization has occurred, as such fencing could be a barrier to turtle movements. If turtles are encountered, they should be removed from the work zone and reported to the NHESP (with photos, locational information and documentation).

6.0 CONCLUSION

All wetlands within the Survey Area provide wildlife habitat functions including providing food, shelter, migration, breeding, and overwintering areas for wildlife. Important wildlife habitat characteristics have been identified within the Survey Area. These include:

- Upland/wetland food plants (hard mast and fruit).
- Standing dead trees (snags).
- Dense herbaceous cover.
- Large woody debris on ground.
- Depressions that may serve as amphibian breeding areas.
- Standing water present at least part of the growing season.

NEP will develop a restoration and mitigation plan for the Project. Possible wildlife habitat enhancements that may be proposed include:

- Creating additional snags for denning and nesting sites where possible/available.
- Stockpiling woody debris near to provide cover.

Alterations to wetlands (which include BVW) which have impacts above the thresholds permitted under the WPA are only permitted if the impacts will have no adverse impact on wildlife habitat. *Adverse effects on wildlife habitat mean the alteration of any habitat characteristic listed in 310 CMR 10.60(2), insofar as such alteration will, following two growing seasons of project completion and thereafter (or, if a project would eliminate trees, upon the maturity of replanted saplings) substantially reduce its capacity to provide the important wildlife habitat functions listed in 310 CMR 10.60(2). Such performance standard, however, shall not apply to the habitat of rare species which are covered by the performance standards established under 310 CMR 10.59.*

There are no adverse effects on wildlife habitat since resource areas within the Survey Area will not be substantially reduced in their function to serve as valuable sources of wildlife habitat in an area. Around the perimeter of the substation yard, where forest habitat will be converted to scrub-shrub and emergent habitats, wildlife will still be able to use the area. .

Wildlife species using the Project area will most likely not be impacted in response to the tree removal as a result of the Project. For the wetlands lost as a result of the proposed Bell Rock Substation expansion, the proper mitigation measures will be taken to compensate for the loss in wildlife habitat.

NEP has identified important habitat features, and incorporated appropriate measures to avoid and/or minimize and mitigate adverse impacts. The proposed alterations will not substantially reduce the long-term capacity of the site to provide food, cover, migratory, and breeding areas, especially when viewed in terms of landscape scale availability of similar habitat types. While the habitat functions associated with forested wetland will be lost due to tree removal and/or fill in these localized areas, it is expected that adjacent similar habitat types will continue to provide basic habitat requirements of the existing assemblage of wetland-dependent species. NEP will compensate for all permanent loss of wetland per comformance with the requirements of the permitting state and federal agencies. NEP will consult with the City of Fall River Conservation Commission to develop wetland mitigation plans that adequately compensate for wetland loss as a result of the Project. Compensatory wetland mitigation options for the Project may include wetland replication and/or enhancement along the Project Area, wetlands creation

(on- or off-ROW), wetlands preservation, the Massachusetts Department of Fish and Game In-Lieu Fee Program and/or placement of conservation restrictions to preserve open spaces.

7.0 REFERENCES

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FIGURES

FIGURE 1 PROJECT OVERVIEW: TOPOGRAPHIC MAP



Legend

- Existing Substation Site
- Proposed Bell Rock Substation Expansion
- Existing Transmission Line

Commonwealth of Massachusetts

Bristol County
City of Fall River

Figure 1

Project Overview: Topographic Map

Bell Rock Substation
Rebuild Project

NAD 1983 UTM Zone 18N USFt

0 1,000 2,000 3,000
Feet

1:24,000

POWER ENGINEERS

nationalgrid

Date: 6/22/2018

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\Bell_Rock\Wetlands_Report\Bell_Rock_Fig_1_Locus_24K_Topo.mxd

ATTACHMENT A WILDLIFE HABITAT EVALUATION DATA FORMS

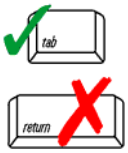
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Bell Rock Substation Rebuild Project
Project Name

Fall River, MA. Bordering Vegetated Wetland L1A
Location

Please refer to breakdown of permanent and temporary impacts below.
Size of Area Being Impacted

10/18/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Permanent (Grading and alterations for the Bell Rock Substation expansion		1,045 sf (0.02 acres)		0.02 acres
2. Temporary (work pads, pull pads, access)		6393, sf (0.15 acres)		0.15 acres
3. Tree Clearing (Secondary Impacts)		215 sf (0.005 acres)		0.005 acres
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Bordering Vegetated Wetland L1A
Impact Area (number/name)

03/23/2018
Date(s) of Site Visit(s) and Data Collection

Sunny, 42 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — Person completing form per 310 CMR 10.60(1)(b)

10/18/2018 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine Subsystem: -

Class: Forested Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	15	45	25	15	40
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Pinus strobus (10%)*	Woody Vine	Smilax rotundifolia (25%)*
Tree	Acer rubrum (5%)*		
Shrub	Clethra alnifolia (30%)*		
Shrub	Vaccinium corymbosum (20%)*		
Herb	Smilax rotundifolia (35%)*		
Herb	Clethra alnifolia (35%)*		

C. Inventory (Soils)

Whitman FSaL, 0-3% slopes, extremely stony	Very Poorly Drained
Soil Survey Unit	Drainage Class
Organic fibric (0"-10"), Organic hemic (10"-12")	12"
Texture (upper part)	Depth
Surface	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
1	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☒ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☒ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☒ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☒ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☐ Yes	☒ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

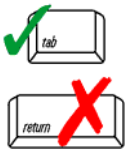
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Bell Rock Substation Rebuild Project
Project Name

Fall River, MA. Bordering Vegetated Wetland M1
Location

Please refer to breakdown of permanent and temporary impacts below.
Size of Area Being Impacted

10/18/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Permanent (Grading and alternations for the Bell Rock Substation expansion)		2,559 sf (0.06 acres)		0.06 acres
2. Permanent (Tree Clearing)		2,559 sf (0.06 acres)		0.06 acres
3. No temporary impacts				
4.				
5.				
6.				
7.				

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 1. Bordering Vegetated Wetland M1
Impact Area (number/name)

11/14/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 10/18/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: -

Class: Forested — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	40	0	85	5
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Nyssa sylvatica (50%)*		
Tree	Acer rubrum (40%)*		
Tree	Pinus strobus (5%)		
Shrubs	Vaccinium corymbosum (25%)*		
Shrubs	Clethra alnifolia (15%)*		
Herb	Vaccinium corymbosum (5%)		

C. Inventory (Soils)

Swansea muck, 0-1% slopes	Very Poorly Drained
Soil Survey Unit	Drainage Class
Organic Fibric (0"-8"), Organic Sapric (8"-11"), Mucky Silt Loam (11"-13")	13"
	Depth
Not found	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
3	2	2	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☒ Present ☐ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

ATTACHMENT B HABITAT CHARACTERISTICS PHOTOGRAPHS

PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland M1.

Photo No.	**Date:**
1	09-18-17

Direction Photo Taken:

North

Description:

View to the north of dense shrub cover predominately comprised of highbush blueberry and sweet pepperbush under a white pine and red maple tree canopy.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland M1.

Photo No.	**Date:**
2	11-14-17

Direction Photo Taken:

North

Description:

Northward view of dead standing trees in the non-maintained portion of the D21 corridor.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland M1.

Photo No.	**Date:**
3	04-24-18

Direction Photo Taken:

North

Description:

Northward view of an amphibian breeding area (MV-1) located within in an ATV tire rut. Wood frog egg masses were observed in 2015 and 2016 and spotted salamander egg masses were observed in April 2018.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L1A.

Photo No.	**Date:**
4	09-08-17

Direction Photo Taken:

North

Description:

View to the north of dense shrub cover in BVW L1A. The shrub layer is predominately comprised of highbush blueberry and sweet pepperbush.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L1A.

Photo No. 5	**Date:** 05-03-17

Direction Photo Taken:

North

Description:

Northward view of an amphibian breeding area (LV-2), where several American toad egg mass strands were observed in May 2017.



PHOTOGRAPHIC LOG

Site Location: Bordering Vegetated Wetland L1A.

Photo No. 6	**Date:** 04-24-18

Direction Photo Taken:

North

Description:

View to the north of an amphibian breeding area (LV-3) where two wood frogs were observed during the April 2016 survey and one green frog was observed during the May 2017 survey.



APPENDIX G BELL ROCK WETLAND INVASIVE SPECIES CONTROL PLAN (WISCP)

October 02, 2018

NEW ENGLAND POWER COMPANY
d/b/a NATIONAL GRID

Bell Rock Substation Rebuild Project

Wetland Invasive Species Control Plan

PROJECT NUMBER:
146770

PROJECT CONTACT:
Karen Hanecak
EMAIL:
Karen.Hanecak@powereng.com
PHONE:
774-643-1821

POWER ENGINEERS

Bell Rock Substation Rebuild Project

Wetland Invasive Species Control Plan

PREPARED FOR: NEW ENGLAND POWER COMPANY
d/b/a NATIONAL GRID

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
FERC	Federal Energy Regulatory Commission
IVM	Integrated Vegetation Management
MassDEP	Massachusetts Department of Environmental Protection
NEP	New England Power Company d/b/a National Grid
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NRCS	Natural Resources Conservation Service
POWER	POWER Engineers, Inc.
Project	NEP's Bell Rock Substation Rebuild Project
ROW	right-of-way
WISCP	Wetland Invasive Species Control Plan

1.0 INTRODUCTION

The New England Power Company d/b/a National Grid (NEP) is planning substation upgrades at the existing Bell Rock Substation located at 181 Bell Rock Road in the city of Fall River. The Bell Rock Substation lies within NEP's existing 2.75 acre substation easement. NSTAR Electric Company d/b/a Eversource Energy (Eversource) holds a 1.06 acre easement adjacent (south) to the NEP easement. All substation improvements will be made within the existing substation and transmission line right-of-way (ROW) easements. The purpose of the Bell Rock Substation Rebuild Project (Project) is to improve the reliability and operability of the substation, and to expand the substation to accommodate new equipment. The Project involves the rebuild and expansion of certain equipment and facilities at the substation, and will primarily include multiple elements, as described below (refer to Figure 2-2 and 2-3 in Appendix A):

1) Expand the existing substation footprint by approximately 0.51 acres (22,000 square feet);
2) Expand the existing substation perimeter security fence line;
3) Install a new control building to replace the existing control building;
4) Install new substation-related equipment;
5) Upgrade the stormwater management system;
6) Temporarily reroute the existing M13 115 kilovolt (kV) transmission line to bypass the existing substation to the south for the purposes of facilitating the rebuild of the substation; and
7) Complete additional minor transmission line reconfigurations to connect the lines back into the rebuilt substation.

This Wetland Invasive Species Control Plan (WISCP) addresses measures NEP will implement to minimize the spread and/or introduction of invasive species in wetlands in the Project Area during construction. Invasive plants are species that are not native or indigenous to a region and can thrive in areas beyond their natural dispersal range, often out-competing native plants for space, nutrients, sunlight, and water (NRCS 2018a). Invasive species are highly adaptable and have few natural control agents in the environment into which they have been introduced, making them very prolific plant species. Invasive species may also be referred to as nuisance, undesirable, noxious, or exotic species.

The WISCP identifies the invasive wetland plant species that are of concern in the Project Area ("Project Area" is identified as all wetlands surveyed within the limit of work activities associated with the rebuild and expansion of the Bell Rock Substation, as well as historical access to the transmission line facilities). However, not all of the wetlands within the Project Area will be impacted, and the wetlands that will be disturbed as a result of Project construction activities could be more susceptible to colonization by invasive species. In addition, the movement of construction equipment and materials through wetlands that presently contain invasive species could promote the spread of invasive species to nearby, un-infested wetlands.

The overall objective of the WISCP is to define the procedures to be used during Project construction to preserve the value and functions of wetlands in the Project Area and to minimize the further spread of invasive plants within wetlands that already contain them. The specific objectives of this plan are as follows:

- Inventory the invasive plant species known to occur in the wetlands in the Project Area that were identified during the wetland delineations conducted for the Project.

- As a baseline, identify the wetlands in the Project Area where such invasive species presently exist.
- Describe NEP's existing vegetation management programs, discuss how these existing programs contribute to minimizing the proliferation of invasive species within the Project Area, and explain the constraints to long-term invasive species management along portions of the Project.
- Summarize the procedures that NEP proposes to implement to minimize the potential for the spread of wetland invasive species during the construction of the Project.

Overall, the goal of the WISCP is to protect the ecological conditions of wetlands within the Project Area, specifically focusing on minimizing the spread of invasive species within affected wetlands and avoiding the introduction of invasive species to areas where they are not currently present. It should be noted that wetlands containing invasive plants are located outside of the Project Area and are thereby also another potential source unrelated to the Project. Therefore, attempting to eradicate invasive species from portions of such wetlands within the proposed work areas is unlikely to be successful and is not considered a practical goal of this WISCP.

2.0 OVERVIEW OF PROJECT ACTIVITIES

The construction of the Project will involve a series of sequential activities. During the Project design process, NEP implemented measures to avoid and minimize the disturbance to wetland vegetation or soils. However, unavoidable construction activities with the potential to influence the spread of invasive plant species in wetlands include:

- Vegetation clearing within wetlands for the construction and subsequent operation and maintenance of the Bell Rock Substation and associated minor transmission line work.
- Temporary improvements to existing access roads or the development of new access roads (temporary) across wetlands.
- Use of temporary access routes across wetlands to facilitate the movement of vegetation clearing equipment.
- Installation of temporary work pads in wetlands.
- Excavation and filling within wetlands L1A and M1.
- Removal of temporary fills (e.g., access roads and work pads) and the restoration of affected wetlands.
- Use of a historical access route to the transmission line facilities off Blossom Road.

3.0 PROJECT WETLAND RESOURCES

As part of the Project planning process, POWER Engineers, Inc. (POWER) conducted field investigations (in November 2015, September 2017, and May 2018) to delineate jurisdictional wetlands within the Project Area. As a result of these field studies, a total of six wetlands were identified. As part of the wetland resource delineations, vegetation types and dominant species were identified. Portions of all of these wetlands are located within presently managed areas of NEP's existing utility rights-of-way (ROWs), and wetlands M2, L2, and L3 are recorded to contain invasive species.

3.1 Invasive Species of Concern in Wetlands

The federal government and the state of Massachusetts maintain information regarding invasive wetland plants. For example, MassDEP maintains a list of invasive species (Massachusetts Invasive Plant Advisory Group 2005). Similarly, the United States Department of Agriculture, Natural Resource Conservation Service (NRCS) also maintains a list of noxious plants by state (NRCS 2018b).

Based on a review of these lists and the characteristics of the Project Area (as determined by field investigations), there is one invasive species located in wetland M2. This invasive species is glossy false buckthorn (*Frangula alnus*). The glossy false buckthorn is sparse with less than five percent of coverage and is in a localized patch in wetland M2.

Wetland L2 contains the invasive emergent species which include common reed (*Phragmites australis*) and reed canary grass (*Phalaris arundinacea*). Both species occurred in localized patches with a moderate abundance (5-25 percent of coverage) for the entire wetland. The shrub glossy false buckthorn has less than 5 percent of coverage in wetland L2.

Wetland L3 also contains the invasive emergent common reed, occurring in localized patches with a moderate abundance (5-25 percent of coverage).

Where there is an ample seed stock or a system of rhizomes of these invasive species, communities of these plants will tend to be the first "pioneer" species to populate and colonize areas that have been disturbed and left exposed (New York State Department of Transportation 2018).

4.0 REVIEW OF EXISTING VEGETATION MANAGEMENT PROGRAMS AND HABITAT BENEFITS

4.1 ROW Vegetation Management Requirements

The Project will be located within existing NEP easements, portions of which are presently managed according to national and regional standards and regulations for electric transmission line operation, including required clearances between conductors and vegetation and around the perimeter of electric substations. These standards and regulations include but are not limited to:

- Federal Energy Regulatory Commission (FERC) standards including North American Electric Reliability Corporation (NERC) Standard FAC-003-1, Commissioner Order 693, FAC-003-2 (effective July 1, 2014).
- NERC Standard FAC-003-1 – Transmission Vegetation Management Program, effective date of April 7, 2006.
- National Electrical Safety Code (NESC) Section 21, Part 2, Rule 218 and the American National Standards Institute (ANSI) pruning standards, A300, Part 1, Part 7, and Z-133.

NEP has established plans and procedures for applying an Integrated Vegetation Management (IVM) approach to manage vegetation within their existing utility corridors and around electric substations in accordance with these standards. IVM is a system of managing plant communities in which managers set objectives; identify compatible and incompatible vegetation; consider action thresholds; and then evaluate, select and implement the most appropriate control methods to achieve those objectives. IVM provides NEP with a proven range of techniques to manage ROW vegetation to conform to federal and

regional standards for transmission line operation, accommodate the varying interests of stakeholders along the ROW, minimize environmental effects, and balance cost considerations. NEP uses a combination of mechanical and chemical controls (i.e., mowing, hand cutting and select herbicide application) to target vegetation that may impact the operation and safety of the transmission lines. The goal is to manage the upland and wetland vegetation within the ROWs using natural vegetative control. Natural vegetative control is the process of working with the cycles of plant succession and interspecies competition to facilitate the spread and stabilization of native, early successional plant communities that discourage the establishment of taller woody vegetation (Bramble et al. 1990).

Therefore, NEP targets undesirable vegetation such as trees and limbs, tall growing shrubs, vegetation growing around stations, guy wires, access roads, gates, and anywhere vegetation impedes access to the ROW. Because of this IVM approach, ROWs are one of the primary remaining early successional ecological communities in New England. These dense, low growing plant communities can help discourage the establishment of undesirable vegetation, do not hinder access to the ROWs, and do not generally interfere with the operation and maintenance of the transmission lines and station facilities.

Plant species that are generally encouraged on the ROWs include herbaceous and shrub species and other vegetation that has a mature height of less than approximately 12 feet. As a result of these ROW vegetation management practices, most of the wetland habitats within the managed portions of the ROWs consist of shrub or emergent marsh.

4.2 Habitat Benefits of ROW Management

The management and maintenance of ROW creates early successional habitats dominated by scrub-shrub vegetation and open areas with dense grasses and other herbaceous vegetation. Many animal species use the habitats provided along the ROWs as their homes, feeding and breeding grounds, migration corridors or nurseries, and many plant species adapt to the growing conditions provided within the managed portions of the ROWs. The early successional landscape maintained within the ROWs, however, is not by nature stable; it is instead the sustained result of the IVM program NEP established in the late 1980s. The removal of the forested areas and subsequent maintenance of the ROW outside of the footprint of the Bell Rock Substation yard will create a change in habitat type, from forested to scrub-shrub or emergent wetland.

Different types of successional communities have various benefits to flora and fauna. For example, a study in Massachusetts indicated an increase in wildlife use, notably avian species, following clearing of ROWs (Nickerson and Thibodeau 1984). This study attributed the increase in wildlife use to the conversion of forested areas into wetland and upland shrub and emergent plant communities. Creating and maintaining additional shrub-land habitat along the ROWs, in many instances, represents a long-term positive effect on some species, since shrub-land habitat is otherwise declining in New England. This is important because land use trends suggest that this habitat type will continue to decline and ROWs will become increasingly significant (Confer 2003). This decline is a result of various factors (e.g., development, ecological succession, absence of fire). A managed transmission ROW is considered a major source of shrub-land habitat (Saucier 2003; Confer and Pascoe 2003); in fact, in the eastern United States utilities maintain more acreage of managed shrub-lands on ROWs than all other sources of this habitat combined (Confer et al. 2004).

Other studies also have indicated that this change of forested areas into scrub-shrub habitats may be beneficial (King et al. 2009; Yahner et al. 2004; Bramble et al. 1992). Scrub-shrub habitats within the ROW can provide wildlife habitat such as nesting for birds, browse for deer, and cover for small mammals (Ballard et al. 2004). The establishment of low-growing species, i.e., grasses and forbs, is also a

form of biological control that reduces the re-invasion of the ROW corridor by tree species (Ballard et al. 2004). Some plant species also have the ability to inhibit the growth or invasion of other species which is referred to as allelopathy (Money 2008). Establishment of such dense shrub and herbaceous emergent plant communities that do not require continued disturbances for management activities may contribute to minimizing the spread of invasive species. In this regard, some invasive plant communities have been shown to provide some beneficial effects such as breeding bird nesting habitat, cover for animals traversing the ROWs, food sources (fruit-bearing plants), buffers to sensitive areas (such as along riparian zones) and, in some instances, serve as a deterrent to unwarranted access (e.g., all-terrain vehicle use) along the ROWs due to the dense thickets and thorn-producing shrubs that may colonize certain areas. The eradication of invasive plants could, therefore, eliminate some of the beneficial uses on the ROWs. In addition, continued regular treatment of invasive plants could inadvertently result in minimizing wildlife use of the ROWs through the frequency of human contact, removal of cover (albeit invasive), and reduction of food sources.

5.0 INVASIVE SPECIES MANAGEMENT IN WETLANDS DURING PROJECT CONSTRUCTION

During the construction of the Project, NEP will implement measures to control the spread of invasive plant communities during construction. The main objectives will be to:

- Perform construction activities so as to minimize the spread of invasive plant species within wetlands and from wetland-to-wetland along the ROWs.
- Restore wetlands affected by the Project promptly to limit the potential for invasive species to colonize disturbed soils.

Invasive species control requirements will be incorporated into construction contracts for the Project. Prior to construction, NEP will provide environmental training to the contractors, inspectors, and work crews responsible for implementing the WISCP. The training will include an overview of the WISCP, a review of the ROW and substation mapping, a discussion and listing of the target species, ways to identify invasive plants in the field, and presentation of the best management practices to be implemented during construction.

NEP's Project team will include an environmental monitor, who will perform site inspections and will oversee the contractors' compliance with applicable federal, state and local permit conditions, Project plans (including this WISCP) and NEP policies and procedures. Care and consideration will be taken during construction to prevent and/or reduce the introduction or the spread of invasive species. Wetland invasive species control efforts will be important throughout the construction of the Project, but the focus of these efforts will be during the following construction phases, which will involve work directly in wetlands and thus will have the greatest potential for construction equipment to come into contact with invasive species:

- Vegetation clearing.
- Placing and removing construction mats, and other temporary access roads and work pads.
- Moving equipment and vehicles through areas containing invasive species, such as for the installation, maintenance, and final removal of temporary soil erosion and sedimentation controls.

To control the spread of invasive plant species, NEP will require construction contractors to implement the procedures described below, as appropriate to the phase of the construction that each contract will perform:

- All construction equipment, vehicles, and materials (e.g., construction mats) must be clean and free of excess soil, debris, and vegetation before being mobilized to the Project Area. The vendor shall use the certification form provided as Appendix 8 in National Grid's Environmental Guidance Document EG-303 – Access, Maintenance and Construction Best Management Practices to document compliance.
- Mats or equivalent will be used in wetlands during clearing operations to minimize the spread of invasive species within a wetland by the clearing equipment itself.
- To minimize the potential for spreading invasive plant species from wetland-to-wetland, any equipment working in or traversing a wetland will be cleaned prior to relocating to another work site. Cleaning of vehicles and other equipment (including the tracks and tires) will involve removal of visible dirt, debris and vegetation through the use of brooms, shovels, and, if needed, compressed air.
- Construction mats or equivalent will be used at wetland crossings so construction vehicles that frequently travel along on-ROW access roads, such as pickups carrying personnel or material delivery trucks, can avoid direct wetland interaction.
- Construction mats will be cleaned prior to relocation to other work areas or wetlands. Cleaning of matting will involve dropping mats one on top of another to shake loose any sediment and debris. The matting will then be swept to remove loose soil and any plant material.
- Construction equipment and excavated soil material will be contained within the approved limits of work areas within the ROW; these limits of work will be defined on the Project plans.
- Soil excavated from wetlands or riparian areas containing a predominance of invasive plants will be stockpiled separately (to the extent there is sufficient work space) and contained within staked bales, silt fence or other approved soil erosion and sedimentation control device to minimize the potential of spreading these soils elsewhere on the ROWs.
- Final restoration of the Project Area will be performed in accordance with National Grid's Environmental Guidance Document EG-303 – Access, Maintenance and Construction Best Management Practices.

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APPENDIX H AFRRP WETLAND AND STREAM DELINEATION REPORT

November 12, 2018

NSTAR ELECTRIC COMPANY D/B/A EVERSOURCE ENERGY

AND NEW ENGLAND POWER COMPANY D/B/A NATIONAL GRID

Acushnet to Fall River Reliability Project

Wetland and Stream Delineation Report

PROJECT NUMBER:
151783 and 146784

PROJECT CONTACT:
Karen Hanecak
EMAIL:
Karen.Hanecak@powereng.com
PHONE:
(774) 643-1821

POWER ENGINEERS

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Acushnet to Fall River Reliability Project

Wetland and Stream Delineation Report

PREPARED FOR: NSTAR ELECTRIC COMPANY D/B/A EVERSOURCE ENERGY AND
NEW ENGLAND POWER COMPANY
DB/A NATIONAL GRID

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

BLSF	Bordering Land Subject to Flooding
BVWs	Bordering Vegetated Wetlands
CMR	Code of Massachusetts Regulations
CVP	Certified vernal pool
CWA	Clean Water Act
Eversource	NSTAR Electric Company d/b/a Eversource Energy
FAC	Facultative
FACW	Facultative Wetland
FEMA	Federal Emergency Management Act
FIRM	Flood Insurance Rate Map
GIS	Geographic Information Systems
GPS	Global Positioning System
HUC	Hydrologic Unit Code
IB	Inland Bank
ILSF	Isolated Land Subject to Flooding
IVW	Isolated Vegetated Wetlands
LUW	Land Under Water Bodies and Waterways
LUB	Lacustrine Unconsolidated Bottom
MassDEP	Massachusetts Department of Environmental Protection
NHD	National Hydrography Dataset
NHESP	Natural Heritage and Endangered Species Program
NEP	New England Power d/b/a National Grid
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
ORW	Outstanding Resource Water
PEM	Palustrine Emergent
PFO	Palustrine Forested
POWER	POWER Engineers, Inc.
Project	Acushnet to Fall River Reliability Project
PSS	Palustrine Scrub-Shrub
PUB	Palustrine Unconsolidated Bottom
PVP	Potential vernal pool
RFA	Riverfront Area
ROW(s)	Right(s)-of-Way
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
WPA	Massachusetts Wetlands Protection Act

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1.0 INTRODUCTION

NSTAR Electric Company d/b/a Eversource Energy (Eversource) and the New England Power Company d/b/a National Grid (NEP) (herein referred to as "the Companies") are proposing to undertake the Acushnet to Fall River Reliability Project (Project) to improve the electric transmission reliability in the southeastern Massachusetts area. The Project consists of the installation of a new overhead transmission line extending from Eversource's Industrial Park Tap in Acushnet to NEP's existing Bell Rock Substation in Fall River. The proposed Project includes the installation of approximately 12 miles of new overhead electric transmission line traversing the municipalities of Acushnet, New Bedford, Dartmouth, and Fall River in Bristol County, Massachusetts (Figure 1). The new line will be located within existing rights-of-ways (ROWs) currently occupied by existing transmission lines. Of the 12 miles, approximately 7.8 miles are in Eversource service territory traversing Acushnet, New Bedford and Dartmouth, and approximately 4.2 miles are in NEP service territory traversing the city of Fall River. (see Figure 2).

POWER Engineers, Inc. (POWER) conducted field assessments within the limit of work activities associated the Project (hereafter referred to as the "Survey Area"). Wetland field assessments occurred from 2015 to 2018 on the NEP portion of the ROW and May – June 2018 on the Eversource portion of the ROW. Fifteen delineated wetlands and one intermittent stream were identified along existing access roads associated with the Project. As there are no anticipated impacts to these resources and the existing access roads themselves are located in wetland buffer zones, these resources appear on the Project mapping, but are not discussed further in this report.

This report discusses the methods used to identify and delineate the wetlands and watercourses within the Survey Area and summarizes the findings of these surveys. Wetlands have been labeled based upon an alpha-numeric coding system followed by increasing numbers from west to east). Representative photographs of delineated wetlands appear in Attachments A (Eversource) and Attachment B (NEP), respectively. Attachments C (Eversource) and Attachment D (NEP), respectively, contain the United States Army Corps of Engineers (USACE) wetland and upland data forms used to document wetland delineations, while Attachments E (Eversource) and Attachment F (NEP) contain the Massachusetts Department of Environmental Protection (MassDEP) field data forms.

Watercourses are labeled based upon the wetland the stream is associated with. Attachments G (Eversource) and Attachment H (NEP) contain representative photos of the delineated watercourse. Attachments I (Eversource) and Attachment J (NEP) contain the waterbody data forms.

1.1 Site Description

The Eversource Survey Area is predominately surrounded by dense upland and wetland forest through the town of Acushnet, the city of New Bedford, and the town of Dartmouth. In several areas, the ROW is also adjacent to residential communities in these three towns and crosses though a few agricultural areas in Dartmouth and Acushnet which include hay fields and a Christmas tree farm. Existing utility infrastructure within the Eversource ROW includes the New Bedford Business Park and a four-lane highway (Route 140) in New Bedford.

The NEP Survey Area is also surrounded by dense upland and wetland forests, providing a large expanse of unfragmented forest habitat. Towards the eastern portion of the NEP ROW a north-south trending high-pressure natural gas pipeline traverses through the corridor. The west end of the NEP Survey Area is the Bell Rock Substation. Several transmission line ROWs enter and exit the Substation to the east, west, and south.

A network of both improved and unimproved roads are aligned along the existing transmission line corridors for performing routine maintenance that includes but is not limited to, ROW vegetation management. As a result of the ROW vegetation management, which is typically performed on a five-year cycle, the ROWs are generally dominated by deciduous shrubs, grasses and other dense herbaceous vegetation compatible with operation and maintenance of the transmission lines.

Hydrological Site Description

The Project lies within the major basin of Buzzards Bay (United States Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] 2005). Watersheds within the Buzzards Bay basin are further delineated into smaller watersheds identified by a unique six level, Hydrologic Unit Code (HUC). The Project is located within the following sub watersheds:

- Buzzards Bay-Point Connett to Sconticut Neck (HUC #010900020306)
- Buzzards Bay-Sconticut Neck to Mishaum Point (HUC #010900020401)
- Buzzards Bay-Mishaum Point to Gooseberry Neck (HUC #010900020402)
- Noquochoke Lake (HUC #010900020501)
- Assonet River (HUC #010900040802)
- Quequechan River (HUC #010900040803)

The Copicut Reservoir is classified as a Class A Public Drinking Water Supply. Wetlands D8 – D18 are tributaries to the Copicut Reservoir and are therefore classified as Outstanding Resource Waters (ORW). At the western extent of the Survey Area, the Project is located in proximity to the North Watuppa Pond/Reservoir which is also classified as a Class A Public Drinking Water Supply. Wetlands L1, M1, and D1 through D7 are tributaries to North Watuppa Pond and are also classified as ORW.

2.0 METHODS

2.1 Analysis of Existing Data

Prior to the commencement of the wetland and watercourse field investigation/delineations, existing information was reviewed to determine the potential extent of wetlands and watercourses within the Survey Area. These source materials included:

- United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle Map - Fall River, Massachusetts and New Bedford, Massachusetts (USGS 1979 and 1985)
- MassDEP Wetland Data (MassDEP 2009)
- Natural Heritage and Endangered Species Program (NHESP) Certified Vernal Pool Maps (NHESP 2015-2018)
- NHESP Potential Vernal Pool Maps (NHESP 2000)
- USDA NRCS 2015 - 2016 Web Soil Survey (USDA NRCS 2015-2016)
- USDA NRCS HUC Basins (8,10,12) (NRCS 2005)

- USDA NRCS National Agriculture Imagery Program (USDA NRCS 2015)
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Wetlands Mapper (USFWS 2007)
- USGS National Hydrography Dataset (NHD) Viewer (USGS 2014)
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Bristol County, Massachusetts Map No. 25005C (FEMA 2009)
- MassDEP ORW (MassDEP 2010)

The information was compiled and synthesized into a geographic information system (GIS) geo-referenced database and used in the field to assist wetland scientists in the location and identification of wetland systems and watercourses in the Survey Area.

2.2 Wetland Delineation Methodology/Procedure

During the 2015, 2017 and 2018 field surveys, wetlands were identified and delineated in accordance with requirements of the following jurisdictions:

- Clean Water Act (CWA) (33 United States Code [U.S.C.] §§ 1251 et seq., Section 404 and Section 401)
- Massachusetts Wetland Protection Act (WPA) (M.G.L. c. 131, § 40) and associated Regulations (310 Code of Massachusetts Regulations [CMR] 10.00)

Most wetlands, including isolated wetlands and waterbodies are considered "waters of the United States" and are subject to the federal CWA. Evidence indicative of wetland from three parameters – predominance of wetland vegetation, hydric soils and hydrology – was used to identify and delineate the wetlands in accordance with the 1987 *United States Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the subsequent *Regional Supplement to the United States Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012). With the exception of unusual or atypical situations, evidence of wetland must be exhibited by all three parameters for an area or position to be designated as wetland.

The field teams also used established delineation procedures as outlined in MassDEP's *Handbook on Delineating Bordering Vegetated Wetlands* (Jackson 1995). Locally, the Conservation Commissions for the town of Acushnet, the town of Dartmouth, the city of New Bedford, and the city of Fall River regulate activities in and adjacent to wetlands under the provisions of the WPA administered by MassDEP. The town of Acushnet and the city of Fall River have not adopted local wetland protection bylaws and therefore local jurisdiction of activities in or adjacent to wetlands is limited to the WPA.

The town of Dartmouth has adopted a local protection bylaw stating: "*Except as permitted by the Conservation Commission or as provided for in this bylaw, no person shall remove, fill, dredge, build upon, or alter land in or within a 100-foot buffer zone of the following resource areas: any freshwater wetlands, coastal wetlands marsh, wet meadow, bog, swamp, or vernal pool: any bank, beach, dune or flat; any lake, river, pond, stream, estuary, or the ocean; or any land under said waters. Included in this jurisdiction is any land subject to flooding or inundation by groundwater, surface water, tidal action, or coastal storm flowage*."

The city of New Bedford also has adopted a local wetland ordinance stating: "*Except as permitted by the Conservation Commission, or as provided in this ordinance, no person shall remove, fill, dredge, alter, or*

build upon or within 100 feet of any bank; upon or within 100 feet of any lake, river, pond (or) stream; land under any fresh or salt waters; or upon any land subject to flooding or inundation by groundwater or surface water."

In order to identify and quantify the number of wetlands, each wetland was numbered and classified by USFWS NWI codes[1] that make use of the *Classification of Wetlands and Deepwater Habitats of the United States* to differentiate wetland cover types (Cowardin et al. 1979). Five wetland community types were identified in the Survey Area. Three of these communities are dominated by vegetation and included: Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO). The other two systems are habitats which include Palustrine Unconsolidated Bottom (PUB) and Lacustrine Littoral Unconsolidated Bottom (LUB).

PUB systems are habitats commonly referred to as ponds that are less than 20 acres in size with less than a 2 meter (6.6 foot) water depth. PUBs are inundated by water for most of the year and have at least 25 percent cover of particles smaller than stones and less than 30 percent plant cover. The LUB system is also commonly referred to as lakes. These habitats that are at least 20 acres in size and have at least 25 percent cover of particles smaller than stones and less than 30 percent plant cover.

Photographs were taken of each wetland (Attachment A (Eversource) and Attachment B (NEP)). Additional observations and descriptive information recorded for each wetland includes: location, wetland classification, vegetative community, wetland functions and values, and general wildlife use. Detailed information was collected at paired data plots in the wetland and upland along each side of the boundary from representative wetlands to document the vegetation, soils and hydrology criteria used to establish wetland boundaries. This information appears on USACE Wetland data sheets (Attachment C (Eversource) and Attachment D (NEP)) and MassDEP Bordering Vegetated Wetlands field data forms completed for delineated wetlands (Attachment E (Eversource) and Attachment F (NEP). The wetland boundaries were marked with consecutively numbered pink flagging hung on vegetation at approximately 15- to 30-foot intervals. As stated previously, wetlands have been labeled based upon an alpha-numeric coding system, based upon the letter of the transmission line.

Streams and drainage ways were examined for the presence/absence of an Ordinary High Water Mark (OHWM) and defined bed (refer to "LUW" below) and bank (refer to "IB" below). Generally, if these characteristics were observed along a waterway, it was determined to be a regulated stream but if absent, or atypical circumstances existed, these areas were determined to be a drainage way, swale, ditch, or other erosional feature, and likely not a CWA-regulated feature (i.e., not a "water of the United States"). Any streams encountered were classified based on the observed flow and channel characteristics at the time of the field review. Watercourses were delineated with blue flagging. As stated previously, watercourses are labeled based upon the wetland the stream is associated with. Photographs were taken of each watercourse and waterbody (Attachment G (Eversource) and Attachment H (NEP)). Data forms completed for delineated watercourses can be found in Attachment I (Eversource) and Attachment J (NEP).

Wetland and watercourse flag positions and data point locations were recorded using a Trimble Geo XT mapping-grade Global Position System (GPS) unit with positional data post-processed to sub-meter accuracy for transfer onto GIS-based mapping of the Project footprint.

[1] https://www.fws.gov/wetlands/data/wetland-codes.html

2.3 Post-Survey Analysis

The field survey data was differentially corrected and post-processed using Trimble Pathfinder Office software (version 5.81). The corrected GPS data was then exported from Pathfinder Office as shapefiles for use on Project aerial-based field survey mapping. The locations of the wetland boundaries and watercourse delineations were then reviewed and confirmed by POWER's wetland scientists and are displayed in Figure 3.

3.0 RESULTS

POWER conducted wetland and watercourse delineations of the Survey Area from 2015 through 2018. Five Resource Areas subject to the WPA have been field delineated or identified to occur in the Survey Area:

- Bank (310 CMR 10.54)
- Bordering Vegetated Wetlands (310 CMR 10.55)
- Land under Waterway (310 CMR 10.56)
- Bordering Land Subject to Flooding (310 CMR 10.57(a))
- Riverfront Area (310 CMR 10.58)

An additional Resource Area was evaluated, Isolated Subject to Flooding (310 CMR 10.57 (2) (b)) but was not identified in the Survey Area. The six Resource Areas are further described below.

Inland Bank

Inland Bank (IB) is defined as the portion of the land surface which normally abuts and confines a water body (310 CMR 10.54(2)(a)(c)). IB occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, the IB occurs between a water body and upland. An IB may be partially or totally vegetated, or it may be comprised of exposed soil, gravel, or stone. The upper boundary of an IB is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of an IB is the mean annual low flow level. A 100-foot-wide buffer zone extends from the upper boundary of an IB and therefore is typically encompassed within Riverfront Area described below.

Bordering Vegetated Wetlands

Bordering Vegetated Wetlands (BVWs) are defined as freshwater wetlands which border on creeks, rivers, streams, ponds and lakes (310 CMR 10.55(2)(a)). BVWs are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The ground and surface water regime and the vegetation community which occur in each type of freshwater wetland (wet meadows, marshes, swamps and bogs) area are specified in the WPA. A 100-foot-wide buffer zone is associated with BVW.

Land Under Water Bodies and Waterways

Land Under Water Bodies and Waterways (LUW) are defined as the land beneath any creek, river, stream, pond, or lake and the boundary of an LUW is the mean annual low water level. LUW may be composed of muck or peat, fine sediments, rocks, or bedrock (310 CMR 10.56(2)). LUW does not have a buffer zone.

Bordering Land Subject to Flooding

Bordering Land Subject to Flooding (BLSF) is defined as an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds, or lakes (310 CMR 10.57(2)(a)). BLSF extends from the banks (IB) of these waterways and water bodies; where a BVW occurs, it extends from said wetland. Flood profile data displayed on FIRMs prepared by FEMA identifies the boundary of BLSF which represents the estimated maximum lateral extent of flood water to theoretically result from the statistical 100-year frequency storm (Figure 4). BLSF does not have a buffer zone.

Riverfront Area

Riverfront Area (RFA) is defined as the area of land between a river's mean annual high water line and a parallel line measured horizontally (310 CMR 10.58(2)). "Rivers" are any natural flowing body of water that empty to any ocean, lake, pond, or other river and which flows throughout the year (310 CMR 10.58(1)). Rivers include streams that are perennial because surface water flows within them throughout the year. Intermittent streams are therefore not rivers because surface water does not flow throughout the year. The RFA may include or overlap other resource areas or their buffer zones. The RFA does not have a buffer zone.

Isolated Land Subject to Flooding

Isolated Land Subject to Flooding (ILSF) was evaluated to determine if any of the isolated vegetated wetlands (IVW) not bordering on creeks, rivers, streams, ponds and lakes met the criteria for ILSF. This resource area is defined as an isolated depression or closed basin without an inlet or an outlet (310 CMR 10.57 (2) (b)). It is an area which at least once a year confines standing water to a volume of at least 1/4 acre-feet and to an average depth of at least six inches.

Consequently, these wetland plant communities are not subject to regulation under the WPA. However, should appropriate nexus to "waters of the United States" be determined by the USACE, the six small isolated areas of freshwater wetland would be regulated under the CWA.

Summary of Field Survey Results

As illustrated in Tables 1 and 2, a total of 20 watercourses (Table 1) and 71 wetlands (Table 2) were identified in the Survey Area. Sixteen watercourses and 46 wetlands are located within the Eversource ROW and four watercourses and 25 wetlands are located within the NEP ROW. In addition the NEP ROW contains the Copicut Reservoir (LUB) and the Eversource ROW contains three ponds (PUBs) associated with BVWs.

3.1 Watercourses

The 20 streams in the Survey Area are displayed on Figure 3, and representative photographs of each stream appear in Appendix G (Eversource) and Appendix H (NEP). Waterbody data sheets completed for delineated watercourses can be found in Attachment I (Eversource) and Attachment J (NEP).

All 20 streams are "*waters of the United States*" and subject to the jurisdiction of the CWA. WPA Resources Areas associated with all 20 streams include IB along each side of the channel, beneath which is LUW. Other WPA Resource Areas associated with the streams are also summarized in Table 1.

The Eversource ROW has nine perennial streams (listed east to west) including: SD54 (Acushnet River), SD53, SD38A, SD35, SD25A, SD25, SD23A, SD22 (Shingle Island River), and SD21. All nine streams have an associated RFA. Due to the perennial classifications, these streams are therefore classified as a

"River" so the RFA also extends for a horizontal distance of 200 feet outward from the stream banks (IB). The only stream classified as perennial in the NEP ROW is SD11 (Copicut River).

No RFA is associated with the following intermittent streams (listed east to west) in the Eversource ROW: SD62, SD59, SD56, SD38, SD27, SD23, and SD20.

No RFA is associated with the following intermittent streams (listed east to west) in the NEP ROW: SD20, SD19A, SD8, and SD5.

FEMA (2009) has also identified several 100-year floodplains (BLSF) along the Eversource ROW which includes:

- Land associated with the Acushnet River (25005C_1339)
- Land associated with Hathaway Swamp (25005C_2135)
- Land associated with Shingle Island Swamp (25005C_2493)

In the NEP Survey Area the only BLSF is associated with the Copicut Reservoir (25005C_2493).

3.1.1 Eversource Transmission Line Watercourses

The list and descriptions of 16 watercourses below are all located on the Eversource ROW extending from the Industrial Park Tap in Acushnet to the Fall River/Dartmouth town line. One of these streams is also located in the NEP ROW. Please refer to Figure 3.

SD62 is an intermittent stream which originates from surface drainage in wetland D62. This surface drainage begins from an excavated depression with ~1.5 feet of water at the time of the June 2018 survey. The drainage becomes channelized with bed and bank close to the ROW edge and flows to the southwest off ROW.

SD59 is an intermittent stream that flows into the ROW on the eastern ROW edge and heads to the southwest before entering into a perennial pond. A narrow fringe of wetland (D59) borders the stream.

SD56 is an intermittent stream that flows south through wetlands D57 and D56 before going off ROW. The stream originates to the north off ROW and flows south under a maintenance road via culverts.

SD54 is the perennial Acushnet River. The river flows south across the ROW through wetland D54. The River has an estimated OHWM depth of ~3.0 feet and the OHWM width of ~ 40 feet. SD54 has a FEMA identified 100-year floodplain or BLSF.

SD53 is a perennial tributary of Deep Brook. This stream originates just southeast of a culvert in wetland D53. The culvert is under Middle Road allowing surface water from wetland D52 (on the northeastern side of Middle Road) to flow under Middle Road and into wetland D53. The stream appears to have been ditched in areas and flows east off the ROW. The stream has a shallow channel (OHWM depth of ~1.5 feet) and stands of dense vegetation.

SD38 is an intermittent stream that flows west along the ROW into the perennial stream SD38A. This intermittent stream is surrounded by a narrow wetland fringe (D38). Portions of SD38 appear ditched and altered and may also convey roadside drainage from Duchaine Boulevard.

SD38A is an unnamed perennial stream that flows south across the ROW. The stream has a wetland fringe (D38). An intermittent stream (SD38) flows into this perennial stream, and SD38A continues off ROW. The stream has a shallow channel (OHWM depth of ~2.0 feet) and dense vegetation.

SD35 is an unnamed perennial stream that flows southward across the ROW through wetland D35. A timber bridge along an existing maintenance road crosses over SD35. There are also three culverts on

each side of the road allowing the stream to flow under the road. The steam has a shallow channel (OHWM depth of ~1.5 feet) and dense vegetation.

SD27 is an intermittent stream that flows from off ROW and heads to the west. The stream flows through a portion of the maintenance road and into a culvert under the High Hill Reservoir Road. SD27 flows through wetland D27.

SD25A is an unnamed perennial stream located in Shingle Island Swamp. The stream flows south across the ROW through wetland D25. The stream has an estimated OHWM depth of ~4.0 feet and the OHWM width of ~ 17 feet. SD25A has a FEMA identified 100-year floodplain or BLSF.

SD25 is an unnamed perennial stream located in Shingle Island Swamp. The stream flows south across the ROW through wetland D25. The stream has an estimated OHWM depth of ~3.0 feet and the OHWM width of ~ 13 feet. SD10 has a FEMA identified 100-year floodplain or BLSF.

SD23 is an intermittent stream, which is also located in wetland D23 that flows from off the northern section of the ROW and heads south. SD23 does not flow off ROW to the south but instead disperses into sheet flow in the northern half of wetland D23.

SD23A is an unnamed perennial tributary of the Shingle Island River that flows south into Shingle Island Swamp. The stream has been ditched and is located adjacent to Flag Swamp Road on the eastern side of the road. The Shingle Island River is located on the west side of Flag Swamp Road. A paved roadside ditch channels road runoff into SD23A. The stream flows through wetland D23. The stream has a shallow channel (OHWM of ~2.0 feet) and dense vegetation.

SD22 is the perennial Shingle Island River that flows south off ROW into Shingle Island Swamp. The river flows across the ROW through wetland D22. The stream has a shallow channel (OHWM depth of ~1.0 foot) and dense vegetation.

SD21 is an unnamed perennial stream that flows south from a perennial pond located in the wetland D21 complex. The stream has a shallow channel (OHWM depth of ~8.0 inches) and dense vegetation.

SD20 is an intermittent stream located in both NEP and Eversource territories. This stream flows southeastward across the ROW through wetland D20. This stream also flows along a section of the maintenance road.

3.1.2 NEP Transmission Line Watercourses

The list and descriptions of the four streams in the NEP Survey Area are listed below. As described above, Stream SD20 is located in both the Eversource and NEP ROWs. Please refer to Figure 3. The water courses listed below begin at the Dartmouth/Fall River town line and head west to the Bell Rock Substation.

SD19A is an intermittent stream which originates from a small wetland (D19A) located on the south side of a maintenance road. Culverts under the road convey water to D19A, where SD19A flows from and heads to the south for a short distance before dispersing into sheetflow. SD19A becomes channelized again after a short distance and flows southward off ROW.

SD11 is the perennial Copicut River. The river flows to the south across wetland D11and into the Copicut Reservoir. Culverts are located under Quanapoag Road for water passage. The river has a shallow channel (OHWM depth of ~1.5 feet) and the dense vegetation. The Copicut River has a FEMA identified 100-year floodplain or BLSF.

SD8 is an intermittent stream originating from wetland D8 and flows northeastward across the ROW. The stream flows under the maintenance road via culverts.

SD5 is an intermittent stream that flows across the corridor northward through wetlands D6 and D5. The stream flows under the maintenance road via culverts.

TABLE 1 WATERCOURSES WITHIN SURVEY AREA

STREAM ID	WATERCOURSE HYDRO-PERIOD	RIVERFRONT AREA (200 FT)	100-YR FLOODPLAIN (BLSF)
Eversource Watercourses			
SD62	Intermittent	NA	No
SD59	Intermittent	NA	No
SD56	Intermittent	NA	No
SD54 (Acushnet River)	Perennial	Yes	Associated with the Acushnet River
SD53	Perennial	Yes	No
SD38	Intermittent	NA	No
SD38A	Perennial	Yes	No
SD35	Perennial	Yes	No
SD27	Intermittent	NA	No
SD25A	Perennial	Yes	Associated with Shingle Island Swamp
SD25	Perennial	Yes	Associated with Shingle Island Swamp
SD23	Intermittent	NA	No
SD23A	Perennial	Yes	No
SD22 (Shingle Island River)	Perennial	Yes	No
SD21	Perennial	Yes	No
NEP Watercourses			
SD20*	Intermittent	NA	No
SD19A	Intermittent	NA	No
SD11 (Copicut River)	Perennial	Yes	Associated with the Copicut Reservoir
SD8	Intermittent	NA	No
SD5	Intermittent	NA	No

* SD20 is located in both the Eversource and NEP Survey Areas

3.2 Wetlands

The 71 wetlands identified in the Survey Area are displayed on Figures 3 and 4 and representative photographs of the wetlands appear in Attachment A (Eversource) and Attachment B (NEP). USACE Wetland and Upland data sheets can be found in (Attachment C (Eversource) and Attachment D (NEP)). MassDEP Bordering Vegetated Wetlands field data forms completed for delineated wetlands can be found in (Attachment E (Eversource) and Attachment F (NEP).

3.2.1 Wetland Vegetation

As discussed above, NWI codes were used to classify the wetlands delineated for the Project. As a result of regular vegetation maintenance within the existing transmission line corridor, the wetlands are generally represented by a deciduous shrub (PSS) community dominated by a dense community of highbush blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), maleberry (*Lyonia ligustrina*) white meadowsweet (*Spiraea alba*), and steeplebush (*Spiraea tomentosa*). The emergent (PEM) strata is dominated by young shrubs under 3.28 feet in height and emergent vegetation such as bluejoint (*Calamagrostis canadensis*), sensitive fern (*Onoclea sensibilis*), soft rush (*Juncus effusus*), a variety of sedges (*Carex* spp.), and the invasive common reed (*Phragmites australis*). Uncleared or treed wetland areas such as adjacent to the maintained corridor are for the most part represented by a broad-leaved deciduous forest (PFO) community comprised predominately of red maple (*Acer rubrum*) with a shrub understory of highbush blueberry and sweet pepperbush.

All of the above listed plants in the 71 wetlands are identified as Facultative Wetland (FACW) or Facultative (FAC) indicators of wetland by the 2016, state of Massachusetts National Wetland Plant List prepared by the USACE and are therefore hydrophytes.

3.2.2 Wetland Soils

A hand auger was used to document the presence of hydric soils beneath the delineated wetlands in shallow soil profiles. Site specific soil information for representative delineated wetlands, along with detailed documentation of vegetation and hydrologic indicators appear on data forms in Attachments C and E for Eversource and Attachments D and F for NEP.

Soils in Bristol County have also been mapped by the NRCS with specific soil series such as Scarboro mucky fine sandy loam being assigned and alpha-numeric code (39A). Drainage properties of soils are also classified by the NRCS and soils identified as very poorly drained, or poorly drained are hydric soils and indicative of wetlands. Refer to Figure 5 for soil unit boundary mapping.

Soils beneath the delineated wetlands on the Eversource ROW beginning at the Industrial Park Tap in Acushnet and heading northwest to Main Street are underlain by soils such as the very poorly drained Scarboro mucky fine sandy loam (39A) and the Whitman fine sandy loam (73A) (USDA NRCS 2015). The very poorly drained Freetown muck (52A) lies to the west of Main Street to the Acushnet River from wetlands D58 – D54. From the Acushnet River heading west/northwest to Acushnet Avenue wetlands D54 – D45 are underlain by very poorly drained Whitman fine sandy loam (73A). Continuing west along the ROW to the New Bedford Industrial Park, wetlands D37 – D35 are predominately underlain by the very poorly drained Swansea muck (51A). Heading northwest to the High Hill Substation, wetlands (D33 – D26) are predominately underlain by the poorly drained Ridgebury fine sandy loam (71A). Soils beneath the delineated wetlands from the High Hill Substation heading west to the Fall River/Dartmouth town line are predominately mapped as very poorly drained hydric soils underlain by Whitman fine sandy loam (73A), Swansea muck (51A), and Freetown muck (52A). Additional common soils encountered along the Eversource ROW in pockets of wetlands include the moderately well drained Woodbridge fine sandy loam (312B) and the well-drained Paxton fine sandy loam (307B). However, hydric soils were found in these areas during the wetland delineations.

Soils beneath the delineated wetlands on the NEP ROW are mapped by the NRCS to be very poorly drained Whitman fine sandy loam in wetlands (D21 and D20) near the Fall River/Dartmouth town line). As the ROW heads to the northwest, wetlands D18 and D17 are underlain by poorly drained Ridgebury fine sandy loams with a 3-8 percent slope (71B). Wetlands D15 and D14, which are associated with the

Copicut Reservoir are also mapped as 71A. As the ROW heads to the west, very poorly drained Ridgebury fine sandy loams (71A) are mapped in wetlands D7 – D5. Soils beneath the delineated wetlands to the north and east of the Bell Rock Substation which include D1, L1, and M1, are underlain by very poorly drained Swansea muck (51A) and Whitman fine sandy loam (73A). Additional soils found on the NEP include the well-drained Paxton fine sandy loam (307B) and the moderately well-drained Ridgebury fine sandy loam (312B). However, hydric soils were found in these areas during the wetland delineations.

TABLE 2 WETLANDS WITHIN SURVEY AREA

WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	STATE-REGULATED WETLAND BUFFER AREA
	NWI	State		
Eversource Wetlands				
D66	PSS	IVW	Federal	NA
D65	PEM	IVW	Federal	NA
D64	PSS/PEM/PFO	BVW	Federal and State	100 feet
D63	PSS	IVW	Federal	NA
D62	PSS/PFO	BVW	Federal and State	100 feet
D61	PSS	BVW	Federal and State	100 feet
D60	PSS/PFO	BVW	Federal and State	100 feet
D59	PSS/PEM/PUB	BVW	Federal and State	100 feet
D58	PEM/PSS/PFO	BVW	Federal and State	100 feet
D57	PEM	BVW	Federal and State	100 feet
D56	PEM	BVW	Federal and State	100 feet
D55	PSS/PEM	BVW	Federal and State	100 feet
D54	PSS/PEM/PFO	BVW	Federal and State	100 feet
D53	PSS/PEM/PFO	BVW	Federal and State	100 feet
D52	PSS/PEM/PFO	BVW	Federal and State	100 feet
D51	PSS/PFO	BVW	Federal and State	100 feet
D50	PSS/PEM/PFO	BVW	Federal and State	100 feet
D49	PSS/PEM	BVW	Federal and State	100 feet
D48	PSS/PEM/PFO	BVW	Federal and State	100 feet
D47	PSS/PEM/PFO	BVW	Federal and State	100 feet
D46	PSS	BVW	Federal and State	100 feet
D45	PSS/PEM	BVW	Federal and State	100 feet
D44	PSS/PEM	BVW	Federal and State	100 feet
D43	PSS/PEM/PFO	BVW	Federal and State	100 feet
D42	PSS/PEM/PFO	BVW	Federal and State	100 feet

WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	STATE-REGULATED WETLAND BUFFER AREA
D41	PSS/PFO	BVW	Federal and State	100 feet
D40	PSS	BVW	Federal and State	100 feet
D39	PSS	BVW	Federal and State	100 feet
D38	PSS/PFO	BVW	Federal and State	100 feet
D37	PSS/PFO	BVW	Federal and State	100 feet
D36	PSS/PFO	BVW	Federal and State	100 feet
D35	PSS/PFO	BVW	Federal and State	100 feet
D34	PSS/PFO	BVW	Federal and State	100 feet
D33	PSS	BVW	Federal and State	100 feet
D32	PSS/PEM/PFO	BVW	Federal and State	100 feet
D31	PSS/PEM	BVW	Federal and State	100 feet
D30	PSS/PFO	BVW	Federal and State	100 feet
D29	PSS	BVW	Federal and State	100 feet
D28	PSS	BVW	Federal and State	100 feet
D27	PSS	BVW	Federal and State	100 feet
D26	PSS/PEM/PFO	BVW	Federal and State	100 feet
D25	PSS/PEM/PFO	BVW	Federal and State	100 feet
D24	PEM/PSS/PUB	BVW	Federal and State	100 feet
D23	PSS/PFO	BVW	Federal and State	100 feet
D22	PSS/PEM/PFO	BVW	Federal and State	100 feet
D21	PSS/PEM/PUB	BVW	Federal and State	100 feet
D20*	PSS/PFO/PEM	BVW	Federal and State	100 feet
NEP Wetlands				
D19A	PFO	BVW	Federal and State	100 feet
D19	PSS	BVW	Federal and State	100 feet
D18	PFO	BVW	Federal and State	100 feet
D17	PSS	BVW	Federal and State	100 feet
D16A	PFO	BVW	Federal and State	100 feet
D16	PSS	BVW	Federal and State	100 feet
D15	PFO	BVW	Federal and State	100 feet
D14	PSS/PFO	BVW	Federal and State	100 feet
D13	PEM	IVW	Federal	NA
D12	PSS/PEM/PFO	BVW	Federal and State	100 feet

WETLAND ID	WETLAND CLASS[1]		JURISDICTIONAL STATUS[2]	STATE-REGULATED WETLAND BUFFER AREA
D11	PSS/PFO/PEM	BVW	Federal and State	100 feet
D10	PSS	IVW	Federal	NA
D9	PSS	IVW	Federal	NA
D8	PFO	BVW	Federal and State	100 feet
D7A	PSS	IVW	Federal	NA
D7	PFO/PSS	BVW	Federal and State	100 feet
D6	PFO	BVW	Federal and State	100 feet
D5	PSS	BVW	Federal and State	100 feet
D4	PSS	BVW	Federal and State	100 feet
D3	PSS	BVW	Federal and State	100 feet
D2	PFO/PSS	BVW	Federal and State	100 feet
D1	PSS/PFO	BVW	Federal and State	100 feet
M1	PFO/PSS	BVW	Federal and State	100 feet
L1	PFO/PSS	BVW	Federal and State	100 feet

[1] Wetlands were classified according to Cowardin et al. (1979). PSS = palustrine scrub-shrub wetland; PFO = palustrine forested wetland; PEM = palustrine emergent wetland; PUB = palustrine unconsolidated bottom.

[2] Please note that the determination of each wetland's isolated or connected status represents the professional opinion of POWER. Final determination of jurisdictional status is the purview of the USACE.

* D20 is located in both the Eversource and NEP Survey Areas

3.2.3 Eversource Transmission Line Wetlands

Forty-six wetlands occur in the Eversource Survey Area from the Industrial Park Tap in Acushnet west to the Fall River/Dartmouth town line. Forty-three of the wetlands are BVWs and are segments of larger wetland systems that continue off the Eversource ROW. These wetlands "border" Tinkham Pond, Deep Brook, Hobomock Swamp, Acushnet River, Acushnet Cedar Swamp, and Shingle Island River. The other three remaining wetlands are closed isolated depressions with no inlet or outlet and are therefore classified as IVWs.

The list and descriptions of the 46 wetlands below are all located on the Eversource Survey Area extending from the Industrial Park Tap in Acushnet heading west to the Fall River/Dartmouth town line. Please refer to Figure 3.

D66 is a small isolated broad-leaved deciduous shrub wetland (PSS) located in an isolated depression on the north side of the maintenance road to the west of the Industrial Park Tap. Steeplebush and winterberry (*Ilex verticillata*) comprise the shrub layer with switchgrass (*Panicum virgatum*) in the emergent understory .There is no indication the small depression D66 meets the volume and flooding requirements to be regulated as an ILSF.

D65 is a small isolated emergent wetland (PEM) located in an isolated depression on the south side of a maintenance road to the west of the Industrial Park Tap. Switchgrass is the dominant plant species in the wetland. There is no indication the small depression D65 meets the volume and flooding requirements to be regulated as an ILSF.

D64 is a mixture of broad-leaved deciduous wetland shrub (PSS) communities intermixed with emergent wetlands (PEM). A forested wetland fringe (PFO) borders the southwestern edge of the ROW boundary. Common shrubs in D64 include sweet pepperbush, highbush blueberry, and maleberry. Stands of common reed dominate the center of D64. This wetland "borders" on Tinkham Pond.

D63 is a small isolated broad-leaved deciduous shrub wetland (PSS) located in an isolated depression on the northeastern side of the maintenance road. Dominant shrubs include steeplebush and pussy willow (*Salix discolor*). There is no indication the small depression D63 meets the volume and flooding requirements to be regulated as an ILSF.

D62 lies on the southern side of the maintenance road and is a wetland shrub community (PSS) bordering the intermittent stream (SD62) which flows from this wetland. A narrow fringe of forested wetland (PFO) is located on the southwestern edge of the ROW. An excavated depression lies within the wetland and surface water drains from this depression and turns into an intermittent stream (SD62). D62 "borders" on the Acushnet River.

D61 lies on the northern side of a maintenance road and is a wetland shrub community (PSS). Highbush blueberry is prevalent in the wetland. The wetland is segmented by the access road where wetland D62 lies on the southern side of the road. An intermittent stream (SD61) flows from D62. Therefore, D61 "borders" on the Acushnet River.

D60 is a located on the southern portion of a maintenance road. The wetland is dominated by broad-leaved deciduous shrubs (PSS) with a broad-leaved deciduous forest (PFO) on the ROW edge. Dominant shrubs include smooth arrowwood (*Viburnum dentatum*) and multiflora rose with an herbaceous understory of bluejoint and tussock sedge (*Carex stricta*). D60 "borders" on the Acushnet River.

D59 is predominately a perennial pond with an unnamed intermittent stream (SD59) draining into the pond. The unnamed perennial stream eventually drains into the Acushnet River. The wetland fringe encompassing SD59 is PSS.

D58 is a depression lying between two hillslopes. The wetland is predominately comprised of emergent vegetation (PEM) which includes common reed, spotted joe-pye weed (*Eutrochium maculatum*), and common wrinkle-leaved goldenrod (*Solidago rugosa*). Forested wetland (PFO) is located along the western fringe of D58. This wetland "borders" on the Acushnet River.

D57 lies to the north of a maintenance road. An unnamed perennial stream (SD56) flows through this wetland, under the maintenance road via a culvert and into wetland D56 to the south. D57 hydrologically borders on the Acushnet River. This wetland is also predominately PEM comprised of broad-leaved cattail (*Typha latifolia*).

D56 lies to the south of a maintenance road. An unnamed intermittent stream (SD56) of the Acushnet River flows through this wetland under the maintenance road via a culvert from wetland D57, which is on the north side of the maintenance road. D56 is predominately emergent wetland (PEM) comprised of common reed, goldenrods (*Solidago* spp.), spotted joe-pye weed, and jewelweed (*Impatiens capensis*).

D55 is located between two Christmas tree farm fields. The wetland is a mixture of wetland shrubs (PSS) with emergent wetland (PEM) pockets. Sweet pepperbush and highbush blueberry are the dominant shrubs. D55 is hydrologically connected and "borders" on the Acushnet River.

D54 borders on the perennial Acushnet River (SD54). The wetland is a mixture of a broad-leaved deciduous shrubs (PSS) and emergents (PEM). White meadowsweet and steeplebush comprise the shrub

understory while sensitive fern is common in the understory. A small patch of forested wetlands borders the southern edge of Acushnet River along the ROW edge.

D53 lies on the south side of Middle Road and is adjacent to the road. A culvert located in D52 goes under Middle Road into D53. This culvert connects to a perennial tributary (SD53) of Deep Brook. D53 is a mixture of a wetland shrubs (PSS) and emergent wetlands (PEM). Common shrubs in the wetland include silky dogwood (*Swida amomum*) and white meadowsweet. The emergent community is comprised of invasive species which include common reed and purple loosestrife (*Lythrum salicaria*), as well as native emergent such sensitive fern and soft rush. A fringe of PFO lies on the northeastern side of D53.

D52 is located adjacent to Middle Road and lies on the east side of a maintenance road across from D51. This broad-leaved deciduous wetland (PSS) is comprised of long-beaked willow (*Salix bebbiana*) and steeplebush. The herb understory is dominated by deer-tongue rosette-panicgrass (*Dichanthelium clandestinum*). Patches of the invasive common reed are present within the wetland. A narrow strip of broad-leaved deciduous forest lies on the east side of the wetland. A culvert in the southeast corner of the wetland hydrologically connects the wetland to Deep Brook due to the presence of former surface drainage flowing under the road and connecting to an unnamed perennial tributary (SD53) of Deep Brook.

D51 is located adjacent to Middle Road and lies on the west side of a maintenance road. This broad-leaved deciduous wetland (PSS) is comprised of long-beaked willow and steeplebush. The herb understory is dominated by deer-tongue rosette-panicgrass. A narrow strip of broad-leaved deciduous forest lies on the west side of the wetland. D51 “borders” on Deep Brook.

D50 lies to the southeast of Park Drive and is located on both sides of a maintenance road. Surface drainage flows through a section of the ROW connecting the wetlands on both sides of the road. A ditch also flows through the northwestern most section of the wetland. D50 “borders” on Deep Brook. This wetland complex is a mixture of PSS and PEM communities. Shrubs include white meadowsweet and long-beaked willow. Stands of common reed comprise the herb community. Narrow strips of PFO occur on the eastern and western edges of the ROW.

D49 is part of the same wetland system as D48 and is located on the east side of a maintenance road. A ditch flows through D49 as described under the D48 description below. D49 “borders” on Deep Brook. This wetland is also a mixture of PSS and PEM communities. Common shrubs include long-beaked willow, white meadowsweet, and steeplebush. The herb understory includes sedges and rushes (*Juncus* spp).

D48 lies to the northwest of Park Drive and includes the portion of ROW that makes an abrupt turn to the west. D48 is an extensive wetland complex (length is over 0.3 miles) located on the west side of a maintenance road. A ditch crosses through a small section of this wetland, flows to the southwest and crosses under the maintenance road via culverts into wetland D49 located on the western side of the road. The ditch flows through D49 and goes off ROW. D48 “borders” on Deep Brook. This wetland complex is a mixture of PSS and PEM communities with a forested wetland fringe (PFO) on the ROW edge before the ROW makes the sharp turn to the east.

D47 lies on the south side of a maintenance road, segmented from D46, and is also part of Hathaway Swamp. The wetland is a mixture of PSS and PEM communities. Common wetland shrubs include highbush blueberry, maleberry, and sweet pepperbush. Herb species include sedges and cinnamon fern (*Osmundastrum cinnamomeum*).

D46 is located within Hathaway Swamp. This wetland is located on the north side of a maintenance road which bisects D46 from wetland D47 which lies south of the maintenance road. D46 is a broad-leaved deciduous shrub wetland (PSS) community. Emergent wetland (PEM) patches also occur throughout the wetland.

D45 is located east of Route 18 and lies within Hathaway Swamp. The wetland is predominately broad-leaved deciduous shrub wetland (PSS) comprised of highbush blueberry, maleberry, and sheep-laurel (*Kalmia angustifolia*). Emergent wetland (PEM) patches are also interspersed in this wetland with common herb species including sedges, ferns, and swamp dewberry (*Rubus hispidus*).

D44 is part of the same wetland system as D43 but a maintenance road has bisected the wetland complex so D44 is on the south side of the road. This wetland is a mixture of shrub wetland (PSS) and emergent wetland (PEM). Long-beaked willow is a common shrub and soft rush is a common emergent species in this wetland. Several ditches are also present in this wetland. D44 "borders" on the Acushnet Cedar Swamp.

D43 is located between Route 140 to the west and Route 18 to the east. D43 is located on the north side of the ROW maintenance road. A culvert is located under Route 140 where highway drainage flows into D43. A ditch runs along the length of much of the wetland. Therefore, D43 "borders" on the Acushnet Cedar Swamp. This wetland is a mixture of PSS and PEM communities with a PFO community on the northern edge of the ROW.

D42 abuts Route 140 and the wetland lies to the west of the highway. This is wetland is predominately a PSS community comprised of steeplebush, sweet pepperbush, and winterberry. There are large patches of persistent emergent vegetation (PEM), predominately the invasive common reed that occurs closer to the Route 140 edge. Forested wetland (PFO) occurs on the northern and southern edges of the wetland. D42 is hydrologically connected via highway drainage and therefore D42 "borders" on the Acushnet Cedar Swamp.

D41 is part of the same wetland complex as D40 but D41 is located on the south side of a maintenance road. This wetland is a PSS wetland and is comprised of white meadowsweet and sweet pepperbush. Forested wetland (PFO) occurs along a narrow strip of the southern ROW boundary. D41 "borders" on the Acushnet Cedar Swamp.

D40 lies to the east of Phillips Road where the ROW is located between residential neighborhoods. D40 is on the north side of a ROW maintenance road which bisects the wetland complex. This PSS community is comprised of the common shrubs, white meadowsweet and sweet pepperbush. This wetland also "borders" on the Acushnet Cedar Swamp.

D39 is located east of Duchaine Boulevard and lies in between the road and the Industrial Park Substation to the east. A small stormwater ditch is located on the west side of D39 and passes under a ROW maintenance road via culverts. This broad-leaved deciduous shrub wetland (PSS) is dominated by steeplebush with sedges in the emergent understory. D39 is hydrologically connected and "borders" on the Acushnet Cedar Swamp.

D38 lies to the west of Duchaine Boulevard and to the east of a set of railroad tracks. The western portion of D38 is a narrow floodplain surrounding an unnamed perennial stream (SD38A). The wetland is partially an area of PSS and patches of PFO closer to the ROW edge. Long-beaked willow and sweet pepperbush are the dominant shrubs. An unnamed intermittent stream (SD38) flows into SD38A and SD38 has a narrow floodplain of forest (PFO) heading west along the southern edge of the ROW. D38 is hydrologically connected and "borders" on the Acushnet Cedar Swamp.

D37 is located on the south side of an off-ROW maintenance road and is predominately dominated by broad-leaved deciduous shrubs (PSS) comprised of sweet pepperbush and steeplebush. PFO wetlands are located on the non-maintained southern portion of the wetland. D37 "borders" on the Hobomock Swamp.

D36 is located on the north side of a maintenance road opposite of D35. Both D35 and D36 are part of the same wetland complex but have been bisected by the maintenance road. D36 is broad-leaved deciduous shrub (PSS). D36 "borders" on the Acushnet Cedar Swamp and Hobomock Swamp.

D35 is located adjacent to a section of the Greater New Bedford Industrial Park and lies to the south of John Vertente Boulevard. This wetland is predominately broad-leaved deciduous shrub (PSS) with a fringe of broad-leaved deciduous forest (PFO) on the southern edge of the non-maintained portion of the wetland. An unnamed perennial stream (SD35) flows through D35 and is associated with the Acushnet Cedar Swamp and Hobomock Swamp. Two sets of culverts allow SD35 to flow under a maintenance road.

D34 is a segment of the D33 complex but lies on the south side of a ROW maintenance road. This predominately broad-leaved deciduous wetland (PSS) is comprised of sweet pepperbush and white meadowsweet with sedges and soft rush in the emergent understory. There is a small fringe of PFO wetland on the southern edge of the wetland along the edge of ROW. D34 "borders" on the Acushnet Cedar Swamp.

D33 is located on the west side of Flaherty Drive and lies on the northwest side of a ROW maintenance road. D33 is predominately PSS comprised of maleberry, highbush blueberry, and white pine (*Pinus strobus*) saplings. The emergent understory includes bushy bluestem and highbush blueberry less than three feet in height. D33 "borders" on the Acushnet Cedar Swamp. D33 is bisected by the maintenance road where D34 lies on the south of the maintenance road.

D32 is a segment of the D31 complex but lies on the south side of a ROW maintenance road. This wetland is PSS comprised mainly of sweet pepperbush, willows, and maleberry. There are interspersed stands of emergent wetland vegetation (PEM). There is a small fringe of broad-leaved deciduous forest (PFO) on the southeastern edge of the wetland along a non-maintained portion of the ROW. D32 "borders" on the Acushnet Cedar Swamp.

D31 is located on the north side of a ROW maintenance road is just to the east of a solar farm. D31 "borders" on the Acushnet Cedar Swamp State Reservation. D31 is predominately broad-leaved deciduous shrubs (PSS), with interspersed stands of PEM. D31 is bisected by the maintenance road and wetland D32 lies on the south of the maintenance road.

D30 is located opposite of D29 and lies on the south side of a ROW maintenance road. Wetlands D29 and D30 are part of the same wetland system that have been bisected by the maintenance road. D30 is also predominately broad-leaved deciduous wetland (PSS). A small fringe of broad-leaved deciduous forest (PFO) lies on the southern edge of the wetland along the ROW.

D29 is located on the north side of a ROW maintenance road just to the west of a solar farm. D29 is a PSS wetland comprised of highbush blueberry and sweet pepperbush. This wetland also "borders" on the Acushnet Cedar Swamp State Reservation.

D28 is located between two gently sloping hills. This broad-leaved deciduous shrub wetland (PSS) is dominated by steeplebush and white meadowsweet. D28 "borders" on the Acushnet Cedar Swamp.

D27 is located between two small hills and lies at the base of a trail to High Hill Reservoir. An unnamed intermittent stream (SD27) flows along the western side of the wetland and into a culvert located under the trail. The wetland is dominated by broad-leaved deciduous shrubs (PSS), mainly sweet pepperbush. D27 "borders" the Acushnet Cedar Swamp.

D26 is located to the northeast of High Hill Substation as a transmission line takes a sharp turn to the west. This predominately broad-leaved deciduous shrub wetland (PSS) comprised of white meadowsweet is interspersed with pockets of emergent vegetation (PEM). A ROW maintenance road bisects a portion of D26 but a culvert on each side of the maintenance road allows surface water to flow between the two segments of D26. This wetland "borders" on Shingle Island Swamp.

D25 is an extensive wetland system to the west of Hill High Substation and heads northwest until abutting a hill which is adjacent to agricultural lands. D25 is approximately a length of 0.4 miles heading from the west into agricultural land. D25 is a mixture of broad-leaved deciduous shrubs (PSS) and emergent vegetation (PEM) in the maintained portion of the ROW. The non-maintained edges of the ROW are broad-leaved deciduous forest (PFO). Two unnamed perennial streams (SD25 and SD25A) flow through wetland D25 into Shingle Island Swamp. A maintenance road cuts through sections of D25.

D24 is a fringe of emergent vegetation (PEM) located along an impounded pond (PUB). The dominant emergent species is sensitive fern, interspersed with the invasive common reed.

D23 is located opposite of D22 on the eastern side of Flag Swamp Road. An unnamed perennial stream (SD23A) flows through D23 and is a tributary of Shingle Island River (SD22). Another intermittent unnamed stream (SD23) also flows into wetland D23 but disperses into sheet flow in the wetland. D23 is dominated by broad-leaved deciduous shrubs (PSS) including red maple saplings and white meadowsweet.

D22 lies to the west of Flag Swamp Road and is predominately a broad-leaved deciduous shrub wetland (PSS) with interspersed stands of emergent vegetation (PEM). The perennial Shingle Island River (SD22) flows south through wetland D22 on the eastern edge of the wetland. Dominant species include sweet pepperbush for the shrubs and bluejoint for the emergents.

D21 is located just to the northwest of Collins Corner Road and is predominately a broad-leaved deciduous shrub wetland (PSS) interspersed with stands of emergent wetland vegetation (PEM). The dominant shrub species is sweet pepperbush and the dominant emergent is bushy bluestem (*Andropogon glomeratus*). The southwestern edge of D21 contains an impounded pond (PUB) where an unnamed perennial stream (SD21) flows out of the pond.

D20 crosses through the NEP territory in the city of Fall River into Eversource territory in the town of Dartmouth. An erosion control diversion ditch flows to the east in NEP territory over a distance of 0.25 miles within the maintenance road into D20. This wetland is predominately broad-leaved deciduous shrub wetland (PSS) interspersed with stands of emergent vegetation (PEM) in the maintained portion of the ROW. The non-maintained portion of the ROW is comprised of broad-leaved deciduous forest (PFO). An unnamed intermittent stream (SD20) of the Shingle Island River flows through wetland D20.

3.2.4 NEP Transmission Line Wetlands

Twenty-five wetlands occur in the NEP Survey Area from the Dartmouth/Fall River town line west to the Bell Rock Substation. Twenty-one of these wetlands in this Survey Area are BVWs and are segments of larger wetland systems that continue off the NEP ROW. These wetlands "border" the Copicut Reservoir

(LUB), the Copicut River, and Queen Gutter Brook. The other four remaining wetlands are closed isolated depressions with no inlet or outlet and are therefore classified as IVWs.

The list and descriptions of the wetlands below located In the NEP Survey Area are numbered sequentially from the Fall River/Dartmouth town line west to the Bell Rock Substation. Please refer to Figure 3. All wetlands, with the exception of D20 are located in the city of Fall River. As described above, D20 crosses from the city of Fall River into the town of Dartmouth (refer to D20 description above).

D19A is located on the south side of a maintenance road, where a culvert under the maintenance road allows surface water flow from wetland D19 to D19A. An unnamed intermittent stream (SD19A) flows from wetland D19A, continues off ROW, and eventually connects to the Copicut Reservoir. This wetland is a broad-leaved deciduous forest (PFO).

D19 lies on the north side of a maintenance road and is a broad-leaved deciduous wetland shrub (PSS) community comprised of sweet pepperbush and maleberry. A culvert underneath the maintenance road allows for a hydrologic connection to wetland D19A on the south side of the road. Therefore, D19 "borders" the Copicut Reservoir.

D18 is located on the south side of a maintenance road and is segmented from D17 by the maintenance road. D18 borders the Copicut Reservoir. This wetland is a mixed forest (PFO) with black birch (*Betula lenta*) and white pines. The shrub understory is comprised of sweet pepperbush and highbush blueberry. An erosion control diversion ditch runs within the center of the maintenance road between D17 and D18 and flows into the Copicut Reservoir.

D17 is located on the north side of a maintenance road and lies within the maintained ROW. The wetland is comprised predominately of broad-leaved deciduous wetland shrubs (PSS) which include highbush blueberry and maleberry. The wetland "borders" the Copicut Reservoir.

D16A lies to the southwest of wetland D16 and also borders the Copicut Reservoir. D16 and D16A are segmented by the maintenance road. D16A is a broad-leaved deciduous forest (PFO) comprised of red maple.

D16 borders the Copicut Reservoir and is comprised of a mixture of broad-leaved deciduous wetland shrubs (PSS) species including highbush blueberry and sweet pepperbush.

D15 is located on the south side of a maintenance road and "borders" the Copicut Reservoir. This wetland is a continuation of wetland D14 but the maintenance road segments D14 and D15. D15 is dominated by a broad-leaved deciduous forest (PFO) community comprised of red maple.

D14 is located on the north side of a maintenance road and is comprised of a mixture of broad-leaved deciduous wetland shrubs (PSS) in the maintained portion of the ROW. D14 has a "bordering" connection to the Copicut Reservoir. D14 is segmented by the maintenance road but is part of wetland D15.

D13 is a small isolated emergent wetland (PEM) located in an isolated depression on the north side of the maintenance road. There is no indication the small depression D13 meets the volume and flooding requirements to be regulated as an ILSF. The dominant emergent in this wetland is the invasive plant Japanese stiltgrass (*Microstegium vimineum*).

D12 is located on the south side of a maintenance road and is adjacent to the Copicut Reservoir. The wetland is comprised mostly of areas with wetland shrubs (PSS) and emergent wetland vegetation (PEM). Dominant shrubs include sweet pepperbush and red maple saplings and dominant emergents include the bluejoint and woolgrass (*Scirpus cyperinus*). There is also a forested wetland (PFO) area dominated by red maple and white pine.

D11 is a wetland complex which crosses the entire width of the ROW in this section. The wetland is adjacent to Quanapoag Road. The maintained portion of the ROW is comprised of areas with wetland shrubs (PSS) and emergent wetland vegetation (PEM). The non-maintained portion of the ROW is dominated by wetland forest (PFO). The perennial Copicut River (SD11) flows southeast through this wetland, continues under Quanapoag Road via culverts, and enters into the Copicut Reservoir.

D10 is located on the north side of a maintenance road. D10 is a small isolated depression dominated by broad-leaved deciduous shrubs (PSS) such as highbush blueberry and sweet pepperbush. There is no indication this small depression meets the volume and flooding requirements to be regulated as an ILSF.

D9 is also a small isolated depression located on the north side of a maintenance road and is adjacent to Copicut Road. The wetland appears to be a former borrow pit. D9 is dominated by wetland shrubs such as white meadowsweet and steeplebush. There is no indication the small depression D9 meets the volume and flooding requirements to be regulated as an ILSF.

D8 is a wetland forest (PFO) dominated by shagbark hickory (*Carya ovata*), white ash (*Fraxinus americana*), and white pine on the south side of a maintenance road. An unnamed intermittent stream (SD8) originates from this wetland and flows under the maintenance road via culverts. The intermittent stream continues off ROW which connects to wetlands associated with the Copicut River.

D7A is located on the south side of a maintenance road and is a broad-leaved deciduous wetland shrub (PSS) community comprised of highbush blueberry. Red maple and white pine trees surround the basin but are not rooted within the wetland. This wetland also overlaps a vernal pool (DP-2). There is no indication the small depression D7A meets the volume and flooding requirements to be regulated as an ILSF.

D7 is located on the south side of a maintenance road and is predominately wetland forest (PFO) with a red maple tree canopy and a shrub understory of sweet pepperbush. This wetland also “borders” Queen Gutter Brook by hydrologically connecting to an unnamed tributary of Queen Gutter Brook off the ROW.

D6 is located on the south side of a maintenance road. Culverts under the maintenance road allow stream SD5 to flow under the road hydrologically connecting D5 to D6. D6 is a broad-leaved deciduous forest (PFO) with a dominant tree canopy of red maple and an understory of ironwood (*Carpinus caroliniana*) saplings.

D5 is a mixture of wetland shrubs (PSS) dominated by inkberry (*Ilex glabra*) and sweet pepperbush. The wetland is located on the north side of a maintenance road and continues off ROW. An unnamed intermittent stream (SD5) flows through wetland D5. The stream flows off ROW and eventually connects to Queen Gutter Brook.

D4 is a broad-leaved evergreen wetland (PSS). This wetland is located on the north side of a maintenance road and is dominated by the wetland shrub inkberry. The wetland continues off-ROW to a larger forested wetland (PFO) system to the north that “borders” Queen Gutter Brook.

D3 is also located on the south side of a maintenance road and is dominated by broad-leaved deciduous shrubs (PSS). Sweet pepperbush is the dominant shrub. This wetland has been segmented by the maintenance road and is part of wetland D1.

D2 is located on the south side of a maintenance road for the ROW and is a broad-leaved deciduous wetland forest (PFO) with a mixture of tree species including red maple and black birch. This wetland has been segmented by the maintenance road and is part of the D1 complex.

D1 lies on the north side of a maintenance road for the ROW and is predominately dominated by broad-leaved deciduous shrubs (PSS). The northernmost edge of this wetland is dominated by broad-leaved deciduous wetland forest (PFO). The wetland continues off ROW and is connected to Queen Gutter Brook.

M1 lies predominately to the north of Bell Rock Substation and is part of a larger broad-leaved deciduous forested (PFO) wetland system that "borders" Queen Gutter Brook. Dominant trees include black tupelo (*Nyssa sylvatica*) and red maple with a shrub understory of highbush blueberry and sweet pepperbush.

L1 lies to the east of Bell Rock Substation and contains a broad-leaved deciduous wetland shrub (PSS) community located under the existing transmission line. Dominant shrubs include sweet pepperbush, highbush blueberry, as well as red maple saplings. Heading southwest, the wetland becomes a wetland forest (PFO) with a mixture of red maple and white pine trees. Wetland L1 is part of a larger PFO system to the north that "borders" Queen Gutter Brook off the NEP ROW.

3.3 Summary

Freshwater wetlands and streams in the Survey Area are regulated by the USACE under the provisions of Section 401 and 404 of the federal Clean Water Act (33 U.S.C. §§ 1251 et seq.), and by the MassDEP and the city of Fall River, the town of Dartmouth, the city of New Bedford, and the town of Acushnet under the Massachusetts Wetlands Protection Act (MGL Ch. 131§40).

Wetland field assessments occurred in from 2015 through 2018. POWER identified and delineated 46 wetlands and 16 watercourses in the Eversource Survey Area subject to regulation by the USACE, MassDEP, the town of Dartmouth, the city of New Bedford, and the town of Acushnet. POWER also identified and field delineated 25 wetlands and four watercourses in the NEP Survey Area subject to regulation by the USACE, MassDEP and the city of Fall River. Field boundaries of wetlands and watercourses were located with sub-meter accuracy GPS from which post-processed information related to location and extent of the wetlands were entered into a GIS geo-referenced database.

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FIGURES

FIGURE 1 PROJECT OVERVIEW: TOPOGRAPHIC MAP

Bell Rock Substation

Industrial Park Substation

High Hill Substation

Industrial Park Tap

City of Fall River

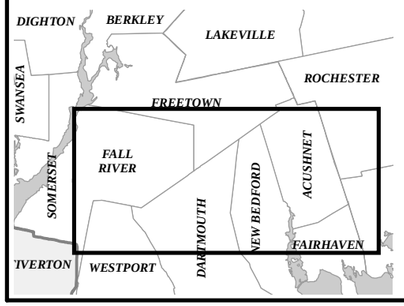
Town of Freetown

Town of Acushnet

City of New Bedford

Town of Dartmouth

Project Vicinity



Legend

- New 115 kV Transmission Line
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 1

Project Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N W E S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE nationalgrid

NOT FOR CONSTRUCTION

Date: 11/12/2018

Author: TDH

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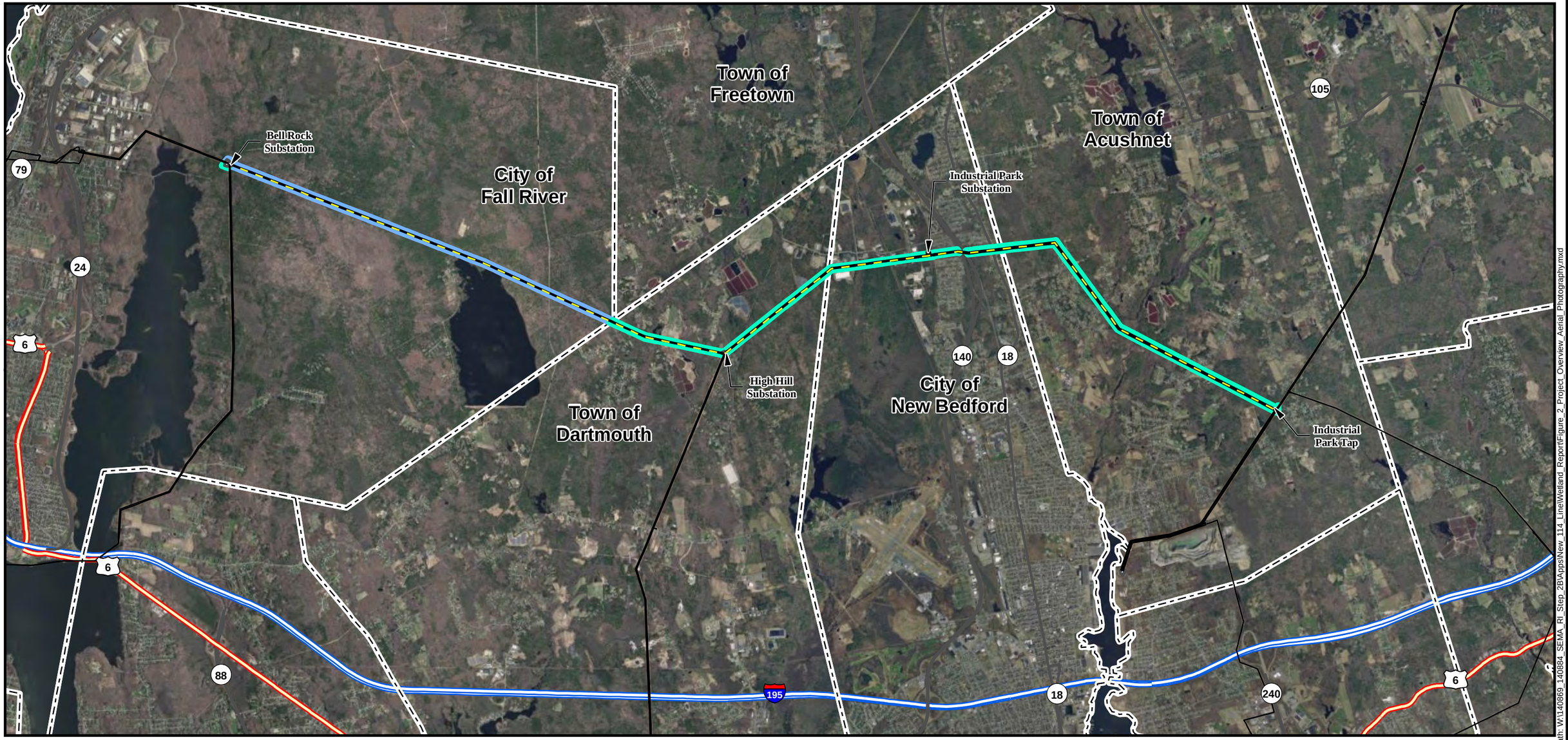
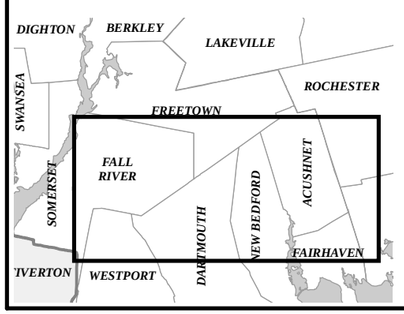
FIGURE 2 PROJECT OVERVIEW: AERIAL PHOTOGRAPHY



Project Vicinity



Legend

- New 115 kV Transmission Line
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Interstate Highway
- US Highway
- State Highway
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 2

Project Overview : Aerial Photography

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

EVERSOURCE
nationalgrid

NOT FOR CONSTRUCTION

NAD 1983 UTM Zone 18N USFt

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1 " = 1 miles

Date: 11/12/2018

Author: TDH

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FIGURE 3 EXISTING CONDITIONS

Refer to Appendix A, Project Figures, of the MEPA EENF

For the Figure 3 Plan Set

FIGURE 4 FEMA FLOOD INSURANCE RATE MAP

Town of Freetown

Town of Acushnet

Bell Rock Substation

City of Fall River

Industrial Park Substation

High Hill Substation

Town of Dartmouth

City of New Bedford

Industrial Park Tap

79 24 6 88 195 18 140 18 105 240 6

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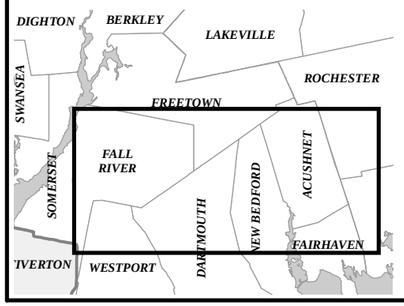
Project Vicinity



Legend

- New 115 kV Transmission Line
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Interstate Highway
- US Highway
- State Highway
- Town Boundary
- FEMA Flood Hazard (DFIRM 100yr)
- Floodway

Acushnet to Fall River Reliability Project

Figure 4

FEMA 100 Year Floodplains and Floodways

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

N W E S

0 1 2 Miles

1 " = 1 miles

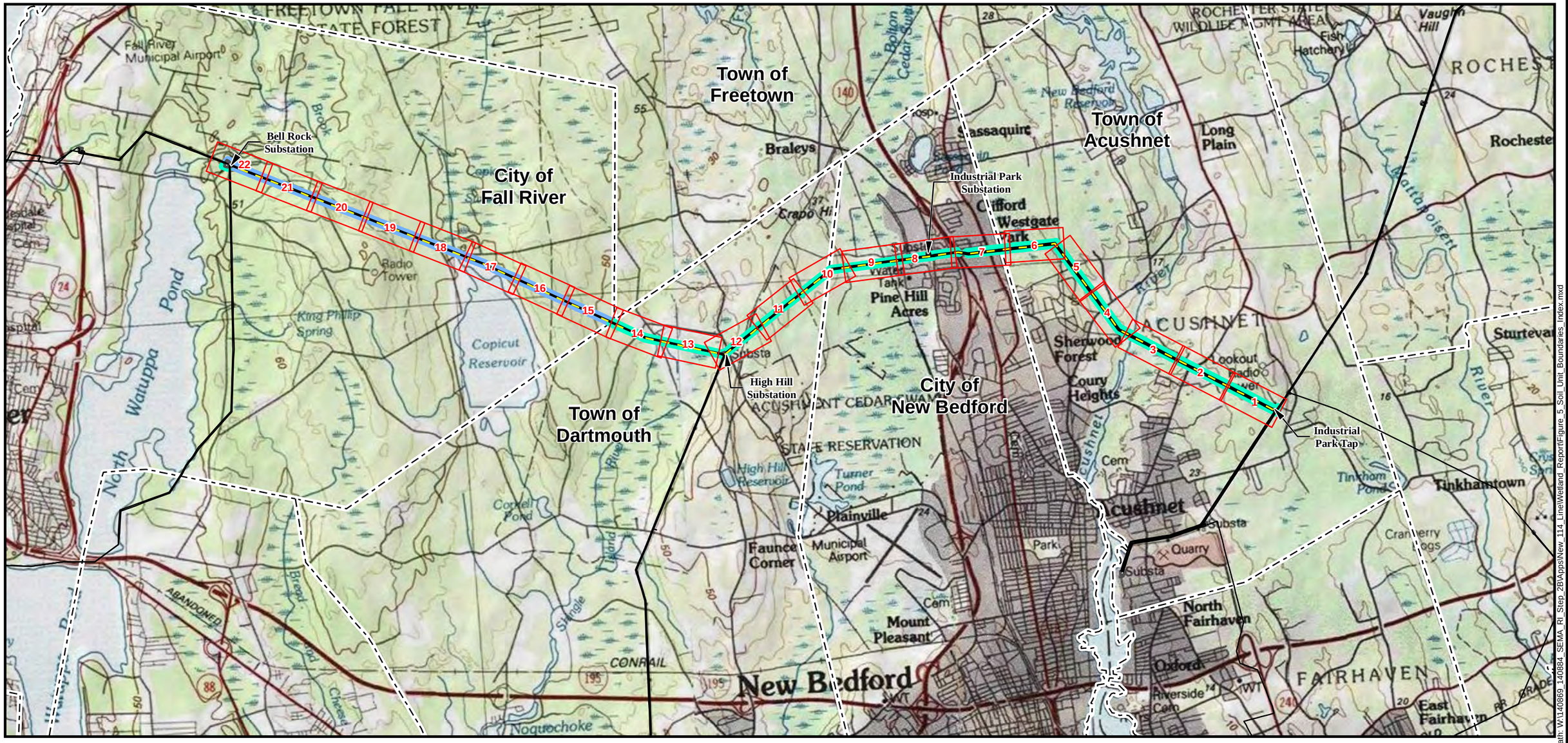
EVERSOURCE nationalgrid

NOT FOR CONSTRUCTION

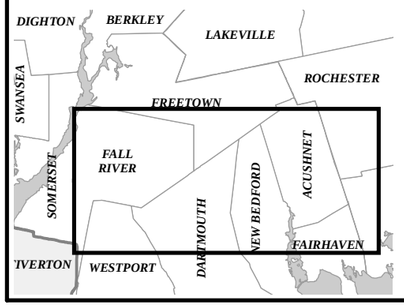
Date: 11/12/2018

Author: TDH

FIGURE 5 SOIL UNIT BOUNDARIES WITH ENVIRONMENTAL CONSTRAINTS



Project Vicinity



Legend

- New 115 kV Transmission Line
- Existing Transmission Line
- Existing Power Facility
- Eversource ROW
- National Grid ROW
- Town Boundary

Acushnet to Fall River Reliability Project

Figure 5

Soil Unit Boundaries Index Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River, Town of Dartmouth,
City of New Bedford, Town of Acushnet

POWER ENGINEERS

NAD 1983 UTM Zone 18N USFt

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W E
S

0 1 2 Miles

1 " = 1 miles

EVERSOURCE
nationalgrid

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Date: 11/12/2018

Author: TDH

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306B
Paxton fine sandy loam, 0 to 8 percent slopes, very stony

306B
Paxton fine sandy loam, 0 to 8 percent slopes, very stony

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

73A
Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

311B
Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

39A
Scarboro mucky fine sandy loam, 0 to 3 percent slopes

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Massachusetts Priority Habitat ID = PH 364

Industrial Park Tap

D63 D64 D65 D66

120 ft 110 ft 100 ft 90 ft 80 ft 70 ft 60 ft 50 ft 40 ft

23 24 25 26 27 28 29 30 77 78

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N E S W

1 " = 200 '

0 100 200 300

Feet

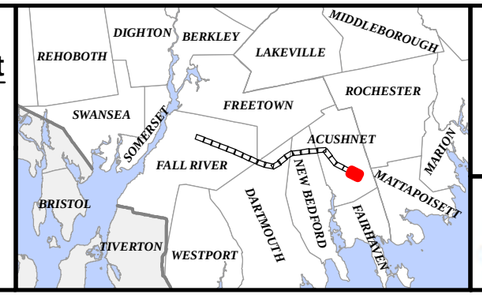
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Isolated Wetland Border
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

NAD 1983 UTM Zone 18N USFt

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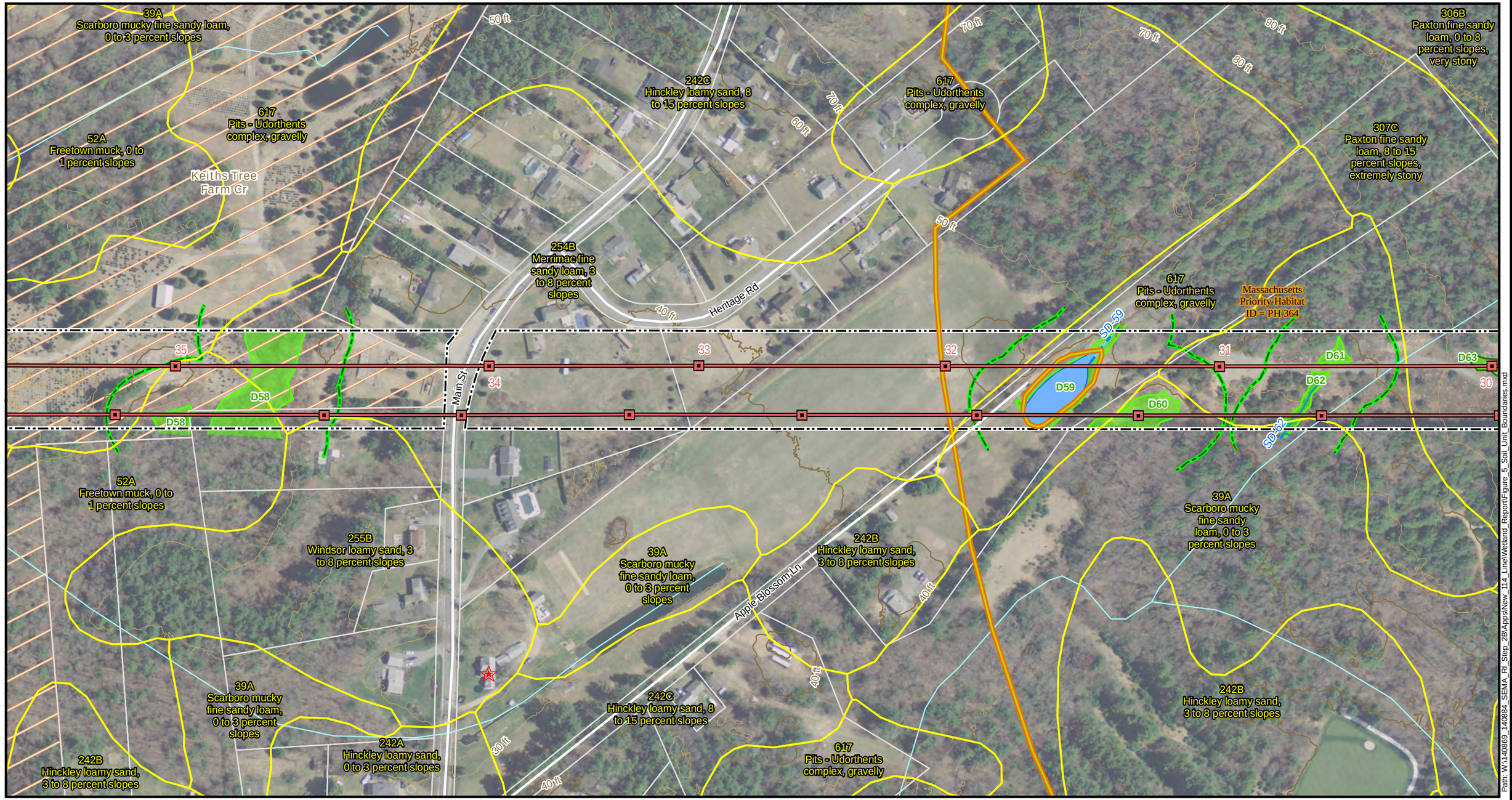
nationalgrid
POWER ENGINEERS



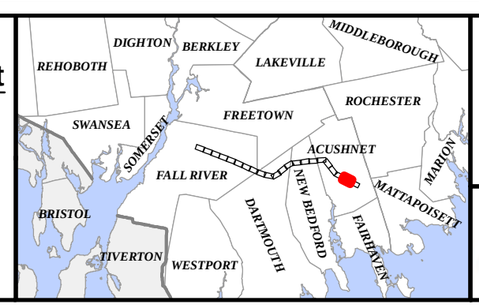
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Isolated Wetland Border
- Intermittent Stream
- Delineated Open Water
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

NAD 1983 UTM Zone 18N USFt

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POWER ENGINEERS

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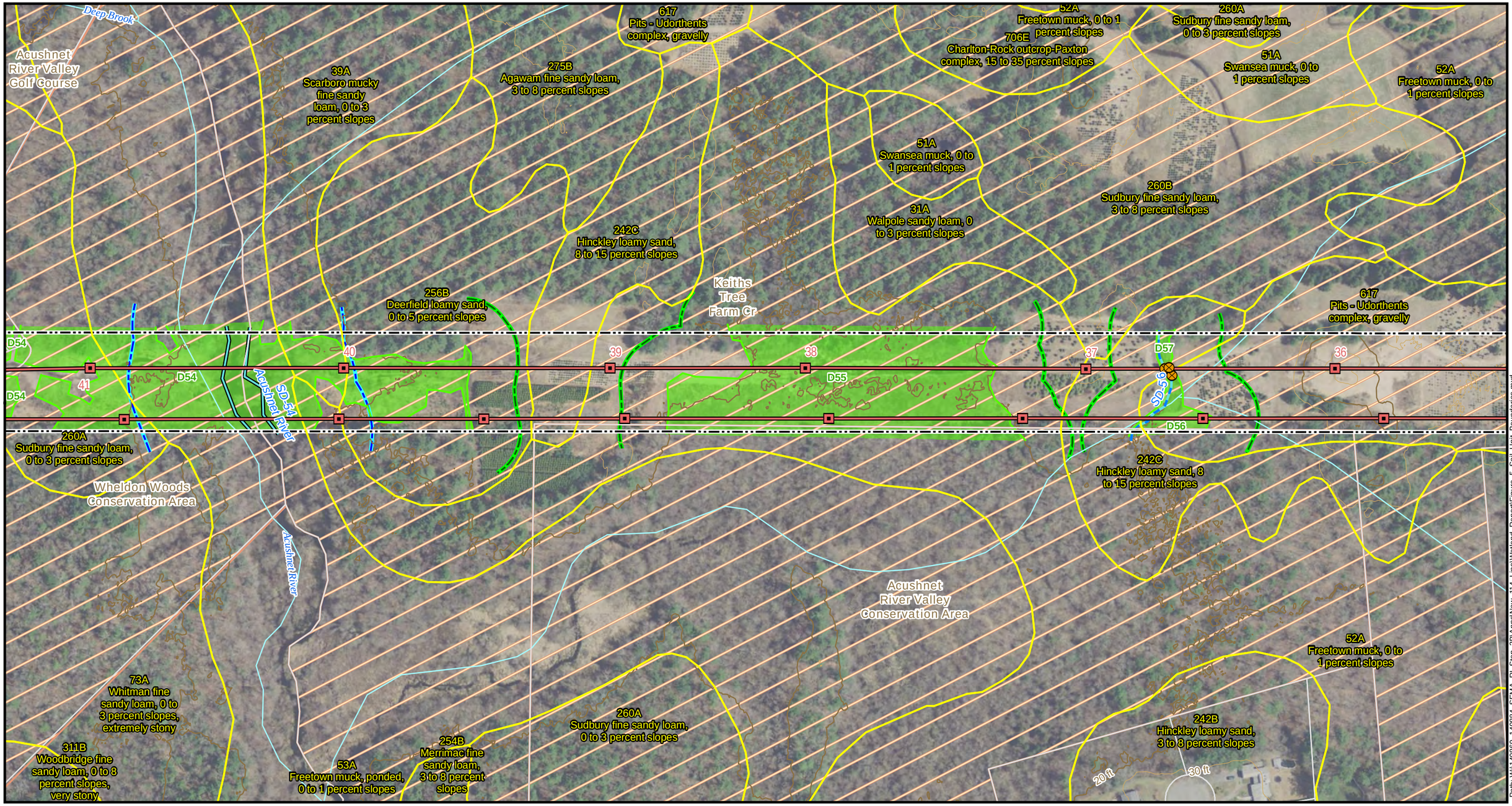

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N E S W

1 " = 200 '

0 100 200 300

Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH

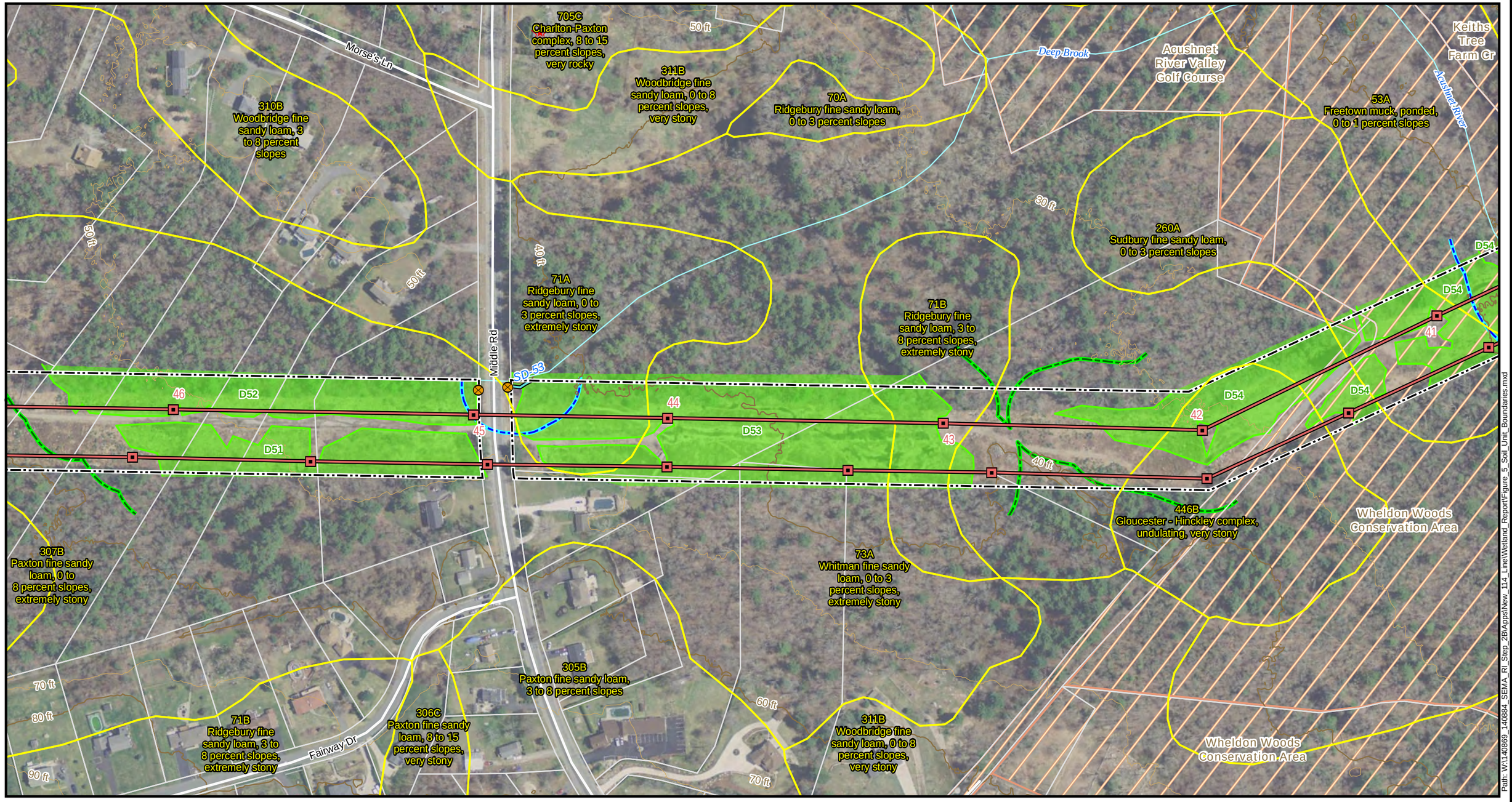


Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS



N E S W

1 " = 200 '

0 100 200 300

Feet

Legend

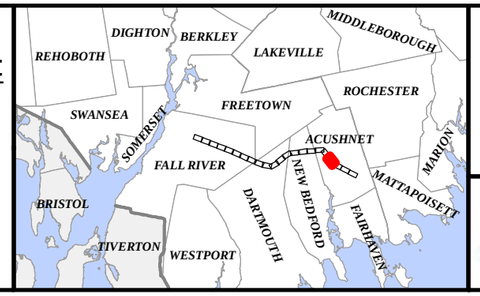
- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Field Delineated Wetland
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Page 4 of 22

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS

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312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

73A
Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

70A
Ridgebury fine sandy loam, 0 to 3 percent slopes

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

60 ft

311B
Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

305B
Paxton fine sandy loam, 3 to 8 percent slopes

310B
Woodbridge fine sandy loam, 3 to 8 percent slopes

90 ft

Deep Brook

80 ft

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

71A
Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

73A
Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

D52

D49

D48

51

50

49

D50

48

47

D48

D50

90 ft

Wildrose Ln

Park Dr

70 ft

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

100 ft

110 ft

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

Reservation Rd

71B
Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Fairway Dr

120 ft

120 ft

110 ft

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N E S W

1 " = 200 '

0 100 200 300

Feet

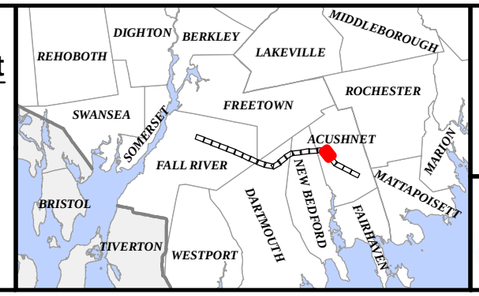
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Surface Drainage
- Wetland Border
- Ditch
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH

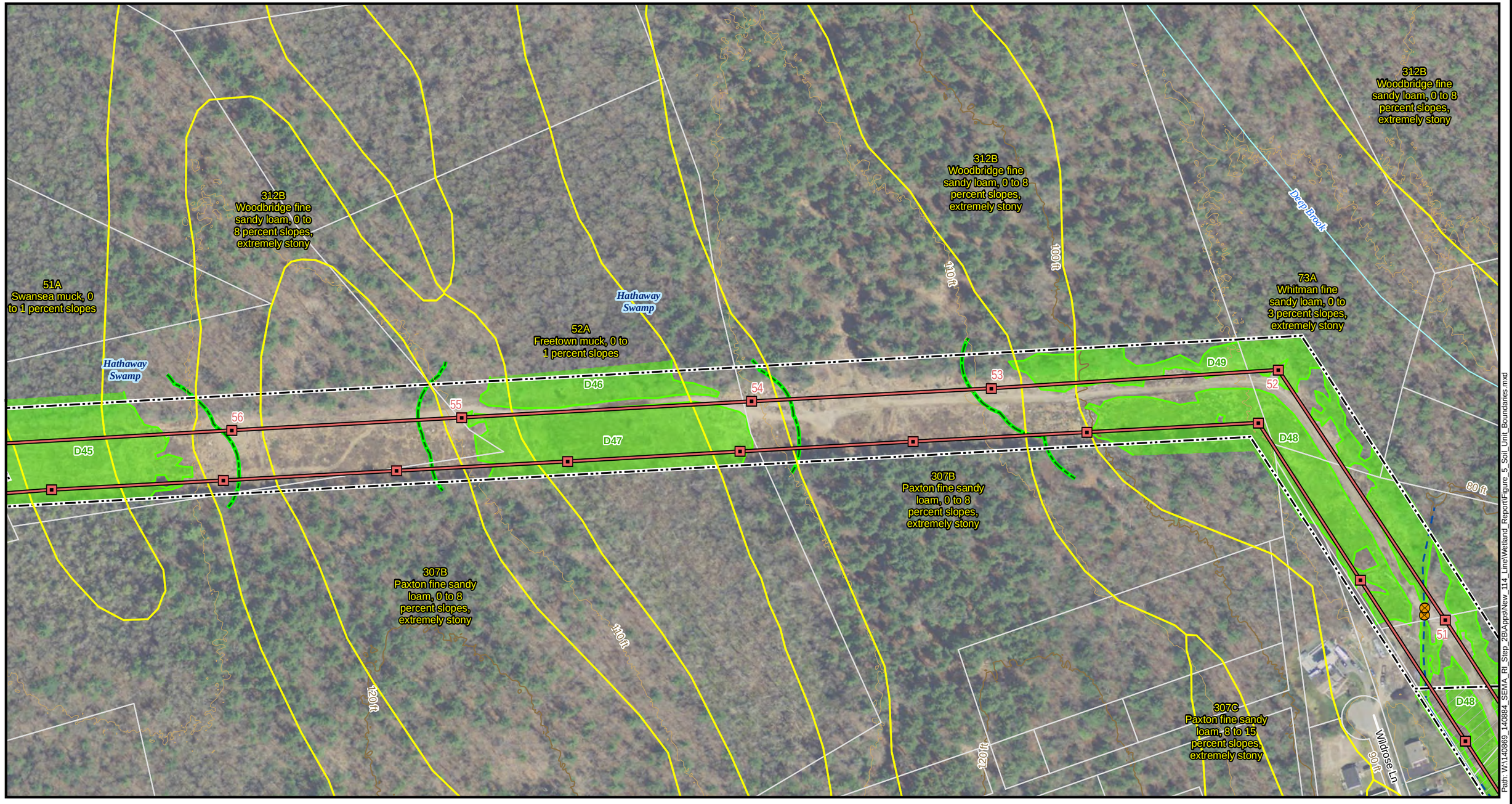


Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS



N
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1 " = 200 '

0 100 200 300
Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Culvert

Field GPS Survey Line (2015-2018)

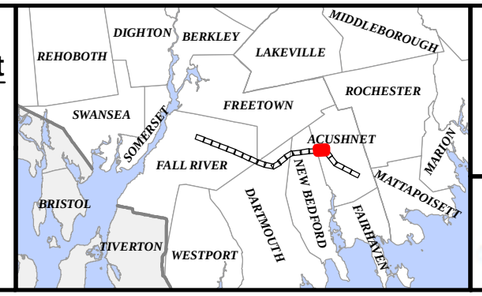
- Wetland Border
- Ditch
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Page 6 of 22

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Acushnet

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS

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1 " = 200 '

0 100 200 300

Feet

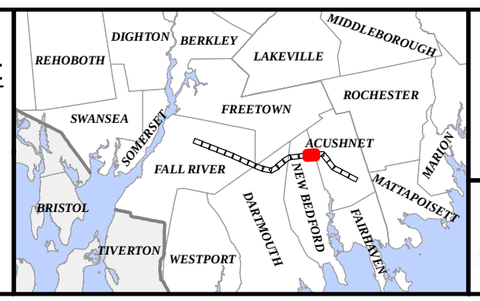
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Ditch
- Field Delineated Wetland
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- State Highway
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Acushnet, City of New Bedford

NAD 1983 UTM Zone 18N USFt

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nationalgrid
POWER ENGINEERS

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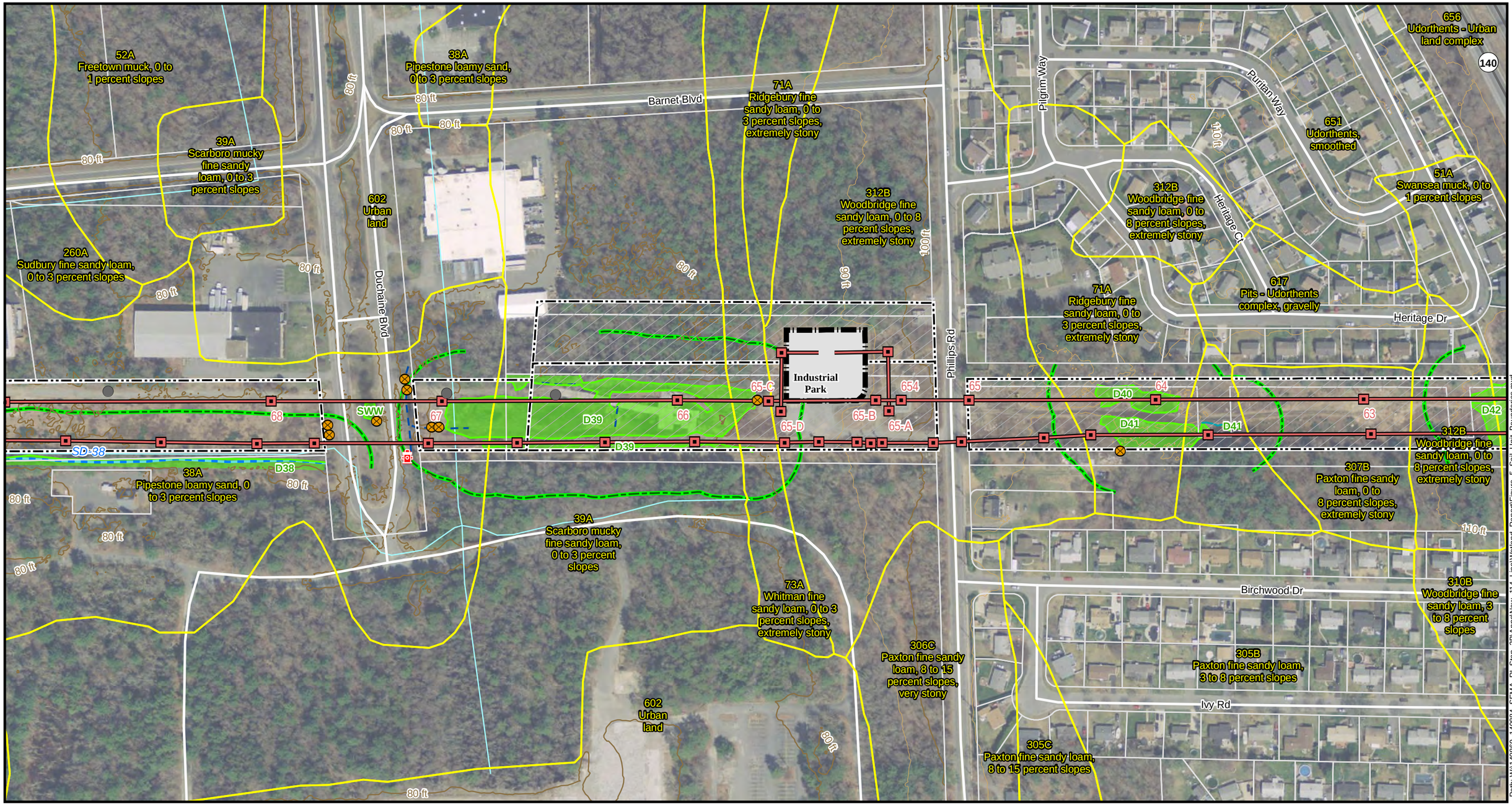

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N
W E
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1 " = 200 '

0 100 200 300
Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Culvert
- Man Hole
- Hydrant

Field GPS Survey Line (2015-2018)

- Surface Drainage
- Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- State Highway
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Page 8 of 22

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
City of New Bedford

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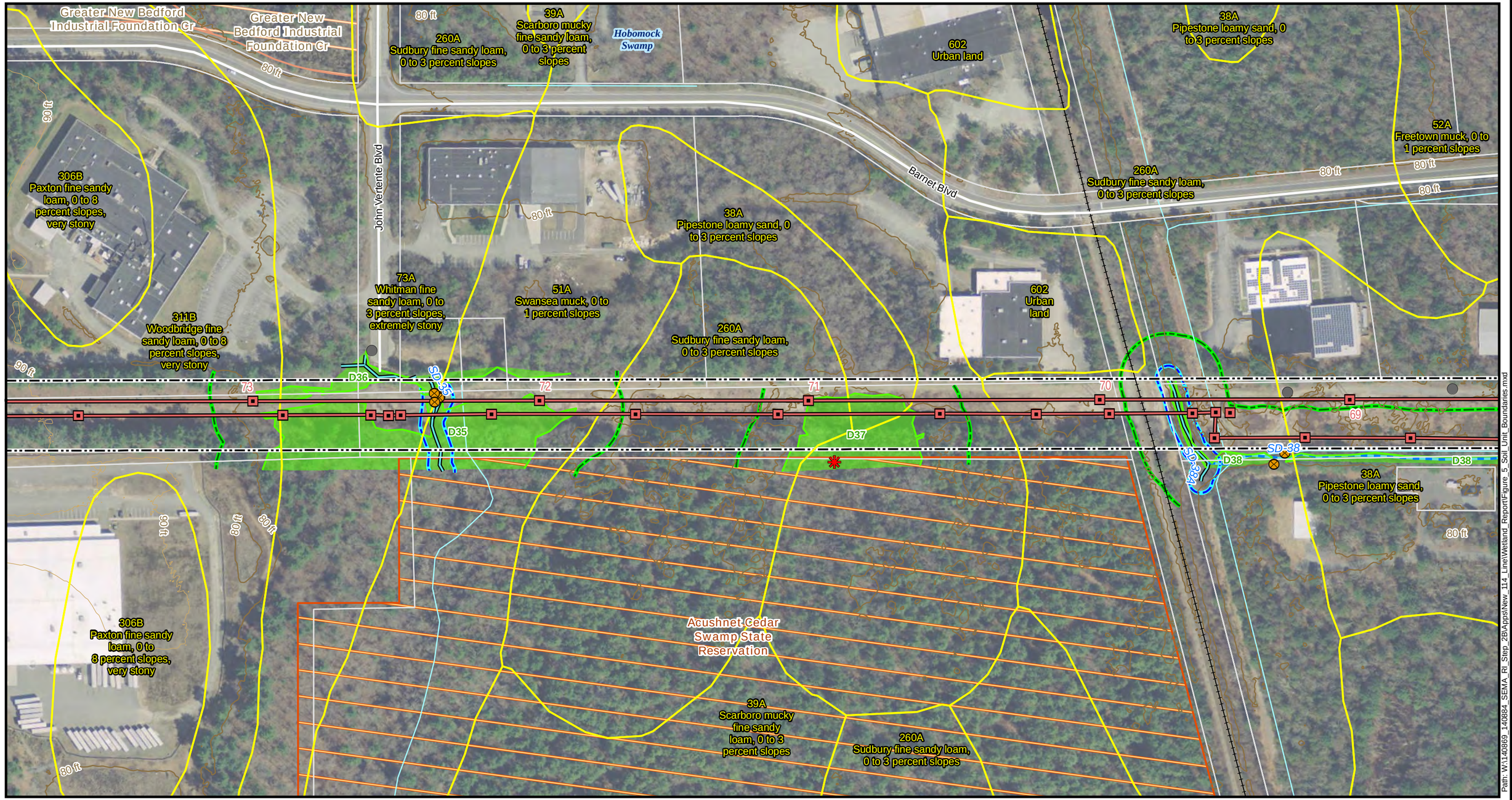

N
W E
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1 " = 200 '

0 100 200 300

Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Culvert
- Man Hole

Field GPS Survey Line (2015-2018)

- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland

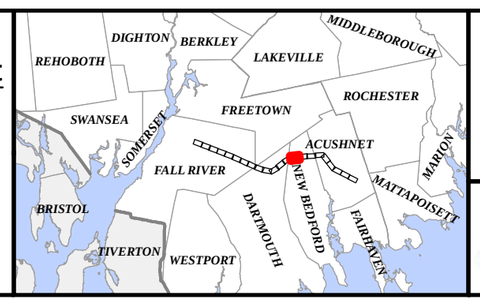
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Railroad
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018

Author: TDH



Commonwealth of Massachusetts

Bristol County:
City of New Bedford

NAD 1983 UTM Zone 18N USFt

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nationalgrid
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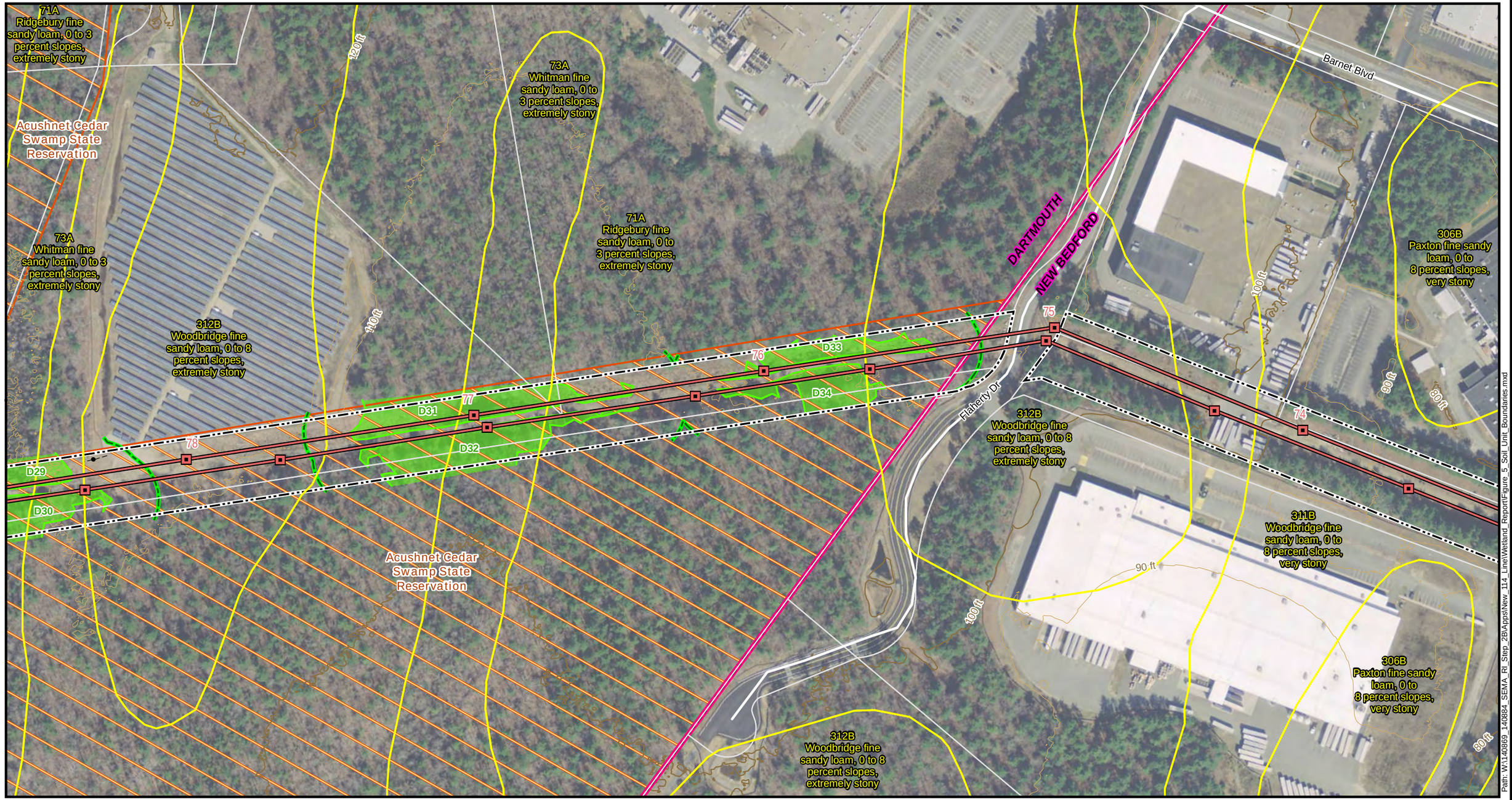


1 " = 200 '

0 100 200 300

Feet

Legend

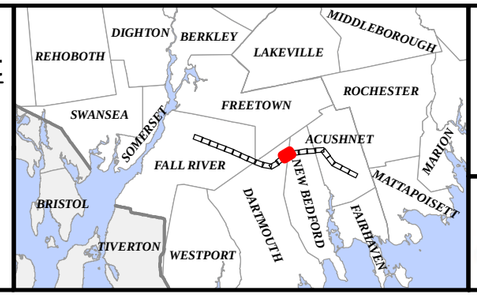
- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Pipeline
- Wetland Border
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Page 10 of 22

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
City of New Bedford, Town of Dartmouth

NAD 1983 UTM Zone 18N USFt

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1 " = 200 '

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Feet

Legend

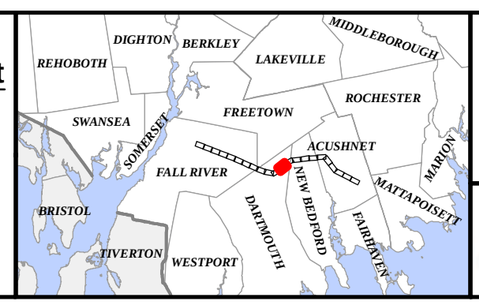
- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Pipeline
- Wetland Border
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018

Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

NAD 1983 UTM Zone 18N USFt

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242C
Hinckley loamy sand, 8 to 15 percent slopes

242B
Hinckley loamy sand, 3 to 8 percent slopes

39A
Scarboro mucky fine sandy loam, 0 to 3 percent slopes

260A
Sudbury fine sandy loam, 0 to 3 percent slopes

260B
Sudbury fine sandy loam, 3 to 8 percent slopes

617
Pits - Udorthents complex, gravelly

71A
Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

51A
Swansea muck, 0 to 1 percent slopes

73A
Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

311B
Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

310B
Woodbridge fine sandy loam, 3 to 8 percent slopes

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

High Hill Reservoir

High Hill S/S

High Hill Rd

Brittany Ln

Town Of Dartmouth Conservation Commission

Acushnet Cedar Swamp State Reservation

SD-25

SD-27

D25

D26

D27

90 ft

100 ft

110 ft

120 ft

130 ft

83

84

85

86

87

88

89

90

1

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1 " = 200 '

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Feet

Legend

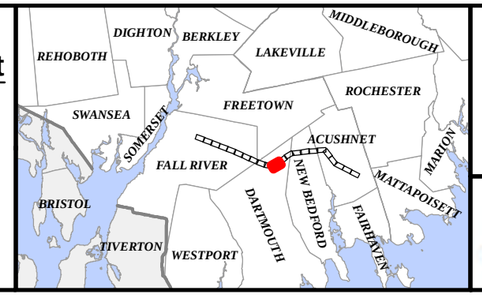
- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Substation or Tap
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Man Hole
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Page 12 of 22

Date: 11/12/2018 Author: TDH

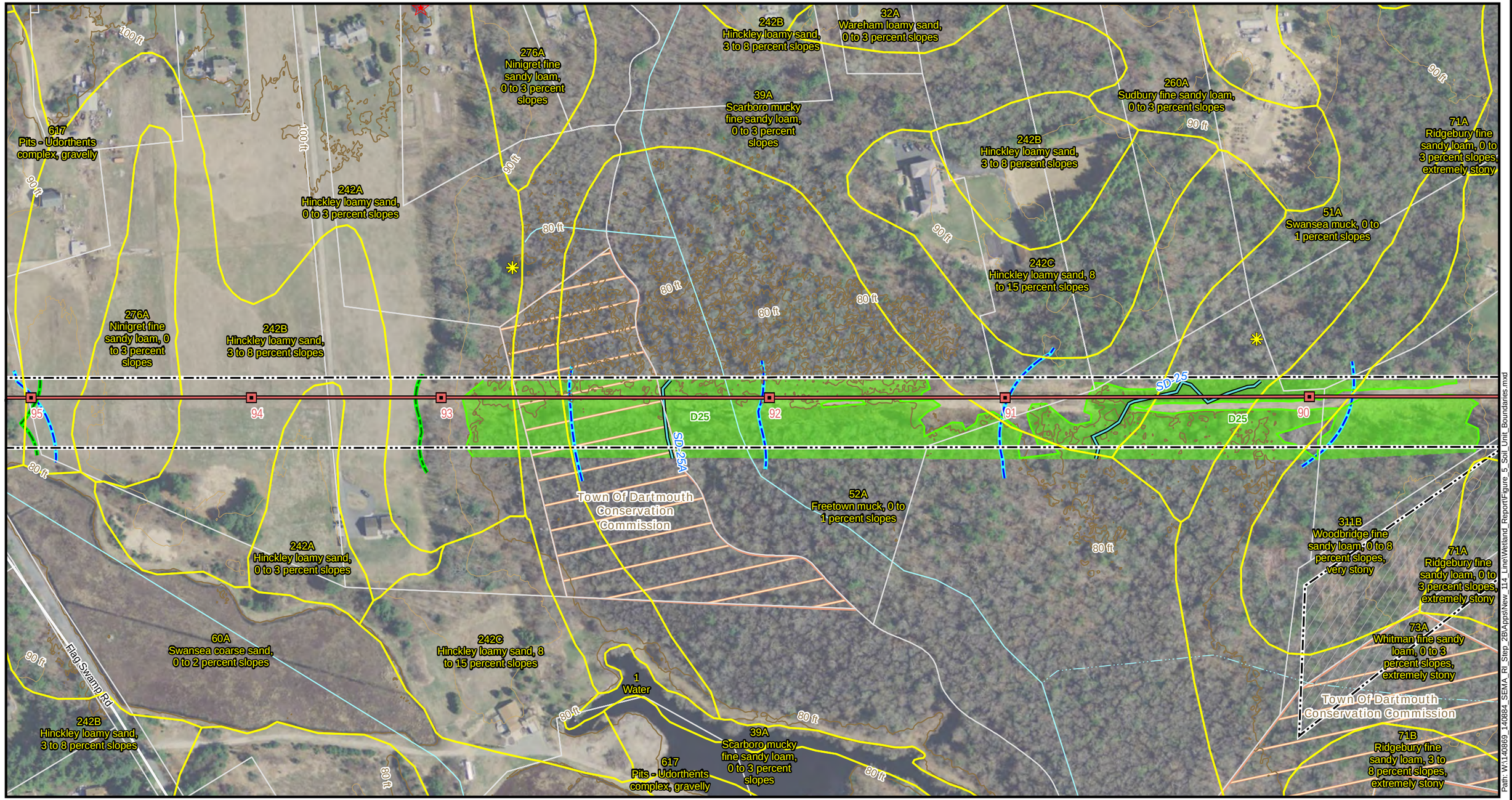


Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS



N
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1 " = 200 '

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Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Eversource Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Other Protected Lands
- MA Historic Commission Historic Inventory Point
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS

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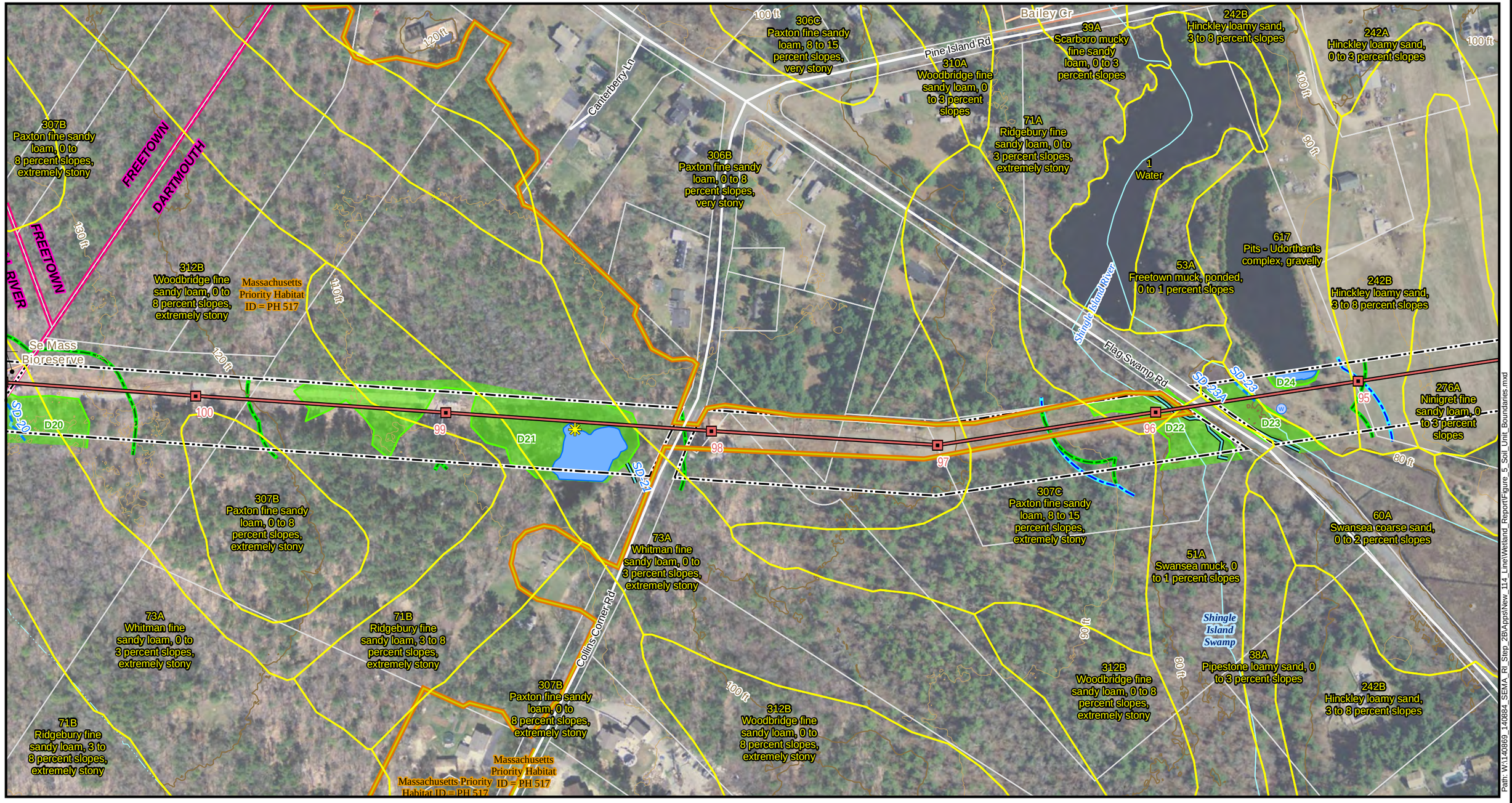

N
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1 " = 200 '

0 100 200 300

Feet

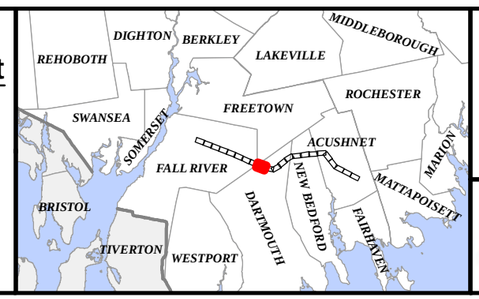
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Well
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Perennial Stream or River
- Intermittent Stream
- Delineated Open Water
- Field Delineated Wetland
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Town of Dartmouth

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS

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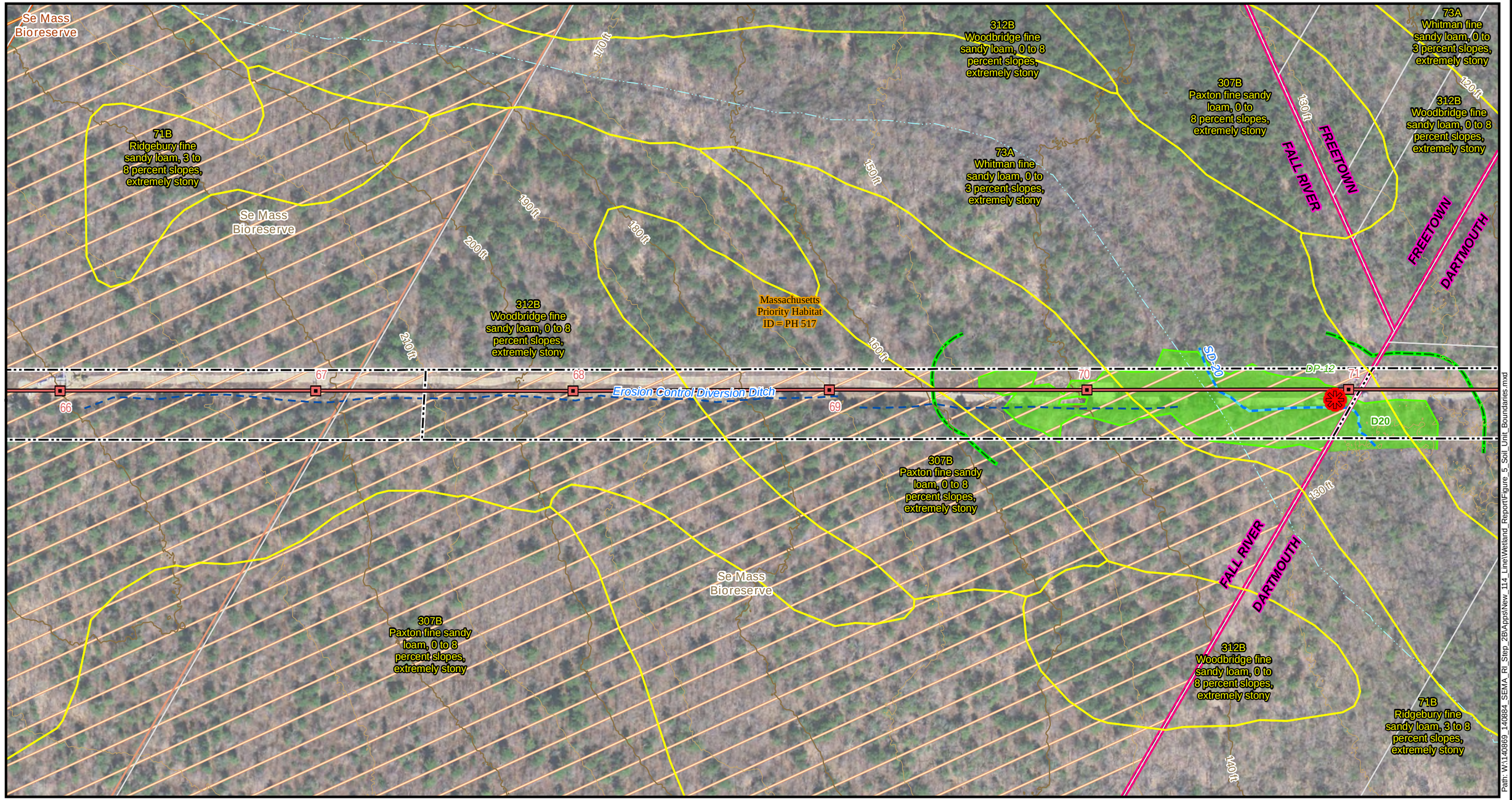

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1 " = 200 '

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Feet

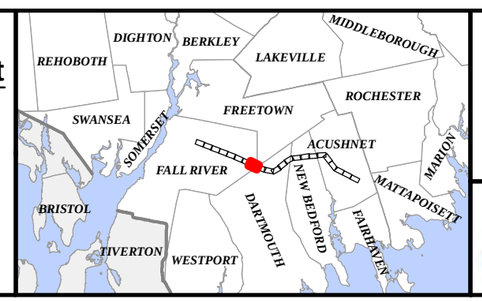
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- Intermittent Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
Towns of Dartmouth & Freetown, City of Fall River

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Se Mass Bioreserve

71A
Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

Massachusetts Priority Habitat ID = PH 517

AR10

Gas Line Trail

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

71B
Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

61 62 63 64 65 66

D19

D19A

AGT 20"

AGT 10"

Se Mass Bioreserve

71B
Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Se Mass Bioreserve

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Se Mass Bioreserve

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N
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1 " = 200 '

0 100 200 300

Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Culvert

Field GPS Survey Line (2015-2018)

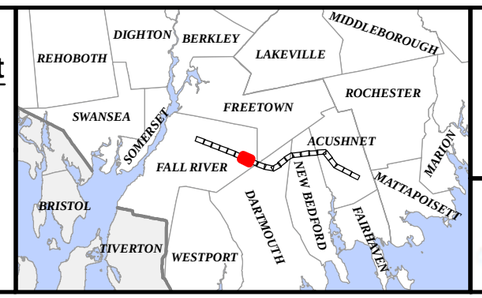
- Wetland Border
- Isolated Wetland Border
- Intermittent Stream
- Ditch
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018

Author: TDH



Commonwealth of Massachusetts

Bristol County:
City of Fall River

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS



N
W E
S

1 " = 200 '

0 100 200 300

Feet

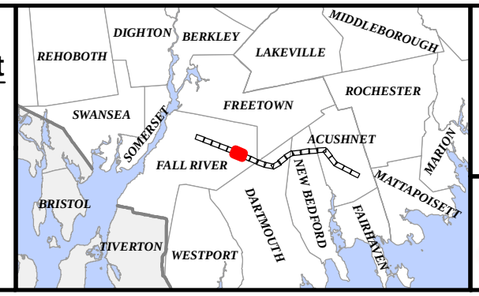
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Field GPS Survey Line (2015-2018)
- Note Road Erosion
- Observed Inundation
- Wetland Border
- Isolated Wetland Border
- Mean Annual High Water Line
- Ditch
- Delineated Open Water
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
City of Fall River

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\New_114_LineWetland_Report\Figure_5_Soil_Unit_Boundaries.mxd

Copicut Reservoir

73A
Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

446C
Gloucester - Hinckley complex, rolling, very stony

Copicut Reservoir

306B
Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Copicut Wma

Massachusetts Priority Habitat ID = PH 517

Copicut Road

SD-11
Copicut River

50 51 D9 52 D10 53 D11 DP-4 54 D12 55 D13

651
Udorthents, smoothed

Se Mass Bioreserve

Quaripaug Road

Se Mass Bioreserve

651
Udorthents, smoothed

Copicut River

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

446C
Gloucester - Hinckley complex, rolling, very stony

446B
Gloucester - Hinckley complex, undulating, very stony

1
Water

Copicut Reservoir

449B
Gloucester - Hinckley complex, undulating

Copicut Rd

160 ft

446C
Gloucester - Hinckley complex, rolling, very stony

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N
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1 " = 200 '

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Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Culvert
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Isolated Wetland Border
- Perennial Stream or River
- Mean Annual High Water Line
- Delineated Open Water
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Riverfront Area
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018

Author: TDH



Commonwealth of Massachusetts

Bristol County:
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NAD 1983 UTM Zone 18N USFt

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POWER ENGINEERS

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

705C
Charlton-Paxton complex, 8 to 15 percent slopes, very rocky

190 ft

Copicut Wma

446C
Gloucester - Hinckley complex, rolling, very stony

446B
Gloucester - Hinckley complex, undulating, very stony

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

210 ft

Se Mass Bioreserve

220 ft

44 45 46 47 48 49

SD-8

D8

230 ft

71B
Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Copicut Wma

307B
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Massachusetts Priority Habitat ID = PH 517

312B
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Se Mass Bioreserve

307C
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

307D
Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\New_114_LineWetland_Report\Figure_5_Soil_Unit_Boundaries.mxd

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Feet

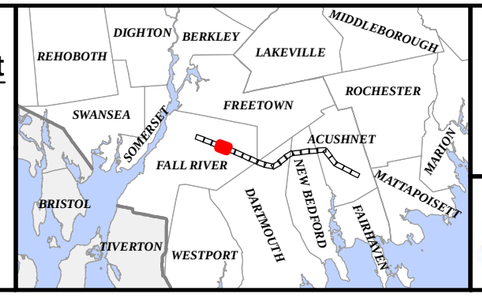
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Culvert
- Field GPS Survey Line (2015-2018)
- Wetland Border
- Intermittent Stream
- Field Delineated Wetland
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



Commonwealth of Massachusetts

Bristol County:
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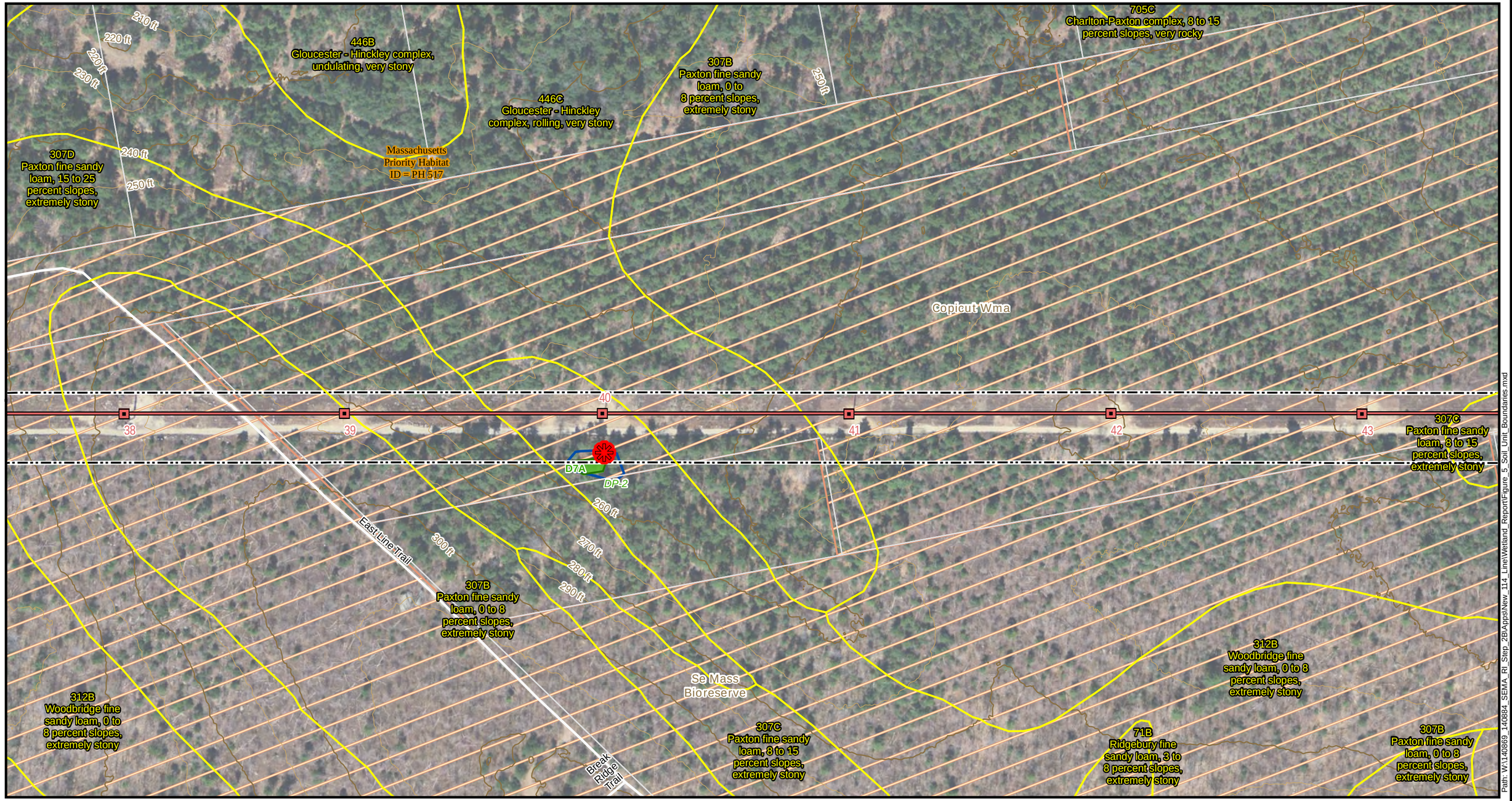

N
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1 " = 200 '

0 100 200 300

Feet

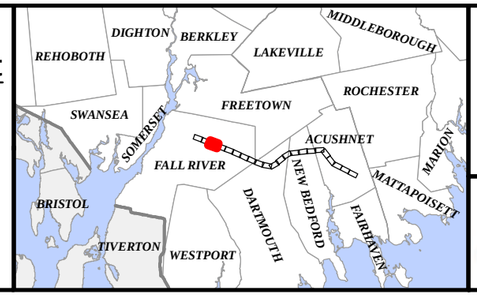
Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Isolated Wetland Border
- Field Delineated Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH



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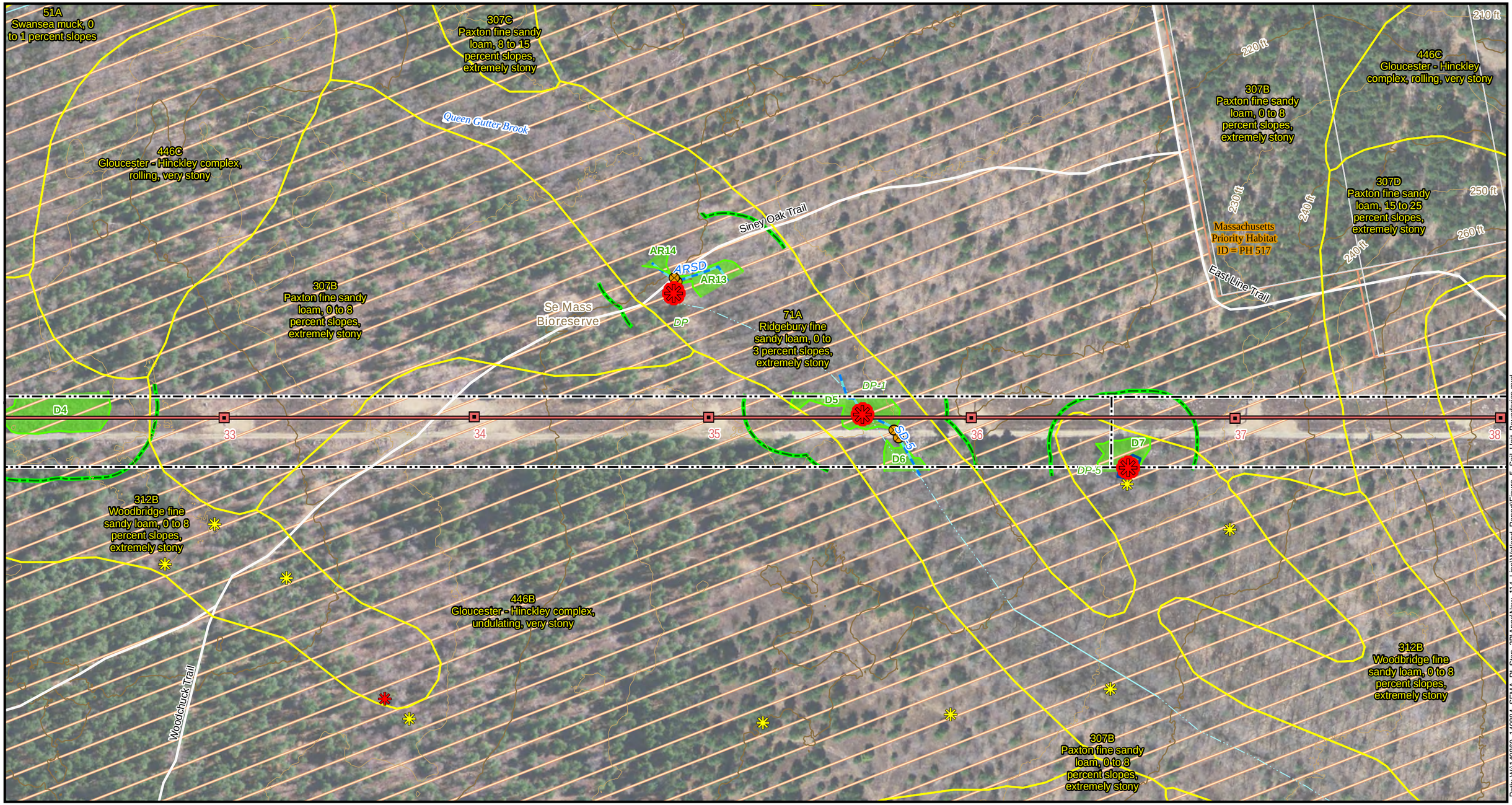
EVERSOURCE
nationalgrid
POWER ENGINEERS

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\New_114_LineWetland_Report\Figure_5_Soil_Unit_Boundaries.mxd



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N E S W

1 " = 200 '

0 100 200 300

Feet

Legend

- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Existing Right of Way
- Parcel Boundary

Field GPS Survey Point (2015-2018)

- Vernal Pool
- Culvert

Field GPS Survey Line (2015-2018)

- Observed Inundation
- Wetland Border
- Intermittent Stream
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Other Protected Lands
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018 Author: TDH

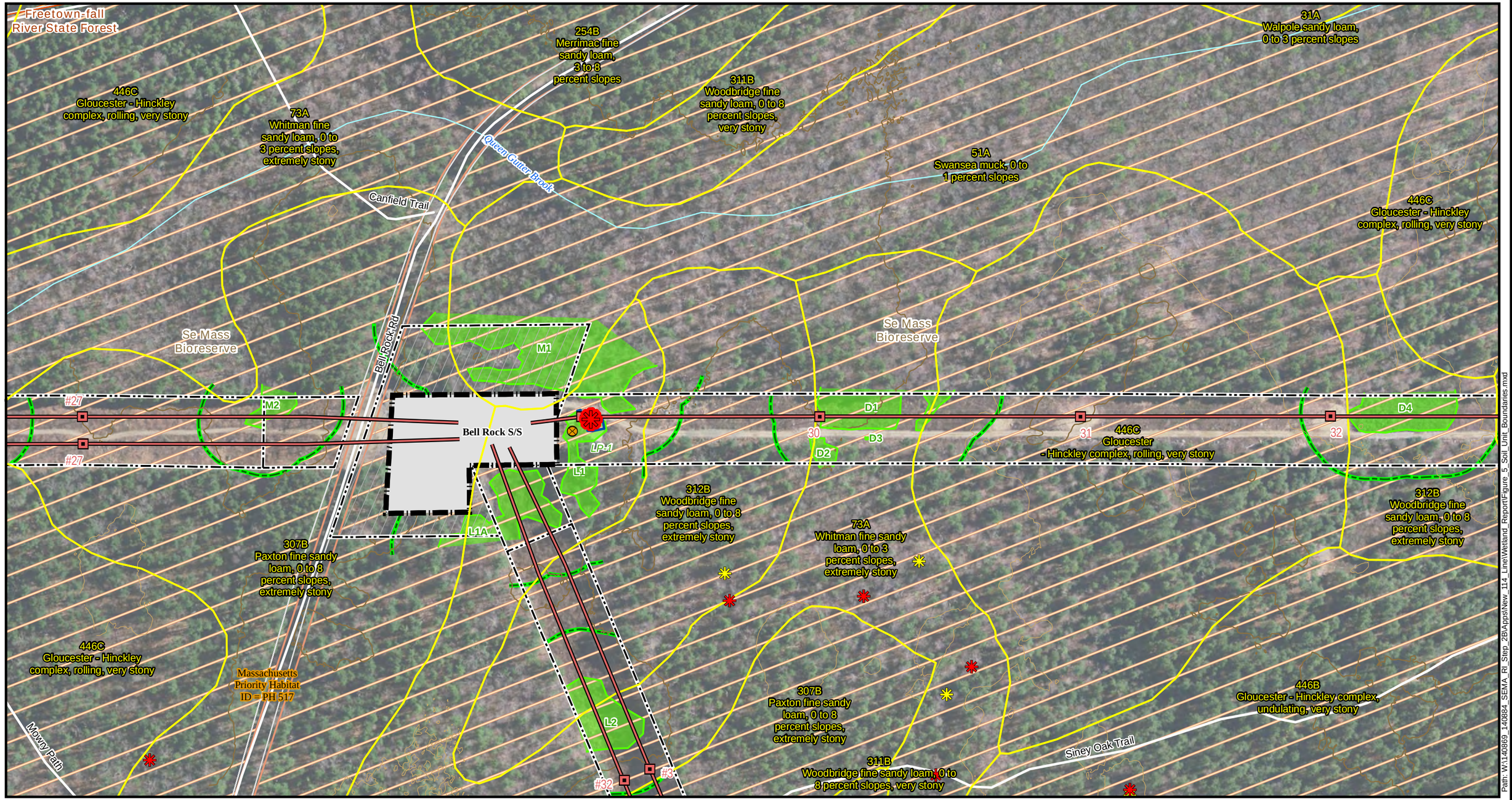


Commonwealth of Massachusetts

Bristol County:
City of Fall River

NAD 1983 UTM Zone 18N USFt

EVERSOURCE
nationalgrid
POWER ENGINEERS



N E S W

1 " = 200 '

0 100 200 300

Feet

Legend

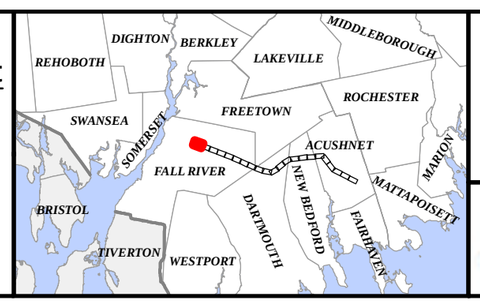
- Soil Unit Boundary
- Utility Structure
- Existing Transmission Line
- Substation or Tap
- National Grid Owned Land
- Existing Right of Way
- Parcel Boundary
- Field GPS Survey Point (2015-2018)
- Vernal Pool
- Culvert
- Field GPS Survey Line (2015-2018)
- Observed Inundation
- Wetland Border
- Field Delineated Wetland
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- 100 ft Buffer Wetland
- Priority Habitats Rare Species (MA-NHESP)
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Local Road
- Contour Line (20' Interval)
- Contour Line (10' Interval)

Acushnet to Fall River Reliability Project

Figure 5
Soil Unit Boundaries

Date: 11/12/2018

Author: TDH



Commonwealth of Massachusetts

Bristol County:
City of Fall River

NAD 1983 UTM Zone 18N USFt

EVERSOURCE

nationalgrid

POWER ENGINEERS

ATTACHMENT A EVERSOURCE WETLAND PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Site Location: D66

Photo No.	**Date:**
1	06-29-18

Direction Photo Taken:

West

Description:

Isolated Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D65

Photo No.	**Date:**
2	06-29-18

Direction Photo Taken:

South

Description:

Isolated Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D64

Photo No.	**Date:**
3	06-29-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D63

Photo No.	**Date:**
4	06-29-18

Direction Photo Taken:

Southeast

Description:

Isolated Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D62 & D61

Photo No.	**Date:**
5	-18

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D60

Photo No.	**Date:**
6	06-29-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS/PFO



PHOTOGRAPHIC LOG

Site Location: D59

Photo No.	**Date:**
7	06-29-18

Direction Photo Taken:

Southwest

Description:

Bordering Vegetated Wetland

Pond



PHOTOGRAPHIC LOG

Site Location: D58

Photo No.	**Date:**
8	06-27-18

Direction Photo Taken:

South

Description:

Bordering Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D57 & D56

Photo No.	**Date:**
9	06-27-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D55

Photo No.	**Date:**
10	06-27-18

Direction Photo Taken:

Southwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D54

Photo No.	**Date:**
11	06-27-18

Direction Photo Taken:

North

Description:

Bordering Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D53

Photo No.	**Date:**
12	06-27-18

Direction Photo Taken:

South

Description:

Bordering Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D52 & D51

Photo No.	**Date:**
13	06-26-18

Direction Photo Taken:

Southeast

Description:

Bordering Vegetated Wetlands

PSS/PEM



PHOTOGRAPHIC LOG

Site Location: D50

Photo No.	**Date:**
14	06-26-18

Direction Photo Taken:

South

Description:

Bordering Vegetated Wetland

PSS/PEM



PHOTOGRAPHIC LOG

Site Location: D49 & D48

Photo No.	**Date:**
15	06-26-18

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetlands

PSS



PHOTOGRAPHIC LOG

Site Location: D47 & D46

Photo No.	**Date:**
16	06-11-18

Direction Photo Taken:

East

Description:

Bordering Vegetated Wetlands

PSS



PHOTOGRAPHIC LOG

Site Location: D45

Photo No.	**Date:**
17	06-11-18

Direction Photo Taken:

South

Description:

Bordering Vegetated Wetland

PSS/PEM



PHOTOGRAPHIC LOG

Site Location: D44 & D43

Photo No.	**Date:**
18	06-11-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetlands

PEM/PSS



PHOTOGRAPHIC LOG

Site Location: D42

Photo No.	**Date:**
19	06-07-18

Direction Photo Taken:

Southwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D41 & D40

Photo No.	**Date:**
20	06-07-18

Direction Photo Taken:

Southwest

Description:

Bordering Vegetated Wetlands

PSS



PHOTOGRAPHIC LOG

Site Location: D39

Photo No.	**Date:**
21	-18

Direction Photo Taken:

Southwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D38

Photo No.	**Date:**
22	06-06-18

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D37

Photo No.	**Date:**
23	06-05-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D36 & D35

Photo No.	**Date:**
24	06-05-18

Direction Photo Taken:

Southwest

Description:

Bordering Vegetated Wetlands

PSS



PHOTOGRAPHIC LOG

Site Location: D34

Photo No.	**Date:**
25	05-30-18

Direction Photo Taken:

East

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D33

Photo No.	**Date:**
26	05-30-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D32 & D31

Photo No.	**Date:**
27	06-04-18

Direction Photo Taken:

Northeast

Description:

Bordering Vegetated Wetlands

PSS



PHOTOGRAPHIC LOG

Site Location: D30 & D29

Photo No.	**Date:**
28	06-01-18

Direction Photo Taken:

East

Description:

Bordering Vegetated Wetlands

PSS



PHOTOGRAPHIC LOG

Site Location: D28

Photo No.	**Date:**
29	06-01-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D27

Photo No.	**Date:**
30	05-31-18

Direction Photo Taken:

East

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D26

Photo No.	**Date:**
31	05-24-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D25

Photo No.	**Date:**
32	05-23-18

Direction Photo Taken:

Southeast

Description:

Bordering Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D24

Photo No.	**Date:**
33	05-17-18

Direction Photo Taken:

Northeast

Description:

Bordering Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D23

Photo No.	**Date:**
34	05-17-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D22

Photo No.	**Date:**
35	05-17-18

Direction Photo Taken:

South

Description:

Bordering Vegetated Wetland

PSS/PEM



PHOTOGRAPHIC LOG

Site Location: D21

Photo No.	**Date:**
36	05-11-18

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS/PEM



PHOTOGRAPHIC LOG

Site Location: D20

Photo No.	**Date:**
37	08-25-17

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



ATTACHMENT B NEP WETLAND PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Site Location: D20

Photo No.	**Date:**
1	08-25-17

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D19A

Photo No.	**Date:**
2	06-21-18

Direction Photo Taken:

North

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D19

Photo No.	**Date:**
3	08-24-17

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D18

Photo No.	**Date:**
4	08-23-17

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D17

Photo No.	**Date:**
5	08-23-17

Direction Photo Taken:

Southeast

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D16A

Photo No.	**Date:**
6	09-27-17

Direction Photo Taken:

East

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D16

Photo No.	**Date:**
7	08-23-17

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D15

Photo No.	**Date:**
8	08-17-17

Direction Photo Taken:

North

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D14

Photo No.	**Date:**
9	08-17-17

Direction Photo Taken:

North

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D13

Photo No.	**Date:**
10	08-16-17

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PEM



PHOTOGRAPHIC LOG

Site Location: D12

Photo No.	**Date:**
11	08-16-17

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PSS/PEM



PHOTOGRAPHIC LOG

Site Location: D11

Photo No.	**Date:**
12	07-21-17

Direction Photo Taken:

North

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D10

Photo No.	**Date:**
13	07-21-17

Direction Photo Taken:

West

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D9

Photo No.	**Date:**
14	07-20-17

Direction Photo Taken:

West

Description:

Isolated Vegetated Wetland

PSS/PEM



PHOTOGRAPHIC LOG

Site Location: D8

Photo No.	**Date:**
15	07-19-17

Direction Photo Taken:

South

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D7A

Photo No.	**Date:**
16	07-13-18

Direction Photo Taken:

Northwest

Description:

Isolated Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D7

Photo No.	**Date:**
17	07-19-18

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D6

Photo No.	**Date:**
18	07-13-17

Direction Photo Taken:

North

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D5

Photo No.	**Date:**
19	07-13-17

Direction Photo Taken:

Southeast

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D4

Photo No.	**Date:**
20	07-12-17

Direction Photo Taken:

East

Description:

Isolated Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D3

Photo No.	**Date:**
21	07-11-17

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: D2

Photo No.	**Date:**
22	07-11-18

Direction Photo Taken:

Northwest

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: D1

Photo No.	**Date:**
23	06-29-17

Direction Photo Taken:

Northeast

Description:

Bordering Vegetated Wetland

PSS



PHOTOGRAPHIC LOG

Site Location: L1

Photo No.	**Date:**
24	09-08-17

Direction Photo Taken:

East

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location: M1

Photo No.	**Date:**
25	09-08-17

Direction Photo Taken:

North

Description:

Bordering Vegetated Wetland

PFO



PHOTOGRAPHIC LOG

Site Location:

Photo No.	**Date:**
26	

Direction Photo Taken:

Description:

ATTACHMENT C EVERSOURCE USACE WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D21
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.710217 Long: -71.009088 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID: _____	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Four-toed salamander in soil pit.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **4**	
Water Table Present?	Yes **X** No _____	Depth (inches): **8**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **8**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D21**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2. *Spiraea alba*	5	No	FACW
3.			
4.			
5.			
6.			
7.			
	35 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Andropogon glomeratus*	55	Yes	FACW
2. *Juncus effusus*	15	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**15**	x 1 =	**15**	
FACW species	**60**	x 2 =	**120**	
FAC species	**30**	x 3 =	**90**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**105**	(A)	**225**	(B)

Prevalence Index = B/A = **2.14**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Osmundastrum cinnamomeum beginning to emerge.

Species within the Sapling/Shrub stratum which have less than 5% cover include Vaccinium corymbosum.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Osmundastrum cinnamomeum, Vaccinium corymbosum, Rubus hispidus, Solidago rugosa, and Smilax rotundifolia.

SOIL

Sampling Point: **WET-D21**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10.5			None	—	—	—	Oa	
10.5-14	10YR 3/1	100	None	—	—	—	Oa, SiL	gravels at 65%
								Layer of gravel at the bottom

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- **X** Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D21
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.710300 Long: -71.009305 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D21**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rubus flagellaris*	30	Yes	FACU
2. *Lyonia ligustrina*	25	Yes	FACW
3. *Pinus strobus*	15	Yes	FACU
4. *Clethra alnifolia*	5	No	FAC
5.			
6.			
7.			
	75 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Andropogon glomeratus*	65	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**90**	x 2 =	**180**	
FAC species	**5**	x 3 =	**15**	
FACU species	**45**	x 4 =	**180**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**140**	(A)	**375**	(B)

Prevalence Index = B/A = **2.68**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Vaccinium corymbosum, Ilex opaca, Spiraea alba.

Species within the Herbaceous stratum which have less than 5% cover include: Betula populifolia, Dichanthelium clandestinum, Solidago rugosa, Rubus flagellaris.

Much of last years Grass is still present. Based upon this, estimated Andropogon glomeratus as dominant.

Grass sp. has no seed head to properly identify, 30% cover in Herb stratum.

SOIL

Sampling Point: **UPL-D21**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100	None	—	—	—	SiL	
2-3	10YR 2/1	100	None	—	—	—	SiL	
3-6	10YR 4/2	100	None	—	—	—	SaL	gravels at 15%
6-13	7.5YR 4/6	100	None	—	—	—	SaL	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 15

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/17/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D22
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.708621 Long: -71.004015 Datum: WGS-84
Soil Map Unit Name: Swansea muck, 0 to 1 percent slopes NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **15**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **10**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

Perennial stream (SD22), which is the Shingle Island River is ~ 8 ft from plot .

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D22**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Calamagrostis canadensis*	70	Yes	OBL
2. *Comarum palustre*	5	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**75**	x 1 =	**75**	
FACW species	**0**	x 2 =	**0**	
FAC species	**5**	x 3 =	**15**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**80**	(A)	**90**	(B)

Prevalence Index = B/A = **1.13**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Shrub/Sapling stratum which have less than 5% cover include: Acer rubrum, Vaccinium corymbosum, Viburnum sp.

Species within the Herbaceous stratum which have less than 5% cover include: Maianthemum canadense, Typha latifolia. In herbaceous stratum, Carex sp. and Solidago sp. each had 5% cover, no seed heads to properly identify.

Species within the Woody Vine stratum which have less than 5% cover include: Vitis labrusca .

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D22**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Oe	
3-6	2.5Y 3/1	100	None	—	—		SaL	Sand pockets
6-9	2.5Y 2.5/1	100	None	—	—	—	SiL	No coarse fragments
9-11							Oa	Buried organics
11-20	10YR 2/1						Lsa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- **x** Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/17/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D22-D23
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 10-15
Subregion (LRR or MLRA): LRR R Lat: 41.708226 Long: -71.003334 Datum: WGS-84
Soil Map Unit Name: Swansea coarse sand, 0 to 2 percent slopes NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

On side of the road and on top of hillside.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D22-D23**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	70	Yes	FACU
2. *Acer rubrum*	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	45	Yes	FACU
2. *Acer rubrum*	25	Yes	FAC
3. *Viburnum dentatum*	15	No	FAC
4. *Clethra alnifolia*	10	No	FAC
5.			
6.			
7.			
	95	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Pinus strobus*	5	Yes	FACU
2. *Gaultheria procumbens*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**70**	x 3 =	**210**
FACU species	**125**	x 4 =	**500**
UPL species	**0**	x 5 =	**0**
Column Totals:	**195** (A)		**710** (B)

Prevalence Index = B/A = **3.64**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Herbaceous stratum which have less than 5% cover include: Toxicodendron radicans, Maianthemum canadense, Parthenocissus quinquefolia.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia and Parthenocissus quinquefolia.

SOIL

Sampling Point: **UPL-D22-D23**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100	None	—	—	—	LSa	Some organics mixed in
2-12	2.5Y 5/6	100	None	—	—	—	Sa	gravels at 55%
12-16	2.5Y 5/4	100	None	—	—	—	Sa	gravels at 55%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Potential fill for the road.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/17/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D23
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.708495 Long: -71.003447 Datum: WGS-84
Soil Map Unit Name: Swansea coarse sand, 0 to 2 percent slopes NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches):	**2**
Water Table Present?	Yes **X** No _____	Depth (inches):	**9**
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches):	**4**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Contains intermittent stream SD23 and pernnial stream SD23A.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D23**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Acer rubrum*	40	Yes	FAC
2. *Spiraea alba*	35	Yes	FACW
3. *Salix discolor*	15	No	FACW
4.			
5.			
6.			
7.			
	90 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus hispidus*	35	Yes	FACW
2. *Comarum palustre*	20	Yes	OBL
3. *Acer rubrum*	10	No	FAC
4. *Juncus effusus*	10	No	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**30**	x 1 =	**30**
FACW species	**85**	x 2 =	**170**
FAC species	**50**	x 3 =	**150**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**165** (A)		**350** (B)

Prevalence Index = B/A = **2.12**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Betula populifolia and Viburnum macrocarpon.

Solidago sp. had 10% cover in herb stratum, no flower available to properly identify.

SOIL

Sampling Point: **WET-D23**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Oa	
2-3	2.5Y 5/2	100	None	—	—	—	SiL	
3-5	5Y 6/2	98	5YR 4/6	2	C	RC	VF SaL	
5-16	2.5Y 4/2	100	None	—	—	—	Lsa	gravels at 65%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/17/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D24
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Pond Fringe Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.708654 Long: -71.003270 Datum: WGS-84
Soil Map Unit Name: Pits - Udorthents complex, gravelly NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **Yes** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches):	**8**
Water Table Present?	Yes **X** No _____	Depth (inches):	**0 in**
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches):	**0 in**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

3-8" of standing water along pond (vegetated) edge.

Appears to be impounded pond, possible farm pond.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D24**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Salix discolor*	40	Yes	FACW
2. *Acer rubrum*	20	Yes	FAC
3. *Morella caroliniensis*	10	No	FAC
4. *Spiraea alba*	5	No	FACW
5.			
6.			
7.			
	75 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Onoclea sensibilis*	80	Yes	FACW
2. *Phragmites australis*	40	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	120.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**165**	x 2 =	**330**	
FAC species	**30**	x 3 =	**90**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**195**	(A)	**420**	(B)

Prevalence Index = B/A = **2.15**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Betula populifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Spiraea alba and Solidago sp.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D24**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Oi	decomposing Phragmites australis
1-3	10YR 3/2	100	None	—	—	—	Mucky SiL	
3-8	2.5YR 4/2	100	None	—	—	—	SaL	gravels at 35%
8-10	2.5Y 6/2	100	None	—	—	—	Fine SaL	gravels at 35%
10-16	10YR 4/2	100	None	—	—	—	LSa	gravels at 65%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- **X** 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/17/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D24
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.708681 Long: -71.003378 Datum: WGS-84
Soil Map Unit Name: Pits - Udorthents complex, gravelly NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D24**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	15	Yes	FACU
2. *Elaeagnus umbellata*	10	Yes	FACU
3. *Spiraea alba*	7	Yes	FACW
4.			
5.			
6.			
7.			
	32 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus hispidus*	55	Yes	FACW
2. *Comarum palustre*	20	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**20**	x 1 =	**20**	
FACW species	**62**	x 2 =	**124**	
FAC species	**0**	x 3 =	**0**	
FACU species	**25**	x 4 =	**100**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**107**	(A)	**244**	(B)

Prevalence Index = B/A = **2.28**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Prunus sp.

Species within the Herbacious stratum which have less than 5% cover include: Solidago rugosa, Spiraea alba, Achillea millefolium, Celastrus orbiculatus.

Grass sp. 35% cover in herb stratum; no seed head unable to properly identify.

SOIL

Sampling Point: **UPL-D24**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100	None	—	—	—	SaL	gravels at 35%
3-5	2.5Y 5/3	100	None	—	—	—	LSa	gravels at 20%
5-13	2.5Y 5/3	80	10YR 6/6	20			FSa	gravels at 5%
13-18	2.5Y 6/3	97	7.5YR 5/8	3	RM	M	VFSa	gravels at 2%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

No signs of hydrology, soil is not saturated and no water table.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/23/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D25
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.707591 Long: -70.999324 Datum: WGS-84
Soil Map Unit Name: Hinckley loamy sand, 0 to 3 percent slopes NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **3**	
Water Table Present?	Yes **X** No _____	Depth (inches): **4**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water seeping into pit at ~4 in and rising.

Perennial streams (SD25 and SD25A) flow through this wetland polygon.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D25**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Juncus effusus*	35	Yes	OBL
2. *Onoclea sensibilis*	25	Yes	FACW
3. *Thelypteris palustris*	15	No	FACW
4. *Typha latifolia*	15	No	OBL
5. *Phragmites australis*	10	No	FACW
6. *Impatiens capensis*	5	No	FACW
7. *Solidago rugosa*	5	No	FAC
8. *Comarum palustre*	5	No	OBL
9.			
10.			
11.			
12.			
	115.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**55**	x 1 =	**55**	
FACW species	**55**	x 2 =	**110**	
FAC species	**5**	x 3 =	**15**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**115**	(A)	**180**	(B)

Prevalence Index = B/A = **1.57**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Salix discolor and Vaccinium corymbosum.

Species within the Herbaceous stratum which have less than 5% cover include: Salix sp and Carex sp.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D25**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Oe	
3-22							Oa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- **X** Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/23/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D25
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 5-10
Subregion (LRR or MLRA): LRR R Lat: 41.707657 Long: -70.999437 Datum: WGS-84
Soil Map Unit Name: Hinckley loamy sand, 0 to 3 percent slopes NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D25**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Fallopia japonica*	60	Yes	FACU
2. *Urtica dioica*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**5**	x 3 =	**15**
FACU species	**60**	x 4 =	**240**
UPL species	**0**	x 5 =	**0**
Column Totals:	**65** (A)		**255** (B)

Prevalence Index = B/A = **3.92**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Grass sp.

Species within the Woody Vine stratum which have less than 5% cover include: Vitis labrusca

SOIL

Sampling Point: **UPL-D25**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100	None	—	—		SaL	gravels at 15%
3-5	10YR 2/2	100	None	—	—	—	SiL	some organics mixed in
5-12	10YR 4/3	100	None	—	—	—	LSa	gravels at 50%
12-16	10YR 2/2	100	None	—	—	—	LSa	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/24/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D26
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.707646 Long: -70.987691 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **11**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **9**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Surface water is present in small isolated pockets about 1-2 in.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D26**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea alba*	40	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	40 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Spiraea alba*	10	Yes	FACW
2. *Eutrochium maculatum*	5	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**5**	x 1 =	**5**	
FACW species	**50**	x 2 =	**100**	
FAC species	**0**	x 3 =	**0**	
FACU species	**5**	x 4 =	**20**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**60**	(A)	**125**	(B)

Prevalence Index = B/A = **2.08**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Acer rubrum.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Thelypteris palustris, Onoclea sesibilis, Juncus effusus.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

Carex sp. ~ 30% cover in herb stratum. No seed head to properly identify.

SOIL

Sampling Point: **WET-D26**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Oi	
2-4	10YR 2/1	100	None	—	—	—	Mucky SiL	
4-10	5Y 6/1	95	7.5YR 4/6	5	C	RC,M	LFSa	gravels at 25% Large sized gravel
10-16							Oab	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- **X** Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/24/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D26
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.707763 Long: -70.987629 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

Pockets of PSS in plot.

Edge of briars and hemlock/pine/maple/ forest.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D26**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	35	Yes	FACU
2. *Pinus strobus*	15	Yes	FACU
3. *Acer rubrum*	10	No	FAC
4. *Quercus alba*	10	No	FACU
5.			
6.			
7.			
	70	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Sassafras albidum*	15	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	15	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Maianthemum canadense*	20	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	40	Yes	FAC
2.			
3.			
4.			
	40	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **20%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**50**	x 3 =	**150**
FACU species	**95**	x 4 =	**380**
UPL species	**0**	x 5 =	**0**
Column Totals:	**145** (A)		**530** (B)

Prevalence Index = B/A = **3.66**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Kalmia latifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Sassafras albidum, Pinus strobus, Ilex opaca, Prunus serotina, Kalmia latifolia, Trientalis sp.

SOIL

Sampling Point: **UPL-D26**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-10	10YR 2/1	100					FSaL	
10-16	10YR 4/3	100					LFSa	gravels at 25%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/31/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D27
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.708251 Long: -70.985986 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	**X** Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)	
X High Water Table (A2)	___ Aquatic Fauna (B13)	___ Surface Soil Cracks (B6)	
X Saturation (A3)	___ Marl Deposits (B15)	**X** Drainage Patterns (B10)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	___ Moss Trim Lines (B16)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	___ Dry-Season Water Table (C2)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	___ Crayfish Burrows (C8)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Saturation Visible on Aerial Imagery (C9)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	___ Stunted or Stressed Plants (D1)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	**X** Geomorphic Position (D2)	
___ Sparsely Vegetated Concave Surface (B8)		___ Shallow Aquitard (D3)	
		___ Microtopographic Relief (D4)	
		X FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **5**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Intermittent stream SD27 flows through this wetland polygon.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D27**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	55	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	55 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	10	Yes	FAC
2. *Juncus effusus*	10	Yes	OBL
3. *Carex intumescens*	5	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	15	Yes	FAC
2.			
3.			
4.			
	15 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**10**	x 1 =	**10**
FACW species	**5**	x 2 =	**10**
FAC species	**80**	x 3 =	**240**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**95** (A)		**260** (B)

Prevalence Index = B/A = **2.74**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Vaccinium macrocarpon, Spiraea tomentosa, Rhododendrom canadense.

Species within the Herbaceous stratum which have less than 5% cover include: Dicanthelium clandestinum, Smilax rotundifolia, Grass sp.

Trees not present; maintained ROW.

Spaghnum moss percent cover in herb plot is 55%.

SOIL

Sampling Point: **WET-D27**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9							Oi	
9-12							Oa	Cobbles at 10%
12-18	10YR 4/2	90	2.5Y 5/2	10	D	M	Lsa	Gravels at 65%, Cobbles at 5%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- **X** Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/31/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D27
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 5-10
Subregion (LRR or MLRA): LRR R Lat: 41.708190 Long: -70.986105 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D27**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Acer rubrum*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago uliginosa*	10	Yes	OBL
2. *Smilax rotundifolia*	10	Yes	FAC
3. *Carex intumescens*	5	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	20	Yes	FAC
2.			
3.			
4.			
	20 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**10**	x 1 =	**10**	
FACW species	**5**	x 2 =	**10**	
FAC species	**35**	x 3 =	**105**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**50**	(A)	**125**	(B)

Prevalence Index = B/A = **2.50**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea alba.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Sassafras albidum, Dichanthelium clandestinum, Carex scoparia.

SOIL

Sampling Point: **UPL-D27**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-5	10YR 2/1	100	None	—	—	—	SiL	
5-6	2.5Y 4/1	100	None	—	—	—	SaL	gravels at 15%
6-8	10YR 3/6	100	None	—	—	—	SaL	gravels at 35%
8-11	10YR 5/6	100	None	—	—	—	LFSa	gravels at 35%, cobbles at 5%
11-14	2.5Y 6/3	100	None	—	—	—	LFSa	gravels at 25%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 06/01/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D28
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.711816 Long: -70.979993 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **5**	
Water Table Present?	Yes **X** No _____	Depth (inches): **4**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Two pockets of standing water in the plot.

Water table at 9 in. and rising, water seeping into pit at ~4 in.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D28**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	35	Yes	FACW
2. *Spiraea alba*	20	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	55 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Panicum virgatum*	35	Yes	FAC
2. *Carex lurida*	15	Yes	OBL
3. *Juncus effusus*	10	No	OBL
4. *Rubus hispidus*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**25**	x 1 =	**25**
FACW species	**60**	x 2 =	**120**
FAC species	**35**	x 3 =	**105**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**120** (A)		**250** (B)

Prevalence Index = B/A = **2.08**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Vaccinium corymbosum, Salix bebbiana, Clethra alnifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Solidago sp. and Carex pensylvanica.

Trees not present; maintained ROW.

Spaghnum moss ~70% cover in herb plot.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia

SOIL

Sampling Point: **WET-D28**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Oi	
3-6							Oe	
6-14	2.5Y 3/2	85	2.5Y 3/2	10	D	M	SiL	Oxidized root channels are in depletions
			7.5YR 4/6	5	C	RC		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Cobble

Depth (inches): 14

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 06/01/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D28
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 5-10
Subregion (LRR or MLRA): LRR R Lat: 41.711935 Long: -70.979816 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D28**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Quercus alba*	20	Yes	FACU
2. *Pinus strobus*	15	Yes	FACU
3. *Acer rubrum*	15	Yes	FAC
4.			
5.			
6.			
7.			
	50	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Smilax rotundifolia*	25	Yes	FAC
2. *Andropogon glomeratus*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	35	Yes	FAC
2.			
3.			
4.			
	35	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**10**	x 2 =	**20**
FAC species	**75**	x 3 =	**225**
FACU species	**35**	x 4 =	**140**
UPL species	**0**	x 5 =	**0**
Column Totals:	**120** (A)		**385** (B)

Prevalence Index = B/A = **3.21**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus strobus, Lyonia ligustina, Viburnum nudum.

Species within the Herbaceous stratum which have less than 5% cover include: Quercus alba, Kalmia latifolia, Pteridium aquilinum, Gaultheria procumbens, Carex sp.

Lichen in plot

Trees located on edge of the plot.

SOIL

Sampling Point: **UPL-D28**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	5YR 2.5/2	100	None	—	—	—	SiL	Organics mixed in
4-7	5YR 2.5/1	100	None	—	—	—	SiL	Cobbles at 10%
7-12	7.5YR 2.5/1	100	None	—	—	—	LSa	Cobbles at 10%
12-18	5YR 3/4	100	None	—	—	—	LSa	Cobbles at 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 06/01/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D29-D30
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.714316 Long: -70.974703 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D29-D30**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vaccinium corymbosum*	35	Yes	FACW
2. *Clethra alnifolia*	20	Yes	FAC
3. *Rubus allegheniensis*	5	No	FACU
4.			
5.			
6.			
7.			
	60 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Carex echinata*	25	Yes	OBL
2. *Andropogon glomeratus*	15	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Smilax rotundifolia*	30	Yes	FAC
2.			
3.			
4.			
	30 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**25**	x 1 =	**25**
FACW species	**50**	x 2 =	**100**
FAC species	**50**	x 3 =	**150**
FACU species	**5**	x 4 =	**20**
UPL species	**0**	x 5 =	**0**
Column Totals:	**130** (A)		**295** (B)

Prevalence Index = B/A = **2.27**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Kalmia latifolia and Lyonia ligustina.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Clethra alnifolia, Carex intumescens.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D29-D30**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/1	100	None	—	—	—	SiL	Organics mixed in
3-8	10YR 2/1	100	None	—	—	—	SiL	Coarse woody debris mixed in
8-16	2.5Y 6/1	97	7.5YR 4/6	3	C	PL/M	Lsa	gravels at 25%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

Soil is not currently saturated.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 06/01/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D29-D30
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.714330 Long: -70.974560 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D29-D30**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	30	Yes	FACU
2. *Acer rubrum*	10	Yes	FAC
3. *Quercus rubra*	5	No	FACU
4.			
5.			
6.			
7.			
	45	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rubus allegheniensis*	20	Yes	FACU
2. *Clethra alnifolia*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	25	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Smilax rotundifolia*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	20	Yes	FAC
2.			
3.			
4.			
	20	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**0**	x 2 =	**0**	
FAC species	**50**	x 3 =	**150**	
FACU species	**55**	x 4 =	**220**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**105**	(A)	**370**	(B)

Prevalence Index = B/A = **3.52**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Herbaceous stratum which have less than 5% cover include: Andropogon glomeratus, Ilex opaca, Acer rubrum, Spiraea alba, Maianthemum canadensis, Lysimachia borealis, Rubus allegheniensis, Solidago uliginosa.

SOIL

Sampling Point: **UPL-D29-D30**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5							Organic	
5-10	10YR 2/1	100	None	—	—	—	SaL	gravels at 25%
10-12	10YR 5/2	100	None	—	—	—	LSa	gravels at 35%
12-17	10YR 4/3	100	None	—	—	—	LSa	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 06/04/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D31-D32
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.716174 Long: -70.971538 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **1**	
Water Table Present?	Yes **X** No _____	Depth (inches): **1**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **1**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

There has been over 1 inch of rain since the morning

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D31-D32**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium oxycoccos*	35	Yes	OBL
2. *Salix bebbiana*	10	No	FACW
3. *Lyonia ligustrina*	10	No	FACW
4. *Vaccinium corymbosum*	5	No	FACW
5.			
6.			
7.			
	60 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus hispidus*	20	Yes	FACW
2. *Potentilla simplex*	15	Yes	FACU
3. *Solidago uliginosa*	10	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**45**	x 1 =	**45**	
FACW species	**45**	x 2 =	**90**	
FAC species	**0**	x 3 =	**0**	
FACU species	**15**	x 4 =	**60**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**105**	(A)	**195**	(B)

Prevalence Index = B/A = **1.86**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Clethra alnifolia, Acer rubrum.

Species within the Herbaceous stratum which have less than 5% cover include: Smilax rotundifolia, Andropogon golmeratus, Acer rubrum, Drosera sp.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

Trees not present; maintained ROW.

15% cover of spaghnum moss in herb stratum.

SOIL

Sampling Point: **WET-D31-D32**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Oi	
1-6	10YR 2/2	100	None	—	—	—	SiL	gravels at 60%
6-9	2.5Y 5/2	85	2.5Y 3/1	15	D	M	LSa	
9-13	2.5Y 6/2	95	7.5YR 4/6	5	C	PL	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 06/04/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D31-D32
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.716173 Long: -70.971413 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

There is a water table and saturation at a 13-inch depth from the soil surface.

There has been over a 1 inch of rain falling this morning.

0

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D31-D32**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Clethra alnifolia*	55	Yes	FAC
2. *Kalmia angustifolia*	15	No	FAC
3. *Vaccinium corymbosum*	5	No	FACW
4. *Rubus allegheniensis*	30	Yes	FACU
5.			
6.			
7.			
	105 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus allegheniensis*	20	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Smilax rotundifolia*	25	Yes	FAC
2.			
3.			
4.			
	25 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**5**	x 2 =	**10**
FAC species	**95**	x 3 =	**285**
FACU species	**50**	x 4 =	**200**
UPL species	**0**	x 5 =	**0**
Column Totals:	**150** (A)		**495** (B)

Prevalence Index = B/A = **3.30**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Vaccinium corymbosum, Smilax rotundifolia, Rubus flagellaris.

Lichen cover in herb stratum is less than 5%

Carex pensylvanica had 35% cover in the Herb stratum. The wetland indicator status is Not Classified.

SOIL

Sampling Point: **UPL-D31-D32**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7							Organic	
7-10	10YR 2/1	100	None	—	—	—	SaL	Organics mixed in, gravels at 35%
10-14	2.5Y 4/2	100	None	—	—	—	SaL	gravels at 50%
14-18	10YR 4/2	100	None	—	—	—	SaL	gravels at 70%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Stone in upper 12 inches of soil.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/30/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D33
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.717335 Long: -70.969705 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X**	No _____	Depth (inches): **3**	
Water Table Present?	Yes **X**	No _____	Depth (inches): **7**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table at 11 inches, water seeping into pit at 7 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D33**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Lyonia ligustrina*	20	Yes	FACW
2. *Pinus strobus*	5	No	FACU
3. *Vaccinium corymbosum*	5	No	FACW
4.			
5.			
6.			
7.			
	30 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Andropogon glomeratus*	35	Yes	FACW
2. *Vaccinium corymbosum*	15	Yes	FACW
3. *Pinus strobus*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**75**	x 2 =	**150**	
FAC species	**0**	x 3 =	**0**	
FACU species	**10**	x 4 =	**40**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**85**	(A)	**190**	(B)

Prevalence Index = B/A = **2.24**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea alba.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Potentilla palustris, Lyonia ligustrina, Spiraea alba, Kalmia latifolia.

Sphagnum moss cover ~20%.

Solidago sp. and Grass sp. each had 5% cover in the herb stratum.

SOIL

Sampling Point: **WET-D33**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Oi	
2-4	10YR 3/1	100	None	—	—	—	LSa	gravels at 20%
4-7	2.5Y 5/2	100	None	—	—	—	FSa	gravels at 20%
7-16	10YR 4/2	100	None	—	—	—	LSa	Pocket of Oa - 5%, gravel at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/30/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D33
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.717378 Long: -70.969729 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

A water table was observed at an 18-inch depth from the soil surface.

Soil saturation was observed at a 15-inch depth from the soil surface.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D33**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	25	Yes	FAC
2. *Pinus strobus*	10	Yes	FACU
3. *Quercus alba*	5	No	FACU
4.			
5.			
6.			
7.			
	40	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	70	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Vaccinium corymbosum*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**20**	x 2 =	**40**	
FAC species	**25**	x 3 =	**75**	
FACU species	**15**	x 4 =	**60**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**60**	(A)	**175**	(B)

Prevalence Index = B/A = **2.92**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Shrub/Sapling stratum which have less than 5% cover include: Clethra alnifolia and Lyonia ligustrina.

Species within the Herb stratum which have less than 5% cover include: Andropogon glomeratus, Smilax rotundifolia, Pinus strobus, Spiraea alba, Pteridium aquilinum, Quercus ilicifolia, Solidago sp.

Site of former tree cutting.

Trees on edge of ROW.

SOIL

Sampling Point: **UPL-D33**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	
4-8	10YR 2/1	100	None	—	—	—	SiL	gravels at 15%
8-10	2.5Y 5/2	100	None	—	—	—	LFSa	
10-12	7.5YR 2.5/3	100	None	—	—	—	SaL	gravels at 15%
12-19	10YR 4/6	100	None	—	—	—	SaL	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/30/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D34
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.717111 Long: -70.969564 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches):	**0.5**
Water Table Present?	Yes **X** No _____	Depth (inches):	**10**
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches):	**9**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

ATV/Tire ruts in various sections of the wetland.

Water seeping into pit at ~10 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D34**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	45	Yes	FAC
2. *Spiraea tomentosa*	30	Yes	FACW
3. *Rubus allegheniensis*	5	No	FACU
4.			
5.			
6.			
7.			
	80 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Juncus effusus*	15	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**15**	x 1 =	**15**	
FACW species	**30**	x 2 =	**60**	
FAC species	**45**	x 3 =	**135**	
FACU species	**5**	x 4 =	**20**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**95**	(A)	**230**	(B)

Prevalence Index = B/A = **2.42**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Carex sp. had 20% cover in the herb stratum.

Species within the Herbaceous stratum which have less than 5% cover include: Clethra alnifolia, Smilax rotundifolia, Solidago rugosa, Dichanthelium clandestinum, Euthamia graminifolia, Juncus sp., Rubus allegheniensis.

SOIL

Sampling Point: **WET-D34**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Oa	
2-10	2.5Y 5/2	65	7.5YR 4/4	5	C	RC	SaL	gravels at 30%, cobbles at 10%
	10YR 2/1	30					LSa	
10-16	2.5Y 5/2	100	None	—	—	—	LFSa	gravels at 30%, cobbles at 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 05/30/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D34
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: Long: Datum: WGS-85
Soil Map Unit Name: NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No **X**	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No **X**	
Wetland Hydrology Present?	Yes	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? **Yes** **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D34**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	25	Yes	FACU
2. *Quercus alba*	20	Yes	FACU
3. *Acer rubrum*	20	Yes	FAC
4.			
5.			
6.			
7.			
	65	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	35	Yes	FAC
2. *Vaccinium corymbosum*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	45	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Rubus flagellaris*	10	Yes	FACU
2. *Potentilla simplex*	5	Yes	FACU
3. *Trientalis borealis*	5	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **8** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**10**	x 2 =	**20**
FAC species	**60**	x 3 =	**180**
FACU species	**60**	x 4 =	**240**
UPL species	**0**	x 5 =	**0**
Column Totals:	**130** (A)		**440** (B)

Prevalence Index = B/A = **3.38**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Shrub/Sapling stratum which have less than 5% cover include: Sassafras albidum and Rubus allegheniensis.

Species within the Herbaceous stratum which have less than 5% cover include: Sassafras albidum, Vaccinium angustifolium, Betula populifolia, Prunus serotina.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

SOIL

Sampling Point: **UPL-D34**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	
4-7	10YR 2/1	100	None	—	—	—	SiL	gravels at 5%
7-10	7.5YR 3/3	100	None	—	—	—	SiL	gravels at 5%
10-14	7.5YR 5/6	100	None	—	—	—	LFSa	cobbles at 10%, gravels at 5%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/05/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D35-D36
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.718064 Long: -70.962936 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches):	**2**
Water Table Present?	Yes **X** No _____	Depth (inches):	**8**
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches):	**0**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table rising, water seeping into pit at 8 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D35-D36**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2. *Spiraea tomentosa*	5	No	FACW
3.			
4.			
5.			
6.			
7.			
	35 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Parathelypteris simulata*	20	Yes	FACW
2. *Calamagrostis canadensis*	15	Yes	OBL
3. *Carex stricta*	5	No	OBL
4. *Thelypteris palustris*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	10	Yes	FAC
2.			
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**20**	x 1 =	**20**	
FACW species	**30**	x 2 =	**60**	
FAC species	**40**	x 3 =	**120**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**90**	(A)	**200**	(B)

Prevalence Index = B/A = **2.22**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Herbaceous stratum which have less than 5% cover include: Spiraea tomentosa, Typha latifolia, Onoclea sensibilis.

Sphagnum moss cover in herb stratum is ~ 20%.

SOIL

Sampling Point: **WET-D35-D36**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Oi	
2-12							Oa	
12-18	5Y 5/1	100	None	—	—	—	gravels at 80%	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/05/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D35-D36
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.718161 Long: -70.962817 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D35-D36**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rosa multiflora*	30	Yes	FACU
2. *Spiraea tomentosa*	15	Yes	FACW
3. *Rubus allegheniensis*	15	Yes	FACU
4.			
5.			
6.			
7.			
	60 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Dichanthelium clandestinum*	55	Yes	FACW
2. *Solidago rugosa*	15	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**70**	x 2 =	**140**	
FAC species	**15**	x 3 =	**45**	
FACU species	**45**	x 4 =	**180**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**130**	(A)	**365**	(B)

Prevalence Index = B/A = **2.81**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Clethra alnifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Juncus effusus, Osmundastrum cinnamomeum, Grass sp.

Trees not present; maintained ROW.

SOIL

Sampling Point: **UPL-D35-D36**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 2.5/2	100	None	—	—	—	SaL	Some organics mixed im, gravels at 5%
4-16	10YR 4/2	100	None	—	—	—	LSa	Gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/05/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D37
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.718475 Long: -70.959010 Datum: WGS-84
Soil Map Unit Name: Pipestone loamy sand, 0 to 3 percent slopes NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

PFO of Acer rubrum and Pinus strobus in woods.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **3**	
Water Table Present?	Yes **X** No _____	Depth (inches): **0**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D37**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	35	Yes	FAC
2. *Spiraea tomentosa*	15	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	50 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	10	Yes	FAC
2. *Carex intumescens*	10	Yes	FACW
3. *Spiraea tomentosa*	5	No	FACW
4. *Dulichium arundinaceum*	5	No	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**5**	x 1 =	**5**	
FACW species	**30**	x 2 =	**60**	
FAC species	**45**	x 3 =	**135**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**80**	(A)	**200**	(B)

Prevalence Index = B/A = **2.50**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Shrub/Sapling stratum which have less than 5% cover include: Vaccinium corymbosum, Acer rubrum, Lyonia ligustrina.

Species within the Herbaceous stratum which have less than 5% cover include: Osmundastrum cinnamoneum and Acer rubrum.

Sphagnum moss cover in herb stratum is ~ 95%.

SOIL

Sampling Point: **WET-D37**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Oi	
4-10							Oe	
10-15	10YR 2/1	100	None	—	—	—	SiL	
15-16	10YR 3/2	100	None	—	—	—	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/05/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D37
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.718437 Long: -70.958858 Datum: WGS-84
Soil Map Unit Name: Swansea muck, 0 to 1 percent slopes NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D37**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus allegheniensis*	35	Yes	FACU
2. *Kalmia latifolia*	15	Yes	FACU
3. *Clethra alnifolia*	10	No	FAC
4. *Spiraea tomentosa*	5	No	FACW
5.			
6.			
7.			
	65 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus flagellaris*	30	Yes	FACU
2. *Rubus allegheniensis*	20	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**5**	x 2 =	**10**
FAC species	**10**	x 3 =	**30**
FACU species	**100**	x 4 =	**400**
UPL species	**0**	x 5 =	**0**
Column Totals:	**115** (A)		**440** (B)

Prevalence Index = B/A = **3.83**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Quercus ilicifolia, Pinus strobus, Ilex opaca, Vaccinium corymbosum.

Species within the Herbaceous stratum which have less than 5% cover include: Ilex opaca and Lysimachia quadrifolia.

Carex pensylvanica had 45% cover in the herb stratum, but the wetland indicator status is Not Classified.

SOIL

Sampling Point: **UPL-D37**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 2.5/1	100	None	—	—	—	SiL	gravels at 5%
3-9	10YR 4/2	100	None	—	—	—	FSa	gravels at 5%
9-11	10YR 2/1	100	None	—	—	—	SiL	gravels at 15%
11-16	5YR 3/2	100	None	—	—	—	LSa	very compact horizon

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

11-16 horizon appears to be rock weathering. Very compact, breaks down, some staining.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/06/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D38
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Flat Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.718748 Long: -70.956889 Datum: WGS-84
Soil Map Unit Name: Sudbury fine sandy loam, 0 to 3 percent slopes NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **Yes** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **6**	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Plot is located on the narrow floodplain of SD38 (perennial).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D38**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Salix bebbiana*	35	Yes	FACW
2. *Clethra alnifolia*	25	Yes	FAC
3. *Acer rubrum*	10	No	FAC
4. *Rosa multiflora*	5	No	FACU
5. *Spiraea alba*	5	No	FACW
6. *Viburnum dentatum*	5	No	FAC
7.			
	85 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Carex crinita*	40	Yes	OBL
2. *Impatiens capensis*	15	Yes	FACW
3. *Clethra alnifolia*	5	No	FAC
4. *Spiraea tomentosa*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**40**	x 1 =	**40**
FACW species	**60**	x 2 =	**120**
FAC species	**45**	x 3 =	**135**
FACU species	**5**	x 4 =	**20**
UPL species	**0**	x 5 =	**0**
Column Totals:	**150** (A)		**315** (B)

Prevalence Index = B/A = **2.10**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea tomentosa.

Viburnum cassinoides had 5% cover in Sapling/shrub stratum.

SOIL

Sampling Point: **WET-D38**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10 YR 2/1	100	None	—	—	—	SiL	Organics mixed in
2-10	10YR 4/3	100	None	—	—	—	FSaL	gravels at 25%
10-16	2.5Y 4/2	100	None	—	—	—	SaL	gravels at 25%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- **X** Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

Soil is not turning out hydric. However, because wetland is in the floodplain of a perennial stream (SD38), the soil is most likely aerated and thus not likely able to produce reducing conditions.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/06/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D38
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Flat Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.718718 Long: -70.956819 Datum: WGS-84
Soil Map Unit Name: Sudbury fine sandy loam, 0 to 3 percent slopes NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D38**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Betula populifolia*	15	Yes	FAC
2. *Kalmia angustifolia*	10	Yes	FAC
3. *Pinus strobus*	5	No	FACU
4.			
5.			
6.			
7.			
	30 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus flagellaris*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**25**	x 3 =	**75**
FACU species	**10**	x 4 =	**40**
UPL species	**0**	x 5 =	**0**
Column Totals:	**35** (A)		**115** (B)

Prevalence Index = B/A = **3.29**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus rigida.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Lysimachia quadrifolia, Pteridium aquilinium, Gaultheria procumbens.

Moss and lichen present in plot.

Solidago sp. had 5% cover in the herb stratum.

SOIL

Sampling Point: **UPL-D38**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-17	10YR 5/8	100	None	—	—	—	FSaL	gravels at 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Most likely fill.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/07/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D39
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.719055 Long: -70.950589 Datum: WGS-84
Soil Map Unit Name: Scarboro mucky fine sandy loam, 0 to 3 percent slopes NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **10**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **9**	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Tire ruts in wetland.

Water table at 12 inches and rising; Water is seeping into the pit at 10 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D39**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	30	Yes	FACW
2. *Kalmia angustifolia*	10	Yes	FAC
3. *Spiraea alba*	10	Yes	FACW
4.			
5.			
6.			
7.			
	50 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Calamagrostis canadensis*	5	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**5**	x 1 =	**5**
FACW species	**40**	x 2 =	**80**
FAC species	**10**	x 3 =	**30**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**55** (A)		**115** (B)

Prevalence Index = B/A = **2.09**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Sphagnum moss cover in herb stratum ~25%.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Lyonia ligustrina.

Species within the Herbaceous stratum which have less than 5% cover include: Rubus hispidus, Juncus effusus, Andropogon glomeratus.

In the herb stratum, Carex sp. had 65% cover but there was no seed head to properly identify to species.

SOIL

Sampling Point: **WET-D39**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Oi	
1-3	10YR 2/1	100	None	—	—	—	SiL	
3-6	2.5Y 3/2	100	None	—	—	—	LFSa	
6-16	2.5Y 5/1	100	None	—	—	—	Sa	gravel at 20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/07/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D39
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.719153 Long: -70.950622 Datum: WGS-84
Soil Map Unit Name: Scarboro mucky fine sandy loam, 0 to 3 percent slopes NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D39**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Morella caroliniensis*	20	Yes	FAC
2. *Salix discolor*	15	Yes	FACW
3. *Salix bebbiana*	5	No	FACW
4. *Pinus strobus*	5	No	FACU
5.			
6.			
7.			
	45 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Salix discolor*	10	Yes	FACW
2. *Holcus lanatus*	10	Yes	FACU
3. *Dichanthelium clandestinum*	5	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**35**	x 2 =	**70**
FAC species	**20**	x 3 =	**60**
FACU species	**15**	x 4 =	**60**
UPL species	**0**	x 5 =	**0**
Column Totals:	**70** (A)		**190** (B)

Prevalence Index = B/A = **2.71**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea tomentosa, Pinus rigida, Betula populifolia, Lyonia ligustrina .

Species within the Herbaceous stratum which have less than 5% cover include: Lyonia ligustrina, Calamagrostis canadensis, Potentilla simplex .

SOIL

Sampling Point: **UPL-D39**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 3/2	100	None	—	—	—	LSa	gravels at 20%
3-5	10YR 4/3	100	None	—	—	—	LSa	gravels at 35%
5-16	2.5Y 4/3	100	None	—	—	—	LSa	gravels at 45%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Last horizon is most likely fill from creating the access road.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/07/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D40-D41
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.719161 Long: -70.946291 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

This point was determined to be within a wetland due to the presence of all three wetland criteria.

Wetland D40 on north side of road and wetland D41 both have large areas where soil has been excavated, leaving depressions with wetland vegetation and hydrology indicators. Very little soil to sample.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)
____ High Water Table (A2)	____ Aquatic Fauna (B13)	____ Surface Soil Cracks (B6)
____ Saturation (A3)	____ Marl Deposits (B15)	**X** Drainage Patterns (B10)
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Moss Trim Lines (B16)
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Dry-Season Water Table (C2)
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Crayfish Burrows (C8)
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Saturation Visible on Aerial Imagery (C9)
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	____ Stunted or Stressed Plants (D1)
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	**X** Geomorphic Position (D2)
____ Sparsely Vegetated Concave Surface (B8)		____ Shallow Aquitard (D3)
		____ Microtopographic Relief (D4)
		X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D40-D41**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	15 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea alba*	35	Yes	FACW
2. *Clethra alnifolia*	10	No	FAC
3. *Spiraea tomentosa*	5	No	FACW
4. *Ilex verticillata*	5	No	FACW
5.			
6.			
7.			
	55 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Thelypteris palustris*	50	Yes	FACW
2. *Juncus effusus*	25	Yes	OBL
3. *Rubus allegheniensis*	10	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**25**	x 1 =	**25**	
FACW species	**95**	x 2 =	**190**	
FAC species	**25**	x 3 =	**75**	
FACU species	**10**	x 4 =	**40**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**155**	(A)	**330**	(B)

Prevalence Index = B/A = **2.13**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Vaccinium corymbosum, Acer rubrum, Viburnum dentatum, Rubus allegheniensis.

Species within the Herbaceous stratum which have less than 5% cover include: Spiraea alba, Acer rubrum, Carex sp., Solidago sp.

Trees on edge of ROW.

Wetland goes off ROW to the south into a forested wetland.

SOIL

Sampling Point: **WET-D40-D41**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Oi	Not saturated
4-10	2.5Y 2.5/1	100	None	—	—	—	SiL	Gravels at 5%, slightly mucky
10-11	10YR 2/1	100	None	—	—	—	Mucky SiL	
11-13	10YR 4/1	98	7.5YR 4/6	2	OX	PL	FSa	Gravels at 10%
13-19	2.5Y 3/2	20					FSa	
	2.5Y 4/2	22						
	2.5Y 5/2	55	7.5Y 4/6	3	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- **X** Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/07/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D40-D41
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.719203 Long: -70.946102 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D40-D41**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus resinosa*	10	Yes	FACU
2. *Pinus strobus*	5	Yes	FACU
3. *Acer rubrum*	5	Yes	FAC
4.			
5.			
6.			
7.			
	20 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea alba*	20	Yes	FACW
2. *Pinus strobus*	5	No	FACU
3. *Rubus allegheniensis*	5	No	FACU
4.			
5.			
6.			
7.			
	30 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Dennstaedtia punctilobula*	65	Yes	UPL
2. *Solidago rugosa*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **40%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**20**	x 2 =	**40**
FAC species	**10**	x 3 =	**30**
FACU species	**25**	x 4 =	**100**
UPL species	**65**	x 5 =	**325**
Column Totals:	**120** (A)		**495** (B)

Prevalence Index = B/A = **4.13**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Acer rubrum, Viburnum dentatum, Lyonia ligustrina, Betula populifolia, Vaccinium corymbosum.

Species within the Herbaceous stratum which have less than 5% cover include: Lysimachia quadrifolia, Maianthemum canadense, Rubus flagellaris, Holcus lanatus.

Plot near edge of ROW.

SOIL

Sampling Point: **UPL-D40-D41**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/1	100	None	—	—	—	SiL	
5-8	10YR 4/1	100	None	—	—	—	Sa	gravels at 35%
8-13	10YR 5/2	100	None	—	—	—	Sa	gravels at 45%
13-18	5YR 3/4	40	None	—	—	—	LSa	gravels at 35%
	10YR 5/6	60	none	—	—	—		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/07/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D42
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.719346 Long: -70.943857 Datum: WGS-84
Soil Map Unit Name: Swansea muck, 0 to 1 percent slopes NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **1**	
Water Table Present?	Yes **X** No _____	Depth (inches): **4**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D42**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	15 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	35	Yes	FACW
2. *Clethra alnifolia*	20	Yes	FAC
3. *Ilex verticillata*	15	No	FACW
4. *Spiraea alba*	10	No	FACW
5.			
6.			
7.			
	80 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Scirpus cyperinus*	35	Yes	OBL
2. *Thelypteris palustris*	25	Yes	FACW
3. *Eutrochium maculatum*	20	Yes	OBL
4. *Impatiens capensis*	15	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**55**	x 1 =	**55**	
FACW species	**100**	x 2 =	**200**	
FAC species	**35**	x 3 =	**105**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**190**	(A)	**360**	(B)

Prevalence Index = B/A = **1.89**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Forested wetland off ROW on southern edge.

Sphagnum moss cover in plot ~30%.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Toxicodendron vernix and Vaccinium corymbosum.

Species within the Herbaceous stratum which have less than 5% cover include: Spiraea tomentosa, Solidago gigantea, Onoclea senseibilis.

SOIL

Sampling Point: **WET-D42**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Oi	
4-9							Oa	
9-11	10YR 2/1	100	None	—	—	—	SiL	
11-16	2.5Y 5/1	100	None	—	—	—	FSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/07/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D42
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.719333 Long: -70.944099 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D42**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Kalmia angustifolia*	25	Yes	FAC
2. *Pinus strobus*	5	No	FACU
3. *Acer rubrum*	5	No	FAC
4.			
5.			
6.			
7.			
	35 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus flagellaris*	65	Yes	FACU
2. *Osmundastrum cinnamomeum*	20	Yes	FACW
3. *Solidago gigantea*	10	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	15	Yes	FAC
2.			
3.			
4.			
	15 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**30**	x 2 =	**60**
FAC species	**45**	x 3 =	**135**
FACU species	**75**	x 4 =	**300**
UPL species	**0**	x 5 =	**0**
Column Totals:	**150** (A)		**495** (B)

Prevalence Index = B/A = **3.30**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Quercus coccinea in the Tree stratum has a percent cover of 10% but the wetland indicator status is Not Classified

Species within the Tree stratum which have less than 5% cover include: Acer rubrum.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Vaccinium corymbosum, Elaeagnus umbellata, Quercus coccinea, Populus tremuloides.

Species within the Woody Vine stratum which have less than 5% cover include: Acer rubrum, Vaccinium corymbosum, Pinus strobus, Streptopus amplexifolius.

SOIL

Sampling Point: **UPL-D42**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-7	10YR 2/1	100	None	—	—	—	SaL	gravels at 20%
7-10	10YR 2/2	100	None	—	—	—	LSa	gravels at 35%
10-16	2.5Y 6/2	100	None	—	—	—	Sa	gravels at 60%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D43-D44
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.719629 Long: -70.938189 Datum: WGS-84
Soil Map Unit Name: Scarboro mucky fine sandy loam, 0 to 3 percent slopes NWI Classification: PEM/PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Wetland is predominately PSS.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **9**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **5**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table at 12 inches and rising. Water is seeping into the pit at 9 inches and rising.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D43-D44**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2. *Pinus strobus*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	25 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rosa multiflora*	30	Yes	FACU
2. *Salix bebbiana*	15	Yes	FACW
3. *Vaccinium corymbosum*	15	Yes	FACW
4. *Viburnum dentatum*	5	No	FAC
5.			
6.			
7.			
	65 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Onoclea sensibilis*	60	Yes	FACW
2. *Juncus effusus*	25	Yes	OBL
3. *Eutrochium maculatum*	5	No	OBL
4. *Solidago gigantea*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **71%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**30**	x 1 =	**30**	
FACW species	**95**	x 2 =	**190**	
FAC species	**20**	x 3 =	**60**	
FACU species	**40**	x 4 =	**160**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**185**	(A)	**440**	(B)

Prevalence Index = B/A = **2.38**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Tree stratum on Edge of plot.

Species within the Herbaceous stratum which have less than 5% cover include: Carex intumescens, Spiraea tomentosa, Lysimachia terrestris, Solidago graminifolia, Carex lurida, Panicum vigatum.

SOIL

Sampling Point: **WET-D43-D44**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10							Oa	
10-12	10YR 2/1	100	None	—	—	—	MkSiL	
12-18	2.5Y 6/2	100	None	—	—	—	Fsa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- **X** Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: New Bedford/Bristol Sampling Date: 06/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D43-D44
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.719632 Long: -70.937998 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D43-D44**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Quercus alba*	20	Yes	FACU
2. *Pinus strobus*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	30	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rosa multiflora*	25	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	25	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Gaultheria procumbens*	25	Yes	FACU
2. *Solidago latissimifolia*	15	Yes	OBL
3. *Solidago rugosa*	15	Yes	FAC
4. *Holcus lanatus*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **43%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**15**	x 1 =	**15**
FACW species	**0**	x 2 =	**0**
FAC species	**20**	x 3 =	**60**
FACU species	**85**	x 4 =	**340**
UPL species	**0**	x 5 =	**0**
Column Totals:	**120** (A)		**415** (B)

Prevalence Index = B/A = **3.46**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus strobus and Vaccinium corymbosum.

Species within the Herbaceous stratum which have less than 5% cover include: Viburnum dentatum, Parthenocissus quinquefolia, Quercus alba, Toxicodendron radicans.

SOIL

Sampling Point: **UPL-D43-D44**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-13	10YR 2/1	100	None	—	—	—	SiL	gravels at 30%
13-17	2.5Y 3/2	100	None	—	—	—	LSa	gravels at 40%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet/Bristol Sampling Date: 06/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D45
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.719476 Long: -70.932827 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	**X** Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)	
X High Water Table (A2)	___ Aquatic Fauna (B13)	___ Surface Soil Cracks (B6)	
X Saturation (A3)	___ Marl Deposits (B15)	**X** Drainage Patterns (B10)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	___ Moss Trim Lines (B16)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	___ Dry-Season Water Table (C2)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	___ Crayfish Burrows (C8)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Saturation Visible on Aerial Imagery (C9)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	___ Stunted or Stressed Plants (D1)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	**X** Geomorphic Position (D2)	
___ Sparsely Vegetated Concave Surface (B8)		___ Shallow Aquitard (D3)	
		___ Microtopographic Relief (D4)	
		X FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **7**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table at 13 inches; water seeping into pit at 7 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D45**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	20	Yes	FACW
2. *Kalmia angustifolia*	10	Yes	FAC
3. *Lyonia ligustrina*	10	Yes	FACW
4. *Clethra alnifolia*	5	No	FAC
5.			
6.			
7.			
	45 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Vaccinium corymbosum*	20	Yes	FACW
2. *Rubus hispidus*	15	Yes	FACW
3. *Thelypteris palustris*	15	Yes	FACW
4. *Lyonia ligustrina*	10	No	FACW
5. *Carex intumescens*	10	No	FACW
6. *Kalmia angustifolia*	5	No	FAC
7. *Osmundastrum cinnamomeum*	5	No	FACW
8.			
9.			
10.			
11.			
12.			
	80.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**105**	x 2 =	**210**
FAC species	**20**	x 3 =	**60**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**125** (A)		**270** (B)

Prevalence Index = B/A = **2.16**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Sphagnum moss cover in herb stratum ~ 85%.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus strobus and Spiraea alba.

Species within the Herbaceous stratum which have less than 5% cover include: Spiraea alba, coptis trifolia, Solidago patula, Solidago sp.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D45**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6							Oi	
6-12							Oa	
12-18	10YR 2/2	100	None	—	—	—	SaL	gravels at 55%
18-20	2.5Y 6/2	100	None	—	—	—	FSa	gravels at 55%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

Large cobble starting at 8 inches, taking up half of the side of the pit.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet/Bristol Sampling Date: 06/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D45
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.719495 Long: -70.932695 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

Upland Mound

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D45**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Kalmia angustifolia*	55	Yes	FAC
2. *Lyonia ligustrina*	10	No	FACW
3. *Clethra alnifolia*	5	No	FAC
4.			
5.			
6.			
7.			
	70 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Smilax rotundifolia*	30	Yes	FAC
2. *Kalmia angustifolia*	20	Yes	FAC
3. *Rubus flagellaris*	10	No	FACU
4. *Andropogon glomeratus*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Smilax rotundifolia*	25	Yes	FAC
2.			
3.			
4.			
	25 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**15**	x 2 =	**30**
FAC species	**135**	x 3 =	**405**
FACU species	**10**	x 4 =	**40**
UPL species	**0**	x 5 =	**0**
Column Totals:	**160** (A)		**475** (B)

Prevalence Index = B/A = **2.97**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Trientalis borealis and Pteridium aquilinum.

Lichen and upland moss in plot.

SOIL

Sampling Point: **UPL-D45**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-4	10YR 2/1	100	None	—	—	—	SiL	
4-11	10YR 5/8	100	None	—	—	—	SaL	gravels at 35%
11-16	10YR 5/2	100	None	—	—	—	SaL	gravels at 50%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet/Bristol Sampling Date: 06/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: WET-D46-D47
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Flat Slope (%): 2-5
Subregion (LRR or MLRA): LRR K Lat: 41.719620 Long: -70.930092 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	**X** Water-Stained Leaves (B9)	
X High Water Table (A2)	___ Aquatic Fauna (B13)	
X Saturation (A3)	___ Marl Deposits (B15)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
X Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **8**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **4**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table at 15 inches and rising.

Water seeping into pit at ~ 8 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D46-D47**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	30	Yes	FACW
2. *Lyonia ligustrina*	25	Yes	FACW
3. *Clethra alnifolia*	10	No	FAC
4. *Kalmia angustifolia*	5	No	FAC
5.			
6.			
7.			
	70 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Kalmia angustifolia*	15	Yes	FAC
2. *Eleocharis palustris*	10	Yes	OBL
3. *Vaccinium corymbosum*	10	Yes	FACW
4. *Osmundastrum cinnamomeum*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**10**	x 1 =	**10**	
FACW species	**70**	x 2 =	**140**	
FAC species	**30**	x 3 =	**90**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**110**	(A)	**240**	(B)

Prevalence Index = B/A = **2.18**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus strobus.

Species within the Herbaceous stratum which have less than 5% cover include: Lyonia ligustrina and Thelypteris palustris.

Sphagnum moss cover in plot ~ 85%.

SOIL

Sampling Point: **WET-D46-D47**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8							Oi	
8-12	10YR 3/1	100	None	—	—	—	SiL	gravels at 10%
12-20	2.5Y 5/1	100	None	—	—	—	FSa	gravels at 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet/Bristol Sampling Date: 06/11/2018
Applicant/Owner: Eversource State: MA Sampling Point: UPL-D46-D47
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.719553 Long: -70.930197 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

Area has been previously cleared of trees to the edge of the ROW.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D46-D47**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Nyssa sylvatica*	35	Yes	FAC
2. *Acer rubrum*	25	Yes	FAC
3. *Quercus rubra*	10	No	FACU
4.			
5.			
6.			
7.			
	70	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	40	Yes	FAC
2. *Vaccinium corymbosum*	5	No	FACW
3.			
4.			
5.			
6.			
7.			
	45	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Maianthemum canadense*	10	Yes	FACU
2. *Vaccinium corymbosum*	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**10**	x 2 =	**20**	
FAC species	**100**	x 3 =	**300**	
FACU species	**20**	x 4 =	**80**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**130**	(A)	**400**	(B)

Prevalence Index = B/A = **3.08**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Trees on edge of ROW.

Half of plot has been maintaned for the ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Tsuga canadensis, Quercus alba, Quercus rubra, Kalmia latifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Ilex opaca, Pinus strobus, Pteridium aquilinum, Grass sp., Lysimachia borealis.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

SOIL

Sampling Point: **UPL-D46-D47**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5							Organic	
5-7	10YR 2/1	100	None	—	—	—	SiL	
7-10	10YR 3/2	100	None	—	—	—	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock Refusal

Depth (inches): 10 inches

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

40% cobbles throughout horizons.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/26/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-48/49W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.717528 Long: -70.921367 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes **X** No _____
Hydric Soil Present?	Yes **X**	No _____	
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	
____ Saturation (A3)	____ Marl Deposits (B15)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

X	Surface Soil Cracks (B6)
X	Drainage Patterns (B10)
____	Moss Trim Lines (B16)
____	Dry-Season Water Table (C2)
____	Crayfish Burrows (C8)
____	Saturation Visible on Aerial Imagery (C9)
____	Stunted or Stressed Plants (D1)
X	Geomorphic Position (D2)
____	Shallow Aquitard (D3)
____	Microtopographic Relief (D4)
X	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes **X** No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **D-48/49W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Salix bebbiana*	30	Yes	FACW
2. *Spiraea alba*	25	Yes	FACW
3. *Spiraea tomentosa*	15	Yes	FACW
4.			
5.			
6.			
7.			
	70 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Carex utriculata*	20	Yes	OBL
2. *Lysimachia terrestris*	20	Yes	OBL
3. *Juncus canadensis*	10	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**50**	x 1 =	**50**	
FACW species	**70**	x 2 =	**140**	
FAC species	**0**	x 3 =	**0**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**120**	(A)	**190**	(B)

Prevalence Index = B/A = **1.58**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Rubus allegheniensis.

Species within the Herbaceous stratum which have less than 5% cover include: Dichanthelium clandestinum and Juncus effusus.

SOIL

Sampling Point: **D-48/49W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	90	5YR 4/6	10	C	RC	SiL	
5-9	10YR 4/2	90	5YR 4/6	10	C	M	Sa	
9-16	10YR 4/2	100	None	—	—	—	Sa	gravels at 40%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/26/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-48/49U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.717283 Long: -70.921074 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-48/49U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rubus allegheniensis*	25	Yes	FACU
2. *Spiraea tomentosa*	5	No	FACW
3.			
4.			
5.			
6.			
7.			
	30 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Smilax rotundifolia*	20	Yes	FAC
2. *Holcus lanatus*	15	Yes	FACU
3. *Panicum virgatum*	5	No	FAC
4. *Lysimachia quadrifolia*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	20	Yes	FAC
2.			
3.			
4.			
	20 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **40%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**5**	x 2 =	**10**
FAC species	**45**	x 3 =	**135**
FACU species	**55**	x 4 =	**220**
UPL species	**0**	x 5 =	**0**
Column Totals:	**105** (A)		**365** (B)

Prevalence Index = B/A = **3.48**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Herbaceous stratum which have less than 5% cover include: Cirsium sp., Solidago gigantea, Toxicodendron radicans, Pteridium aquilinum.

Species within the Woody Vine stratum which have less than 5% cover include: Celastrus sp.

SOIL

Sampling Point: **D-48/49U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/3	100	None	—	—	—	SiL	gravels at 5%
9-16	10YR 2/2	98	7.5YR 3/3	2	C	RC	SaL	gravels at 15%
								Redox is in smaller pockets
								that have a SiL texture

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/26/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-50W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.716246 Long: -70.920393 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	
____ Saturation (A3)	____ Marl Deposits (B15)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____	Surface Soil Cracks (B6)
X	Drainage Patterns (B10)
____	Moss Trim Lines (B16)
____	Dry-Season Water Table (C2)
____	Crayfish Burrows (C8)
____	Saturation Visible on Aerial Imagery (C9)
____	Stunted or Stressed Plants (D1)
X	Geomorphic Position (D2)
____	Shallow Aquitard (D3)
____	Microtopographic Relief (D4)
X	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **D-50W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea alba*	30	Yes	FACW
2. *Salix bebbiana*	25	Yes	FACW
3. *Rubus idaeus*	5	No	FACU
4.			
5.			
6.			
7.			
	60 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Phragmites australis*	35	Yes	FACW
2. *Acer rubrum*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Celastrus orbiculatus*	10	Yes	UPL
2.			
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**90**	x 2 =	**180**	
FAC species	**5**	x 3 =	**15**	
FACU species	**5**	x 4 =	**20**	
UPL species	**10**	x 5 =	**50**	
Column Totals:	**110**	(A)	**265**	(B)

Prevalence Index = B/A = **2.41**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Elaeagnus umbellata, Acer rubrum, Rubus allegheniensis.

Species within the Herbaceous stratum which have less than 5% cover include: Thelypteris palustris, Solidago rugosa, Parthenocissus quinquefolia, Spiraea alba.

Species within the Woody Vlne stratum which have less than 5% cover include: Parthenocissus quinquefolia.

SOIL

Sampling Point: **D-50W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2	80	None	—	—	—	SiL	
	10YR 4/2	20	None	—	—	—	Sa	pockets with approximately 5% gravels
9-16	10YR 6/2	100	None	—	—	—	Sa	gravels at 40%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/26/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-50U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.716403 Long: -70.920507 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-50U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Salix discolor*	15	Yes	FACW
2. *Acer rubrum*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	15	Yes	FAC
2. *Elymus repens*	10	Yes	FACU
3. *Holcus lanatus*	5	No	FACU
4. *Dichanthelium clandestinum*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**20**	x 2 =	**40**	
FAC species	**20**	x 3 =	**60**	
FACU species	**15**	x 4 =	**60**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**55**	(A)	**160**	(B)

Prevalence Index = B/A = **2.91**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea alba, Spiraea tomentosa, Elaeagnus umbellata, Fraxinus americana

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Juncus canadensis, Pinus strobus.

Species within the Woody Vine stratum which have less than 5% cover include: Celastrus orbiculatus.

SOIL

Sampling Point: **D-50U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 4/2	100	None	—	—	—	SaL	gravels at 45%, very dry
5-9	10YR 4/4	100	None	—	—	—	LSa	gravels at 55%
9-16	2.5Y 5/3	100	None	—	—	—	Sa	gravels at 55%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/26/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-51/52W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.712312 Long: -70.916826 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	
X Saturation (A3)	____ Marl Deposits (B15)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____	Surface Soil Cracks (B6)
X	Drainage Patterns (B10)
____	Moss Trim Lines (B16)
____	Dry-Season Water Table (C2)
____	Crayfish Burrows (C8)
____	Saturation Visible on Aerial Imagery (C9)
____	Stunted or Stressed Plants (D1)
X	Geomorphic Position (D2)
____	Shallow Aquitard (D3)
____	Microtopographic Relief (D4)
X	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **12**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

A water table was present at a depth of 13 inches from the soil surface.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-51/52W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Salix bebbiana*	25	Yes	FACW
2. *Spiraea tomentosa*	10	Yes	FACW
3. *Vaccinium macrocarpon*	10	Yes	OBL
4.			
5.			
6.			
7.			
	45 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Dichanthelium clandestinum*	40	Yes	FACW
2. *Solidago uliginosa*	5	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**15**	x 1 =	**15**	
FACW species	**75**	x 2 =	**150**	
FAC species	**0**	x 3 =	**0**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**90**	(A)	**165**	(B)

Prevalence Index = B/A = **1.83**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Sphagnum moss cover in herb stratum ~ 5%.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Elaeagnus umbellata.

Species within the Herbaceous stratum which have less than 5% cover include: Holcus lanatus, Thelypteris palustris, Acer rubrum, Carex folliculata, Juncus effusus, Solidago speciosa, Eutrochium maculatum.

SOIL

Sampling Point: **D-51/52W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100	None	—	—	—	Mucky SiL	gravels at 10%
6-12	10YR 6/1	100	None	—	—	—	FSa	gravels at 15%
12-16	2.5Y 5/2	100	None	—	—	—	Sa	gravels at 45%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/26/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-51/52U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.712554 Long: -70.917037 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-51/52U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Elymus repens*	20	Yes	FACU
2. *Rubus flagellaris*	20	Yes	FACU
3. *Lysimachia quadriflora*	5	No	OBL
4. *Dichanthelium clandestinum*	5	No	FACW
5. *Holcus lanatus*	5	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**5**	x 1 =	**5**
FACW species	**10**	x 2 =	**20**
FAC species	**0**	x 3 =	**0**
FACU species	**45**	x 4 =	**180**
UPL species	**0**	x 5 =	**0**
Column Totals:	**60** (A)		**205** (B)

Prevalence Index = B/A = **3.42**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Solidago rugosa, Spiraea tomentosa, Parthenocissus quinquefolia, Carex sp., Solidago sp., Pinus strobus.

SOIL

Sampling Point: **D-51/52U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	100	None	—	—	—	SiL	gravels at 10%
4-7	10YR 4/4	100	None	—	—	—	SaL	gravels at 25%
7-16	2.5Y 4/4	100	None	—	—	—	SaL	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-53W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.709997 Long: -70.915051 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	
____ Saturation (A3)	____ Marl Deposits (B15)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____	Surface Soil Cracks (B6)
X	Drainage Patterns (B10)
____	Moss Trim Lines (B16)
____	Dry-Season Water Table (C2)
____	Crayfish Burrows (C8)
____	Saturation Visible on Aerial Imagery (C9)
____	Stunted or Stressed Plants (D1)
X	Geomorphic Position (D2)
____	Shallow Aquitard (D3)
____	Microtopographic Relief (D4)
X	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **D-53W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Swida amomum*	20	Yes	FACW
2. *Spiraea alba*	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	25 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Lythrum salicaria*	35	Yes	OBL
2. *Onoclea sensibilis*	30	Yes	FACW
3. *Phragmites australis*	25	Yes	FACW
4. *Spiraea alba*	15	No	FACW
5. *Thelypteris palustris*	10	No	FACW
6. *Juncus effusus*	10	No	OBL
7. *Carex lurida*	5	No	OBL
8.			
9.			
10.			
11.			
12.			
	130.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Vitis labrusca*	5	Yes	FACU
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **83%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**50**	x 1 =	**50**	
FACW species	**105**	x 2 =	**210**	
FAC species	**0**	x 3 =	**0**	
FACU species	**5**	x 4 =	**20**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**160**	(A)	**280**	(B)

Prevalence Index = B/A = **1.75**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Salix discolor, Viburnum dentatum, Acer rubrum.

Species within the Herbaceous stratum which have less than 5% cover include: Equisetum arvense, Solidago rugosa, Galium asprellum.

SOIL

Sampling Point: **D-53W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 2.5/1	100	None	—	—	—	SiL	Many roots
3-10	10YR 3/1	98	7.5YR 3/4	2	C	RC	SiL	gravels at 15%, cobbles at 5%
10-16	2.5Y 5/1	97	10YR 4/6	3	C	RC	FSand	gravels at 5%, cobbles at 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/26/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-53U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.710103 Long: -70.915179 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-53U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rosa multiflora*	25	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	25 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	90	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Celastrus orbiculatus*	30	Yes	UPL
2. *Vitis labrusca*	20	Yes	FACU
3.			
4.			
	50 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **25%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**90**	x 3 =	**270**
FACU species	**45**	x 4 =	**180**
UPL species	**30**	x 5 =	**150**
Column Totals:	**165** (A)		**600** (B)

Prevalence Index = B/A = **3.64**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Betula populifolia and Viburnum dentatum

Species within the Herbaceous stratum which have less than 5% cover include: Dichanthelium clandestinum and Juncus effusus.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

SOIL

Sampling Point: **D-53U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	100	None	—	—	—	SaL	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock and Root Refusal

Depth (inches): 12

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-54W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.706380 Long: -70.910972 Datum: WGS-84
Soil Map Unit Name: Sudbury fine sandy loam, 0 to 3 percent slopes NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	
____ Saturation (A3)	____ Marl Deposits (B15)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____	Surface Soil Cracks (B6)
X	Drainage Patterns (B10)
____	Moss Trim Lines (B16)
____	Dry-Season Water Table (C2)
____	Crayfish Burrows (C8)
____	Saturation Visible on Aerial Imagery (C9)
____	Stunted or Stressed Plants (D1)
X	Geomorphic Position (D2)
____	Shallow Aquitard (D3)
____	Microtopographic Relief (D4)
X	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

The perennial Acushnet River (SD54) flows through this wetland polygon.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-54W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	20	Yes	FACW
2. *Spiraea alba*	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	25 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Onoclea sensibilis*	50	Yes	FACW
2. *Juncus effusus*	5	No	OBL
3. *Solidago rugosa*	5	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**5**	x 1 =	**5**	
FACW species	**75**	x 2 =	**150**	
FAC species	**5**	x 3 =	**15**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**85**	(A)	**170**	(B)

Prevalence Index = B/A = **2.00**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Herbaceous stratum which have less than 5% cover include: Thelypteris palustris.

SOIL

Sampling Point: **D-54W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100	None	—	—	—	SiL	
4-16	2.5YR 4/2	90	7.5YR 4/6	10	C	RC/PL	SiL	gravels at 20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-54U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.706321 Long: -70.910705 Datum: WGS-84
Soil Map Unit Name: Sudbury fine sandy loam, 0 to 3 percent slopes NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-54U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea alba*	10	Yes	FACW
2. *Rosa multiflora*	5	Yes	FACU
3. *Rubus allegheniensis*	5	Yes	FACU
4.			
5.			
6.			
7.			
	20 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	40	Yes	FAC
2. *Dichanthelium clandestinum*	30	Yes	FACW
3. *Rubus allegheniensis*	15	No	FACU
4. *Rubus flagellaris*	10	No	FACU
5. *Spiraea alba*	5	No	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**45**	x 2 =	**90**	
FAC species	**40**	x 3 =	**120**	
FACU species	**35**	x 4 =	**140**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**120**	(A)	**350**	(B)

Prevalence Index = B/A = **2.92**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Solidago speciosa and Spiraea tomentosa.

Species within the Woody Vine stratum which have less than 5% cover include: Vitis labrusca.

SOIL

Sampling Point: **D-54U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/3	100	None	—	—	—	LSa	gravels at 40%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock Refusal

Depth (inches): 12

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Upper 3 layers had dense roots.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-55W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.703402 Long: -70.904326 Datum: WGS-84
Soil Map Unit Name: Freetown muck, 0 to 1 percent slopes NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___	Surface Water (A1)	**X**	Water-Stained Leaves (B9)
X	High Water Table (A2)	___	Aquatic Fauna (B13)
X	Saturation (A3)	___	Marl Deposits (B15)
___	Water Marks (B1)	___	Hydrogen Sulfide Odor (C1)
___	Sediment Deposits (B2)	___	Oxidized Rhizospheres on Living Roots (C3)
___	Drift Deposits (B3)	___	Presence of Reduced Iron (C4)
___	Algal Mat or Crust (B4)	___	Recent Iron Reduction in Tilled Soils (C6)
___	Iron Deposits (B5)	___	Thin Muck Surface (C7)
___	Inundation Visible on Aerial Imagery (B7)	___	Other (Explain in Remarks)
___	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

___	Surface Soil Cracks (B6)
___	Drainage Patterns (B10)
___	Moss Trim Lines (B16)
___	Dry-Season Water Table (C2)
___	Crayfish Burrows (C8)
___	Saturation Visible on Aerial Imagery (C9)
___	Stunted or Stressed Plants (D1)
X	Geomorphic Position (D2)
___	Shallow Aquitard (D3)
___	Microtopographic Relief (D4)
X	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **11.5**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **5**	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table at 11.5 inches and rising.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-55W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2. *Vaccinium corymbosum*	20	Yes	FACW
3. *Alnus incana*	15	No	FACW
4. *Lyonia ligustrina*	10	No	FACW
5. *Spiraea tomentosa*	5	No	FACW
6.			
7.			
	80 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Thelypteris palustris*	50	Yes	FACW
2. *Phragmites australis*	35	Yes	FACW
3. *Scirpus cyperinus*	35	Yes	OBL
4. *Calamagrostis canadensis*	5	No	OBL
5. *Osmundastrum cinnamomeum*	5	No	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	130.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**40**	x 1 =	**40**	
FACW species	**140**	x 2 =	**280**	
FAC species	**30**	x 3 =	**90**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**210** (A)		**410** (B)	

Prevalence Index = B/A = **1.95**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea alba and Toxicodendron vernix.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum and Spiraea tomentosa.

Species within the Woody Vine which have less than 5% cover include: Vitis labrusca.

SOIL

Sampling Point: **D-55W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8							Oe	
8-10							Oa	
10-16							Oe	
16-18							Oa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- **X** Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-55U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.703422 Long: -70.904241 Datum: WGS-84
Soil Map Unit Name: Freetown muck, 0 to 1 percent slopes NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-55U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	80	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**0**	x 2 =	**0**	
FAC species	**80**	x 3 =	**240**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**80**	(A)	**240**	(B)

Prevalence Index = B/A = **3.00**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Clethra alnifolia, Lyonia ligustrina, Vaccinius corymbosum, Rubus allegheniensis.

Species within the Herbaceous stratum which have less than 5% cover include: Pteridium aquilinum, Scirpus sp., Eutrochium maculatum.

SOIL

Sampling Point: **D-55U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100	None	—	—	—	SiL	
4-6	10YR 3/1	100	None	—	—	—	SiL	gravels at 10%
6-11	2.5Y 2.5/1	99	5YR 4/6	1	C	RC	SiL	gravels at 10%
11-16	2.5Y 5/2	100	None	—	—	—	FSa	gravels at 25%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-56/57W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.702826 Long: -70.903045 Datum: WGS-84
Soil Map Unit Name: Pits - Udorthents complex, gravelly NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes **X**	No _____	Depth (inches): **10**
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **4**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Adjacent to intermittent stream SD56.

Water table at 10 inches and rising. Water seeping into pit at 8 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-56/57W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Phragmites australis*	35	Yes	FACW
2. *Solidago rugosa*	15	Yes	FAC
3. *Lysimachia terrestris*	15	Yes	OBL
4. *Galium asprellum*	10	No	OBL
5. *Eutrochium maculatum*	10	No	OBL
6. *Impatiens capensis*	10	No	FACW
7. *Juncus effusus*	5	No	OBL
8.			
9.			
10.			
11.			
12.			
	100.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**40**	x 1 =	**40**	
FACW species	**45**	x 2 =	**90**	
FAC species	**15**	x 3 =	**45**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**100**	(A)	**175**	(B)

Prevalence Index = B/A = **1.75**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Thelypteris palustris, Glyceria canadensis, Sagittaria latifolia, Mikania scandens.

SOIL

Sampling Point: **D-56/57W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Oe	
4-19							Oa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- **X** Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-56/57U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.702884 Long: -70.902960 Datum: WGS-84
Soil Map Unit Name: Pits - Udorthents complex, gravelly NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-56/57U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	35	Yes	FAC
2. *Potentilla simplex*	25	Yes	FACU
3. *Salix discolor*	10	No	FACW
4. *Celastrus orbiculatus*	5	No	UPL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**10**	x 2 =	**20**
FAC species	**35**	x 3 =	**105**
FACU species	**25**	x 4 =	**100**
UPL species	**5**	x 5 =	**25**
Column Totals:	**75** (A)		**250** (B)

Prevalence Index = B/A = **3.33**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Herbaceous stratum which have less than 5% cover include: Holcus lanatus, Acer rubrum, Toxicodendron radicans.

Trees not present; maintained ROW.

SOIL

Sampling Point: **D-56/57U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 3/2	100	None	—	—	—	SaL	gravels at 35%
5-7	10YR 2/1	100	None	—	—	—	SaL	gravels at 35%
7-12	10YR 4/2	100	None	—	—	—	SaL	gravels at 50%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock Refusal

Depth (inches): 12

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-58W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.701416 Long: -70.899360 Datum: WGS-84
Soil Map Unit Name: Merrimac fine sandy loam, 3 to 8 percent slopes NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)	
X High Water Table (A2)	____ Aquatic Fauna (B13)	____ Surface Soil Cracks (B6)	
X Saturation (A3)	____ Marl Deposits (B15)	____ Drainage Patterns (B10)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Moss Trim Lines (B16)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Dry-Season Water Table (C2)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Crayfish Burrows (C8)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Saturation Visible on Aerial Imagery (C9)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	**X** Geomorphic Position (D2)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	____ Shallow Aquitard (D3)	
____ Sparsely Vegetated Concave Surface (B8)		____ Microtopographic Relief (D4)	
		X FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes **X**	No _____	Depth (inches): **11**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **4**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table at 15 inches.

Water seeping into pit at 11 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-58W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Phragmites australis*	75	Yes	FACW
2. *Eutrochium maculatum*	35	Yes	OBL
3. *Solidago rugosa*	25	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	135.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**35**	x 1 =	**35**	
FACW species	**75**	x 2 =	**150**	
FAC species	**25**	x 3 =	**75**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**135**	(A)	**260**	(B)

Prevalence Index = B/A = **1.93**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Toxicodendron vernix and Sambucus sp.

Species within the Herbaceous stratum which have less than 5% cover include: Thelypteris palustris, Impatiens capensis, Celastrus orbiculatus, Parthenocissus quinquefolia, Polygonum sagittatum.

SOIL

Sampling Point: **D-58W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6							Oe	gravels at 10%
6-10	10YR 4/3	100	None	—	—	—	FSa	gravels at 25%
10-16							Oab	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

Depositional material breaks up the organic horizon.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/27/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-58U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.701488 Long: -70.899431 Datum: WGS-84
Soil Map Unit Name: Merrimac fine sandy loam, 3 to 8 percent slopes NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-58U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	25	Yes	FAC
2. *Parthenocissus quinquefolia*	15	Yes	FACU
3. *Dichanthelium clandestinum*	5	No	FACW
4. *Toxicodendron radicans*	5	No	FAC
5. *Euthamia graminifolia*	5	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**5**	x 2 =	**10**	
FAC species	**35**	x 3 =	**105**	
FACU species	**15**	x 4 =	**60**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**55**	(A)	**175**	(B)

Prevalence Index = B/A = **3.18**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Salix discolor.

Species within the Herbaceous stratum which have less than 5% cover include: Rhus hirta, Holcus lanatus, Grass sp., Salix discolor.

In Shrub/Sapling stratum there was a variety of Christmas trees that had 20% cover due to a tree farm.

SOIL

Sampling Point: **D-58U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/4	100	None	—	—	—	LSa	
2-5	10YR 4/6	99	7.5YR 4/6	1	C	RC	LSa	Broken down rock, gravels at 25%
5-16	10YR 5/6	97	7.5YR 4/6	3	C	RC	Sa	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-59W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):
Subregion (LRR or MLRA): LRR R Lat: 41.699066 Long: -70.893883 Datum: WGS-84
Soil Map Unit Name: Pits - Udorthents complex, gravelly NWI Classification: Pond
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No **X**	**Is the Sampled Area within a Wetland?** Yes No **X**
Hydric Soil Present?	Yes	No **X**	
Wetland Hydrology Present?	Yes **X**	No	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydrophytic vegetation and hydric soils.

Pond; Open water body. Did not sample.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No	Depth (inches): **0**	
Water Table Present?	Yes **X** No	Depth (inches): **0**	
Saturation Present? (includes capillary fringe)	Yes **X** No	Depth (inches): **0**	**Wetland Hydrology Present?** Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION - Use scientific names of plants.

Sampling Point: **D-59W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
= Total Cover			

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
= Total Cover			

Herb Stratum (Plot size: 5 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
= Total Cover			

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
= Total Cover			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **0** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**0**	x 2 =	**0**	
FAC species	**0**	x 3 =	**0**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**0**	(A)	**0**	(B)

Prevalence Index = B/A = **N/A**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

SOIL

Sampling Point: **D-59W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-59U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):
Subregion (LRR or MLRA): LRR R Lat: 41.699106 Long: -70.893827 Datum: WGS-84
Soil Map Unit Name: Pits - Udorthents complex, gravelly NWI Classification: Pond
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No **X**	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No **X**	
Wetland Hydrology Present?	Yes	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

This plot is a residential lawn.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? **Yes** **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-59U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **0** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**0**	x 3 =	**0**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**0** (A)		**0** (B)

Prevalence Index = B/A = **N/A**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

SOIL

Sampling Point: **D-59U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-60W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.698530 Long: -70.893472 Datum: WGS-84
Soil Map Unit Name: Scarboro mucky fine sandy loam, 0 to 3 percent slopes NWI Classification: PSS/PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches):	**0.5**
Water Table Present?	Yes **X** No _____	Depth (inches):	**4**
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches):	**0**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION - Use scientific names of plants.

Sampling Point: **D-60W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	20	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Viburnum dentatum*	30	Yes	FAC
2. *Rosa multiflora*	20	Yes	FACU
3. *Morus alba*	5	No	FACU
4.			
5.			
6.			
7.			
	55 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	40	Yes	FAC
2. *Calamagrostis canadensis*	25	Yes	OBL
3. *Carex stricta*	20	Yes	OBL
4. *Thelypteris palustris*	15	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Celastrus orbiculatus*	7	Yes	UPL
2.			
3.			
4.			
	7 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **71%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**45**	x 1 =	**45**	
FACW species	**15**	x 2 =	**30**	
FAC species	**90**	x 3 =	**270**	
FACU species	**25**	x 4 =	**100**	
UPL species	**7**	x 5 =	**35**	
Column Totals:	**182**	(A)	**480**	(B)

Prevalence Index = B/A = **2.64**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus strobus and Lonicera morrowii.

SOIL

Sampling Point: **D-60W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8							Oi	
8-12	2.5Y 2.5/1	100	None	—	—	—	SiL	gravels at 25%
12-16							Oab	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-60U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Berm Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.698479 Long: -70.893423 Datum: WGS-84
Soil Map Unit Name: Scarboro mucky fine sandy loam, 0 to 3 percent slopes NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-60U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Yes	FAC
2. *Pinus strobus*	15	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	65 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	25	Yes	FACU
2. *Viburnum dentatum*	15	Yes	FAC
3. *Morus alba*	5	No	FACU
4.			
5.			
6.			
7.			
	45 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rosa virginiana*	30	Yes	FAC
2. *Morus alba*	10	Yes	FACU
3. *Toxicodendron radicans*	10	Yes	FAC
4. *Celastrus orbiculatus*	5	No	UPL
5. *Parthenocissus quinquefolia*	5	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Celastrus orbiculatus*	10	Yes	UPL
2.			
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **8** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**105**	x 3 =	**315**
FACU species	**60**	x 4 =	**240**
UPL species	**15**	x 5 =	**75**
Column Totals:	**180** (A)		**630** (B)

Prevalence Index = B/A = **3.50**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Nyssa sylvatica and Rosa multiflora.

Species within the Herbaceous stratum which have less than 5% cover include: Onoclea sensibilis, Impatiens capensis, Potentilla simplex, Simlax rotundifolia.

SOIL

Sampling Point: **D-60U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100	None	—	—	—	SiL	
2-6	10YR 3/2	100	None	—	—	—	SaL	gravels at 10%
6-16	5Y 5/3	100	None	—	—	—	LFSa	gravels at 15%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-61/62W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.698383 Long: -70.891979 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	**X** Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)	
___ High Water Table (A2)	___ Aquatic Fauna (B13)	___ Surface Soil Cracks (B6)	
___ Saturation (A3)	___ Marl Deposits (B15)	___ Drainage Patterns (B10)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	___ Moss Trim Lines (B16)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	___ Dry-Season Water Table (C2)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	___ Crayfish Burrows (C8)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Saturation Visible on Aerial Imagery (C9)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	___ Stunted or Stressed Plants (D1)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	**X** Geomorphic Position (D2)	
___ Sparsely Vegetated Concave Surface (B8)		___ Shallow Aquitard (D3)	
		___ Microtopographic Relief (D4)	
		X FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **D-61/62W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vaccinium corymbosum*	35	Yes	FACW
2. *Pinus strobus*	5	No	FACU
3.			
4.			
5.			
6.			
7.			
	40 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus flagellaris*	30	Yes	FACU
2. *Carex scoparia*	25	Yes	FACW
3. *Dichanthelium clandestinum*	20	Yes	FACW
4. *Smilax rotundifolia*	10	No	FAC
5. *Solidago latissimifolia*	5	No	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Smilax rotundifolia*	15	Yes	FAC
2.			
3.			
4.			
	15 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**5**	x 1 =	**5**	
FACW species	**80**	x 2 =	**160**	
FAC species	**25**	x 3 =	**75**	
FACU species	**35**	x 4 =	**140**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**145**	(A)	**380**	(B)

Prevalence Index = B/A = **2.62**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Viburnum dentatum.

Sphagnum moss cover in her stratum ~ 10%.

SOIL

Sampling Point: **D-61/62W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/1	100	None	—	—	—	SiL	
3-7	10YR 2/1	98	7.5YR 3/4	2	C	RC	SaL	gravels at 20%
7-16	2.5Y 5/2	97	5YR 4/6	3	C	RC	LSa	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-61/62U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.698505 Long: -70.892007 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-61/62U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	55	Yes	FACU
2. *Acer rubrum*	40	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	95	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	35	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	35	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Maianthemum canadense*	10	Yes	FACU
2. *Smilax rotundifolia*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	35	Yes	FAC
2.			
3.			
4.			
	35	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**80**	x 3 =	**240**
FACU species	**100**	x 4 =	**400**
UPL species	**0**	x 5 =	**0**
Column Totals:	**180** (A)		**640** (B)

Prevalence Index = B/A = **3.56**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Plot taken on the edge of the forest/shrub line.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus strobus, Lysimachia borealis, Carex sp.

SOIL

Sampling Point: **D-61/62U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3								Dry organics
3-11	7.5YR 2.5/1	100	None	—	—	—	LSa	gravels at 5%
11-17	10YR 5/1	100	None	—	—	—	LSa	gravels at 15%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-63W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.697903 Long: -70.891088 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Isolated Vegetated Wetland

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **D-63W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	35	Yes	FACW
2. *Salix discolor*	30	Yes	FACW
3. *Spiraea alba*	10	No	FACW
4. *Viburnum dentatum*	5	No	FAC
5.			
6.			
7.			
	80 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	30	Yes	FAC
2. *Juncus effusus*	30	Yes	OBL
3. *Spiraea tomentosa*	25	Yes	FACW
4. *Dichanthelium clandestinum*	15	No	FACW
5. *Eutrochium maculatum*	10	No	OBL
6. *Onoclea sensibilis*	5	No	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	115.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**40**	x 1 =	**40**
FACW species	**120**	x 2 =	**240**
FAC species	**35**	x 3 =	**105**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**195** (A)		**385** (B)

Prevalence Index = B/A = **1.97**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Carex lurida, Viburnum dentatum, Solidago gigantea.

SOIL

Sampling Point: **D-63W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/2	100	None	—	—	—	SaL	gravels at 35%
7-13	10YR 5/2	95	7.5YR 4/6	5	C	RC	SaL	gravels at 15%
13-16	10YR 4/4	97	7.5YR 4/6	3	C	M	SaL	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-63U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.697981 Long: -70.891102 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-63U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	30	Yes	FACU
2. *Spiraea tomentosa*	10	Yes	FACW
3. *Morella caroliniensis*	5	No	FAC
4.			
5.			
6.			
7.			
	45 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Solidago rugosa*	45	Yes	FAC
2. *Rubus flagellaris*	15	Yes	FACU
3. *Smilax rotundifolia*	5	No	FAC
4. *Dichanthelium latifolium*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**10**	x 2 =	**20**
FAC species	**60**	x 3 =	**180**
FACU species	**50**	x 4 =	**200**
UPL species	**0**	x 5 =	**0**
Column Totals:	**120** (A)		**400** (B)

Prevalence Index = B/A = **3.33**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Lonicera morrowii, Rubus allegheniensis, Lyoinia ligustrina, Quercus ilicifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Ilex opaca and Sassafras albidum.

SOIL

Sampling Point: **D-63U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/1	100	None	—	—	—	SiL	gravels at 5%
5-13	10YR 4/6	100	None	—	—	—	LSa	gravels at 20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 13

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-64W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.694375 Long: -70.883877 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X** No _____	Depth (inches): **2**	
Water Table Present?	Yes **X** No _____	Depth (inches): **9**	
Saturation Present? (includes capillary fringe)	Yes **X** No _____	Depth (inches): **3**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water table at 10 inches and rising.

Water seeping into the pit at 9 inches.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-64W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	35	Yes	FAC
2. *Vaccinium corymbosum*	20	Yes	FACW
3. *Lyonia ligustrina*	15	No	FACW
4. *Spiraea tomentosa*	10	No	FACW
5.			
6.			
7.			
	80 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Parathelypteris simulata*	65	Yes	FACW
2. *Carex intumescens*	5	No	FACW
3. *Dichanthelium clandestinum*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**120**	x 2 =	**240**	
FAC species	**35**	x 3 =	**105**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**155**	(A)	**345**	(B)

Prevalence Index = B/A = **2.23**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Toxicodendron vernix.

Species within the Herbaceous stratum which have less than 5% cover include: Osmundastrum cinnamomeum, Carex flava, Acer rubrum.

Sphagnum moss cover in herb stratum ~ 25%.

SOIL

Sampling Point: **D-64W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Oi	
3-8							Oa	
8-9	10YR 2/1	100	None	—	—	—	FSa	
9-16	10YR 3/1	97	2.5Y 5/2	3	D	M	Sand	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___**X**___ **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-64U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.694245 Long: -70.883579 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-64U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2. *Betula lenta*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	35	Yes	FACW
2. *Clethra alnifolia*	15	Yes	FAC
3. *Lyonia ligustrina*	10	No	FACW
4. *Pinus strobus*	5	No	FACU
5. *Betula populifolia*	5	No	FAC
6.			
7.			
	70 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus flagellaris*	50	Yes	FACU
2. *Solidago rugosa*	10	No	FAC
3. *Athyrium angustum*	10	No	FAC
4. *Solidago latissimifolia*	5	No	OBL
5. *Osmundastrum cinnamomeum*	5	No	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**5**	x 1 =	**5**	
FACW species	**50**	x 2 =	**100**	
FAC species	**55**	x 3 =	**165**	
FACU species	**60**	x 4 =	**240**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**170**	(A)	**510**	(B)

Prevalence Index = B/A = **3.00**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Sassafras albidum, Acer rubrum, Ilex opaca.

Species within the Herbaceous stratum which have less than 5% cover include: Maianthemum canadense.

SOIL

Sampling Point: **D-64U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/1	100	None	—	—	—	SiL	gravels at 10%
5-8	7.5YR 2.5/2	100	None	—	—	—	SaL	gravels at 30%
8-17	10YR 4/6	100	None	—	—	—	FSa	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-65W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Convex Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.694232 Long: -70.882590 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Isolated Vegetated Wetland

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X**	No _____	Depth (inches): **1**	
Water Table Present?	Yes **X**	No _____	Depth (inches): **0**	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **0**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

Heavy rains on 6/28/18.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-65W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	15	Yes	FACW
2. *Spiraea alba*	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Panicum virgatum*	80	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**20**	x 2 =	**40**	
FAC species	**80**	x 3 =	**240**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**100**	(A)	**280**	(B)

Prevalence Index = B/A = **2.80**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Acer rubrum.

Species within the Herbaceous stratum which have less than 5% cover include: Spiraea tomentosa.

SOIL

Sampling Point: **D-65W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100	None	—	—	—	SiL	gravels at 10%
2-6	2.5Y 5/3	90	2.5Y 6/1	3	D	M	LSa	gravels at 35%
			5YR 4/6	7	C	RC	Sa	
6-13	2.5Y 5/3	100	None	—	—	—		gravels at 60%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- **X** Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- **X** Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock Refusal

Depth (inches): 13

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-66W
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.693973 Long: -70.882288 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Isolated Vegetated Wetland.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes **X**	No _____	Depth (inches): **7**	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

7 inch deep pool of water where 3 spotted turtles were observed.

Heavy rains on 6/28/18. During vernal pools surveys there was no observed water in the wetland.

The wetland appears to be excavated

VEGETATION - Use scientific names of plants.

Sampling Point: **D-66W**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea tomentosa*	35	Yes	FACW
2. *Ilex verticillata*	35	Yes	FACW
3. *Spiraea alba*	5	No	FACW
4.			
5.			
6.			
7.			
	75 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Panicum virgatum*	15	Yes	FAC
2. *Spiraea tomentosa*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**85**	x 2 =	**170**
FAC species	**15**	x 3 =	**45**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**100** (A)		**215** (B)

Prevalence Index = B/A = **2.15**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Pinus strobus, Acer rubrum, Ilex opaca.

SOIL

Sampling Point: **D-66W**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100	None	—	—	—	Mucky SiL	
4-7	2.5Y 4/3	100	None	—	—	—	LFSa	gravels at 20%
7-16	10YR 5/4	95	5YR 5/8	5	C	M	LSa	gravels at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- **X** Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Acushnet Sampling Date: 06/29/2018
Applicant/Owner: Eversource State: MA Sampling Point: D-65/66U
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hilltop Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.694071 Long: -70.882392 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **D-65/66U**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Sassafras albidum*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Panicum virgatum*	45	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**45**	x 3 =	**135**
FACU species	**5**	x 4 =	**20**
UPL species	**0**	x 5 =	**0**
Column Totals:	**50** (A)		**155** (B)

Prevalence Index = B/A = **3.10**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Lysimachia quadrifolia and Baptista tinctoria.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

Solidago nemoralis had 35% cover in herb stratum, unclassified.

SOIL

Sampling Point: **D-65/66U**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100	None	—	—	—	SiL	Dense roots
3-16	10YR 5/8	100	None	—	—	—	FSa	gravels at 25%, very dry soil

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

ATTACHMENT D NEP USACE WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-L1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.736966 Long: -71.086108 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X**	**No** _____
Hydric Soil Present?	Yes **X**	No _____			
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	____ Surface Soil Cracks (B6)	
____ Saturation (A3)	____ Marl Deposits (B15)	**X** Drainage Patterns (B10)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	**X** Moss Trim Lines (B16)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Dry-Season Water Table (C2)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Crayfish Burrows (C8)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Saturation Visible on Aerial Imagery (C9)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	____ Stunted or Stressed Plants (D1)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	**X** Geomorphic Position (D2)	
____ Sparsely Vegetated Concave Surface (B8)		____ Shallow Aquitard (D3)	
		X Microtopographic Relief (D4)	
		____ FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Mound and pool topography.

Due to the presence of a histic epipedon, soils are most likely saturated earlier in the growing season.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-L1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Yes	FAC
2. *Pinus strobus*	30	Yes	FACU
3. *Betula lenta*	10	No	FACU
4.			
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	20	Yes	FAC
2. *Vaccinium corymbosum*	10	Yes	FACW
3. *Acer rubrum*	10	Yes	FAC
4.			
5.			
6.			
7.			
	40	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **86%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**10**	x 2 =	**20**
FAC species	**90**	x 3 =	**270**
FACU species	**40**	x 4 =	**160**
UPL species	**0**	x 5 =	**0**
Column Totals:	**140** (A)		**450** (B)

Prevalence Index = B/A = **3.21**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Sphagnum moss cover in herb stratum is ~ 50%.

SOIL

Sampling Point: **WET-L1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5							Organic-fibric	
5-8							Organic-hemic	
8-12							Organic-sapric	
12-20	2.5Y 3/1	100	None	—	—	—	Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-L1/L1A
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-5
Subregion (LRR or MLRA): LRR R Lat: 41.736895 Long: -71.086228 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-L1/L1A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Betula lenta*	50	Yes	FACU
2. *Acer rubrum*	25	Yes	FAC
3. *Pinus strobus*	15	No	FACU
4.			
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	60	Yes	FAC
2. *Vaccinium corymbosum*	10	No	FACW
3. *Betula lenta*	5	No	FACU
4.			
5.			
6.			
7.			
	75	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**10**	x 2 =	**20**	
FAC species	**115**	x 3 =	**345**	
FACU species	**70**	x 4 =	**280**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**195**	(A)	**645**	(B)

Prevalence Index = B/A = **3.31**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

SOIL

Sampling Point: **UPL-L1/L1A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-5	10YR 2/1	100	None	—	—	—	Silt Loam	
5-9	2.5Y 4/2	100	None	—	—	—	Fine Sand	
9-15	10YR 4/6	100	None	—	—	—	Loamy Sand	Coarse gravels ~15%
								Cobbles ~20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-M1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.737739 Long: -71.085959 Datum: WGS-84
Soil Map Unit Name: Swansea muck, 0 to 1 percent slopes NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes **X** No _____
Hydric Soil Present?	Yes **X**	No _____	
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- **X** Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes **X** No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Mound and pool topography. Depressions are filled with Sphagnum moss.

Soils are most likely saturated earlier in the growing season.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-M1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Nyssa sylvatica*	50	Yes	FAC
2. *Acer rubrum*	40	Yes	FAC
3. *Pinus strobus*	5	No	FACU
4.			
5.			
6.			
7.			
	95	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	25	Yes	FACW
2. *Clethra alnifolia*	15	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	40	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Vaccinium corymbosum*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**30**	x 2 =	**60**	
FAC species	**105**	x 3 =	**315**	
FACU species	**5**	x 4 =	**20**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**140**	(A)	**395**	(B)

Prevalence Index = B/A = **2.82**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Shrub/Sapling stratum which have less than 5% cover include: Nyssa sylvatica.

Sphagnum moss cover in herb stratum is ~ 85%.

SOIL

Sampling Point: **WET-M1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8							Oi Fibric	
8-11							Oa	No Coarse Sediments
11-13	N 2.5/	100	None	—	—	—	Mucky SiL	No Coarse Sediments
13-15	7.5YR 3/1	100	None	—	—	—	SiCL	No Coarse Sediments
15-19	2.5Y 6/1	100	None	—	—	—	FSa	No Coarse Sediments

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- **X** Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

Soils are most likely saturated earlier in the growing season. Therefore, A2 is being used as a hydric soil indicator.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Bell Rock Substation Rebuild Project City/County: Fall River/Bristol Sampling Date: 09/08/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-M1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-10
Subregion (LRR or MLRA): LRR R Lat: 41.737908 Long: -71.086449 Datum: WGS-84
Soil Map Unit Name: Swansea muck, 0 to 1 percent slopes NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-M1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Yes	FAC
2. *Pinus strobus*	30	Yes	FACU
3. *Quercus rubra*	15	No	FACU
4. *Betula lenta*	5	No	FACU
5.			
6.			
7.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	60	Yes	FACU
2. *Clethra alnifolia*	35	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	95	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**0**	x 2 =	**0**	
FAC species	**95**	x 3 =	**285**	
FACU species	**110**	x 4 =	**440**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**205**	(A)	**725**	(B)

Prevalence Index = B/A = **3.54**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Herbaceous stratum which have less than 5% cover include: Pinus strobus and Grass sp.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

SOIL

Sampling Point: **UPL-M1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/3	100	None	—	—	—	LSa	gravels at 15%
								cobbles at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 15

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

This upland island appears to be a gravel mound that was hauled in during the past. Uniform soils and cobbles are throughout the soil pit.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: New 115kV 114 Line City/County: Fall River/Bristol Sampling Date: 06/29/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.736474 Long: -71.083395 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes **X** No _____
Hydric Soil Present?	Yes **X**	No _____	
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Boulder field throughout wetland. Shallow soil development.

Wetland polygon is ~ 95% PSS and 5% PFO.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **9.5**

Wetland Hydrology Present? Yes **X** No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

A high water table is assumed earlier in the growing season; therefore, saturation is being used as an Indicator.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vaccinium corymbosum*	40	Yes	FACW
2. *Morella pensylvanica*	15	Yes	FAC
3. *Clethra alnifolia*	10	No	FAC
4. *Salix discolor*	10	No	FACW
5. *Ilex verticillata*	5	No	FACW
6.			
7.			
	80 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Osmundastrum cinnamomeum*	20	Yes	FACW
2. *Clethra alnifolia*	15	Yes	FAC
3. *Smilax rotundifolia*	7	No	FAC
4. *Rubus hispidus*	7	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	49.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vitis labrusca*	10	Yes	FACU
2.			
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**82**	x 2 =	**164**
FAC species	**47**	x 3 =	**141**
FACU species	**10**	x 4 =	**40**
UPL species	**0**	x 5 =	**0**
Column Totals:	**139** (A)		**345** (B)

Prevalence Index = B/A = **2.48**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Rhododendron viscom and Rubus allegheniensis.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Spirea alba, Lysimachia borealis, and Toxicodendron vernix.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

Sphagnum moss percent cover in the herb stratum is ~ 60%.

SOIL

Sampling Point: **WET-D1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Oi	
2-5	2.5Y 2.5/1	100	None	—	—	—	Mucky SiL	
5-12	5Y 6/1	100	None	—	—	—	SaL	45% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stone

Depth (inches): 12

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: New 115kV 114 Line City/County: Fall River/Bristol Sampling Date: 06/29/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D1
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.736490 Long: -71.083551 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vaccinium corymbosum*	60	Yes	FACW
2. *Acer rubrum*	10	No	FAC
3. *Comptonia peregrina*	7	No	UPL
4. *Rubus idaeus*	5	No	FACU
5.			
6.			
7.			
	82 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Clethra alnifolia*	35	Yes	FAC
2. *Fragaria vesca*	15	Yes	UPL
3. *Kalmia angustifolia*	15	Yes	FAC
4. *Potentilla simplex*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Parthenocissus quinquefolia*	5	Yes	FACU
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**60**	x 2 =	**120**
FAC species	**60**	x 3 =	**180**
FACU species	**15**	x 4 =	**60**
UPL species	**22**	x 5 =	**110**
Column Totals:	**157** (A)		**470** (B)

Prevalence Index = B/A = **2.99**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Salix discolor, Betula lenta, Clethra alnifolia, Pinus strobus, Spiraea alba, Spiraea tometosa, and Quercus rubra.

Species within the Herbaceous stratum which have less than 5% cover include: Ilex verticillata, Lysimachia quadrifolia, Smilax rotundifolia, and Solidago rugosa.

SOIL

Sampling Point: **UPL-D1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-3	7.5YR 2.5/2	100	None	—	—	—	FSaL	
3-12	10YR 5/6	100	None	—	—	—	FSaL	Gravels @ 20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: New 115kV 114 Line City/County: Fall River/Bristol Sampling Date: 07/11/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D2
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.736453 Long: -71.084194 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Wetland polygon is ~ 95% PFO and 5% PSS.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes **X**	No _____	Depth (inches): **8**
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **2**

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	35	Yes	FAC
2. *Betula lenta*	25	Yes	FACU
3. *Quercus bicolor*	15	No	FACW
4. *Fraxinus pennsylvanica*	10	No	FACW
5. *Pinus strobus*	5	No	FACU
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	65	Yes	FAC
2. *Carpinus caroliniana*	10	No	FAC
3. *Betula lenta*	5	No	FACU
4.			
5.			
6.			
7.			
	80	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Rubus pubescens*	7	Yes	FACW
2. *Maianthemum canadense*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	12.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *See Remarks*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**32**	x 2 =	**64**
FAC species	**110**	x 3 =	**330**
FACU species	**40**	x 4 =	**160**
UPL species	**0**	x 5 =	**0**
Column Totals:	**182** (A)		**554** (B)

Prevalence Index = B/A = **3.04**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Herbaceous stratum which have less than 5% cover include: Betula lenta.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

Sphagnum moss present.

SOIL

Sampling Point: **WET-D2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6							Oi	Fibric
6-10	10YR 2/1	100	None	—	—	—	SiL	
10-16	10YR 4/1	100	None	—	—	—	LFSa	gravels @ 30%.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- **X** Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: New 115kV 114 Line City/County: Fall River/Bristol Sampling Date: 07/11/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D2
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 3-5
Subregion (LRR or MLRA): LRR R Lat: 41.736431 Long: -71.084041 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	Yes	FAC
2. *Pinus strobus*	35	Yes	FACU
3. *Betula lenta*	15	No	FACU
4.			
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	35	Yes	FAC
2. *Betula lenta*	20	Yes	FACU
3. *Rhododendron viscosum*	10	No	FACW
4.			
5.			
6.			
7.			
	65	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Osmundastrum cinnamomeum*	30	Yes	FACW
2. *Clethra alnifolia*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **71%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**40**	x 2 =	**80**
FAC species	**90**	x 3 =	**270**
FACU species	**70**	x 4 =	**280**
UPL species	**0**	x 5 =	**0**
Column Totals:	**200** (A)		**630** (B)

Prevalence Index = B/A = **3.15**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

SOIL

Sampling Point: **UPL-D2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	
4-8	10YR 2/1	100	None	—	—	—	SiL	
8-16	2.5Y 3/1	100	None	—	—	—	SaL	gravels @ 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: New 115kV 114 Line City/County: Fall River/Bristol Sampling Date: 07/11/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D3
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.736510 Long: -71.083894 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **11**	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D3**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Clethra alnifolia*	90	Yes	FAC
2. *Betula lenta*	5	No	FACU
3. *Vaccinium corymbosum*	5	No	FACW
4.			
5.			
6.			
7.			
	100 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Osmundastrum cinnamomeum*	10	Yes	FACW
2. *Clethra alnifolia*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**15**	x 2 =	**30**
FAC species	**95**	x 3 =	**285**
FACU species	**5**	x 4 =	**20**
UPL species	**0**	x 5 =	**0**
Column Totals:	**115** (A)		**335** (B)

Prevalence Index = B/A = **2.91**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Herbaceous stratum which have less than 5% cover include: Maianthemum canadense.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	
4-8	2.5Y 2.5/1	98	10YR 3/3	2	C	RC	FSaL	gravels @ 15%
8-13	7.5YR 3/2	100	None	—	—	—	SaL	gravels @ 30%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 13

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

Extremely rocky (boulders). Very shallow soil intermixed with boulders.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: New 115kV 114 Line City/County: Fall River/Bristol Sampling Date: 07/11/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D3
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.736518 Long: -71.083920 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

Located in a boulder field.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D3**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Clethra alnifolia*	80	Yes	FAC
2. *Vaccinium corymbosum*	10	No	FACW
3. *Kalmia latifolia*	5	No	FACU
4.			
5.			
6.			
7.			
	95 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Clethra alnifolia*	15	Yes	FAC
2. *Maianthemum canadense*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**10**	x 2 =	**20**	
FAC species	**95**	x 3 =	**285**	
FACU species	**10**	x 4 =	**40**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**115**	(A)	**345**	(B)

Prevalence Index = B/A = **3.00**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Sassafras albidum and Pinus strobus.

Species within the Herbaceous stratum which have less than 5% cover include: Osmundastrum cinnamomeum.

Trees not present; maintained ROW.

SOIL

Sampling Point: **UPL-D3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-7	10YR 3/2	100	None	—	—	—	FSaL	gravels 10%, cobbles 20%
7-11	10YR 2/1	100	None	—	—	—	FSaL	gravels 10%, cobbles 20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 11

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/12/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D4
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.735405 Long: -71.080243 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **Yes** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Wetland associated with ditch alongside access road.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D4**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Ilex glabra*	90	Yes	FACW
2. *Acer rubrum*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
	95 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Ilex glabra*	20	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**110**	x 2 =	**220**	
FAC species	**5**	x 3 =	**15**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**115**	(A)	**235**	(B)

Prevalence Index = B/A = **2.04**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Ilex verticillata.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum and Ilex verticillata.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D4**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5							Organic	
5-12	7.5YR 2.5/1	100	None	—	—	—	FSaL	gravels @ 10%
12-14	10YR 4/1	100	None	—	—	—	FSaL	gravels @ 30%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- **X** Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal and roots

Depth (inches): 14

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

Soils have been altered by mechanical disturances associated with the ROW. The wetland was delineated based upon FACW vegetation and landform (depression). FACW vegetation includes Ilex glabra and Ilex verticillata.

Redox concentrations were observed in the deepest section of the ditch alongside the access road; however, these soils were not representative of the entire wetland polygon.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/12/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D4
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 1-3
Subregion (LRR or MLRA): LRR R Lat: 41.735447 Long: -71.080368 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D4**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus allegheniensis*	50	Yes	FACU
2. *Comptonia peregrina*	15	No	UPL
3. *Kalmia angustifolia*	15	No	FAC
4. *Lyonia ligustrina*	7	No	FACW
5. *Vaccinium angustifolium*	5	No	FACU
6.			
7.			
	92 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Carex novae-angliae*	60	Yes	FACU
2. *Rubus flagellaris*	10	No	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**7**	x 2 =	**14**
FAC species	**15**	x 3 =	**45**
FACU species	**125**	x 4 =	**500**
UPL species	**15**	x 5 =	**75**
Column Totals:	**162** (A)		**634** (B)

Prevalence Index = B/A = **3.91**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Herbaceous stratum which have less than 5% cover include: Smilax rotundifolia and Solidago rugosa.

Trees not present; maintained ROW.

SOIL

Sampling Point: **UPL-D4**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-3	2.5Y 3/1	100	None	—	—	—	LFSa	Spodic E horizon
3-5	10YR 3/3	100	None	—	—	—	LFSa	
5-12	10YR 4/6	100	None	—	—	—	LFSa	15% gravels
								10% small cobbles

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Spodic properties present.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/13/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D5
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.733443 Long: -71.074271 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Wetland polygon is ~ 90% PSS and 10% PEM.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Intermittent stream SD-5 flows through the wetland.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D5**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Ilex verticillata*	30	Yes	FACW
2. *Clethra alnifolia*	20	Yes	FAC
3. *Vaccinium corymbosum*	10	No	FACW
4. *Corylus americana*	5	No	FACU
5.			
6.			
7.			
	65 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus pubescens*	25	Yes	FACW
2. *Dichanthelium clandestinum*	20	Yes	FACW
3. *Carex intumescens*	10	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Parthenocissus quinquefolia*	5	Yes	FACU
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**95**	x 2 =	**190**	
FAC species	**20**	x 3 =	**60**	
FACU species	**10**	x 4 =	**40**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**125**	(A)	**290**	(B)

Prevalence Index = B/A = **2.32**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Sphagnum moss present in 90% of herb plot. Sphagnum moss is also present in pockets throughout the plot.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D5**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6							Oi	Fibric / dry
6-12	N2.5/	100	None	—	—	—	SiL	Cobbles @ 40%
12-13	10YR 4/1	40					SiL	Cobbles @ 40%
	2.5Y 5/2	50	10YR 4/6	10	C	M	SiL	Cobbles @ 40%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- **X** Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 13

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/13/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D5
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Berm Local relief (concave, convex, none): Convex Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.733410 Long: -71.074362 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D5**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Clethra alnifolia*	40	Yes	FAC
2. *Vaccinium corymbosum*	15	Yes	FACW
3. *Lyonia ligustrina*	7	No	FACW
4.			
5.			
6.			
7.			
	62 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Athyrium asplenioides*	85	Yes	FAC
2. *Vitis labrusca*	10	No	FACU
3. *Rubus flagellaris*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vitis labrusca*	5	Yes	FACU
2. *Parthenocissus quinquefolia*	5	Yes	FACU
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**22**	x 2 =	**44**
FAC species	**125**	x 3 =	**375**
FACU species	**25**	x 4 =	**100**
UPL species	**0**	x 5 =	**0**
Column Totals:	**172** (A)		**519** (B)

Prevalence Index = B/A = **3.02**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Rubus occidentalis.

Species within the Herbaceous stratum which have less than 5% cover include: Parthenocissus quinquefolia.

Trees not present; maintained ROW.

SOIL

Sampling Point: **UPL-D5**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/2	100	None	—	—	—	SaL	gravels @ 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Medium-sized cobbles throughout matrix.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/13/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D6
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.732983 Long: -71.073921 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	
____ Saturation (A3)	____ Marl Deposits (B15)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____ Surface Soil Cracks (B6)
X Drainage Patterns (B10)
____ Moss Trim Lines (B16)
____ Dry-Season Water Table (C2)
____ Crayfish Burrows (C8)
____ Saturation Visible on Aerial Imagery (C9)
____ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
____ Shallow Aquitard (D3)
____ Microtopographic Relief (D4)
____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Intermittent stream SD-5 flows through wetland polygon. No water at time of site visit. Sphagnum moss present in stream channel.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D6**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	70	Yes	FAC
2. *Carya ovata*	10	No	FACU
3.			
4.			
5.			
6.			
7.			
	80	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Carpinus caroliniana*	45	Yes	FAC
2. *Quercus palustris*	5	No	FACW
3.			
4.			
5.			
6.			
7.			
	50	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Carpinus caroliniana*	15	Yes	FAC
2. *Maianthemum canadense*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	**0**	x 1 =	**0**
FACW species	**5**	x 2 =	**10**
FAC species	**130**	x 3 =	**390**
FACU species	**20**	x 4 =	**80**
UPL species	**0**	x 5 =	**0**
Column Totals:	**155** (A)		**480** (B)

Prevalence Index = B/A = **3.10**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Arisaema triphyllum, Carex scoparia, Dichanthelium clandestinum, Parthenocissus quinquefolia, and Thalictrum dioicum.

~40% Sphagnum moss cover in herb plot.

SOIL

Sampling Point: **WET-D6**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4		100	None	—	—	—	Organic	
4-15	N2.5/	100	None	—	—	—	SiL	Greasy with cobbles @ 15%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- **X** Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 15

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

There is a higher percentage of cobbles at the bottom of the soil pit.

Due to rock refusal, only 15 inches of soil was sampled. The indicator of "Thick Dark Surface" is being applied to the soils due to a thickness of 11 inches, even though a depleted or gleyed matrix was not observed under the dark horizon. -ML

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/13/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D6
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Flat Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.733024 Long: -71.073822 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D6**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Carya ovata*	55	Yes	FACU
2. *Pinus strobus*	10	No	FACU
3. *Acer rubrum*	5	No	FAC
4.			
5.			
6.			
7.			
	70	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Carpinus caroliniana*	45	Yes	FAC
2. *Vaccinium angustifolium*	20	Yes	FACU
3. *Acer rubrum*	5	No	FAC
4.			
5.			
6.			
7.			
	70	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Carpinus caroliniana*	15	Yes	FAC
2. *Maianthemum canadense*	15	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **40%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**70**	x 3 =	**210**
FACU species	**100**	x 4 =	**400**
UPL species	**0**	x 5 =	**0**
Column Totals:	**170** (A)		**610** (B)

Prevalence Index = B/A = **3.59**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum.

SOIL

Sampling Point: **UPL-D6**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-7	10YR 3/2	100	None	—	—	—	SaL	cobbles @ 60%
7-13	10YR 4/6	100	None	—	—	—	FSaL	cobbles @ 60%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 13

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/19/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D7
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.732536 Long: -71.072410 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	____ Surface Soil Cracks (B6)
____ High Water Table (A2)	____ Aquatic Fauna (B13)	____ Drainage Patterns (B10)
X Saturation (A3)	____ Marl Deposits (B15)	____ Moss Trim Lines (B16)
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Dry-Season Water Table (C2)
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Crayfish Burrows (C8)
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Saturation Visible on Aerial Imagery (C9)
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Stunted or Stressed Plants (D1)
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	**X** Geomorphic Position (D2)
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	____ Shallow Aquitard (D3)
____ Sparsely Vegetated Concave Surface (B8)		____ Microtopographic Relief (D4)
		____ FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **10**	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A water table was present at a depth of 16 inches from the soil surface

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D7**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	80	Yes	FAC
2. *Pinus strobus*	5	No	FACU
3.			
4.			
5.			
6.			
7.			
	85	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	60	Yes	FAC
2. *Vaccinium corymbosum*	35	Yes	FACW
3. *Hamamelis virginiana*	25	Yes	FACU
4.			
5.			
6.			
7.			
	120	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Smilax rotundifolia*	15	Yes	FAC
2. *Clethra alnifolia*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **83%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**35**	x 2 =	**70**	
FAC species	**165**	x 3 =	**495**	
FACU species	**30**	x 4 =	**120**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**230**	(A)	**685**	(B)

Prevalence Index = B/A = **2.98**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

~ 30% Sphagnum moss cover in herb plot.

Buttressed trunks on a few Acer rubrum trees.

SOIL

Sampling Point: **WET-D7**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6							Organic	Fibric, unsaturated
6-14	N2.5/	100	None	—	—	—	SiL	few gravels
14-16	N2.5/	100	None	—	—	—	Mucky SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- **X** Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

The indicator Thick Dark Surface is being applied to the soils due to the thickness of at least 10 inches, even though a depleted or gleyed matrix was not observed under the dark horizon. -ML

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/19/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D7
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Footslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.732527 Long: -71.072298 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

DIM road with evidence of previous tree clearing. Plot is located on the edge of a DIM road and a forest.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D7**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	45	Yes	FAC
2. *Pinus strobus*	15	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	60 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	25	Yes	FACW
2. *Hamamelis virginiana*	15	Yes	FACU
3. *Clethra alnifolia*	10	No	FAC
4. *Sassafras albidum*	5	No	FACU
5.			
6.			
7.			
	55 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2. *Vaccinium corymbosum*	20	Yes	FACW
3. *Smilax rotundifolia*	10	No	FAC
4. *Parathelypteris noveboracensis*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	**0**	x 1 =	**0**
FACW species	**45**	x 2 =	**90**
FAC species	**100**	x 3 =	**300**
FACU species	**35**	x 4 =	**140**
UPL species	**0**	x 5 =	**0**
Column Totals:	**180** (A)		**530** (B)

Prevalence Index = B/A = **2.94**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **UPL-D7**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	
4-6	10YR 2/1	100	None	—	—	—	SiL	
6-13	10YR 4/2	100	None	—	—	—	FSaL	cobbles @ bottom of hole

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 13

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/13/2018
Applicant/Owner: National Grid State: MA Sampling Point: WET-D7A
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.730566 Long: -71.066461 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	____ Surface Soil Cracks (B6)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	____ Drainage Patterns (B10)	
____ Saturation (A3)	____ Marl Deposits (B15)	____ Moss Trim Lines (B16)	
X Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Dry-Season Water Table (C2)	
____ Sediment Deposits (B2)	**X** Oxidized Rhizospheres on Living Roots (C3)	____ Crayfish Burrows (C8)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Saturation Visible on Aerial Imagery (C9)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Stunted or Stressed Plants (D1)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	**X** Geomorphic Position (D2)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	____ Shallow Aquitard (D3)	
____ Sparsely Vegetated Concave Surface (B8)		____ Microtopographic Relief (D4)	
		____ FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

This wetland surrounds vernal pool DP-2. No surface water was present during this site visit.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D7A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	10	Yes	FAC
2. *Pinus strobus*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	15 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	20	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Vaccinium corymbosum*	20	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**40**	x 2 =	**80**	
FAC species	**10**	x 3 =	**30**	
FACU species	**5**	x 4 =	**20**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**55**	(A)	**130**	(B)

Prevalence Index = B/A = **2.36**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees are overhanging the plot and are not rooted in the wetland. The overhanging canopy was assessed. This wetland depression is predominately Vaccinium coymbosum under 3' in height. Vaccinium corymbosum shrubs are located on the edge of the wetland. Osmunda regalis is located ~ 20' from the wetland data plot.

Species within the Tree stratum which have less than 5% cover includes Betula lenta

Species within the Herbaceous stratum which have less than 5% cover includes Carex scoparia

SOIL

Sampling Point: **WET-D7A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-4	10YR 2/1	100	None	—	—	—	SiL	
4-6	10YR 3/2	100	None	—	—	—	FSaL	20% cobbles
6-10	2.5Y 5/2	95	7.5YR 3/3	5	C	M	FSaL	
10-14	2.5Y 6/2	98	10YR 5/8	2	C	RC	FSaL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/13/2018
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D7A
Investigator(s): Meaghan Lamothe and Devon Robinson Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.730594 Long: -71.066443 Datum: WGS-84
Soil Map Unit Name: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

A high water table is assumed earlier in the growing season; therefore, saturation is being used as an Indicator.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D7A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	35	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	35 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Vaccinium corymbosum*	15	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**50**	x 2 =	**100**
FAC species	**0**	x 3 =	**0**
FACU species	**5**	x 4 =	**20**
UPL species	**0**	x 5 =	**0**
Column Totals:	**55** (A)		**120** (B)

Prevalence Index = B/A = **2.18**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Tree stratum which have less than 5% cover includes Acer rubrum.

Species within the Herbaceous stratum which have less than 5% cover includes Smilax rotundifolia

SOIL

Sampling Point: **UPL-D7A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-4	10YR 2/1	100	None	—	—	—	SiL	
4-7	10YR 3/4	100	None	—	—	—	FSaL	
7-14	10YR 4/4	100	None	—	—	—	FSaL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/19/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D8
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.955721 Long: -71.429557 Datum: WGS-84
Soil Map Unit Name: Canton and Charlton fine sandy loams, very rocky, 3 to 15 percent slopes NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	____ Aquatic Fauna (B13)
____ High Water Table (A2)	____ Marl Deposits (B15)	____ Hydrogen Sulfide Odor (C1)
____ Saturation (A3)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Presence of Reduced Iron (C4)
X Water Marks (B1)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Thin Muck Surface (C7)
____ Sediment Deposits (B2)	____ Other (Explain in Remarks)	
____ Drift Deposits (B3)		
____ Algal Mat or Crust (B4)		
____ Iron Deposits (B5)		
____ Inundation Visible on Aerial Imagery (B7)		
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____ Surface Soil Cracks (B6)	
____ Drainage Patterns (B10)	
____ Moss Trim Lines (B16)	
____ Dry-Season Water Table (C2)	
____ Crayfish Burrows (C8)	
____ Saturation Visible on Aerial Imagery (C9)	
____ Stunted or Stressed Plants (D1)	
X Geomorphic Position (D2)	
____ Shallow Aquitard (D3)	
X Microtopographic Relief (D4)	
____ FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Intermittent stream SD-8 begins at this wetland. There are sphagnum moss hummocks throughout the wetland.

Water marks occur on the trees.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D8**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Carya ovata*	35	Yes	FACU
2. *Fraxinus americana*	25	Yes	FACU
3. *Pinus strobus*	20	Yes	FACU
4. *Acer rubrum*	5	No	FAC
5.			
6.			
7.			
	85	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Acer rubrum*	45	Yes	FAC
2. *Ulmus rubra*	35	Yes	FAC
3. *Betula lenta*	30	Yes	FACU
4. *Pinus strobus*	15	No	FACU
5. *Hamamelis virginiana*	10	No	FACU
6.			
7.			
	135	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Maianthemum canadense*	15	Yes	FACU
2. *Betula lenta*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **8** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **25%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**85**	x 3 =	**255**
FACU species	**160**	x 4 =	**640**
UPL species	**0**	x 5 =	**0**
Column Totals:	**245** (A)		**895** (B)

Prevalence Index = B/A = **3.65**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- **X** 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (Morphological Adaptations).

Species within the Herbaceous stratum which have less than 5% cover include: Smilax rotundifolia.

Spagnum moss ~50% cover in the herb plot.

Morphological Adaptations: White ash, white pine, and red maple saplings are growing on hummocks. More than 50% of the tree species have shallow root systems.

SOIL

Sampling Point: **WET-D8**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-8	10YR 2/1	100	None	—	—	—	SiL	
8-12	10YR 4/2	100	None	—	—	—	SaL	gravels @ 35%
12-20	2.5Y 6/2	100	None	—	—	—	SaL	gravels @ 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

Cobbles are throughout the soil pit.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/19/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D8
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3-5
Subregion (LRR or MLRA): LRR R Lat: 41.727905 Long: -71.058390 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D8**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Carya ovata*	50	Yes	FACU
2. *Quercus alba*	30	Yes	FACU
3. *Fraxinus americana*	10	No	FACU
4. *Pinus strobus*	10	No	FACU
5.			
6.			
7.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Ulmus rubra*	35	Yes	FAC
2. *Acer rubrum*	15	Yes	FAC
3. *Hamamelis virginiana*	10	No	FACU
4. *Pinus strobus*	5	No	FACU
5.			
6.			
7.			
	65	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Maianthemum canadense*	15	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **40%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**50**	x 3 =	**150**
FACU species	**130**	x 4 =	**520**
UPL species	**0**	x 5 =	**0**
Column Totals:	**180** (A)		**670** (B)

Prevalence Index = B/A = **3.72**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum and Ilex opaca.

SOIL

Sampling Point: **UPL-D8**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-3	10YR 2/1	100	None	—	—	—	SiL	stones @ 40%
3-13	10YR 3/2	100	None	—	—	—	SaL	gravels @ 20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 13

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/20/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D9
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.724161 Long: -71.046336 Datum: WGS-84
Soil Map Unit Name: Gloucester - Hinckley complex, undulating, very stony NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Wetland is located in a 'borrow' pit where large boulders have been excavated and placed along the side of Copicut Road.

Isolated Vegetated Wetland

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D9**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Spiraea alba*	40	Yes	FACW
2. *Spiraea tomentosa*	25	Yes	FACW
3. *Rubus idaeus*	10	No	FACU
4. *Hamamelis virginiana*	5	No	FACU
5. *Lyonia ligustrina*	5	No	FACW
6.			
7.			
	85 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Onoclea sensibilis*	60	Yes	FACW
2. *Carex scoparia*	7	No	FACW
3. *Ilex verticillata*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	72.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**142**	x 2 =	**284**	
FAC species	**0**	x 3 =	**0**	
FACU species	**15**	x 4 =	**60**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**157**	(A)	**344**	(B)

Prevalence Index = B/A = **2.19**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Ilex verticillata.

Species within the Herbaceous stratum which have less than 5% cover include: Scirpus cyperinus.

SOIL

Sampling Point: **WET-D9**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-9	2.5Y 4/2	85	5YR 4/6	5	C	RC	SiL	
			7.5YR 4/6	10	C	RC	SiL	
9-13	10YR 5/8	70	None	—	—	—	FSa	"C" Horizon
	2.5Y 4/1	30	None	—	—	—	FSa	gravels @ 20%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/20/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D9
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3-5
Subregion (LRR or MLRA): LRR R Lat: 41.724117 Long: -71.046352 Datum: WGS-84
Soil Map Unit Name: Gloucester - Hinckley complex, undulating, very stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D9**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rubus idaeus*	30	Yes	FACU
2. *Corylus americana*	15	Yes	FACU
3. *Quercus rubra*	15	Yes	FACU
4. *Spiraea alba*	7	No	FACW
5. *Rhus copallinum*	5	No	UPL
6.			
7.			
	72 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus idaeus*	20	Yes	FACU
2. *Carex scoparia*	15	Yes	FACW
3. *Dichanthelium clandestinum*	10	No	FACW
4. *Smilax rotundifolia*	10	No	FAC
5. *Toxicodendron radicans*	5	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **20%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**32**	x 2 =	**64**
FAC species	**15**	x 3 =	**45**
FACU species	**80**	x 4 =	**320**
UPL species	**5**	x 5 =	**25**
Column Totals:	**132** (A)		**454** (B)

Prevalence Index = B/A = **3.44**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea tomentosa.

Species within the Herbaceous stratum which have less than 5% cover include: Parthenocissus quinquefolia.

SOIL

Sampling Point: **UPL-D9**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-6	10YR 2/1	100	None	—	—	—	FSaL	
6-9	10YR 4/6	100	None	—	—	—	FSa	gravels @ 10%
9-16	10YR 5/8	100	None	—	—	—	FSa	gravels @ 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/21/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D10
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.723262 Long: -71.043661 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X**	**No** _____
Hydric Soil Present?	Yes **X**	No _____			
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Isolated Vegetated Wetland

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least two secondary indicators).

The perennial Copicut River (SD-11) flows through this wetland.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D10**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	45	Yes	FACW
2. *Clethra alnifolia*	30	Yes	FAC
3. *Carpinus caroliniana*	20	Yes	FAC
4. *Rubus allegheniensis*	20	Yes	FACU
5. *Spiraea alba*	20	Yes	FACW
6. *Amelanchier laevis*	15	No	UPL
7. *Acer rubrum*	5	No	FAC
	155 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Vaccinium corymbosum*	10	Yes	FACW
2. *Ilex verticillata*	5	Yes	FACW
3. *Rubus allegheniensis*	5	Yes	FACU
4. *Sassafras albidum*	5	Yes	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Vitis labrusca*	20	Yes	FACU
2.			
3.			
4.			
	20 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **10** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**80**	x 2 =	**160**
FAC species	**55**	x 3 =	**165**
FACU species	**50**	x 4 =	**200**
UPL species	**15**	x 5 =	**75**
Column Totals:	**200** (A)		**600** (B)

Prevalence Index = B/A = **3.00**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Additional Plants Observed in Sapling/Shrub stratum: Sassafras albidum and Quercus velutina.

Species within the Herbaceous stratum which have less than 5% cover include: Parthenocissus quinquefolia.

Trees not present; maintained ROW.

SOIL

Sampling Point: **WET-D10**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-3	10YR 2/1	100	None	—	—	—	SiL	
3-6	2.5Y 4/1	97	10YR 5/6	3	C	M	FSaL	gravels @ 15%
6-16	10YR 3/2	100	None	—	—	—	SiL	gravels @ 15%
								20% small cobbles present
								throughout the matrix

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/21/20017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D10
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3-5
Subregion (LRR or MLRA): LRR R Lat: 41.723322 Long: -71.043787 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D10**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Quercus rubra*	35	Yes	FACU
2. *Vaccinium corymbosum*	30	Yes	FACW
3. *Betula populifolia*	15	No	FAC
4. *Rubus allegheniensis*	5	No	FACU
5.			
6.			
7.			
	85 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Betula papyrifera*	15	Yes	FACU
2. *Parthenocissus quinquefolia*	10	Yes	FACU
3. *Vitis labrusca*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vitis labrusca*	10	Yes	FACU
2.			
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **20%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**30**	x 2 =	**60**
FAC species	**15**	x 3 =	**45**
FACU species	**80**	x 4 =	**320**
UPL species	**0**	x 5 =	**0**
Column Totals:	**125** (A)		**425** (B)

Prevalence Index = B/A = **3.40**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea alba.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Calamagrostis canadensis, Lysimachia quadrifolia, Toxicodendron radicans, and Vaccinium corymbosum.

SOIL

Sampling Point: **UPL-D10**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-5	10YR 2/1	100	None	—	—	—	SiL	
5-7	10YR 3/2	100	None	—	—	—	Sand	gravels @ 50%
7-16	2.5Y 5/2	100	None	—	—	—	Sand	gravels @ 60%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

The 7"-16" horizon is most likely the "C" horizon.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/21/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D11
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.722845 Long: -71.043025 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X**	**No** _____
Hydric Soil Present?	Yes **X**	No _____			
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	____ Water-Stained Leaves (B9)	____ Surface Soil Cracks (B6)
____ High Water Table (A2)	____ Aquatic Fauna (B13)	____ Drainage Patterns (B10)
X Saturation (A3)	____ Marl Deposits (B15)	____ Moss Trim Lines (B16)
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Dry-Season Water Table (C2)
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Crayfish Burrows (C8)
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Saturation Visible on Aerial Imagery (C9)
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Stunted or Stressed Plants (D1)
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	**X** Geomorphic Position (D2)
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	____ Shallow Aquitard (D3)
____ Sparsely Vegetated Concave Surface (B8)		____ Microtopographic Relief (D4)
		X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____		
Water Table Present?	Yes _____	No **X**	Depth (inches): _____		
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **11**	**Wetland Hydrology Present?**	**Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

A water table is most likely present earlier in the growing season.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D11**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	55	Yes	FAC
2. *Pinus strobus*	40	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	95 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	50	Yes	FAC
2. *Fraxinus pennsylvanica*	5	No	FACW
3. *Quercus palustris*	5	No	FACW
4.			
5.			
6.			
7.			
	60 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Osmundastrum cinnamomeum*	85	Yes	FACW
2. *Parathelypteris simulata*	55	Yes	FACW
3. *Osmunda regalis*	10	No	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	150.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Toxicodendron radicans*	5	Yes	FAC
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **83%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**10**	x 1 =	**10**	
FACW species	**150**	x 2 =	**300**	
FAC species	**110**	x 3 =	**330**	
FACU species	**40**	x 4 =	**160**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**310**	(A)	**800**	(B)

Prevalence Index = B/A = **2.58**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Chamaecyparis thyoides.

Species within the Herbaceous stratum which have less than 5% cover include:Clethra alnifolia.

Sphagnum moss percent cover in herb plot is ~ 10%.

Several white pine trees do not look healthy.

SOIL

Sampling Point: **WET-D11**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	Pine needles
4-6	10YR 2/1	100	None	—	—	—	SiL	
6-16	10YR 4/1	95	2.5Y 5/1	5	D	M	LSa	gravels @ 45%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- **X** Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 07/21/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D11
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 5-10
Subregion (LRR or MLRA): LRR R Lat: 41.722766 Long: -71.042926 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

Plot located on a hillslope adjacent to Quanapog Rd.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D11**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	60	Yes	FAC
2. *Pinus strobus*	30	Yes	FACU
3. *Fraxinus pennsylvanica*	10	No	FACW
4.			
5.			
6.			
7.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	60	Yes	FAC
2. *Pinus strobus*	5	No	FACU
3.			
4.			
5.			
6.			
7.			
	65	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	20	Yes	FAC
2. *Maianthemum canadense*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	**0**	x 1 =	**0**
FACW species	**10**	x 2 =	**20**
FAC species	**140**	x 3 =	**420**
FACU species	**45**	x 4 =	**180**
UPL species	**0**	x 5 =	**0**
Column Totals:	**195** (A)		**620** (B)

Prevalence Index = B/A = **3.18**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Amelanchier laevis.

Species within the Herbaceous stratum which have less than 5% cover include: Parathelypteris simulata, Toxicodendron radicans, and Streptopus amplexifolius.

SOIL

Sampling Point: **UPL-D11**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-13	2.5Y 3/2	100	None	—	—	—	Loam	gravels @ 30%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 13

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Potential road-fill, very dry soil.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/16/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D12
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Lake fringe Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.722294 Long: -71.041308 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, very stony NWI Classification: PSS/PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X**	**No** _____
Hydric Soil Present?	Yes **X**	No _____			
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Water-Stained Leaves (B9)	___ Surface Soil Cracks (B6)
X High Water Table (A2)	___ Aquatic Fauna (B13)	___ Drainage Patterns (B10)
X Saturation (A3)	___ Marl Deposits (B15)	___ Moss Trim Lines (B16)
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	___ Dry-Season Water Table (C2)
___ Sediment Deposits (B2)	**X** Oxidized Rhizospheres on Living Roots (C3)	___ Crayfish Burrows (C8)
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	___ Saturation Visible on Aerial Imagery (C9)
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Stunted or Stressed Plants (D1)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	**X** Geomorphic Position (D2)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	___ Shallow Aquitard (D3)
___ Sparsely Vegetated Concave Surface (B8)		___ Microtopographic Relief (D4)
		X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____		
Water Table Present?	Yes **X**	No _____	Depth (inches): **12**		
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **4**	**Wetland Hydrology Present?**	**Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D12**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	20	Yes	FAC
2. *Pinus strobus*	15	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	35 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2. *Acer rubrum*	25	Yes	FAC
3. *Viburnum dentatum*	15	No	FAC
4. *Spiraea alba*	10	No	FACW
5.			
6.			
7.			
	80 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Calamagrostis canadensis*	40	Yes	OBL
2. *Scirpus cyperinus*	30	Yes	OBL
3. *Juncus effusus*	10	No	OBL
4. *Sparganium americanum*	7	No	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	87.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **83%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**87**	x 1 =	**87**	
FACW species	**10**	x 2 =	**20**	
FAC species	**90**	x 3 =	**270**	
FACU species	**15**	x 4 =	**60**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**202**	(A)	**437**	(B)

Prevalence Index = B/A = **2.16**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Chamaedaphne calyculata.

Species within the Herbaceous stratum which have less than 5% cover include: Euthamia caroliniana and Hypericum virginicum.

Species within the Tree stratum which have less than 5% cover include: Betula populifolia.

A majority of the Acer rubrum trees are not rooted in the wetland. Acer rubrum overhanging leaf cover has been included in the the tree cover.

Sphagnum moss had ~ 10% cover in the herb stratum.

SOIL

Sampling Point: **WET-D12**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-6	10YR 4/2	75	None	—	—	—	SaL	gravels at 35%
	10YR 2/1	25	None	—	—	—	Sandy Loam	cobbles at 10%
6-12	10YR 2/1	95	10YR 3/4	5	C	RC	SiL	gravels @ 10%, cobbles @ 5%
12-16	10YR 4/2	77	None	—	—	—	FSaL	gravels @ 10%
	10YR 2/1	20	10YR 3/4	3	C	PL	FSaL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/16/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D12
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3-5
Subregion (LRR or MLRA): LRR R Lat: 41.722336 Long: -71.041206 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, very stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D12**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	35	Yes	FACU
2. *Acer rubrum*	25	Yes	FAC
3. *Chamaecyparis thyoides*	25	Yes	OBL
4. *Betula papyrifera*	5	No	FACU
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	55	Yes	FACW
2. *Clethra alnifolia*	30	Yes	FAC
3. *Pinus strobus*	7	No	FACU
4. *Chamaecyparis thyoides*	5	No	OBL
5.			
6.			
7.			
	97	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	15	Yes	FAC
2. *Vaccinium corymbosum*	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	7	Yes	FAC
2.			
3.			
4.			
	7	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **7** (A)

Total Number of Dominant Species Across All Strata: **8** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **88%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**30**	x 1 =	**30**	
FACW species	**60**	x 2 =	**120**	
FAC species	**77**	x 3 =	**231**	
FACU species	**47**	x 4 =	**188**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**214**	(A)	**569**	(B)

Prevalence Index = B/A = **2.66**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **UPL-D12**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-7	10YR 5/4	100	None	—	—	—	FSaL	gravels @ 5%
7-16	10YR 4/3	100	None	—	—	—	FSaL	gravels @ 5%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/16/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D13
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.722018 Long: -71.040050 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, very stony NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Isolated Vegetated Wetland

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D13**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *See Remarks*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Microstegium vimineum*	80	Yes	FAC
2. *Vitis labrusca*	10	No	FACU
3. *Dichanthelium clandestinum*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**5**	x 2 =	**10**
FAC species	**80**	x 3 =	**240**
FACU species	**10**	x 4 =	**40**
UPL species	**0**	x 5 =	**0**
Column Totals:	**95** (A)		**290** (B)

Prevalence Index = B/A = **3.05**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Rubus allegheniensis.

Species within the Herbaceous stratum which have less than 5% cover include: Capsella bursa-pastoris, Juncus effusus, and Scirpus cyperinus.

SOIL

Sampling Point: **WET-D13**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1		100	None	—	—	—	Organic	
1-8	10YR 2/1	95	5YR 3/4	5	C	RC	SiL	gravels @ 5%
8-15	10YR 4/6	95	7.5YR 4/6	2	C	M	FSaL	gravels @ 10%
			5YR 4/6	3	C	M	FSaL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/16/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D13
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-5
Subregion (LRR or MLRA): LRR R Lat: 41.722097 Long: -71.040075 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, very stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D13**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus allegheniensis*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Dichanthelium clandestinum*	85	Yes	FACW
2. *Vitis labrusca*	20	No	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	105.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Vitis labrusca*	30	Yes	FACU
2.			
3.			
4.			
	30 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**85**	x 2 =	**170**
FAC species	**0**	x 3 =	**0**
FACU species	**55**	x 4 =	**220**
UPL species	**0**	x 5 =	**0**
Column Totals:	**140** (A)		**390** (B)

Prevalence Index = B/A = **2.79**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Corylus americana.

Species within the Herbaceous stratum which have less than 5% cover include: Solidago rugosa.

SOIL

Sampling Point: **UPL-D13**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-8	10YR 2/2	100	None	—	—	—	SiL	gravels @ 10%
8-16	7.5YR 4/6	90	5YR 4/6	10	C	M	FSaL	gravels @ 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/17/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D14
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.721953 Long: -71.038853 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	____ Aquatic Fauna (B13)
____ High Water Table (A2)	____ Marl Deposits (B15)	____ Hydrogen Sulfide Odor (C1)
____ Saturation (A3)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Presence of Reduced Iron (C4)
X Water Marks (B1)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Thin Muck Surface (C7)
____ Sediment Deposits (B2)	____ Other (Explain in Remarks)	
____ Drift Deposits (B3)		
____ Algal Mat or Crust (B4)		
____ Iron Deposits (B5)		
____ Inundation Visible on Aerial Imagery (B7)		
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____ Surface Soil Cracks (B6)
____ Drainage Patterns (B10)
____ Moss Trim Lines (B16)
____ Dry-Season Water Table (C2)
____ Crayfish Burrows (C8)
____ Saturation Visible on Aerial Imagery (C9)
____ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
____ Shallow Aquitard (D3)
____ Microtopographic Relief (D4)
____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

MA CVP site based upon digital data layer. However, MA CVP digital data appears offset based upon field observations. Recommend returning to site in Spring 2018 for a vernal pool survey.

Water marks were observed on trees.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D14**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	Yes	FAC
2. *Pinus strobus*	20	Yes	FACU
3. *Quercus alba*	5	No	FACU
4.			
5.			
6.			
7.			
	65 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *See remarks*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Microstegium vimineum*	20	Yes	FAC
2. *Scirpus cyperinus*	15	Yes	OBL
3. *Vitis labrusca*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	10	Yes	FAC
2.			
3.			
4.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**15**	x 1 =	**15**
FACW species	**0**	x 2 =	**0**
FAC species	**70**	x 3 =	**210**
FACU species	**30**	x 4 =	**120**
UPL species	**0**	x 5 =	**0**
Column Totals:	**115** (A)		**345** (B)

Prevalence Index = B/A = **3.00**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Water marks on tree trunks.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea alba.

Pinus strobus and Quercus alba trees are predominately growing on the upland edge. The overlapping canopy into the wetland was assessed. Trees are rooted in the upland.

SOIL

Sampling Point: **WET-D14**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-9	10YR 2/1	100	None	—	—	—	FSaL	gravels @ 5%, organic staining
9-12	10YR 3/2	100	None	—	—	—	FSaL	gravels @ 15%, cobbles present
12-17	10YR 4/2	97	7.5YR 3/4	3	C	PL	FSaL	gravels @15%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/17/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D14
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.721944 Long: -71.038983 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

Historic stone wall in plot.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D14**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	65	Yes	FACU
2. *Acer rubrum*	10	No	FAC
3. *Quercus alba*	5	No	FACU
4.			
5.			
6.			
7.			
	80	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	35	Yes	FACU
2. *Acer rubrum*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	45	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Dryopteris intermedia*	50	Yes	FAC
2. *Toxicodendron radicans*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	25	Yes	FAC
2.			
3.			
4.			
	25	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**100**	x 3 =	**300**
FACU species	**105**	x 4 =	**420**
UPL species	**0**	x 5 =	**0**
Column Totals:	**205** (A)		**720** (B)

Prevalence Index = B/A = **3.51**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Vaccinium angustifolium and Prunus serotina.

Species within the Herbaceous stratum which have less than 5% cover include: Quercus alba and Mainthemum canadense.

SOIL

Sampling Point: **UPL-D14**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-11	10YR 3/2	100	None	—	—	—	FSaL	
11-20	10YR 4/4	100	None	—	—	—	FSaL	small cobbles @ 5%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/17/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D15
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.721413 Long: -71.038747 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Stonewall present in wetland.

Overnbird sighting.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	____ Surface Soil Cracks (B6)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	____ Drainage Patterns (B10)	
____ Saturation (A3)	____ Marl Deposits (B15)	____ Moss Trim Lines (B16)	
X Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Dry-Season Water Table (C2)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Crayfish Burrows (C8)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Saturation Visible on Aerial Imagery (C9)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Stunted or Stressed Plants (D1)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	**X** Geomorphic Position (D2)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	____ Shallow Aquitard (D3)	
____ Sparsely Vegetated Concave Surface (B8)		____ Microtopographic Relief (D4)	
		X FAC-Neutral Test (D5)	

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Water marks on tree trunks.

Potential vernal pool in wetland and off-ROW. Recommend a site visit in Spring 2018.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D15**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	60	Yes	FAC
2. *Quercus bicolor*	10	No	FACW
3. *Pinus strobus*	5	No	FACU
4.			
5.			
6.			
7.			
	75	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	15	Yes	FACU
2. *Vaccinium corymbosum*	15	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	30	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**25**	x 2 =	**50**	
FAC species	**65**	x 3 =	**195**	
FACU species	**20**	x 4 =	**80**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**110**	(A)	**325**	(B)

Prevalence Index = B/A = **2.95**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Clethra alnifolia.

Species within the Herbaceous stratum which have less than 5% cover include: GRASS sp.

Pinus strobus trees are predominately on the wetland edge.

SOIL

Sampling Point: **WET-D15**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/1	100	None	—	—	—	SiL	Organic staining
3-9	10YR 2/2	95	7.5YR 3/4	5	C	M	SiL	
9-19	7.5YR 3/4	100	None	—	—	—	FSaL	gravels @ 5%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/17/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D15
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Flat Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.721359 Long: -71.038596 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D15**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	50	Yes	FACU
2. *Acer rubrum*	35	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	85	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	35	Yes	FACU
2. *Vaccinium corymbosum*	5	No	FACW
3.			
4.			
5.			
6.			
7.			
	40	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Maianthemum canadense*	15	Yes	FACU
2. *Smilax rotundifolia*	15	Yes	FAC
3. *Pinus strobus*	10	Yes	FACU
4. *Vaccinium corymbosum*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**10**	x 2 =	**20**	
FAC species	**50**	x 3 =	**150**	
FACU species	**110**	x 4 =	**440**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**170**	(A)	**610**	(B)

Prevalence Index = B/A = **3.59**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Amelanchier canadensis, Prunus serotina, and Vaccinium angustifolium.

Species within the Herbaceous stratum which have less than 5% cover include: Pteridium aquilinum and Quercus bicolor.

There was ~ 10% cover of CAREX sp. in the herb stratum. However, there was no seed head so the species could not be identified.

A few snag trees are present.

SOIL

Sampling Point: **UPL-D15**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-6	10YR 2/1	100	None	—	—	—	SiL	
6-14	10YR 3/6	100	None	—	—	—	FSaL	gravels and small cobbles at 40%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 14

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/23/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D16-16A
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.720400 Long: -71.035240 Datum: WGS-84
Soil Map Unit Name: Udorthents, smoothed NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

D16A is a forested wetland adjacent to the Copicut Reservoir just to the SW of Wetland D16.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D16-16A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	35	Yes	FACW
2. *Clethra alnifolia*	30	Yes	FAC
3. *Nyssa sylvatica*	10	No	FAC
4. *Acer rubrum*	5	No	FAC
5. *Spiraea tomentosa*	5	No	FACW
6.			
7.			
	85 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Calamagrostis canadensis*	35	Yes	OBL
2. *Rubus hispidus*	25	Yes	FACW
3. *Clethra alnifolia*	5	No	FAC
4. *Nyssa sylvatica*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**35**	x 1 =	**35**
FACW species	**65**	x 2 =	**130**
FAC species	**55**	x 3 =	**165**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**155** (A)		**330** (B)

Prevalence Index = B/A = **2.13**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Salix bebbiana.

Species within the Herbaceous stratum which have less than 5% cover include: Dennstaedtia punctilobula, Euthamia caroliniana, and Thelypteris palustris.

SOIL

Sampling Point: **WET-D16-16A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-6	10YR 3/1	20	5YR 4/6	3	C	RC	SaL	gravels @ 10%
	10YR 3/3	20						
	2.5Y 5/2	50	10YR 4/4	5	C	M		
			7.5YR 4/6	2	C	RC		
6-14	10YR 4/4	97	7.5YR 4/6	3	C	RC	SaL	cobbles at 20%,
								gravels at 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 14

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/23/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D16-D16A
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.720443 Long: -71.035208 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony NWI Classification: Scrub-Shrub Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D16-D16A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Quercus rubra*	30	Yes	FACU
2. *Vaccinium corymbosum*	20	Yes	FACW
3. *Clethra alnifolia*	10	No	FAC
4. *Quercus ilicifolia*	10	No	UPL
5. *Acer rubrum*	5	No	FAC
6.			
7.			
	75 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	20	Yes	FAC
2. *Kalmia angustifolia*	15	Yes	FAC
3. *Rubus hispidus*	10	Yes	FACW
4. *Comptonia peregrina*	5	No	UPL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**30**	x 2 =	**60**
FAC species	**50**	x 3 =	**150**
FACU species	**30**	x 4 =	**120**
UPL species	**15**	x 5 =	**75**
Column Totals:	**125** (A)		**405** (B)

Prevalence Index = B/A = **3.24**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Betula populifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Pinus strobus, Pteridium aquilinum, and Smilax rotundifolia.

Grass sp. has ~ 7% cover but there was no seed head present to properly identify to species.

SOIL

Sampling Point: **UPL-D16-D16A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-5	10YR 2/1	100	None	—	—	—	SiL	
5-6	7.5YR 4/4	100	None	—	—	—	SiL	
6-16	10YR 5/6	100	None	—	—	—	SaL	gravels @ 5%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/23/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D17
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.719568 Long: -71.032997 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Drainage patters are present as depressions with sphagnum moss.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D17**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Vaccinium corymbosum*	35	Yes	FACW
2. *Lyonia ligustrina*	15	Yes	FACW
3. *Clethra alnifolia*	5	No	FAC
4.			
5.			
6.			
7.			
	55 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Andropogon glomeratus*	15	Yes	FACW
2. *Rubus hispidus*	15	Yes	FACW
3. *Smilax rotundifolia*	10	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**80**	x 2 =	**160**	
FAC species	**15**	x 3 =	**45**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**95**	(A)	**205**	(B)

Prevalence Index = B/A = **2.16**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Acer rubrum, Spiraea tomentosa, and Betula populifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Calamagrostis canadensis and Lyonia ligustrina.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

Spagnum moss: ~80% cover in herb plot.

SOIL

Sampling Point: **WET-D17**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4							Organic	decomposing Sphagnum moss
4-5	10YR 2/1	100	None	—	—	—	SiL	organic staining
5-11	10YR 6/1	100	None	—	—	—	LSa	gravels @ 20%
11-12	10YR 5/8	100	None	—	—	—	LSa	
12-16	2.5Y 6/1	90	10YR 5/8	10	C	M	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 16

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/23/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D17-D18
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Mound Local relief (concave, convex, none): Convex Slope (%): 5-15
Subregion (LRR or MLRA): LRR R Lat: 41.719558 Long: -71.033167 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**	
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No **X**	Depth (inches): _____	
Water Table Present?	Yes _____ No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____ No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D17-D18**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Rubus allegheniensis*	20	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	20 = Total Cover		

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Dennstaedtia punctilobula*	80	Yes	UPL
2. *Smilax rotundifolia*	10	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**15**	x 3 =	**45**
FACU species	**20**	x 4 =	**80**
UPL species	**80**	x 5 =	**400**
Column Totals:	**115** (A)		**525** (B)

Prevalence Index = B/A = **4.57**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Betula populifolia and Spiraea tomentosa.

Species within the Herbaceous stratum which have less than 5% cover include: Andropogon glomeratus.

SOIL

Sampling Point: **UPL-D17-D18**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/2	100	None	—	—	—	Loam	Gravels at 10%
3-4	7.5YR 3/2	100	None	—	—	—	LSa	Gravels at 10%
4-7	2.5Y 6/2	100	None	—	—	—	LSa	Gravels at 10%
7-10	2.5Y 2.5/1	100	None	—	—	—	SiL	Buried organics
10-16	10YR 6/1	100	None	—	—	—	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Potential fill is located along the northeast side of road adjacent to a large boulder.

The soils from a 0"-7" depth are compacted.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/23/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D18
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.719458 Long: -71.033218 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- **X** Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

The wetland is most likely saturated earlier in the growing season due to an 8-inch organic (fibric) horizon and the dense mat of Sphagnum moss.

Potential vernal pool: recommend visit in Spring 2018.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D18**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Betula lenta*	35	Yes	FACU
2. *Pinus strobus*	25	Yes	FACU
3. *Nyssa sylvatica*	10	No	FAC
4.			
5.			
6.			
7.			
	70	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	25	Yes	FAC
2. *Vaccinium corymbosum*	20	Yes	FACW
3. *Nyssa sylvatica*	10	No	FAC
4. *Fagus grandifolia*	5	No	FACU
5. *Hamamelis virginiana*	5	No	FACU
6.			
7.			
	65	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Osmundastrum cinnamomeum*	15	Yes	FACW
2. *Vaccinium corymbosum*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**45**	x 2 =	**90**	
FAC species	**45**	x 3 =	**135**	
FACU species	**70**	x 4 =	**280**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**160**	(A)	**505**	(B)

Prevalence Index = B/A = **3.16**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Betula lenta and Pinus strobus.

Species within the Herbaceous stratum which have less than 5% cover include: Clethra alnifolia and Rubus hispidus.

Sphagnum moss: 90% cover in herb plot.

Osmundastrum cinnamomeum is predominately on the edge of the plot.

SOIL

Sampling Point: **WET-D18**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	Oi						Organic	Fibric -Sphagnum moss
8-10	10YR 2/1	100	None	—	—	—	MkSiL	
10-13	2.5Y 5/2	100	None	—	—	—	LFSa	gravels @ 5%
13-17	2.5Y 6/2	93	10YR 5/8	7	C	M	LFSa	gravels @ 5%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- **X** Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

Soil is moist and is most likely saturated earlier in the growing season. Therefore, Indicator (A2) Histic epipedon is being used.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/16/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D12A
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5
Subregion (LRR or MLRA): LRR R Lat: 41.722310 Long: -71.041265 Datum: WGS-84
Soil Map Unit Name: Paxton fine sandy loam, 0 to 8 percent slopes, very stony NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D12A**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	30	Yes	FAC
2. *Pinus strobus*	30	Yes	FACU
3. *Chamaecyparis thyoides*	10	No	OBL
4. *Betula papyrifera*	5	No	FACU
5.			
6.			
7.			
	75	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	50	Yes	FAC
2. *Vaccinium corymbosum*	20	Yes	FACW
3. *Acer rubrum*	5	No	FAC
4. *Chamaecyparis thyoides*	5	No	OBL
5.			
6.			
7.			
	80	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	15	Yes	FAC
2. *Rubus hispidus*	7	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	22.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **86%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**15**	x 1 =	**15**	
FACW species	**27**	x 2 =	**54**	
FAC species	**105**	x 3 =	**315**	
FACU species	**35**	x 4 =	**140**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**182**	(A)	**524**	(B)

Prevalence Index = B/A = **2.88**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **WET-D12A**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-6	10YR 4/2	80	5YR 3/4	15	OX, C	RC,M	FSaL	gravels @ 15%
			2.5YR 4/6	5	C	M		
6-13	10YR 3/2	90	7.5YR 3/4	10	C	M	FSaL	gravels @ 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/24/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D19
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Lowland Local relief (concave, convex, none): Concave Slope (%): 0-3
Subregion (LRR or MLRA): LRR R Lat: 41.717127 Long: -71.026903 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- **X** Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- **X** Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- **X** Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Drainage patterns most likely resulting from water running off the access road. Sphagnum moss is growing in drainage patterns.

Water marks were present on dead shrubs.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D19**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	30	Yes	FAC
2. *Lyonia ligustrina*	15	Yes	FACW
3. *Ilex verticillata*	5	No	FACW
4.			
5.			
6.			
7.			
	50 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus hispidus*	25	Yes	FACW
2. *Smilax rotundifolia*	20	Yes	FAC
3. *Clethra alnifolia*	10	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *Smilax rotundifolia*	5	Yes	FAC
2.			
3.			
4.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**45**	x 2 =	**90**	
FAC species	**65**	x 3 =	**195**	
FACU species	**0**	x 4 =	**0**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**110**	(A)	**285**	(B)

Prevalence Index = B/A = **2.59**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Herbaceous stratum which have less than 5% cover include: Acer rubrum, Dichanthelium clandestinum, and Grass sp.

~ 75% Sphagnum moss cover in herb plot. Deer browse on Clethra alnifolia.

SOIL

Sampling Point: **WET-D19**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5							Oi	decomposing Sphagnum
5-9	N 2.5/	75	None	—	—	—	MkSiL	
	2.5Y 2.5/1	25	None	—	—	—		
9-18	2.5Y 6/1	100	None	—	—	—	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- **X** Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Sandy Gleyed Matrix (S4)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

Very few gravels in the soil profile.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Fall River/Bristol Sampling Date: 08/24/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D19
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Hilltop Local relief (concave, convex, none): Flat Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.717006 Long: -71.027084 Datum: WGS-84
Soil Map Unit Name: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?**	**Yes** _____	**No X**
Hydric Soil Present?	Yes _____	No **X**			
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D19**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Nyssa sylvatica*	40	Yes	FAC
2. *Acer rubrum*	35	Yes	FAC
3. *Pinus strobus*	10	No	FACU
4.			
5.			
6.			
7.			
	85	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Pinus strobus*	65	Yes	FACU
2. *Fagus grandifolia*	25	Yes	FACU
3. *Clethra alnifolia*	10	No	FAC
4.			
5.			
6.			
7.			
	100	= Total Cover	

Herb Stratum (Plot size: 5 feet)			
1. *Clethra alnifolia*	10	Yes	FAC
2. *Lysimachia borealis*	5	Yes	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15.00	= Total Cover	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**95**	x 3 =	**285**
FACU species	**100**	x 4 =	**400**
UPL species	**5**	x 5 =	**25**
Column Totals:	**200** (A)		**710** (B)

Prevalence Index = B/A = **3.55**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (Include photo numbers here or on a separate sheet.)

No positive indication of hydrophytic vegetation was observed.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Vaccinium corymbosum.

Species within the Herbaceous stratum which have less than 5% cover include: Pinus strobus, Smilax rotundifolia, and Streptopus lanceolatus.

Species within the Woody Vine stratum which have less than 5% cover include: Smilax rotundifolia.

SOIL

Sampling Point: **UPL-D19**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3							Organic	
3-7	10YR 2/1	100	None	—	—	—	SiL	
7-9	10YR 3/1	100	None	—	—	—	LSa	
9-11	7.5YR 4/6	100	None	—	—	—	LSa	
11-16	10YR 5/6	100	None	—	—	—	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

Very few gravels throughout the soil profile.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 08/25/2017
Applicant/Owner: National Grid State: MA Sampling Point: WET-D20
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Lowland Local relief (concave, convex, none): Concave Slope (%): 0-2
Subregion (LRR or MLRA): LRR R Lat: 41.711523 Long: -71.012567 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X** **No** _____
Hydric Soil Present?	Yes **X**	No _____		
Wetland Hydrology Present?	Yes **X**	No _____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined to be within a wetland due to the presence of all three wetland criteria.

Plot located on hillslope adjacent to access road.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

____ Surface Water (A1)	**X** Water-Stained Leaves (B9)	____ Aquatic Fauna (B13)	____ Marl Deposits (B15)
____ High Water Table (A2)	____ Hydrogen Sulfide Odor (C1)	____ Saturation (A3)	____ Water Marks (B1)
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Iron Deposits (B5)	____ Thin Muck Surface (C7)
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	____ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

____ Surface Soil Cracks (B6)	____ Moss Trim Lines (B16)
X Drainage Patterns (B10)	____ Dry-Season Water Table (C2)
____ Crayfish Burrows (C8)	____ Saturation Visible on Aerial Imagery (C9)
____ Stunted or Stressed Plants (D1)	**X** Geomorphic Position (D2)
____ Shallow Aquitard (D3)	____ Microtopographic Relief (D4)
X FAC-Neutral Test (D5)	

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

A positive indication of wetland hydrology was observed (at least two secondary indicators).

Drainage patterns and water-stained leaves are in the access road.

VEGETATION - Use scientific names of plants.

Sampling Point: **WET-D20**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	10	Yes	FAC
2. *Pinus strobus*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	15 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Clethra alnifolia*	40	Yes	FAC
2. *Carpinus caroliniana*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	50 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Dichanthelium clandestinum*	25	Yes	FACW
2. *Glyceria obtusa*	10	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **83%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**10**	x 1 =	**10**	
FACW species	**25**	x 2 =	**50**	
FAC species	**60**	x 3 =	**180**	
FACU species	**5**	x 4 =	**20**	
UPL species	**0**	x 5 =	**0**	
Column Totals:	**100**	(A)	**260**	(B)

Prevalence Index = B/A = **2.60**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Species within the Sapling/Shrub stratum which have less than 5% cover include: Fagus grandifolia.

Species within the Herbaceous stratum which have less than 5% cover include: Calamagrostis canadensis, Carex folliculata, Euthamia graminifolia, and Triandenum virginicum.

20% Sphagnum moss cover in herb plot.

SOIL

Sampling Point: **WET-D20**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2							Organic	
2-4	2.5Y 6/2	100	None	—	—	—	FSa	
4-7	2.5Y 2.5/1	100	None	—	—	—	SiL	
7-16	2.5Y 6/2	93	7.5YR 4/6	7	C	PL,M	LSa	gravels @ 5%, cobbles @ 10%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- **X** Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** **X** **No** ____

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fall River to Acushnet Reliability Project-114 Line City/County: Dartmouth/Bristol Sampling Date: 08/25/2017
Applicant/Owner: National Grid State: MA Sampling Point: UPL-D20
Investigator(s): Meaghan Lamothe and Bert Pelletier Section, Township, Range: N/A
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Flat Slope (%): 0-1
Subregion (LRR or MLRA): LRR R Lat: 41.711525 Long: -71.012397 Datum: WGS-84
Soil Map Unit Name: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (if no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes** _____ **No** **X**
Hydric Soil Present?	Yes _____	No **X**		
Wetland Hydrology Present?	Yes _____	No **X**	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- **X** FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____	**Wetland Hydrology Present?** **Yes** _____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION - Use scientific names of plants.

Sampling Point: **UPL-D20**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Rubus allegheniensis*	7	Yes	FACU
2. *Comptonia peregrina*	5	Yes	UPL
3.			
4.			
5.			
6.			
7.			
	12 = Total Cover		

Herb Stratum (Plot size: 5 feet)			
1. *Rubus hispidus*	35	Yes	FACW
2. *Dichanthelium clandestinum*	30	Yes	FACW
3. *Andropogon glomeratus*	20	No	FACW
4. *Euthamia graminifolia*	15	No	FAC
5. *Smilax rotundifolia*	5	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	105.00 = Total Cover		

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**	
FACW species	**85**	x 2 =	**170**	
FAC species	**20**	x 3 =	**60**	
FACU species	**7**	x 4 =	**28**	
UPL species	**5**	x 5 =	**25**	
Column Totals:	**117**	(A)	**283**	(B)

Prevalence Index = B/A = **2.42**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Trees not present; maintained ROW.

Species within the Sapling/Shrub stratum which have less than 5% cover include: Spiraea tomentosa.

Species within the Herbaceous stratum which have less than 5% cover include: Calamagrostis canadensis and Oxalis sp.

SOIL

Sampling Point: **UPL-D20**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1							Organic	
1-3	10YR 3/1	100	None	—	—	—	LSa	cobbles @ 35%
3-15	10YR 3/6	100	None	—	—	—	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Sandy Gleyed Matrix (S4)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ____ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ____ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ____ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ____ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ____ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ____ Dark Surface (S7) **(LRR K, L, M)**
- ____ Polyvalue Below Surface (S8) **(LRR K, L)**
- ____ Thin Dark Surface (S9) **(LRR K, L)**
- ____ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ____ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ____ Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock refusal

Depth (inches): 15

Hydric Soil Present? **Yes** ____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

ATTACHMENT E EVERSOURCE MA DEP WETLAND FIELD DATA FORMS

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D21 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D21		Transect Number:	Date of Delineation: 5/11/2018
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees					
Sapling/Shrub	Clethra alnifolia FAC* Spiraea alba FACW	30* 5			
Herbaceous	Andropogon glomeratus FACW* Juncus effusus OBL*	55* 15*			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oa	0-10.5		
A	10.5-14	10YR 3/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE indicator: Histic epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 4 in
- ☑ Depth to free water in observation hole: 8 in
- ☑ Depth to soil saturation in observation hole: 8 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D22 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D22		Transect Number:	Date of Delineation: 5/17/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Clethra alnifolia FAC*	5*			
Herbaceous: Calamagrostis canadensis OBL*	70*			
Herbaceous: Comarum palustre OBL	5			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 2

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Swansea muck, 0 to 1 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oe	0-3		
A	3-6	2.5Y 3/1	
Bw1	6-9	2.5Y 2.5/1	
Oab	9-11		

Remarks:

Bw2 11-20 10YR 2/1

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Black histic (A3)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 15 in
- ☑ Depth to soil saturation in observation hole: 10 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D23 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D23		Transect Number:	Date of Delineation: 5/17/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Acer rubrum FAC* Spiraea alba FACW* Salix discolor FACW	40* 35* 15			
Herbaceous: Rubus hispidus FACW* Comarum plastre OBL* Acer rubrum FAC Juncus effusus OBL	35* 20* 10 10			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Swansea coarse sand, 0 to 2 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oa	0-2		
A	2-3	2.5Y 5/2	
Bg	3-5	5Y 6/2, 98%	5YR 4/6, 2% Concentrations in the Root Channels
Bw	5-16	2.5Y 4/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Matrix (F3)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 2 in
- ☑ Depth to free water in observation hole: 9 in
- ☑ Depth to soil saturation in observation hole: 4 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D24 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D24		Transect Number:	Date of Delineation: 5/17/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Salix discolor FACW* Acer rubrum FAC* Morella caroliniensis FAC Spiraea alba FACW	40* 20* 10 5			
Herbaceous: Onoclea sesibilis FACW* Phragmites australis FACW*	80* 40*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Pits - Udorthents complex, gravelly

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-1		
A	1-3	10YR 3/2	
Bw1	3-8	2.5YR 4/2	
Bg	8-10	2.5Y 6/2	

Remarks:

Bw2 10-16 (10YR 4/2)

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: 2cm Muck (A10)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 8 in
- ☑ Depth to free water in observation hole: 0 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: geomorphic postion

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D25 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D25		Transect Number:	Date of Delineation: 5/23/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub				
Herbaceous	Juncus effusus OBL* Onoclea sensibilis FACW* Thelypteris palustris FACW Typha latifolia OBL Phragmites australis FACW	35* 25* 15 15 10		
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 2

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Pits - Udorthents complex, gravelly

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oe	0-3		
Oa	3-22		

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histosol (A1)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 3 in
- ☑ Depth to free water in observation hole: 4 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D26 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D26		Transect Number:	Date of Delineation: 5/24/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Pinus strobus FACU	5*			
Sapling/Shrub: Spiraea alba FACW*	40*			
Herbaceous: Spiraea alba FACW* Eutrochium maculatum OBL*	10* 5*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-2		
A	2-4	10YR 2/1	
Bg	4-10	5Y 6/1 -95%	7.5YR 4/6 - 5%, Concentrations in the Root Channels and Matrix
Oab	10-16		

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicators: Depleted Below Dark Surface (A11) and Sandy Redox (S5)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 11 in
- ☑ Depth to soil saturation in observation hole: 9 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D27 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D27		Transect Number:	Date of Delineation: 5/31/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Clethra alnifolia FAC*	55*			
Herbaceous: Clethra alnifolia FAC* Juncus effusus OBL* Carex intumescens FACW*	10* 10* 5*			
Vines: Smilax rotundifolia FAC*	15*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-9		
Oa	9-12		
Bw	12-18	10YR 4/2 - 90%	2.5Y 5/2 - 10% Depletions in the Matrix

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 5 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D28 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D28		Transect Number:	Date of Delineation: 6/01/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub	Spiraea tomentosa FACW* Spiraea alba FACW*	35* 20*		
Herbaceous	Panicum virgatum FAC* Carex lurida OBL* Juncus effusus OBL Rubus hispidus FACW	35* 15* 10 5		
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-3		
Oe	3-6		
Bw	6-14	2.5Y3/2 - 85%	2.5Y 3/2, 10%, Depletions in the Matrix 7.5YR 4/6, 5%, Concentrations in the Root Channels

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 5 in
- ☑ Depth to free water in observation hole: 4 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D29 & D30 DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: ~~D29 & D30~~		Transect Number:	Date of Delineation: ~~6/01/2018~~
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub Vaccinium corymbosum FACW* Clethra alnifolia FAC* Rubus allegheniensis FACU	35* 25* 5			
Herbaceous Carex echinata OBL* Andropogon glomeratus FACW*	25* 15*			
Vines Smilax rotundifolia FAC*	30*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A1	0-3	10YR 2/1 (organics mixed in)	
A2	3-8	10YR 2/1 (coarse woody debris mixed in)	
Bg	8-16	2.5Y 6/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D31 & D32 DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: ~~D31 & D32~~		Transect Number:	Date of Delineation: ~~6/04/2018~~
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub	Vaccinium oxycoccos OBL* Salix bebbiana FACW Lyonia lugustrina FACW Vaccinium corymbosum FACW	35* 10 10 5		
Herbaceous	Rubus hispidus FACW* Potentilla simplex FACU* Solidago uliginosa OBL*	20* 15* 10*		
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-1		
A	1-6	10YR 2/2	2.5Y 3/1(15%) Depletions in the Matrix
Bw	6-9	2.5Y 5/2 (85%)	7.5YR 4/6 (5%) Concentrations in the Pore Linings
Bg	9-13	2.5Y 6/2 (95%)	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 1 in
- ☑ Depth to free water in observation hole: 1 in
- ☑ Depth to soil saturation in observation hole: 1in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic postion

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D33 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D33		Transect Number:	Date of Delineation: 5/30/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub	Lyonia ligustrina FACW* Pinus strobus FACU Vaccinium corymbosum FACW	20* 5 5		
Herbaceous	Andropogon glomeratus FACW* Vaccinium corymbosum FACW* Pinus strobus FACU	35* 15* 5		
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-2		
A	2-4	10YR 3/1	
Bw1	4-7	2.5Y 5/2	
Bw2	7-16	10YR 4/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 3 in
- ☑ Depth to free water in observation hole: 7 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Dartmouth, Wetland D34 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D34		Transect Number:	Date of Delineation: 5/30/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Clethra alnifolia FAC* Spiraea alba FACW* Rubus allegheniensis FACU	45* 30* 5			
Herbaceous: Juncus effusus OBL*	15*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oa	0-2		
Bw1	2-10	2.5Y 5/2 - 65% 10YR 2/1 - 30%	7.5YR 4/4 -5%, Concentrations in the Root Channels
Bw2	10-16	2.5Y 5/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 0.5 in
- ☑ Depth to free water in observation hole: 10 in
- ☑ Depth to soil saturation in observation hole: 9 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: New Bedford, Wetland D35 & D36 DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: ~~D35 & D36~~		Transect Number:	Date of Delineation: ~~6/05/2018~~
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub	Clethra alnifolia FAC* Spiraea tomentosa FACW	30* 5		
Herbaceous	Parathelypteris simulata FACW* Calamagrostis canadensis OBL* Carex stricta OBL Thelypteris palustris FACW	20* 15* 5 5		
Vines	Smilax rotundifolia FAC*	10*		

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-2		
Oa	2-12		
Bw	12-18	5Y 5/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 2 in
- ☑ Depth to free water in observation hole: 8 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: New Bedford, Wetland D37 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D37		Transect Number:	Date of Delineation: 6/05/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub	Clethra alnifolia FAC* Spiraea tomentosa FACW*	35* 15*		
Herbaceous	Clethra alnifolia FAC* Carex intumescens FACW* Spiraea tomentosa FACW Dulichium arundinaceum OBL	10* 10* 5 5		
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Pipestone loamy sand, 0 to 3 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-4		
Oe	4-10		
A	10-15	10YR 2/1	
Bw	15-16	10YR 3/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 3 in
- ☑ Depth to free water in observation hole: 0 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: New Bedford, Wetland D38 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D38		Transect Number:	Date of Delineation: 6/06/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Salix bebbiana FACW* Clethra alnifolia FAC* Acer rubrum FAC Rosa multiflora FACU Spiraea alba FACW	35* 25* 10 5 5			
Herbaceous: Carex crinita OBL* Impatiens capensis FACW* Clethra alnifolia FAC Spiraea tomentosa FACW	40* 15* 5 5			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Sudbury fine sandy loam, 0 to 3 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-2	10YR 2/1	
Bw1	2-10	10YR 4/3	
Bw2	10-16	2.5Y 4/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Soil is not turning out hydric. However, because wetland is in the floodplain of a perennial stream, the soil is most likely aerated and thus not likely able to produce reducing conditions.

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 6 in
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: New Bedford, Wetland D39 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D39		Transect Number:	Date of Delineation: 6/07/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Spiraea tomentosa FACW* Kalmia angustifolia FAC* Spiraea alba FACW*	30* 10* 10*			
Herbaceous: Calamagrostis canadensis OBL*	5*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Scarboro mucky fine sandy loam, 0 to 3 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-1		
A	1-3	10 YR 2/1	
Bw	3-6	2.5Y 3/2	
C	6-16	2.5Y 5/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 10 in
- ☑ Depth to soil saturation in observation hole: 9 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: New Bedford, Wetland D40 & D41 DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: ~~D40 & D41~~		Transect Number:	Date of Delineation: ~~6/07/2018~~
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC*	15*			
Sapling/Shrub: Spiraea alba FACW* Clethra alnifolia FAC Spiraea tomentosa FACW Ilex verticillata FACW	35* 10 5 5			
Herbaceous: Thelypteris palustris FACW* Juncus effusus OBL* Rubus allegheniensis FACU	50* 25* 10			
Vines:				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-4		
A	4-10	2.5Y 2.5/1	
Bw1	10-11	10YR 2/1	
Bw2	11-13	10YR 4/1 - 98%	7.5YR 4/6 - 2%, Concentrations in the Pore Linings

Remarks:

C 13-19 2.5Y 3/2 - 20%
2.5Y 4/2 - 22%
2.5Y 5/2 - 55% 7.5Y 4/6 - 3%, C, M

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Loamy Mucky Mineral (F1)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: New Bedford, Wetland D42 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D42		Transect Number:	Date of Delineation: 6/07/2018
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Acer rubrum FAC*	15*			
Sapling/Shrub	Spiraea tomentosa FACW* Clethra alnifolia FAC* Ilex verticillata FACW Spiraea alba FACW	35* 20* 15 10			
Herbaceous	Scirpus cyperinus OBL* Thelypteris palustris FACW* Eutrochium maculatum OBL* Impatiens capensis FACW	35* 25* 20* 15			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 6

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Swansea muck, 0 to 1 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-4		
Oa	4-9		
A	9-11	10YR 2/1	
Bw	11-16	2.5Y 5/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 1 in
- ☑ Depth to free water in observation hole: 4 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: New Bedford, Wetland D43 & D44 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D43 & D44		Transect Number:	Date of Delineation: 6/11/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubum FAC* Pinus strobus FACU	15* 10*			
Sapling/Shrub: Rosa multiflora FACU Salix bebbiana FACW* Vaccinium corymbosum FACW* Viburnum dentatum FAC	30* 15* 15* 5			
Herbaceous: Onoclea sensibilis FACW* Juncus effusus OBL* Eutrochium maculatum OBL Solidago gigantea FACW	60* 25* 5 5			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 2

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Scarboro mucky fine sandy loam, 0 to 3 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oa	0-10		
A	10-12	10YR 2/1	
Bg	12-18	2.5Y 6/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 9 in
- ☑ Depth to soil saturation in observation hole: 5 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D45 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D45		Transect Number:	Date of Delineation: 6/11/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub Vaccinium corymbosum FACW* Kalmia angustifolia FAC* Lyonia ligustrina FACW* Clethra alnifolia FAC	20* 10* 10* 5			
Herbaceous Vaccinium corymbosum FACW* Rubus hispidus FACW* Thelypteris palustris FACW* Lyonia ligustrina FACW Carex intumescens FACW	20* 15* 15* 10 10			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 6

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-6		
Oa	6-12		
A	12-18	10YR 2/2	
Bw	18-20	2.5Y 6/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 7 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D46 & D47 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: ~~D46 & D47~~		Transect Number:	Date of Delineation: ~~6/11/2018~~
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub Vaccinium corymbosum FACW* Lyonia ligustrina FACW* Clethra alnifolia FAC Kalmia angustifolia FAC	30* 25* 10 5			
Herbaceous Kalmia angustifolia FAC* Eleocharis palustris OBL* Vaccinium corymbosum FACW* Osmundastrum cinnamomeum FACW	15* 10* 10* 5			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-8		
A	8-12	10YR 3/1	
Bw	12-20	2.5Y 5/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 8 in
- ☑ Depth to soil saturation in observation hole: 4 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D48& D49 DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D48 & D49		Transect Number:	Date of Delineation: 6/26/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Salix bebbiana FACW* Spiraea alba FACW* Spiraea tomentosa FACW*	30* 25* 15*			
Herbaceous: Carex utriculata OBL* Lysimachia terrestris OBL* Juncus canadensis OBL*	20* 20* 10*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 6 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Bw1	0-5	10YR 3/2 - 90%	5YR 4/6 10%,Concentrations in the Root Channel
Bw2	5-9	10YR 4/2 - 90%	5YR 4/6-10%,Concentrations in the Matrix
C	9-16	10YR 4/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Redox Dark Surface (F6)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position and surface soil cracks

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D50 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D50		Transect Number:	Date of Delineation: 6/26/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Spiraea alba FACW* Salix bebbiana FACW* Rubus idaeus FACU	30* 25* 5			
Herbaceous: Phragmites australis FACW* Acer rubrum FAC	35* 5			
Vines: Celastrus orbiculatus UPL	10*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-9	10YR 3/2 - 80% 10YR 4/2 - 20%	
Bg	9-16	10YR 6/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
  _____
  _____
  _____
- ☑ Other: Geomorphic position _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D51 & D52 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation | Observation Plot Number: ~~D51 & D52~~ | Transect Number: | Date of Delineation: ~~6/26/2018~~

	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees					
Sapling/Shrub	Salix bebbiana FACW* Spiraea tomentosa FACW* Vaccinium macrocarpon OBL*	25* 10* 10*			
Herbaceous	Dichanthelium clandestinum FACW* Solidago uliginosa OBL	40* 5			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-6	10YR 2/2	
Bg	6-12	10YR 6/1	
Bw	12-16	2.5Y 5/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 13 in
- ☑ Depth to soil saturation in observation hole: 12 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D53 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation | Observation Plot Number: D53 | Transect Number: | Date of Delineation: 6/27/2018

	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees					
Sapling/Shrub	Swida amomum FACW* Spiraea alba FACW*	20* 5*			
Herbaceous	Lythrum salicaria OBL* Onoclea sensibilis FACW* Phragmites australis FACW* Spiraea alba FACW	35* 30* 25* 15		Thelypteris FACW (10%) Juncus effusus OBL (10%) Carex lurida OBL (5%)	
Vines	Vitis labrusca FACU	5*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-3	2.5Y 2.5/1	7.5YR 3/4 - 2%,Concentrations in the Root Channels
Bw	3-10	10YR 3/1 - 98%	10YR 4/6 - 3%,Concentrations in the Root Channels
C	10-16	2.5Y 5/1 - 97%	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Redox Dark Surface is an Army Corps of Engineers hydric soil indicator.

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D54 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D54		Transect Number:	Date of Delineation: 6/27/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Spiraea tomentosa FACW* Spiraea alba FACW*	20* 5*			
Herbaceous: Onoclea sensibilis FACW* Juncus effusus OBL Solidago rugosa FAC	50* 5 5			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Sudbury fine sandy loam, 0 to 3 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-4	10YR 2/2	
Bw	4-16	2.5YR 4/2 - 90%	7.5YR 4/6 - 10%,C, RC/PL

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D55 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D55		Transect Number:	Date of Delineation: 6/27/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub Clethra alnifolia FAC* Vaccinium corymbosum FACW* Alnus incana FACW Lyonia ligustrina FACW Spiraea tomentosa FACW	30* 20* 15 10			
Herbaceous Thelypteris palustris FACW* Phragmites australis FACW* Scirpus cyperinus FACW* Osmundastrum cinnamomeum FACW Calamagrostis canadensis OBL	50* 35* 35* 5 5			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Freetown muck, 0 to 1 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oe	0-8		
Oa	8-10		
Oe	10-16		
Oa	16-18		

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histosol (A1)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 11.5 in.
- ☑ Depth to soil saturation in observation hole: 5 in.
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D56 & D57 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D56 & D57		Transect Number:	Date of Delineation: 6/27/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub				
Herbaceous	Phragmites australis FACW* Solidago rugosa FAC* Lysimachia terrestris OBL* Galium asprellum OBL Eutrochium maculatum OBL Impatiens capensis FACW Juncus effusus OBL	35* 15* 15* 10 10 10 5		
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Pits - Udorthents complex, gravelly

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oe	0-4		
Oa	4-19		

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histosol (A1)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 10 in.
- ☑ Depth to soil saturation in observation hole: 4 in.
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet,Wetland D58 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D58		Transect Number:	Date of Delineation: 6/27/2018
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees					
Sapling/Shrub					
Herbaceous	Phragmites australis FACW* Eutrochium maculatum OBL* Solidago rugosa FAC	75* 35* 25			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 2

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Merrimac fine sandy loam, 3 to 8 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oe	0-6		
C	6-10	10YR 4/3	
Oab	10-16		

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 11 in.
- ☑ Depth to soil saturation in observation hole: 4 in.
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet,Wetland D59 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

This data plot is a pond.

Vegetation	Observation Plot Number: D60		Transect Number:	Date of Delineation: 6/29/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub				
Herbaceous				
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 0

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Scarboro mucky fine sandy loam, 0 to 3 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color

Remarks:

This data plot is a pond.

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 0 in
- ☑ Depth to free water in observation hole: 0 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet,Wetland D60 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D60		Transect Number:	Date of Delineation: 6/29/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC*	20*			
Sapling/Shrub: Viburnum dentatum FAC* Rosa multiflora FACU Morus alba FACU	30* 20* 5			
Herbaceous: Solidago rugosa FAC* Calamagrostis canadensis OBL* Carex stricta OBL* Thelypteris palustris FACW	40* 25* 20* 15			
Vines: Celastrus orbiculatus UPL	7*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 2

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Scarboro mucky fine sandy loam, 0 to 3 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-8		
Bw	8-12	2.5Y 2.5/1	
Oab	12-16		

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 0.5 in
- ☑ Depth to free water in observation hole: 4 in
- ☑ Depth to soil saturation in observation hole: 0 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet, Wetland D61 & D62 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation | Observation Plot Number: ~~D61 & D62~~ | Transect Number: | Date of Delineation: ~~6/29/2018~~

	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees					
Sapling/Shrub	Vaccinium corymbosum FACW* Pinus strobus FACU	35* 5			
Herbaceous	Rubus flagellaris FACU Carex scoparia FACW* Dichanthelium clandestinum FACW* Smilax rotundifolia FAC Solidago latissimifolia OBL	30* 25* 20* 10 5			
Vines	Smilax rotundifolia FAC*	15*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐
title/date: Web Soil Survey - Bristol County, MA S. Part, 2017
map number:
soil type mapped: Pits - Udorthents complex, gravelly
hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-3	10YR 2/1	
Bw	3-7	10YR 2/1 - 98%	7.5YR 3/4 -2%,Concentrations in the Root Channels
	7-16	2.5Y 5/2 - 97%	5YR 4/6 - 3%,Concentrations in the Root Channels

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Redox Dark Surface (F6)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Eversource Prepared by: M. Lamothe Project location: Acushnet,Wetland D64 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D64		Transect Number:	Date of Delineation: 6/29/2018
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub Clethra alnifolia FAC* Vaccinium corymbosum FACW* Lyonia ligustrina FACW Spiraea tomentosa FACW	35* 20* 15 10			
Herbaceous Parathelypteris simulata FACW* Carex intumescens FACW Dichanthelium clandestinum FACW	65* 5 5			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-3		
Oa	3-8		
A	8-9	10YR 2/1	
Bw	9-16	10YR 3/1 - 97%	2.5Y 5/2 -3%,Depletions in the Matrix

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: 2 in
- ☑ Depth to free water in observation hole: 9 in
- ☑ Depth to soil saturation in observation hole: 3 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

ATTACHMENT F NEP MA DEP WETLAND FIELD DATA FORMS

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River; Wetland L1 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: L1		Transect Number:	Date of Delineation: 9/08/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC* Pinus strobus FACU Betula lenta FACU	50* 30* 10			
Sapling/Shrub: Clethra alnifolia FAC* Vaccinium corymbosum FACW* Acer rubrum FAC*	20* 10* 10*			
Herbaceous: Smilax rotundifolia FAC*	5*			
Vines: Smilax rotundifolia FAC*	5*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 6 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey- Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0-3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-5		
Oe	5-8		
Oa	8-12		

Remarks:

A 12-20" (2.5Y 3/1)

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Histic epipedon is the Army Corps of Engineers hydric soils indicator.

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position and microtopographic relief

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland M1 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: M1		Transect Number:	Date of Delineation: 9/08/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Nyssa sylvatica FAC* Acer rubrum FAC* Pinus strobus FACU	50* 40* 5			
Sapling/Shrub	Vaccinium corymbosum FACW* Clethra alnifolia FAC*	25* 15*			
Herbaceous	Vaccinium corymbosum FACW*	5*			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey- Bristol County, MA S. Part, 2017

map number:

soil type mapped: Swansea muck, 0 to 1 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-8		
Oa	8-11		
A	11-13	N2.5/	None

Remarks:

Bw: 13-15" (7.5YR3/1)
Bg: 15-19" (2.5Y 6/1)

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

Histic epipedon and depleted matrix are Army Corps of Engineers hydric soil indicators

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position, microtopographic relief

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D1 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation | Observation Plot Number: D1 | Transect Number: | Date of Delineation: 6/29/2017

	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees					
Sapling/Shrub	Vaccinium corymbosum FACW* Morella pensylvanica FAC* Clethra alnifolia FAC Salix discolor FACW Ilex verticillata FACW	40* 15* 10 10 5			
Herbaceous	Osmundastrum cinnamomeum FACW* Clethra alnifolia FAC* Rubus hispidus FACW Smilax rotundifolia FAC	20* 15* 7 7			
Vines	Vitus labrusca FACU	10*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-2		
A	2-5	2.5Y 2.5/1	
Bg	5-12	5Y 6/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☑ Depth to soil saturation in observation hole: 9.5 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D2 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation | Observation Plot Number: D2 | Transect Number: | Date of Delineation: 7/11/2017

	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Acer rubrum FAC* Betula lenta FACU Quercus bicolor FACW Fraxinus pensylvanica FACW Pinus strobus FACU	35* 25* 15 10 5			
Sapling/Shrub	Clethra alnifolia FAC* Carpinus caroliniana FAC Betula lenta FACU	65* 10 5			
Herbaceous	Rubus pubescens FACW* Maianththemum canadense FACU	7* 5*			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 2

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-6		
A	6-10	10YR 2/1	
Bw	10-16	10YR 4/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Thin Dark Surface (S9)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 8 in.
- ☑ Depth to soil saturation in observation hole: 2 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D3 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D3		Transect Number:	Date of Delineation: 7/11/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Clethra alnifolia FAC* Betula lenta FACU Vaccinium corymbosum FACW	90* 5 5			
Herbaceous: Osmundastrum cinnamomuem FACW* Clethra alnifolia FAC*	10* 5*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Organic	0-4		
Bw1	4-8	2.5Y 2.5/1 - 98%	10YR 3/3 - 2%, Concentrations in the Root Channels
Bw2	8-13	7.5YR 3/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Redox Dark Surface (F6)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☑ Depth to soil saturation in observation hole: 11 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D4 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D4		Transect Number:	Date of Delineation: 7/12/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Ilex glabra FACW* Acer rubrum FAC	90* 5			
Herbaceous: Ilex glabra FACW*	20*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 2

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Organic	0-5		
A	5-12	7.5YR 2.5/1	
Bw	12-14	10YR 4/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Thin Dark Surface (S9)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D5 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D5		Transect Number:	Date of Delineation: 7/13/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Ilex verticillata FACW* Clethra alnifolia FAC* Vaccinium corymbosum FACW Corylus americana FACU	30* 20* 10 5			
Herbaceous: Rubus pubescens FACW* Dichanthelium clandestinum FACW* Carex intumescens FACW	25* 20* 10			
Vines: Parthenocissus quinquefolia FACU	5*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-6		
A	6-12	N2.5/	
Bw	12-13	10YR 4/1 -40% 2.5Y 5/2 -50%	10YR 4/6 -10%,Concentrations in the Matrix

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Thick Dark Surface (A12)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D6 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D6		Transect Number:	Date of Delineation: 7/13/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC* Carya ovata FACU	70* 10			
Sapling/Shrub: Carpinus caroliniana FAC* Quercus palustris FACW	45* 5			
Herbaceous: Carpinus caroliniana FAC* Maianthemum canadense FACU	15* 10*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Organic	0-4		
	4-15	N2.5/	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Thick Dark Surface (A12)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D7 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D7		Transect Number:	Date of Delineation: 7/19/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC* Pinus strobus FACU	80* 5			
Sapling/Shrub: Clethra alnifolia FAC* Vaccinium corymbosum FACW* Hamamelis virginiana FACU	60* 35* 25*			
Herbaceous: Smilax rotundifolia FAC* Clethra alnifolia FAC*	15* 10*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-6		
Bw1	6-14	N2.5/	
Bw2	14-16	N2.5/ (mucky)	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Thick Dark Surface (A12)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 16 in
- ☑ Depth to soil saturation in observation hole: 10 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D8 DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D8		Transect Number:	Date of Delineation: 7/19/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Carya ovata FACU Fraxinus americana FACU* Growing on hummocks and shallow roots Pinus strobus FACU* Growing on hummock and shallow roots Acer rubrum FAC	35* 25* 20* 5			
Sapling/Shrub	Acer rubrum FAC* Ulmus rubra FAC* Betula lenta FACU Pinus strobus FACU	45* 35* 30* 15			
Herbaceous	Maianthemum canadensis FACU Betula lenta FACU	15* 10*			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4

Number of dominant non-wetland indicator plants: 4

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Canton and Charlton fine sandy loams, very rocky, 3 to 15 percent slopes

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Organic	0-3		
A	3-8	10YR 2/1	
Bw	8-12	10YR 4/2	
Bg	12-20	2.5Y 6/2	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Matrix (F3)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☑ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position and Microtopographic Relief

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☐	☑
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D11 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D11		Transect Number:	Date of Delineation: 7/21/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC* Pinus strobus FACU	55* 40*			
Sapling/Shrub: Clethra alnifolia FAC* Fraxinus pennsylvanica FACW Quercus palustris FACW	50* 5 5			
Herbaceous: Osmundastrum cinnamomeum FACW* Parathelypteris simulata FACW* Osmunda regalis OBL	85* 55* 10			
Vines: Toxicodendron radicans FAC*	5*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O	0-4		
A	4-6	10YR 2/1	
Bw	6-16	10YR 4/1 -95%	2.5Y 5/1 -5%,Depletions in the Matrix

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Thin Dark Surface (S9)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☑ Depth to soil saturation in observation hole: 11 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D12 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D12		Transect Number:	Date of Delineation: 8/16/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Acer rubrum FAC* Pinus strobus FACU	20* 15*			
Sapling/Shrub	Clethra alnifolia FAC* Acer rubrum FAC* Viburnum dentatum FAC Spiraea alba FACW	30* 25* 15 10			
Herbaceous	Calamagrostis canadensis OBL* Scirpus cyperinus OBL* Juncus effusus OBL Sparganium americanum OBL	40* 30* 10 7			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Paxton fine sandy loam, 0 to 8 percent slopes, very stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Organic	0-1		
Bw1	1-6	10YR 4/2 -75% 10YR 2/1 -25%	
Bw2	6-12	10YR 2/1 -95%	10YR 3/4 -5% Concentrations in the Root Channels

Remarks:

Bw3 2-16 10YR 4/2- 77%
10YR 2/1- 20% 10YR 3/4 -3%, Concentrations in the Pore Linings

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Redox Dark Surface Matrix (F6)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☑ Depth to free water in observation hole: 12 in
- ☑ Depth to soil saturation in observation hole: 4 in
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D14 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D14		Transect Number:	Date of Delineation: 8/16/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Acer rubrum FAC* Pinus strobus FACU Quercus alba FACU	40* 20* 5			
Sapling/Shrub	Smilax rotundifolia FAC*	10*			
Herbaceous	Microstegium vimineum FAC* Scirpus cyperinus OBL* Vitis labrusca FACU	20* 15* 5			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O	0-2		
A	2-9	10YR 2/1	
Bw1	9-12	10YR 3/2	
Bw2	12-17	10 YR 4/2 -97%	7.5YR 3/4 -3%,Concentrations in the Pore Linings

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Matrix (F3)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☑ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D15 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D15		Transect Number:	Date of Delineation: 8/17/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: Acer rubrum FAC* Quercus bicolor FACW Pinus strobus FACU	60* 10 5			
Sapling/Shrub: Pinus strobus FACU Vaccinium corymbosum FACW*	15* 15*			
Herbaceous: Smilax rotundifolia FAC*	5*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
AO	0-3	10YR 2/1	
Bw1	3-9	10YR 2/2- 95%	7.5YR 3/4 -5%,Concentrations in the Matrix
Bw2	9-19	7.5YR 3/4	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Redox Dark Surface (F6)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☑ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D16 & D16A DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D16 & D6A		Transect Number:	Date of Delineation: 8/23/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees					
Sapling/Shrub	Vaccinium corymbosum FACW* Clethra alnifolia FAC* Nyssa sylvatica FAC Acer rubrum FAC Spiraea tomentosa FACW	35* 30* 10 5 5			
Herbaceous	Calamagrostis canadensis OBL* Rubus hispidus FACW* Clethra alnifolia FAC Nyssa sylvatica FAC	35* 25* 5 5			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Udorthents, smoothed

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O	0-3		
Bw1	3-6	10YR 3/1 - 20% 10YR 3/3 - 20% 2.5Y 5/2 - 50%	5YR 4/6 -3%,Concentrations (C) in the Root Channels (RC) 10YR 4/4 -5%,C in the Matrix 7.5YR 4/6 -2%,C in theRC

Remarks:

Bw2 6-14 10YR 4/4 -97% 7.5YR 4/6 -3%,Concentrations in the Root Channels

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Matrix (F3)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☑ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☐ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D17 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D17		Transect Number:	Date of Delineation: 8/23/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Vaccinium corymbosum FACW* Lyonia ligustrina FACW* Clethra alnifolia FAC	35* 15* 5			
Herbaceous: Andropogon glomeratus FACW* Rubus hispudus FACW* Smilax rotundifolia FAC*	15* 15* 10*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-4		
A	4-5	10YR 2/1	
Bg1	5-11	10YR 6/1	
Bw	11-12	10YR 5/8	10YR 5/8 -10%, Concentrations in the Matrix
Bg2	12-16	2.5Y 6/1 -90%	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Matrix (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
  _____
  _____
  _____
- ☐ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D18 DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D18		Transect Number:	Date of Delineation: 8/23/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Betula lenta FACU Pinus strobus FACU Nyssa sylvatica FAC	35* 25* 10			
Sapling/Shrub				
Clethra alnifolia FAC* Vaccinium corymbosum FACW* Nyssa sylvatica FAC Fagus grandifolia FACU Hamamelis virginiana FCU	25* 20* 10 5 5			
Herbaceous				
Osmundastrum cinnamomeum FACW* Vaccinium corymbosum FACW*	15* 10*			
Vines				

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 2

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-8		
A	8-10	10YR 2/1	
Bw	10-13	2.5Y 5/2	
Bg	13-17	2.5Y 6/2 - 93%	10YR 5/8 -7%,Concentrations in the Matrix

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Histic Epipedon (A2)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D19 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D19		Transect Number:	Date of Delineation: 8/24/2017
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees				
Sapling/Shrub: Clethra alnifolia FAC* Lyonia ligustrina FACW* Ilex verticillata FACW	30* 15* 5			
Herbaceous: Rubus hispidus FACW* Smilx rotundifolia FAC* Clethra alnifolia FAC	25* 20* 10			
Vines: Smilax rotundifolia FAC*	5*			

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Oi	0-5		
A	5-9	N2.5/ -75%	
Bg	9-18	2.5Y 2.5/1 -25% 2.5Y 6/1	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Depleted Below Dark Surface (A11)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☑ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
  _____
  _____
  _____
- ☑ Other: Geomorphic Position _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: National Grid Prepared by: M. Lamothe Project location: Fall River, Wetland D20 DEP File #:_____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: D20		Transect Number:	Date of Delineation: 8/24/2017
	A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees	Acer rubrum FAC* Pinus strobus FACU	10* 5*			
Sapling/Shrub	Clethra alnifolia FAC* Carpinus caroliniana FAC*	40* 10*			
Herbaceous	Dichanthelium clandestinum FACW* Glyceria obtusa OBL*	25* 10*			
Vines					

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes ☑ no ☐

title/date: Web Soil Survey - Bristol County, MA S. Part, 2017

map number:

soil type mapped: Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

hydric soil inclusions: YES

Are field observations consistent with soil survey? yes ☑ no ☐

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O	0-2		
Bw1	2-4	2.5Y 6/2	
Bw2	4-7	2.5Y 2.5/1	7.5YR 4/6-7%,C oncentrations in the Pore Linings and the Matrix
Bw3	7-16	2.5Y 6/2 - 93%	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes ☑ no ☐

ACOE Indicator: Sandy Redox (S5)

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☑ Other: Geomorphic Position

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
Hydric soil present	☑	☐
Other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

ATTACHMENT G EVERSOURCE STREAM PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Site Location: SD62

Photo No.	**Date:**
1	06-29-18

Direction Photo Taken:

West

Description:

Intermittent Stream

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD59

Photo No.	**Date:**
2	06-29-18

Direction Photo Taken:

North

Description:

Intermittent Stream

Upstream View



PHOTOGRAPHIC LOG

Site Location: SD56

Photo No.	**Date:**
3	06-27-18

Direction Photo Taken:

West

Description:

Intermittent Stream

Across Channel View



PHOTOGRAPHIC LOG

Site Location: SD54

Photo No.	**Date:**
4	06-14-18

Direction Photo Taken:

South

Description:

Perennial Acushnet River

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD53

Photo No.	**Date:**
5	06-27-18

Direction Photo Taken:

North

Description:

Perennial Stream

Upstream View



PHOTOGRAPHIC LOG

Site Location: SD38

Photo No.	**Date:**
6	06-06-18

Direction Photo Taken:

North

Description:

Intermittent Stream

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD38A

Photo No.	**Date:**
7	06-06-18

Direction Photo Taken:

North

Description:

Perennial Stream

Upstream View



PHOTOGRAPHIC LOG

Site Location: SD35

Photo No.	**Date:**
8	06-05-18

Direction Photo Taken:

South

Description:

Perennial Stream

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD27

Photo No.	**Date:**
9	05-31-18

Direction Photo Taken:

West

Description:

Intermittent Stream

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD25A

Photo No.	**Date:**
10	

Direction Photo Taken:

West

Description:

Perennial Stream

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD25

Photo No.	**Date:**
11	05-31-18

Direction Photo Taken:

West

Description:

Perennial Stream

Upstream View



PHOTOGRAPHIC LOG

Site Location: SD23

Photo No.	**Date:**
12	05-17-18

Direction Photo Taken:

West

Description:

Intermittent Stream

Across Channel View



PHOTOGRAPHIC LOG

Site Location: SD23A

Photo No.	**Date:**
13	05-17-18

Direction Photo Taken:

West

Description:

Perennial Stream

Upstream View



PHOTOGRAPHIC LOG

Site Location: SD22

Photo No.	**Date:**
14	05-11-18

Direction Photo Taken:

East

Description:

Perennial Stream

Cross View



PHOTOGRAPHIC LOG

Site Location: SD21

Photo No.	**Date:**
15	05-11-18

Direction Photo Taken:

North

Description:

Perennial Stream

Upstream View



PHOTOGRAPHIC LOG

Site Location: SD20

Photo No.	**Date:**
16	11-15-17

Direction Photo Taken:

Southeast

Description:

Intermittent Stream

Upstream View



ATTACHMENT H NEP STREAM PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Site Location: SD20

Photo No.	**Date:**
1	11-15-17

Direction Photo Taken:

Southeast

Description:

Intermittent Stream

Upstream View



PHOTOGRAPHIC LOG

Site Location: SD19A

Photo No.	**Date:**
1	04-27-18

Direction Photo Taken:

Northeast

Description:

Intermittent Stream

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD11

Photo No.	**Date:**
3	07-21-17

Direction Photo Taken:

West

Description:

Perennial Copicut River

Across the Channel View



PHOTOGRAPHIC LOG

Site Location: SD8

Photo No.	**Date:**
4	07-19-17

Direction Photo Taken:

Northeast

Description:

Intermittent Stream

Downstream View



PHOTOGRAPHIC LOG

Site Location: SD5

Photo No.	**Date:**
5	07-12-17

Direction Photo Taken:

North

Description:

Intermittent Stream

Downstream View



ATTACHMENT I EVERSOURCE STREAM DATA FORMS

Waterbody Data Sheet

FEATURE ID: SD62

WATERBODY NAME:

SURVEY DATE: 6/29/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): No water at visit

CURRENT WATER DEPTH AT CROSSING (FT): No water at visit

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[ ] SAND
[ ] OTHER _____
[✓] SILT
[ ] CLAY

[ ] RUNS
[ ] POOLS
[ ] RIFFLES

COMMENTS: No water at visit

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 10 ft

OHWM WIDTH (FT): 4 ft OHWM HEIGHT (FT): 0.5 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below

INVASIVES/NOXIOUS VEGETATION [✓] YES [ ] NO

IF YES, SPECIES PRESENT: Rosa multiflora

ADJACENT WETLAND [✓] YES [ ] NO D62

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[ ] VEGETATION MATTED DOWN, BENT OR ABSENT
[✓] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[ ] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
-Ponded water at the top of drainage - 1.5 ft of water. Possibly excavated or old farm pond/watering hole. On the top of banks are red cedar trees.
-Took drainage points leaving pond until drainage forms into an intermittent stream heading off ROW.

Dominant Riparian Species: Acer rubrum, Vibrunum sp., Thelypteris palustris, Pinus strobus, Toxicodendron radicans, Rosa multiflora, Sphagnum.

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD59

WATERBODY NAME:

SURVEY DATE: 6/29/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 1 ft

CURRENT WATER DEPTH AT CROSSING (FT): 2 in

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER _____
[ ] SILT
[ ] CLAY

[✓] RUNS
[ ] POOLS
[ ] RIFFLES

COMMENTS:

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 4.5 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 3 ft (WHEN FACING DOWNSTREAM)
SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°	SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 15 ft

OHWM WIDTH (FT): 2.5 ft OHWM HEIGHT (FT): 1 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES:
See photographs section below.

INVASIVES/NOXIOUS VEGETATION [✓] YES [ ] NO

IF YES, SPECIES PRESENT: Rosa Multiflora, Elaeagnus umbellata, Lythrum salicaria

ADJACENT WETLAND [✓] YES [ ] NO D59

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[ ] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments: Stream crosses off-ROW road.

Dominant Riparain Species: Salix sp., Impatiens capensis, Solidago sp., Lythrum salicaria, Onoclea sensibilis, Sambucus sp., Rosa multiflora, Elaeagnus umbellata

Applicant: Eversource

Waterbody Data Sheet

Feature ID: SD56

Waterbody Name:

Survey Date: 6/27/18

Investigator: ML, DR

Flow Characteristics

[ ] Ephemeral
[✓] Intermittent
[ ] Perennial

Comments:

Current Water Width at Crossing (ft): 15 ft

Current Water Depth at Crossing (ft): 1 ft

Substrate

[ ] Bedrock
[ ] Gravel
[✓] Sand
[ ] Other _____
[✓] Silt
[ ] Clay

[ ] Runs
[✓] Pools
[ ] Riffles

Comments:

Stream Characteristics

Left Bank Height (ft): 4 ft (when facing downstream)	Right Bank Height (ft): 4 ft (when facing downstream)
Slope [ ] 0 - 30° [✓] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	Slope [ ] 0 - 30° [✓] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

Top of Bank Width (ft): 25 ft

OHWM Width (ft): 15 ft OHWM Height (ft): 1 ft

Evidence of Scour or Erosion: No

Riparian Habitat

Riparian Vegetation [✓] Yes [ ] No

Dominant Riparian Species:
See photographs section below.

Invasives/Noxious Vegetation [✓] Yes [ ] No
If yes, species present: Phragmites australis

Adjacent Wetland [✓] Yes [ ] No D56

Sensitive Species Present [ ] Yes [✓] No
If yes, identify species and location:

OHWM Criteria

[✓] Clear, natural line impressed on bank
[ ] Vegetation matted down, bent or absent
[ ] Leaf litter disturbed or washed away
[ ] Destruction of terrestrial vegetation
[✓] Abrupt change in plant community
[ ] Changes in soil character
[ ] Sediment deposition
[ ] Sediment sorting
[ ] Presence of litter or debris
[ ] Presence of wrack line
[ ] Shelving
[ ] Scour
[✓] Water staining
[ ] Other:

Photographs

Comments:
-Water marks on cattails
- Upstream side of SD56 has very little water.
-Data plot taken where road crosses over stream.
-16 in concrete culverts on each side of stream. under the access road
-only 1 12 in culvert on the north side of the access road

Dominant Riparian Species:
Salix discolor, Typha latifolia, Impatiens capensis, Phragmites australis.

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD54

WATERBODY NAME: Acushnet River

SURVEY DATE: 6/14/18

INVESTIGATOR: ML,DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): ~ 40 ft

CURRENT WATER DEPTH AT CROSSING (FT): 1 ft

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER
[✓] SILT
[ ] CLAY

Gravel and sand at crossing, silt closer to eastern side of river

[✓] RUNS
[ ] POOLS
[ ] RIFFLES

COMMENTS:

Runs -45%, Pools - 35%, Riffles - 20%

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 8 ft (WHEN FACING DOWNSTREAM)

SLOPE
[ ] 0 - 30°
[ ] 31 - 45°
[✓] 46 - 60°
[ ] 61 - 90°

RIGHT BANK HEIGHT (FT): 6 ft (WHEN FACING DOWNSTREAM)

SLOPE
[ ] 0 - 30°
[✓] 31 - 45°
[ ] 46 - 60°
[ ] 61 - 90°

TOP OF BANK WIDTH (FT): 55 ft

OHWM WIDTH (FT): 40 ft OHWM HEIGHT (FT): 3 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES:
See photographs section below.

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D54

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[✓] LEAF LITTER DISTURBED OR WASHED AWAY
[✓] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[✓] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
- OHWM points were taken on each side of the river.
-River flows through an island of willows.
-Muskrat scat near river.

Dominant Riparian Species:
Carex crinita, Salix bebbiana, Scirpus sp., Onoclea sensibilis, Thelypteris palustris.

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD53

WATERBODY NAME: Tributary to Deep Brook

SURVEY DATE: 6/27/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 20 ft

CURRENT WATER DEPTH AT CROSSING (FT): 10 in

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER Predominately Gravel
[✓] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[ ] RIFFLES

COMMENTS: Pools at culvert where data form was filled out

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 5 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 4 ft (WHEN FACING DOWNSTREAM)
SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°	SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 30 ft

OHWM WIDTH (FT): 20 ft OHWM HEIGHT (FT): 1.5 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below.

INVASIVES/NOXIOUS VEGETATION [✓] YES [ ] NO

IF YES, SPECIES PRESENT: Rosa multiflora

ADJACENT WETLAND [✓] YES [ ] NO D53

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[✓] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
-There are ~2 ft concrete culverts under each side of Middle Road.
-There may possibly 2 culverts - but only one culvert is draining water.

Dominant Riparian Species:
Rosa multiflora, Lythrum salicaria, Typha latifolia, Impatiens capensis, Calamagrostis canadensis

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD38A

WATERBODY NAME:

SURVEY DATE: 6/6/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 7 ft

CURRENT WATER DEPTH AT CROSSING (FT): 0.5 ft

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER _____
[ ] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[✓] RIFFLES

COMMENTS: Runs are predominately off ROW

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 2.5 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 3.5 ft (WHEN FACING DOWNSTREAM)
SLOPE [ ] 0 - 30° [✓] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [ ] 0 - 30° [✓] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 20 ft

OHWM WIDTH (FT): 15 ft OHWM HEIGHT (FT): 2 ft

EVIDENCE OF SCOUR OR EROSION: Scour further downstream

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below.

INVASIVES/NOXIOUS VEGETATION [✓] YES [ ] NO

IF YES, SPECIES PRESENT: Rosa multiflora

ADJACENT WETLAND [✓] YES [ ] NO D38

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[✓] PRESENCE OF WRACK LINE
[ ] SHELVING
[✓] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Scouring is further downstream

Dominant Riparian Vegetation: Clethra alnifolia, Carex crinita, Salix bebbiana, Impatiens capensis

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD38

WATERBODY NAME:

SURVEY DATE: 6/6/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 7 ft

CURRENT WATER DEPTH AT CROSSING (FT): 8 in

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[ ] SAND
[ ] OTHER Muck Bottom
[✓] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[✓] RIFFLES

COMMENTS: Runs -55%, Pools 30%-located behind washed away debris, Riffles 15%

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 2 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 3.5 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 10 ft

OHWM WIDTH (FT): 8.5 ft OHWM HEIGHT (FT): 1.5 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below.

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D38

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[ ] VEGETATION MATTED DOWN, BENT OR ABSENT
[✓] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[✓] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
SD38 connects to SD38A off ROW.

Dominant Riparian Species:
Acer rubrum, Onoclea sensibilis, Pinus strobus, Osmundastrum cinnamomeum.

Waterbody Data Sheet

FEATURE ID: SD35

WATERBODY NAME:

SURVEY DATE: 6/5/18

INVESTIGATOR: ML,DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 10 ft

CURRENT WATER DEPTH AT CROSSING (FT): 1 ft

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER Predominately Sand
[ ] SILT
[ ] CLAY

[✓] RUNS
[ ] POOLS
[✓] RIFFLES

COMMENTS: Mostly runs

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 2 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 5.5 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 15 ft

OHWM WIDTH (FT): 10 ft OHWM HEIGHT (FT): 1.5 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below

INVASIVES/NOXIOUS VEGETATION [✓] YES [ ] NO

IF YES, SPECIES PRESENT: Elaeagnus umbellata and Phragmites australis

ADJACENT WETLAND [✓] YES [ ] NO D35

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[✓] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
-Stream flows south
- Bridge Across Access Road
- Two 16 in double culverts on each side under road.
- One 18 in concrete culvert on each side of road.

Dominant Riparian Species:
Aver rubrum (saplings), Salix bebbiana, Phragmites australis, Spiraea alba.

Waterbody Data Sheet

FEATURE ID: SD27

WATERBODY NAME:

SURVEY DATE: 5/31/18

INVESTIGATOR: ML,DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 5 ft

CURRENT WATER DEPTH AT CROSSING (FT): 6 in

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER _____
[ ] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[✓] RIFFLES

COMMENTS: Runs - 25%, Pools 35%, Riffles 40%

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 1.5 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 2 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 15 ft

OHWM WIDTH (FT): 10 ft OHWM HEIGHT (FT): 1.5 ft

EVIDENCE OF SCOUR OR EROSION: Yes, on right bank, where crosses road

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D27

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[✓] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[✓] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
-Scouring is on right bank.
- Stream flows into 3 ft metal circular culvert.
- Stream crosses ROW.
- Braided channel in road, measurements taken to include 2 channels.
- 2 green frogs
- 1 pickerel frog
- ~50 wood frog tadpoles in pooled area.

Riparian Dominant Species:
Acer rubrum, Juncus effusus, Carex sp., Rubus hispidus, Osmundastrum cinnamomeum.

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD25A

WATERBODY NAME:

SURVEY DATE: 5/23/18

INVESTIGATOR: ML,DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 17 ft at widest point

CURRENT WATER DEPTH AT CROSSING (FT): ~4 ft, pockets likely over 5 ft

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER More gravel and sand downstream
[✓] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[✓] RIFFLES

COMMENTS: Runs- 65%, Pools - 25%, Riffles - 10%

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 1 ft (WHEN FACING DOWNSTREAM)

SLOPE
[✓] 0 - 30°
[ ] 31 - 45°
[ ] 46 - 60°
[ ] 61 - 90°

RIGHT BANK HEIGHT (FT): 1 ft (WHEN FACING DOWNSTREAM)

SLOPE
[✓] 0 - 30°
[ ] 31 - 45°
[ ] 46 - 60°
[ ] 61 - 90°

TOP OF BANK WIDTH (FT): 19 ft

OHWM WIDTH (FT): 17 ft

OHWM HEIGHT (FT): 4 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D25

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[ ] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Dominant Riparian Species:
Carex sp., Salix sp., Onoclea sensibilis, Juncus effusus

Waterbody Data Sheet

FEATURE ID: SD25

WATERBODY NAME:

SURVEY DATE: 5/23/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 12 ft

CURRENT WATER DEPTH AT CROSSING (FT): 2.5 ft

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[ ] SAND
[ ] OTHER _____
[✓] SILT
[ ] CLAY

[✓] RUNS
[ ] POOLS
[ ] RIFFLES

COMMENTS: Low flow

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 3 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 3 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 13 ft

OHWM WIDTH (FT): 13 ft OHWM HEIGHT (FT): 3 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below.

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
-Flags hung on the side of stream due to the water depth.
-Data form filled out at flag 9
- Green frogs, spotted turtles on an island.
- Footbridge
- This is the second data form to show different characteristics on sections of the stream.

Dominant Riparian Species:
Clethra alnifolia, Juncus effusus, Carex sp., Acer rubrum

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD25

WATERBODY NAME:

SURVEY DATE: 5/23/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 5 ft

CURRENT WATER DEPTH AT CROSSING (FT): 16 in

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[ ] SAND
[ ] OTHER _____
[✓] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[ ] RIFFLES

COMMENTS: Standing water, not much flow.

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 1.5 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 1.5 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 6 ft

OHWM WIDTH (FT): 6 ft OHWM HEIGHT (FT): 2 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below.

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D25

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
- OHWM Height is from top of water.
- Green frog in stream.
- Taken at flag SD25-4

Dominant Riparian Species:
Clethra alnifolia, Spiraea alba, Carex sp., Osmundastrum cinnamomeum.

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD23A

WATERBODY NAME:

SURVEY DATE: 5/17/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 6 ft

CURRENT WATER DEPTH AT CROSSING (FT): 1 ft

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[ ] SAND
[ ] OTHER Mucky
[✓] SILT
[ ] CLAY

[✓] RUNS
[ ] POOLS
[ ] RIFFLES

COMMENTS: Predominately runs

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 6 in (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 5 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°

Due to road bank

TOP OF BANK WIDTH (FT): 10 ft

OHWM WIDTH (FT): 8 ft OHWM HEIGHT (FT): 2 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below.

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D23

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[ ] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments: Current water depth is 12 in at crossing, depth about 28 in downstream.

Dominant Riparian Species: Acer rubrum, Spiraea alba, Typha latifolia, Onoclea sensibilis, Rosa palustris, Iris versicolor

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD23

WATERBODY NAME:

SURVEY DATE: 5/17/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 3 ft

CURRENT WATER DEPTH AT CROSSING (FT): 7 ft

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[ ] SAND
[ ] OTHER Mucky
[✓] SILT
[ ] CLAY

[ ] RUNS
[ ] POOLS
[ ] RIFFLES

COMMENTS: Barely any flow

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 6 in (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 4 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [ ] 0 - 30° [ ] 31 - 45° [✓] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 7 ft

OHWM WIDTH (FT): 5 ft OHWM HEIGHT (FT): 1.5 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below

INVASIVES/NOXIOUS VEGETATION [✓] YES [ ] NO

IF YES, SPECIES PRESENT: Elaeagnus umbellata (on hillside)

ADJACENT WETLAND [✓] YES [ ] NO D23

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[ ] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[✓] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[ ] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
- Ruby-throated hummingbird and Red-winged black bird.
- Unidentified snake
-May be a ditch but appears to be more of a ground water seep flowing off ROW from SD23-flag 4 to SD23- flag1.
- At groundwater seep there is sphagnum moss where water emerges.

Dominant Riparian Species: Spiraea alba, Acer rubrum, Clethra alnifolia, Thelypteris palustris, Onoclea sensibilis.

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD22

WATERBODY NAME: Shingle Island River

SURVEY DATE: 5/11/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 5.5 ft

CURRENT WATER DEPTH AT CROSSING (FT): 6 in

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[✓] SAND
[ ] OTHER _____
[✓] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[✓] RIFFLES

COMMENTS: Runs -55%, Pools - 15%, Riffles - 30%

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 1 ft (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 1 ft (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 8 ft

OHWM WIDTH (FT): 7 ft OHWM HEIGHT (FT): 1 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below.

INVASIVES/NOXIOUS VEGETATION [✓] YES [ ] NO

IF YES, SPECIES PRESENT: Rosa Multiflora

ADJACENT WETLAND [✓] YES [ ] NO D22

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[ ] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
- Unidentified fish in stream.

Dominant Riparian Species:
Rosa multiflora, Carex stricta, Acer rubrum

Applicant: Eversource

Waterbody Data Sheet

FEATURE ID: SD21

WATERBODY NAME: Unnamed

SURVEY DATE: 5/11/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 8 ft

CURRENT WATER DEPTH AT CROSSING (FT): 4 in

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[ ] SAND
[✓] OTHER Cobble
[ ] SILT
[ ] CLAY

[✓] RUNS
[ ] POOLS
[✓] RIFFLES

COMMENTS: Runs - 70%, Riffles - 30%

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 12 ft

OHWM WIDTH (FT): 8 ft OHWM HEIGHT (FT): 1 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D21

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[ ] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
-Stream is flowing out from perennial pond.
- 2 Canada geese in pond.
- Tree swallows and tree swallow nesting box in pond

Dominant Riparian Species: Clethra alnifolia, Grass sp., Carex sp.

Applicant: Eversource

ATTACHMENT J NEP STREAM DATA FORMS

Waterbody Data Sheet

FEATURE ID: SD20

WATERBODY NAME: Unnamed

SURVEY DATE: 8/25/17

INVESTIGATOR: ML, BP

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): No water during v

CURRENT WATER DEPTH AT CROSSING (FT): No water during vi

SUBSTRATE

[ ] BEDROCK
[ ] GRAVEL
[ ] SAND
[✓] SILT
[✓] CLAY
[✓] OTHER Cobble - 30%, Silt and Clay - 70%

[ ] RUNS
[ ] POOLS
[ ] RIFFLES

COMMENTS: No water

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)
SLOPE	SLOPE
[ ] 0 - 30°	[ ] 0 - 30°
[✓] 31 - 45°	[✓] 31 - 45°
[ ] 46 - 60°	[ ] 46 - 60°
[ ] 61 - 90°	[ ] 61 - 90°

TOP OF BANK WIDTH (FT): 12 ft

OHWM WIDTH (FT): 10 ft OHWM HEIGHT (FT): 2 ft

EVIDENCE OF SCOUR OR EROSION: Yes

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs section below

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D20

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[ ] VEGETATION MATTED DOWN, BENT OR ABSENT
[✓] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[✓] PRESENCE OF WRACK LINE
[✓] SHELVING
[✓] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
-Sphagnum moss lined bottom
-Water present during November 2017 and May 2018 site visits.

Dominant Riparian Species:
Clethra alnifolia, Tsuga canadensis, Vaccinium corymbosum, Acer rubrum, Carex sp.

Applicant: NEP & Eversource

Waterbody Data Sheet

FEATURE ID: SD-19

WATERBODY NAME:

SURVEY DATE: 4/27/18

INVESTIGATOR: ML, DR

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): ~3 ft

CURRENT WATER DEPTH AT CROSSING (FT): 6 in

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[ ] SAND
[ ] OTHER Turns into silt further from culvert
[✓] SILT
[ ] CLAY

[ ] RUNS
[✓] POOLS
[✓] RIFFLES

COMMENTS: Pools near culvert but predominately riffles

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): 4 in (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): 6 in (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 4 ft

OHWM WIDTH (FT): 3 ft OHWM HEIGHT (FT): 0.5 ft

EVIDENCE OF SCOUR OR EROSION: No

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES:

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D19A

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[✓] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[ ] PRESENCE OF WRACK LINE
[ ] SHELVING
[ ] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
- Culvert under road, ~12 in circular and metal.
- Gravel near culvert outlet and substrate turns into silt further from the culvert.
- Sphagnum moss pockets in stream.
- Heavy rains on 4/25/18
- No water flow in September 2017 when wetland D19 was delineated
- No hydric soils are present.
- American beech and white pine over story.
-Water disperses into forest and disperses into wetland on the north side of the access road.
-Most likely culvert put in to drain the water around Structure #63 which is currently sitting in ~6 in of water.

Dominant Riparian Species:
Grass sp., Fagus grandifolia, Pinus strobus.

Applicant: NEP

Waterbody Data Sheet

FEATURE ID: SD11

WATERBODY NAME: Copicut River

SURVEY DATE: 7/20/17

INVESTIGATOR: ML, BP

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[ ] INTERMITTENT
[✓] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): 15 ft

CURRENT WATER DEPTH AT CROSSING (FT): 1 ft

SUBSTRATE

[ ] BEDROCK
[✓] GRAVEL
[✓] SAND
[ ] OTHER Silt is dominant
[✓] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[ ] RIFFLES

COMMENTS: 60% runs, 40% pools.

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 20 ft

OHWM WIDTH (FT): 18 ft OHWM HEIGHT (FT): 1.5 ft

EVIDENCE OF SCOUR OR EROSION: Yes, left bank is cutting.

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES: See photographs below.

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO D11

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[✓] VEGETATION MATTED DOWN, BENT OR ABSENT
[✓] LEAF LITTER DISTURBED OR WASHED AWAY
[✓] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[✓] PRESENCE OF WRACK LINE
[ ] SHELVING
[✓] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments:
- Culvert under Quanapog road.
- Stream flows to Copicut Reservior.
- Headwalls of culvert were dry stack stone and mason stone.

Dominant Riparian Species: Clethra alnifolia, Acer rubrum, Viburnum dentatum, Carpinus caroliniana.

Applicant: NEP

Waterbody Data Sheet

FEATURE ID: SD8

WATERBODY NAME:

SURVEY DATE: 7/19/2017

INVESTIGATOR: ML, BP

FLOW CHARACTERISTICS

[ ] EPHEMERAL
[✓] INTERMITTENT
[ ] PERENNIAL

COMMENTS:

CURRENT WATER WIDTH AT CROSSING (FT): No water during visit

CURRENT WATER DEPTH AT CROSSING (FT): No water during visit

SUBSTRATE

[✓] BEDROCK
[ ] GRAVEL
[ ] SAND
[ ] OTHER _____
[ ] SILT
[ ] CLAY

[✓] RUNS
[✓] POOLS
[✓] RIFFLES

COMMENTS:

STREAM CHARACTERISTICS

LEFT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)	RIGHT BANK HEIGHT (FT): (WHEN FACING DOWNSTREAM)
SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	SLOPE [✓] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

TOP OF BANK WIDTH (FT): 8 ft.

OHWM WIDTH (FT): 7 ft OHWM HEIGHT (FT): 1 ft

EVIDENCE OF SCOUR OR EROSION: Yes, further downstream

RIPARIAN HABITAT

RIPARIAN VEGETATION [✓] YES [ ] NO

DOMINANT RIPARIAN SPECIES:
See Photographs Section Below

INVASIVES/NOXIOUS VEGETATION [ ] YES [✓] NO

IF YES, SPECIES PRESENT:

ADJACENT WETLAND [✓] YES [ ] NO WD-8 at top of stream

SENSITIVE SPECIES PRESENT [ ] YES [✓] NO

IF YES, IDENTIFY SPECIES AND LOCATION:

OHWM CRITERIA

[✓] CLEAR, NATURAL LINE IMPRESSED ON BANK
[ ] VEGETATION MATTED DOWN, BENT OR ABSENT
[ ] LEAF LITTER DISTURBED OR WASHED AWAY
[ ] DESTRUCTION OF TERRESTRIAL VEGETATION
[ ] ABRUPT CHANGE IN PLANT COMMUNITY
[ ] CHANGES IN SOIL CHARACTER
[ ] SEDIMENT DEPOSITION
[ ] SEDIMENT SORTING
[✓] PRESENCE OF LITTER OR DEBRIS
[✓] PRESENCE OF WRACK LINE
[ ] SHELVING
[✓] SCOUR
[ ] WATER STAINING
[ ] OTHER:

PHOTOGRAPHS

Comments: Sphagnum moss growing in channel. Stream dry but a few wet rocks are present.
Ground water seep.
Stream flows to access road into culvert (12 in.) which is exposed and crushed.
Flow appears to become less channelized on the north side of the access road.

Dominant Riparian Species: Ulmus rubra, Hamamelis virginiana, Sphagnum moss.

Applicant: NEP

Waterbody Data Sheet

Feature ID: SD5

Waterbody Name: Unnamed Tributary to Copicut

Survey Date: 7/12/2017

Investigator: ML, BP

Flow Characteristics

- [ ] Ephemeral
- [x] Intermittent
- [ ] Perennial

Comments:

Current Water Width at Crossing (ft): No water during visit

Current Water Depth at Crossing (ft): No water during visit

Substrate

- [x] Bedrock
- [x] Gravel
- [ ] Sand
- [ ] Other _____
- [ ] Silt
- [ ] Clay

- [ ] Runs
- [x] Pools
- [x] Riffles

Comments: See Photographs section below

Stream Characteristics

Left Bank Height (ft): (when facing downstream)	Right Bank Height (ft): (when facing downstream)
Slope [x] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°	Slope [x] 0 - 30° [ ] 31 - 45° [ ] 46 - 60° [ ] 61 - 90°

Top of Bank Width (ft): 2 ft

OHWM Width (ft): 1 ft OHWM Height (ft): 1.5 ft

Evidence of Scour or Erosion: Yes

Riparian Habitat

Riparian Vegetation [x] Yes [ ] No

Dominant Riparian Species: See Photographs section below.

Invasives/Noxious Vegetation [ ] Yes [x] No

If yes, species present:

Adjacent Wetland [x] Yes [ ] No W-D5, W-D6

Sensitive Species Present [ ] Yes [x] No

If yes, identify species and location:

OHWM Criteria

- [x] Clear, natural line impressed on bank
- [x] Vegetation matted down, bent or absent
- [x] Leaf litter disturbed or washed away
- [ ] Destruction of terrestrial vegetation
- [ ] Abrupt change in plant community
- [ ] Changes in soil character
- [x] Sediment deposition
- [ ] Sediment sorting
- [x] Presence of litter or debris
- [x] Presence of wrack line
- [ ] Shelving
- [ ] Scour
- [ ] Water staining
- [ ] Other:

Photographs

Comments: Downstream right bank is wider than left bank from main channel. Actual channel ~5ft.

Applicant: NEP

Substrate comments: No water at the time of site visit. Based on the channel topography, most likely pools and riffles. Pool ~8 in. Dammed part of stream is a vernal pool (DP-1).

Dominant Riparian Species: Smilax rotundifolia, Dichanthelium clandestinum, Parthenocissus quinquefolia, Vitis labrusca.

APPENDIX I AFRRP VERNAL POOL INVENTORY

October 02, 2018

NEW ENGLAND POWER COMPANY

d/b/a NATIONAL GRID

Acushnet to Fall River Reliability Project

Vernal Pool Inventory

PROJECT NUMBER:
146784
PROJECT CONTACT:
Karen Hanecak
EMAIL:
Karen.Hanecak@powereng.com
PHONE:
774-643-1821

POWER ENGINEERS

Vernal Pool Inventory

PREPARED FOR:
NEW ENGLAND POWER COMPANY D/B/A NATIONAL GRID

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

ATV	All-terrain vehicle
CFR	Code of Federal Regulations
CVP	Certified vernal pool
Eversource	NSTAR Electric Company d/b/a Eversource Energy
kV	kilovolt
NEP	New England Power Company d/b/a National Grid
NHESP	Massachusetts Natural Heritage and Endangered Species Program
POWER	POWER Engineers, Inc.
Project	Acushnet to Fall River Reliability Project
PVP	Potential vernal pool
ROW(s)	Right(s)-of-Way
USACE	United States Army Corps of Engineers
WPA	Massachusetts Wetlands Protection Act

1.0 INTRODUCTION

NSTAR Electric Company d/b/a Eversource Energy (Eversource) and the New England Power Company d/b/a National Grid (NEP) are proposing to undertake the Acushnet to Fall River Reliability Project (Project) to improve the electric transmission reliability in the southeastern Massachusetts. The Project consists of the installation of a new 115 kilovolt (kV) overhead transmission line extending from Eversource's Industrial Park Tap in Acushnet to NEP's existing Bell Rock Substation in Fall River. The proposed Project includes the installation of approximately 12 miles of new overhead 115 kV electric transmission line traversing the municipalities of Acushnet, New Bedford, Dartmouth, and Fall River in Bristol County, Massachusetts (Figure 1). The new line will be located within existing rights-of-ways (ROWs) currently occupied by existing transmission lines. Of the 12 miles, approximately 7.8 miles are in Eversource service territory traversing Acushnet, New Bedford and Dartmouth, and approximately 4.2 miles are in NEP service territory traversing the city of Fall River.

This report provides a detailed summary of vernal pool investigations conducted by POWER Engineers, Inc. (POWER) along the NEP portion of the Project in Fall River. Field assessments along the NEP ROW were conducted from spring 2015 to spring 2018. Representative photographs of the vernal pools documented in the Project ROW are included in Attachment A while Attachment B contains Vernal Pool Data Forms. The locations of the vernal pools are displayed in Figure 2.

1.1 Definitions/ Classifications

Vernal pools are unique wildlife habitats best known for amphibians and invertebrate animals that use them to breed. Vernal pools, also known as ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water by spring rains and snowmelt. Many vernal pools also fill with autumn rains and persist through late autumn and winter due to rainfall and rising groundwater and remain ponded through the spring and into summer. Autumnal vernal pools provide breeding habitats for the marbled salamander (*Ambystoma opacum*). Vernal pools dry completely by the middle or end of summer each year, or at least every few years. Occasional drying prevents fish from establishing permanent populations, which is critical to the reproductive success of many amphibian and invertebrate species that rely on breeding habitats free of fish predators.

1.1.1 State of Massachusetts

The Massachusetts Wetlands Protection Act Regulations (WPA) (M.G.L. c. 131, § 40) defines vernal pool habitat as confined basin depressions that typically hold water for two continuous months during the spring and are free of adult fish populations. These areas provide essential breeding habitat for a variety of amphibian species such as wood frogs (*Lithobates sylvatica*) and the spotted salamander (*Ambystoma maculatum*).

Certified vernal pools (CVPs) are those that have been certified by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) according to the Guidelines for Certification of Vernal Pool Habitat (Massachusetts Division of Fisheries and Wildlife 2009) and are protected if they fall under the jurisdiction of the WPA. CVPs are also afforded protection under Section 401 of the Federal Clean Water Act, the Massachusetts Surface Water Quality Standards that relate to Section 401, and the Massachusetts Forest Cutting Practices Act. No CVPs were identified to occur within the NEP Survey Area (NHESP 2018). Potential vernal pools (PVPs) have also been mapped by NHESP but do not receive protection under the WPA or under any other state or federal wetlands protection laws (NHESP 2000). The

identification of PVPs by the NHESP is to be used as a tool to guide the field investigations in determining the presence of a vernal pool. No PVPs were mapped within the NEP ROW.

1.1.2 United States Army Corps of Engineers

The United States Army Corps of Engineers (USACE), New England District, Vernal Pool Assessment Draft (2013) defines vernal pools as the following:

> "Vernal pools are depressional aquatic resource basins that typically go dry in most years and may contain inlets or outlets, typically of intermittent flow. Vernal pools range in both size and depth depending upon landscape position and parent material(s). Pools usually support one or more indicator species, including: wood frog (*Lithobates sylvatica*), spotted salamander (*Ambystoma maculatum*), blue-spotted salamander (*Ambystoma laterale*), marbled salamander (*Ambystoma opacum*), Jefferson salamander (*Ambystoma jeffersonianum*), and species of fairy shrimp (*Eubranchipus* spp.*)*; however, they should preclude sustainable populations of predatory fish."

Vernal pools may also be considered as special aquatic sites under the USACE General Permit for Massachusetts. Special aquatic sites include inland and saltmarsh wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 Code of Federal Regulations (CFR) Part 230.3 and listed in 40 CFR 230 Subpart E.

1.1.3 Vernal Pool Field Classifications

Vernal Pool

To satisfy both the USACE and the state of Massachusetts requirements for the identification of vernal pools and for the purpose of the ROW field investigations, a field identified vernal pool is defined as: an area that held standing water and exhibited obligate breeding species in either spring 2015, 2016, 2017 and/or 2018 breeding seasons and met the state and federal vernal pool criteria discussed above. The areas classified as field identified vernal pools were located in either an isolated depression in an upland system or within a distinct depression in a wetland system, such as an area of inundation within a WPA – regulated Bordering Vegetated Wetland. In addition, several vernal pools were located within disturbed depressional wetlands predominately created from all-terrain vehicle (ATV) trails. These depressional areas were deep enough and with a hydroperiod able to support obligate amphibian egg mass development and maturation.

Isolated vernal pools occurring in a terrestrial environment were identified, recorded and surveyed in the field. In cases where wetland systems exhibited expansive flooding and contained depressions where obligate vernal pool species were breeding, the breeding evidence was recorded and the areas were field identified and surveyed. Such determinations were made by field biologists during the spring 2015-2018 surveys.

1.1.4 Vernal Pool Species Classifications

Obligate Vernal Pool Species

Obligate vernal pool species include those vertebrate and invertebrate species that require vernal pools for all or a portion of their life cycle and are unable to successfully complete their life cycle without vernal

pools. Obligate species serve as *direct* indicators of vernal pool habitat since they require at least two months of flooded conditions and the absence of fish.

According to *A Field Guide to the Animals of Vernal Pools* (Kenny and Burne 2001), obligate species in Massachusetts are:

- Wood frog (*Lithobates sylvatica*)
- Spotted salamander (*Ambystoma maculatum*)
- Spadefoot toad (*Scaphiopus holbrookii holbrookii*)
- Blue-spotted salamander (*Ambystoma laterale*)
- Jefferson salamander (*Ambystoma jeffersonianum*)
- Marbled salamander (*Ambystoma opacum*)
- Two Species of Fairy Shrimp (*Eubranchipus vernalis* and *E. intricatus*)

Facultative Vernal Pool Species

Facultative vernal pool species include those vertebrate and invertebrate species that frequently use vernal pools for all of a portion of their life cycle, but are able to successfully complete their life cycle in other types of wetlands and do not require vernal pools for reproductive success. Facultative amphibian species serve as *indirect* indicators of vernal pool habitat.

According to *A Field Guide to the Animals of Vernal Pools* (Kenny and Burne 2001), examples of amphibian species that can breed in both vernal pools and permanent ponds and that may be present in Massachusetts include:

- Spring peeper (*Pseudacris crucifer*)
- Gray treefrog (*Hyla versicolor*)
- Pickerel frog (*Lithobates palustris*)
- American toad (*Anaxyrus americanus*)
- Green frog (*Lithobates clamitans melanota*)
- Northern leopard frog (*Lithobates pipiens*)
- Fowler's toad (*Anaxyrus fowleri*)

In addition, a few reptiles, fingernail clams, amphibious snails and leeches, and numerous insect larvae such as the Caddisfly (order Trichoptera) also utilize vernal pools. A variety of invertebrate species may also utilize vernal pools during some point in their life history.

2.0 METHODS

The field investigations consisted of surveying the entire length and width of the existing transmission line NEP ROW. In accordance with the state and federal definitions of vernal pools provided above, the presence of obligate or facultative species alone was not used to identify an area as a vernal pool. Where at least one obligate or two facultative vernal pool species were observed, the area was further investigated to determine whether the pool was a confined basin depression that typically held water for two continuous months during the spring and were free of adult fish populations. To the extent possible, visual observations of off-ROW depressions were made in the field, however access constraints and visual screening made confirmation of vernal pools in these off-ROW areas difficult.

Surveys along the ROW were conducted from spring 2015-spring 2018. The surveys were scheduled after the first significant rain events, when the majority of evening low temperatures were expected to remain in the 40s (degrees Fahrenheit). These weather conditions promote inward migration of amphibians to the pools for the purpose of breeding. Biologists conducted visual surveys and used dip nets to sweep the water column to determine the presence or absence of amphibians and other vernal pool species, as described in Section 1.1.4 above. When heard, choruses of breeding frogs were also noted. Observations of obligate and facultative species were recorded on the Vernal Pool Data Forms provided in Attachment B. Additional data recorded on the data forms included the approximate size and depth of the observed breeding pool(s), substrate type, vegetation composition, wetland classification (Cowardin et al. 1979), and general comments (if any).

POWER used a Trimble Geo XT mapping-grade Global Position System unit to document the location and shape of the vernal pools. Positional data was post-processed to sub-meter accuracy for transfer onto ArcGIS-based mapping of the Project. Field identified vernal pools are presented on the mapping in Figure 2.

The three obligate vernal pool inhabitants observed along the ROW included wood frogs, spotted salamanders, and fairy shrimp. Life history information for these species is provided below.

Wood Frog (*Lithobates sylvatica*)

In Massachusetts, the wood frog is among the first species to arrive at the breeding pools and begin their loud, duck-like mating call. Wood frogs have been documented as breeding in open and closed canopy wetlands (Werner and Glennemeier 1999). The timing of their movement varies annually, depending on climatic conditions but in general terms they immigrate to breeding sites in most years in March and early April. The large scale migration to the breeding pools generally occurs at night during the first few heavy downpours that are accompanied by warmer air temperatures.

Except for the brief period spent at breeding habitats, wood frogs are mainly terrestrial. They utilize all types of forests and woodlands, including maritime, deciduous, and coniferous (Klemens 1993), as well as a variety of other types of habitats. During the coldest months wood frogs hibernate under leaf litter, rotting logs, stumps, rocks, and moss. Wood frogs have perfected the cryogenic freezing process. In the winter, as much as 35 to 45 percent of the frog's body may freeze and turn to ice. Ice crystals form beneath the skin and become interspersed among the body's skeletal muscles. During the freeze, the frogs breathing, blood flow, and heartbeat cease. Freezing is made possible by specialized proteins and glucose, which prevent intracellular freezing and dehydration.

Compared to other amphibian species that utilize vernal pools for breeding in southern New England, the wood frog is one of the only species that truly can be considered obligate to vernal pools. Wood frogs

successfully breed in pools with shorter hydroperiods than any other amphibian in this region, with tadpole metamorphosis often complete by mid-July. Therefore, ponds that dry by August still provide perfectly suitable breeding habitat, whereas it takes much longer for the young of most other species to complete metamorphosis.

Wood frog eggs masses are often deposited near the edge of a breeding pool on the water's surface where water temperatures are typically highest. They are usually attached to submerged woody debris and/or herbaceous vegetation. Wood frog egg masses can easily be distinguished from those of the spotted salamander by the lack of an outer gelatinous sheath.

Newly hatched larvae feed on their egg masses and associated algae, as wood frog tadpoles are microphagous filter-feeders with a largely herbivorous diet. Larger tadpoles use their specialized mouth parts to feed on algae and various microorganisms scraped from aquatic vegetation, decaying plants and some animal matter. Adult wood frogs feed on a variety of invertebrates including flies, beetles, spiders, earthworms, moth larva, slugs, snails, and annelids (Klemens 1993).

Spotted Salamander (*Ambystoma maculatum*)

In Massachusetts, the spotted salamander is a very common and widespread mole salamander. Collectively, the mole salamanders are a secretive group of salamanders that are primarily active at night. These animals are rarely seen except during their nocturnal migrations to and from their breeding pools during their brief early spring breeding season. Often times, spotted salamanders can be observed migrating to vernal pools in conjunction with wood frogs. Within a few days after mating, eggs are deposited in firm spherical or kidney-shaped masses and in most cases, are attached to submerged objects such as woody debris or other organic material. The mass is surrounded by a stiff gelatinous matrix and can contain 30 to 250 single eggs (Kenney and Burne 2001).

Once hatched, larvae feed predominantly on very small aquatic invertebrates. Larger individuals feed on snails, clams, oligochaete worms, small aquatic insects and their larvae and other invertebrates (Kenney and Burne 2001). In general, zooplankton is the dietary staple of larvae of all size classes. As adults, spotted salamanders are generalized carnivores that forage in upland habitats for a variety of invertebrates including earthworms, snails, slugs, insects and larvae, spiders, and beetles (Degraaf and Yamasaki 2001).

While breeding and larval development takes place in aquatic habitats, during most of the year, spotted salamanders reside in upland forests away from breeding pools. Adults typically reside up to 200 meters from breeding pools but have been documented moving greater distances. Spotted salamanders typically live in burrows created by small mammals such as the short-tail shrew (*Blarina brevicauda*). They appear to be habitat generalists, and have been documented in forest habitats including deciduous, coniferous and mixed forest. However, they are most abundant in mature deciduous or mixed deciduous woodlands.

Fairy Shrimp (*Eubranchipus* spp.)

Fairy shrimp are crustaceans only found in vernal pools. They are quite small (0.5 to 1.5 inches) and swim upside-down by beating their abdominal appendages in a wave-like motion. Fairy shrimp are obligate vernal pool species as they require a dry period for their reproductive cycle. The females produce eggs that need to dry out and then be re-submerged in water in order to hatch. The larvae mature into adults quickly and produce multiple broods. Fairy shrimp feed mainly by filtering bacteria, phytoplankton, protozoans, and detritus and are most active during the winter and early spring before predators become abundant (Kenny and Burne 2001).

3.0 RESULTS

As illustrated in Table 1, the NEP ROW contains eight field-identified vernal pools of which one pool was located within a tire rut.

Digital aerial mapping, provided in Figure 2, depicts the field-delineated vernal pools within the Project ROW. It should be noted that the size of the overall vernal pool and dimensions presented on the data forms and in the mapping represents data collected during the field investigations. The size of the vernal pool and dimensions may be expected to vary from year to year based upon seasonal fluctuations in the water table caused by annual variations in the amount and timing of precipitation.

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TABLE 1 VERNAL POOLS IDENTIFIED IN THE NEP PROJECT AREA

ID NUMBER	VERNAL POOL		EXISTING COVER TYPE	AVERAGE WATER DEPTH (IN.) IN 2018	MAXIMUM WATER DEPTH (IN.) IN 2018	OBLIGATE SPECIES OBSERVED	FACULTATIVE SPECIES OBSERVED[1]	ADDITIONAL SPECIES OBSERVED[1]	CITY/ TOWN
	Isolated Depression / Distinct Pool Within Wetland System	Associated with ATV or Tire Rut in a Wetland System							
DP-12	X		PSS	19	19	2 wood frog egg masses (2018) ~50 wood frog tadpoles (2018)			Fall River
DP-7	X		PFO	8	13	~50 fairy shrimp (2018)	1 American toad (2018)		Fall River
DP-6	X		PFO	5	14	8 wood frog egg masses (2018) ~100 wood frog tadpoles (2018) 12 spotted salamander egg masses (2018) ~1,000 fairy shrimp (2018)			Fall River
DP-5	X		PFO	14	17	3 wood frog egg masses (2018) ~hundreds of wood frog tadpoles (2018) ~55 spotted salamander egg masses (2018)			Fall River
DP-4		X	PSS	6	13	~30 spotted salamander egg masses (2017) 2 wood frog egg masses (2018) 8 spotted salamander egg masses (2018)			Fall River
DP-2	X		PSS	10	12	5 spotted salamander egg masses (2017) ~20 spotted salamander larvae (2017) 2 wood frog egg masses (2018) 7 spotted salamander egg masses (2018) ~100 fairy shrimp (2018)	American toad calling (2018)		Fall River
DP-1	X		PSS	17	29	20 wood frog tadpoles (2017) 1 spotted salamander egg mass (2017) 10 spotted salamander larvae (2017) 3 spotted salamander egg masses (2018)			Fall River

ID NUMBER	VERNAL POOL		EXISTING COVER TYPE	AVERAGE WATER DEPTH (IN.) IN 2018	MAXIMUM WATER DEPTH (IN.) IN 2018	OBLIGATE SPECIES OBSERVED	FACULTATIVE SPECIES OBSERVED[1]	ADDITIONAL SPECIES OBSERVED[1]	CITY/ TOWN
	Isolated Depression / Distinct Pool Within Wetland System	Associated with ATV or Tire Rut in a Wetland System							
LP-1	X		PSS	10	14	2 wood frog egg masses (one hatching) (2016) ~50 wood frog tadpoles (2018) 2 old wood frog egg masses (2018)			Fall River

4.0 REFERENCES

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FIGURE 1 PROJECT OVERVIEW: TOPOGRAPHIC MAP

Bell Rock Substation

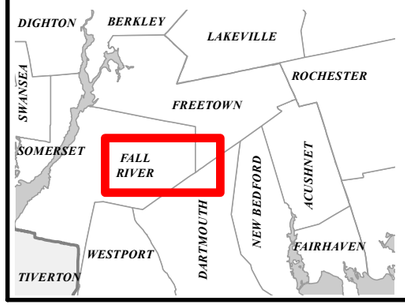
High Hill Substation

City of Fall River

Town of Freetown

Town of Dartmouth

Project Vicinity



Legend

- New 114 Line Extension
- Existing Transmission Line
- Existing Power Facility
- National Grid ROW
- Town Boundary

Fall River to Acushnet Reliability Project

Figure 1

Project Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River

POWER ENGINEERS

nationalgrid

NAD 1983 UTM Zone 18N USFt

N W E S

0 1,000 2,000 3,000 4,000 Feet

NOT FOR CONSTRUCTION

Date: 9/17/2018

1:24,000

Author: TDH

Path: W:\140869_140884_SEMA_RI_Step_2B\Apps\New_114_Line\Locus_Map_114_Line_NG_Only.mxd

FIGURE 2 VERNAL POOL MAPPING

Appendix A, Project Figures, of the MEPA EENF

For Figure 2 Plan Set

ATTACHMENT A VERNAL POOL REPRESENTATIVE SITE PHOTOGRAPHS

PHOTOGRAPHIC LOG

Site Location: DP-12

Photo No.	**Date:**
1	05-11-18

Direction Photo Taken:

West

Description:

Vernal pool located in Wetland D20.



PHOTOGRAPHIC LOG

Site Location: DP-7

Photo No.	**Date:**
2	04-27-18

Direction Photo Taken:

East

Description:

Vernal pool located in Wetland D15.



PHOTOGRAPHIC LOG

Site Location: DP-6

Photo No.	**Date:**
3	04-24-18

Direction Photo Taken:

South

Description:

Vernal pool located in Wetland D14.



PHOTOGRAPHIC LOG

Site Location: DP-5

Photo No.	**Date:**
4	04-24-18

Direction Photo Taken:

North

Description:

Vernal pool located in Wetland D7.



PHOTOGRAPHIC LOG

Site Location: DP-4

Photo No.	**Date:**
5	04-27-18

Direction Photo Taken:

Northwest

Description:

Vernal pool located in Wetland D11.



PHOTOGRAPHIC LOG

Site Location: DP-2

Photo No.	**Date:**
6	04-24-18

Direction Photo Taken:

West

Description:

Vernal pool located in Wetland D7A.



PHOTOGRAPHIC LOG

Site Location: DP-1

Photo No.	**Date:**
7	04-24-18

Direction Photo Taken:

North

Description:

Vernal pool located in Wetland D5.



PHOTOGRAPHIC LOG

Site Location: LP-1

Photo No.	**Date:**
8	04-24-18

Direction Photo Taken:

Southwest

Description:

Vernal pool located in Wetland L1.



ATTACHMENT B VERNAL POOL DATA FORMS

POOL # DP-12

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Sunny 65°F	**TIME**	9:30am
DATE	5/11/18	**TOWN**	Fall River
OBSERVERS	ML+DR	**TIME SPENT AT POOL**	10min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	#9/9	**LENGTH & WIDTH**	8'L x 4'W
POOL NUMBER	Dp-12	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D21 #71
ISOLATED POOL Y / N	N		
AVG. WATER DEPTH	19"	**DOMINANT COVER TYPE**	☐PEM ☒PSS ☐PFO
MAX. WATER DEPTH	19"	**PRESENCE OF FISH Y / N**	N

SUBSTRATE:

- ☒ Mud/Muck
- ☐ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: Carex sp.
Juncus effusus

Shrub/Sapling: Smilax rotundifolia

Tree: —

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☒	Wood frog	2,3	2,~50
☐	Spotted salamander		
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):

Conclusions / Comments:
Next to Access Road
Overflow from stream 4 (SD-4)

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

40 % PSS | 10 % PFO | ____ % PEM

10 % UF | 40 % OFS | ____ % Other / define:

100 % of pool w/in managed portion of ROW 0 % of pool within forested area of ROW

POOL # DP-7

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Sunny, 56°F	**TIME**	8:30am
DATE	4/27/18	**TOWN**	Fall River
OBSERVERS	ML+DR	**TIME SPENT AT POOL**	20min
POOL CHARACTERISTICS			
WETLAND # / MAPSHEET #	#619	**LENGTH & WIDTH**	35'L x 21'W
POOL NUMBER	DP-7	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D21 #56
ISOLATED POOL Y / N	Y		
AVG. WATER DEPTH	8"	**DOMINANT COVER TYPE**	☐PEM ☐PSS ☒PFO
MAX. WATER DEPTH	13"	**PRESENCE OF FISH Y / N**	N

SUBSTRATE:

- ☐ Mud/Muck
- ☐ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: Osmundastrum cinnamomium

Shrub/Sapling: Pinus strobus, Smilax rotundifolia, Vaccinium corymbosum, Viburnum dentatum

Tree: Acer rubrum, Pinus strobus

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☐	Wood frog		
☐	Spotted salamander		
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☒	Fairy shrimp	5	~50

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☒ American toad – (1)
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):

Conclusions / Comments:

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

35 % PSS | 30 % PFO | ____ % PEM

30 % UF | ____ % OFS | 5 % Other / define:

0 % of pool w/in managed portion of ROW 100 % of pool within forested area of ROW

POOL # DP-6

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Sunny 55°F	**TIME**	2:43 pm
DATE	4/24/18	**TOWN**	Fall River
OBSERVERS	ML + DR	**TIME SPENT AT POOL**	20 min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	#619	**LENGTH & WIDTH**	50'L x 45'W
POOL NUMBER	DP-6	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	
ISOLATED POOL Y / N	Y		
AVG. WATER DEPTH	5"	**DOMINANT COVER TYPE**	☐ PEM ☐ PSS ☒ PFO
MAX. WATER DEPTH	14"	**PRESENCE OF FISH Y / N**	N

SUBSTRATE:

- ☒ Mud/Muck
- ☒ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: Grass sp

Shrub/Sapling: Smilax rotundifolia, Spiraea alba, Pinus strobus

Tree: Pinus strobus, Acer rubrum

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☒	Wood frog	2,3	8, ~100
☒	Spotted salamander	2	12
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☒	Fairy shrimp	5	~1000

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):

Conclusions / Comments:

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

20 % PSS | 30 % PFO | ____ % PEM

30 % UF | 20 % OFS | ____ % Other / define:

5 % of pool w/in managed portion of ROW | 95 % of pool within forested area of ROW

↳ Pool goes off ROW

POOL # DP-5

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Sunny, 56°F	**TIME**	11:45am
DATE	4/24/18	**TOWN**	Fall River
OBSERVERS	ML + DR	**TIME SPENT AT POOL**	20 min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	#219	**LENGTH & WIDTH**	43'L x 35'W
POOL NUMBER	DP-5	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D21 #371 x 3
ISOLATED POOL Y / N	Y		
AVG. WATER DEPTH	14"	**DOMINANT COVER TYPE**	☐ PEM ☐ PSS ☒ PFO
MAX. WATER DEPTH	17"	**PRESENCE OF FISH Y / N**	N

SUBSTRATE:

- ☐ Mud/Muck
- ☒ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: —

Shrub/Sapling: Clethra alnifolia, Smilax rotundifolia, Eubotrys racemose, Vaccinium corymbosum

Tree: Acer rubrum

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☒	Wood frog	02,03	3, hundreds
☒	Spotted salamander	02	~55
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed: several smaller egg masses

Photo Documentation (note direction):

Conclusions / Comments:

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

____% PSS 45 % PFO ____% PEM

40 % UF 15 % OFS ____% Other / define:

0 % of pool w/in managed portion of ROW 100 % of pool within forested area of ROW

↳ 600 of ROW

POOL # DP-4

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Rainy, 55°F	**TIME**	1:15pm
DATE	4/27/18	**TOWN**	Fall River
OBSERVERS	ML+DR	**TIME SPENT AT POOL**	15min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	#519	**LENGTH & WIDTH**	232'Lx 11'W
POOL NUMBER	DP-4	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D-21 #53
ISOLATED POOL Y / N	N		
AVG. WATER DEPTH	6"	**DOMINANT COVER TYPE**	☐PEM ☒PSS ☐PFO
MAX. WATER DEPTH	13"	**PRESENCE OF FISH Y / N**	N

SUBSTRATE:

- ☒ Mud/Muck
- ☒ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: Carex sp., Grass sp.

Shrub/Sapling: Spiraea alba, Vaccinium corymbosum, Clethra alnifolia

Tree: Acer rubrum

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☒	Wood frog	02	2
☒	Spotted salamander	02	8
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:



Photo Documentation (note direction):

Conclusions / Comments: H_2O flowing down through pool into river. Located in A.R. depression, flows out to Copicut river. Did not connect pool which is adj to river.

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

50 % PSS | 45 % PFO | ____ % PEM

____ % UF | ____ % OFS | 5 % Other / define: Dirt/gravel Access Road

100 % of pool w/in managed portion of ROW | 0 % of pool within forested area of ROW

POOL # DP-4

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2017 FIELD SEASON

WEATHER CONDITIONS	Cloudy 60°F	**TIME**	11:15am
DATE	5/2/17	**TOWN**	Fall River
OBSERVERS	BP + ML	**TIME SPENT AT POOL**	30min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	# 519	**LENGTH & WIDTH**	232'L x 11'W
POOL NUMBER	DP-4	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	DZ1 #53
ISOLATED POOL Y / N	N		
AVG. WATER DEPTH	8"	**DOMINANT COVER TYPE**	☐ PEM ☒ PSS ☐ PFO
MAX. WATER DEPTH	12"	**PRESENCE OF FISH Y / N**	N

- ow PSS adjacent to VP

SUBSTRATE:

- ☒ Mud/Muck
- ☒ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous:	Shrub/Sapling:	Tree:
Grass sp.	Vaccinium corymbosum Clethra alnifolia Spiraea alba	Pinus strobus

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☐	Wood frog		
☒	Spotted salamander	02	~30 - scattered throughout
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):

Conclusions / Comments:

- 3 sets of riffles throughout pool - due to stormwater backed up road?

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

50 % PSS | 45 % PFO | ____ % PEM

____ % UF | ____ % OFS | 5 % Other / define: Dirt/gravel Access Road + Quequechan Rd

100 % of pool w/in managed portion of ROW | 0 % of pool within forested area of ROW

- located w/i accessroad
- int. flow into + out of pool; heavy rains in AM

POOL # DP-2

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Sunny 59°F	**TIME**	12:30pm
DATE	4/24/18	**TOWN**	Fall River
OBSERVERS	ML + DR	**TIME SPENT AT POOL**	15min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	#3/9	**LENGTH & WIDTH**	70'L x 95'W
POOL NUMBER	DP. 2	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D21 #40
ISOLATED POOL Y / N	Y		
AVG. WATER DEPTH	10"	**DOMINANT COVER TYPE**	☐PEM ☐PSS ☐PFO
MAX. WATER DEPTH	12"	**PRESENCE OF FISH Y / N**	

← Upland Forest

SUBSTRATE:

- ☐ Mud/Muck
- ☐ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: Grass sp.

Shrub/Sapling: Vaccinium corymbosum

Tree: Pinus strobus

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☒	Wood frog	02	2
☒	Spotted salamander	02	7
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☒	Fairy shrimp	5	~100

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☒ American toad ← calling before approached pool.
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):

Conclusions / Comments:
Water levels much lower than last year

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

____% PSS ____% PFO ____% PEM

65 % UF 35 % OFS 45 % Other / define: Access Road / stone

0 % of pool w/in managed portion of ROW 100 % of pool within forested area of ROW

↳ Goes off ROW

POOL # DP-2

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2017 FIELD SEASON

WEATHER CONDITIONS	Cloudy, 58°F	TIME	2:30pm
DATE	5/1/17	TOWN	Fall River
OBSERVERS	BP + ML	TIME SPENT AT POOL	20 min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	# 319	LENGTH & WIDTH	70'L x 95'W
POOL NUMBER	DP-2	CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER	D21 #40
ISOLATED POOL Y / N	Y		
AVG. WATER DEPTH	15"-18"	DOMINANT COVER TYPE	☐PEM ☐PSS ☐PFO → Upland
MAX. WATER DEPTH	24"	PRESENCE OF FISH Y / N	N

SUBSTRATE:

- ☒ Mud/Muck
- ☒ Leaf Litter ← White pine needles
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous:

Shrub/Sapling: Vaccinium corymbosum

Tree: Pinus strobus

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☐	Wood frog		
☒	Spotted salamander	02, 04	5, ~20
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):
3 photos

Conclusions / Comments:

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

____% PSS ____% PFO ____% PEM

65 % UF 35 % OFS ____% Other / define:

0 % of pool w/in managed portion of ROW 100 % of pool within forested area of ROW

↳ Goes off ROW

POOL # DP-1

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Sunny 56°F	**TIME**	11:10 am
DATE	4/24/18	**TOWN**	Fall River
OBSERVERS	ML+DR	**TIME SPENT AT POOL**	15min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	# 219	**LENGTH & WIDTH**	23'L x 23'W
POOL NUMBER	DP-1	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D21 #36
ISOLATED POOL Y / N	N		
AVG. WATER DEPTH	17"	**DOMINANT COVER TYPE**	☐ PEM ☒ PSS ☐ PFO
MAX. WATER DEPTH	29"	**PRESENCE OF FISH Y / N**	N

some of the stream spills into pool. + outlet ← from vernal pool that joins a stream.

-Stream branch runs through VP.

SUBSTRATE:

- ☒ Mud/Muck
- ☒ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: Carex sp

Shrub/Sapling: Smilax rotundifolia, Eubotrys racemose, Pinus sp., Vaccinium corymbosum

Tree: —

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☐	Wood frog		
☒	Spotted salamander	02	3
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):

Conclusions / Comments:

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

20 % PSS | 30 % PFO | ____ % PEM

20 % UF | 30 % OFS | ____ % Other / define:

100 % of pool w/in managed portion of ROW | 0 % of pool within forested area of ROW

POOL # DP-1

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2017 FIELD SEASON

WEATHER CONDITIONS	Cloudy, 80°F	**TIME**	10:25am
DATE	7/13/17	**TOWN**	Fall River
OBSERVERS	ML + BP	**TIME SPENT AT POOL**	20 min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	#219	**LENGTH & WIDTH**	23'Lx23'W
POOL NUMBER	DP-1	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D21 structure D-36
ISOLATED POOL Y / N	N		
AVG. WATER DEPTH	8"	**DOMINANT COVER TYPE**	☐ PEM ☒ PSS ☐ PFO
MAX. WATER DEPTH	36"	**PRESENCE OF FISH Y / N**	N

SUBSTRATE:

- ☒ Mud/Muck
- ☒ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous:
- Carex sp - most likely lurida, no seed head or crinitata - thick leaves + sharp leaves
- Parthenocissus quinquefolia

Shrub/Sapling:
- Smilax rotundifolia
- Ilex verticillata
- Lyonia ligustrina

Tree: —

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☒	Wood frog	03	~20
☒	Spotted salamander	02, 04	1, ~10
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:
- Wood frogs
  - 1 adult in WDG
  - 1 juvenile in UDG
- Water beetles

Photo Documentation (note direction):

Conclusions / Comments:
- Sphagnum moss surrounding pool
- Part of stream B1, flowed out from stream

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

20 % PSS	30 % PFO	____ % PEM
20 % UF	30 % OFS	____ % Other / define:

100 % of pool w/in managed portion of ROW 0 % of pool within forested area of ROW

POOL # LP-1

TRANSMISSION LINE VERNAL POOL / AMPHIBIAN BREEDING HABITAT DATA FORM
2018 FIELD SEASON

WEATHER CONDITIONS	Sunny, 50°F	**TIME**	9:15am
DATE	4/24/18	**TOWN**	Fall River
OBSERVERS	ML+DR	**TIME SPENT AT POOL**	20 min

POOL CHARACTERISTICS

WETLAND # / MAPSHEET #	#1 / 9	**LENGTH & WIDTH**	50'L x 20'W
POOL NUMBER	LP-1	**CLOSEST WETLAND FLAG NUMBER / EXISTING STRUCTURE NUMBER**	D-21 #29
ISOLATED POOL Y / N	Y		
AVG. WATER DEPTH	10"	**DOMINANT COVER TYPE**	☐ PEM ☒ PSS ☐ PFO
MAX. WATER DEPTH	14"	**PRESENCE OF FISH Y / N**	

SUBSTRATE:

- ☒ Mud/Muck
- ☒ Leaf Litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION WITHIN POOL BY STRATUM:

Herbaceous: Carex sp.

Shrub/Sapling: Spiraea alba, Clethra alnifolia, Vaccinium corymbos

Tree:

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
☒	Wood frog	3	~50
☐	Spotted salamander		
☐	Jefferson salamander		
☐	Blue-spotted salamander		
☐	Spadefoot toad		
☐	Fingernail clams		
☐	Marbled salamander		
☐	Unidentified mole salamander		
☐	Fairy shrimp		

FACULTATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's Toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel Frog

Additional Species Observed:

Photo Documentation (note direction):

Conclusions / Comments:
2 old wood frog egg masses, tadpoles swimming around it

☒ Vernal Pool ☐ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

15 % PSS | 50 % PFO | ____ % PEM

15 % UF | ____ % OFS | 30 % Other / define: Bell Rock S/S + Access Road

100 % of pool w/in managed portion of ROW | 0 % of pool within forested area of ROW

APPENDIX J AFRRP WILDLIFE HABITAT EVALUATION

November 13, 2018

NEW ENGLAND POWER COMPANY

d/b/a NATIONAL GRID

Acushnet to Fall River Reliability Project

Wildlife Habitat Evaluation

PROJECT NUMBER:
146784
PROJECT CONTACT:
Karen Hanecak
EMAIL:
Karen.Hanecak@powereng.com
PHONE:
774-643-1821

POWER ENGINEERS

Wildlife Habitat Evaluation

PREPARED FOR: NEW ENGLAND POWER COMPANY
d/b/a NATIONAL GRID

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

ATV	all-terrain vehicle
Bioreserve	Southeastern Massachusetts Bioreserve
BLSF	Bordering Land Subject to Flooding
BMP(s)	Best Management Practice(s)
BVW	Bordering Vegetated Wetland
CMR	Code of Massachusetts Regulations
CVP	Certified vernal pool
dbh	diameter at breast height
IVW	Isolated Vegetated Wetlands
LUB	Lacustrine Unconsolidated Bottom
MassDEP	Massachusetts Department of Environmental Protection
NHESP	Natural Heritage and Endangered Species Program
NEP	New England Power d/b/a National Grid
NWI	National Wetland Inventory
PEM	Palustrine Emergent
PFO	Palustrine Forested
POWER	POWER Engineers, Inc.
Project	Acushnet to Fall River Reliability Project
PSS	Palustrine Scrub-Shrub
PUB	Palustrine Unconsolidated Bottom
PVP	Potential vernal pool
RFA	Riverfront Area
ROW(s)	Right(s)-of-Way
USFWS	United States Fish and Wildlife Service
WPA	Massachusetts Wetlands Protection Act

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1.0 INTRODUCTION

NSTAR Electric Company d/b/a Eversource Energy (Eversource) and the New England Power Company d/b/a National Grid (NEP) are proposing to undertake the Acushnet to Fall River Reliability Project (the Project) to improve the electric transmission reliability in the Southeastern Massachusetts area. The Project consists of the installation of a new overhead transmission line extending from Eversource's Industrial Park Tap in Acushnet to NEP's existing Bell Rock Substation in Fall River. The proposed Project includes the installation of approximately 12 miles of new overhead electric transmission line traversing the municipalities of Acushnet, New Bedford, Dartmouth, and Fall River in Bristol County, Massachusetts (Figure 1). The new line will be located within existing rights-of-ways (ROWs) currently occupied by existing transmission lines. Of the 12 miles, approximately 7.8 miles are in Eversource service territory and approximately 4.2 miles are in NEP service territory traversing the city of Fall River (see Figure 1).

This report pertains to the proposed Project facilities for NEP's portion of the Project in Fall River. Field assessments for the NEP portion of the Project within the existing transmission line ROW (hereafter referred to as the "Survey Area") were conducted from 2015 through 2018. Tree clearing will be required to expand the cleared ROW width in order to accommodate the new transmission line.

2.0 DETAILED WILDLIFE HABITAT EVALUATION

This document presents the results of a wildlife habitat evaluation conducted on the NEP portion of the ROW pursuant to the Massachusetts Wetland Protection Act ([WPA] M.G. L. c. 131 §40) and associated Regulations (310 Code of Massachusetts Regulations [CMR] 10.00) addressing Wildlife Habitat Evaluations (310 CMR 10.60) and the procedures and methods detailed in the Massachusetts Department of Environmental Protection (MassDEP) *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands* (Guidance, MassDEP 2006). The Project qualifies as a "limited project" (310 CMR 10.53 (3)(d)) for the construction, reconstruction, operation, and maintenance of underground and overhead public utilities such as transmission lines; under which the issuing authority (Conservation Commissions/MassDEP) is empowered with the discretion to either waive or require wildlife habitat evaluations (Guidance, MassDEP 2006).

The analysis was undertaken because the Project exceeds review thresholds for wildlife habitat alteration under the MA WPA, as implemented by the Wetlands Regulations (310 CMR 10.00). Cumulatively, anticipated impacts to Bordering Vegetated Wetland (BVW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area (RFA) are greater than 5,000 square feet due to temporary (construction) impacts associated with construction mats and permanent wetland conversion associated with new tree removal. Some habitat functions associated with forested wetland will be converted to scrub-shrub habitat. However, in accordance with 310 CMR 10.53 (3)(d), the Project qualifies as a limited project for the construction, reconstruction, operation and maintenance of underground and overhead public utilities, such as transmission lines.

As a limited project, completion of a wildlife habitat evaluation may be required at the discretion of the issuing authority. NEP has elected to proactively undertake an Appendix B Detailed Wildlife Habitat Evaluation (Habitat Evaluation) for areas affected by the Project. This documentation is consistent with the standards of the MassDEP Guidance.

Habitat features or characteristics were evaluated in the Survey Area based on characteristics identified on the Guidance detailed data form (Attachment A). Important wildlife habitat features found during the field analyses includes:

- Upland/wetland food plants (hard mast and fruit).
- Shrub thickets/streambeds with abundant earthworms.
- Shrub vegetation suitable for veery nesting.
- Live trees (>30 inches diameter at breast height [dbh]).
- Standing dead trees (snags).
- Potential small mammal burrows.
- Dense herbaceous cover.
- Large woody debris on ground.
- Logs under the water's surface.
- Overhanging shrub branches at, or within one meter above the water's surface.
- Rock piles and crevices suitable as potential habitat.

- Live standing vegetation overhanging water or offering good visibility of open water.
- Depressions that serve as vernal pools and/or amphibian breeding areas.
- Standing water present at least part of the growing season for use by non-breeding amphibians.
- Standing water present at least part of the growing season suitable for use by turtles and foraging waterfowl.
- Flat rocks within exposed portions of streambeds.
- Areas of ice-free open water in winter.
- Perennial and intermittent streams.

Representative photographs of habitat characteristics within each impacted resource area are presented in Attachment B. The remainder of this document includes: state agencies' rare species consultations (Section 4.0), Best Management Practices (BMPs) which will be used throughout the course of Project activities (Section 5.0), anticipated Project impacts to wildlife habitat with potential mitigation actions listed to offset Project impacts (Section 6.0), and an adverse effect analysis and conclusion (Section 7.0).

3.0 EXISTING HABITAT CONDITIONS

3.1 Important Habitat Features

Wildlife habitat features and characteristics identified by the MassDEP Guidance were field evaluated in every wetland resource area (BVW, BLSF, and RFA) to be impacted by the Project and documented on the detailed data forms (Attachment A). The following wetland resource areas are located in the NEP Survey Area: 16 BVWs, one BLSF, and one RFA. The BLSF is associated with the Copicut Reservoir and the RFA is associated with perennial stream SD-11. Project impacts include: tree clearing within the existing corridor expected to convert to shrub habitat; temporary work pads and access routes; and structure installation. In locations where multiple sites of impact would take place in a wetland resource area, a representative site was selected to document wildlife habitat characteristics. Wildlife habitat information was collected at a total of 14 locations.

Based on the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) classification system (Cowardin et al. 1979), wetlands to be impacted by the Project are predominately forested wetlands (PFO). However, four other community types were also identified in the Survey Area: Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), Palustrine Unconsolidated Bottom (PUB), and Lacustrine Unconsolidated Bottom (LUB).

A variety of suburban wetland wildlife species utilize these habitats including an assemblage of mammals (chiefly small other than white-tailed deer (*Odocoileus virginianus*) and Eastern coyote (*Canis latrans* var.)), songbirds, reptiles, amphibians, and invertebrates. These wetland habitats provide feeding, nesting, breeding, and cover opportunities for wildlife where the wetlands are already embedded in a large area of natural habitat. Characteristics of the forest and shrub wetlands which provide necessary resources for wildlife include: berry-producing shrubs for food sources, young, developing shrubs providing an understory for cover, localized areas of surface water in the form of depressions, vernal pools, and standing dead trees offering the potential for cavities and perches.

Listed in the sections below is a comprehensive overview of the wildlife habitat evaluation characteristics observed during the field surveys. The listed habitat characteristics are those identified on the MassDEP detailed habitat evaluation data forms (Attachment A) that are relevant to Project wetland resource areas. At the end of Section 3.0 is Table 1 which is a summary of these data forms (Attachment A).

TABLE 1 EXISTING WILDLIFE HABITAT FEATURES IN FALL RIVER, MASSACHUSETTS

HABITAT CHARACTERISTICS	WETLAND RESOURCE AREA	EXISTING HABITAT FEATURES	NOTES/COMMENTS (EXISTING PLANTS, OBSERVED WATER DEPTHS, SPECIES, SIGN ETC.)
Wildlife Food: Upland/wetland food plants (hard mast and fruit)	BVW D20	Present	Highbush blueberry, maleberry, roundleaf greenbrier, white oak, American beech.
	BVW D19 and BVW D19A	Present	Highbush blueberry, maleberry.
	BVW D18	Present	Highbush blueberry, maleberry.
	BVW D17	Present	Highbush blueberry, maleberry, roundleaf greenbrier.
	Upland BLSF associated with the Copicut Reservoir and Upland RFA of SD-11	Present	Highbush blueberry, roundleaf greenbrier maleberry.
	BVW D16A/ BLSF	Present	Highbush blueberry.
	BVW D15	Present	White oak, highbush blueberry, roundleaf greenbrier.
	BVW D14	Present	Highbush blueberry and roundleaf greenbrier
	BVW D12/BLSF of the Copicut Reservoir	Present	Highbush blueberry, arrowwood, roundleaf greenbrier, beech.
	BVW D11/BLSF of the Copicut Reservoir/Vernal Pool DP-4	Abundant	Highbush blueberry, winterberry, maleberry, arrowwood, roundleaf greenbrier, white oak, willow.
	BVW D8	Present	White oak, shagbark hickory.
	BVW D7	Abundant	Highbush blueberry, red oak, white oak, roundleaf greenbrier.
	BVW D6	Present	Raspberry, winterberry, highbush blueberry, roundleaf greenbrier, shagbark hickory.
	BVW D3	Present	Highbush blueberry.
	BVW D2	Present	Highbush blueberry, winterberry, maleberry, roundleaf greenbrier, willow, white oak.
	BVW D1	Abundant	Highbush blueberry, winterberry, roundleaf greenbrier, fox grape.
	BVW L1	Present	Highbush blueberry, maleberry, roundleaf greenbrier, red oak.
Shrub thickets/streambeds with abundant earthworms	BVW D20	Present	BVW D20 provides dense shrub thickets comprised of sweet pepperbush along portions of intermittent stream SD20. No woodcocks were observed during the evaluations.
	BVW D11	Present	BVW D11 provides dense shrub thickets comprised of sweet pepperbush and highbush blueberry along portions of perennial stream SD11 (the Copicut River). No woodcocks were observed during the evaluations.
Shrub/herbaceous vegetation suitable for veery nesting	BVW D20	Present	BVW D20 provides dense shrub thickets comprised of sweet pepperbush. No veerys were observed during the evaluations.
	BVW D17	Present	BVW D17 provides dense shrub thickets comprised of maleberry and highbush blueberry. No veerys were observed during the evaluations.
	BVW D11	Present	BVW D11 provides dense shrub thickets comprised of sweet pepperbush and highbush blueberry. No veerys were observed during the evaluations.
	BVW D7	Present	BVW D7 provides dense shrub thickets comprised of sweet pepperbush and highbush blueberry. No veerys were observed during the evaluations.

HABITAT CHARACTERISTICS	WETLAND RESOURCE AREA	EXISTING HABITAT FEATURES	NOTES/COMMENTS (EXISTING PLANTS, OBSERVED WATER DEPTHS, SPECIES, SIGN ETC.)
	BVW D3	Present	BVW D3 provides dense shrub thickets comprised of sweet pepperbush. No veerys were observed during the evaluations.
	BVW D2	Present	BVW D2 provides dense shrub thickets comprised of sweet pepperbush. No veerys were observed during the evaluations.
	BVW D1	Present	BVW D1 provides dense shrub thickets comprised of sweet pepperbush. No veerys were observed during the evaluations.
Trees (live or dead) > 30" dbh (diameter at breast height)	BVW D12	1	A live 32" dbh white pine tree located in the wetland buffer and 20 feet from the upland Copicut Reservoir BLSF.
	BVW D11	2	Two (32 and 33 dbh) live white pine trees located in the wetland buffer on the north side of Quanapoag Road.
Standing Dead Trees			
6-12" dbh	BVW D20	5 trees	Species unknown. Two trees are leaning.
6-12" dbh	BVW D19	1 tree	Species unknown. Woodpecker holes. Located on edge of the ROW.
6-12" dbh	Upland BLSF of the Copicut Reservoir	3 trees	Species unknown. On edge of ROW.
6-12" dbh	BVW D16A and BLSF of the Copicut Reservoir	3 trees	Species unknown.
6-12" dbh	BVW D11	2 trees	Species unknown.
6-12" dbh	BVW D8	1 tree	Species unknown.
6-12" dbh	BVW D7	2 trees	Species unknown. Woodpecker holes.
6-12" dbh	BVW D6	12 trees	Species unknown. Woodpecker holes.
6-12" dbh	BVW L1	2 trees	Species unknown.
12-18" dbh	BVW D7	4 trees	Species unknown.
Small mammal burrows	BVW D7	Present	Located under a rock for an Eastern chipmunk.
	BVW D20	Present	Located under a rock for an Eastern chipmunk.
Dense herbaceous cover	BVW D20	Present	Young sweet pepperbush, young white pine, and young sheep laurel all under three feet tall; deer-tongue rosette-panicgrass.
	Upland BLSF of the Copicut Reservoir	Present	Bracken fern, flat-branched tree-clubmoss.
	BVW D11	Present	Cinnamon fern, royal fern, Massachusetts fern.
	BVW D7	Present	Sweet pepperbush under three feet tall, roundleaf greenbrier under three feet tall.
	BVW D1	Present	Cinnamon fern, young sweet pepperbush under three feet tall.
Large woody debris on ground	BVW D20	Present	Medium-sized woody debris on the ground.
	BVW D19	Present	Timber slash (tree logs) on the forest/ROW edge.
	BVW D11	Present	Large woody debris on edge of ROW along upland edge.
	Vernal Pool DP-2 in Isolated Vegetated Wetland (IVW) D7A	Present	Medium-sized woody debris on the ground.
	BVW D6	Present	18" dbh log on ground.
	BVW D2	Present	10" dbh fallen tree on ground.
Rocks, crevices, logs, tree roots, or hummocks under water's surface	Vernal Pool DP-7 in BVW D15	Present	Logs are present under the water's surface.
	Vernal Pool DP-2 in IVW 7A	Present	When the pool is inundated, there is a fallen tree under the water's surface.

HABITAT CHARACTERISTICS	WETLAND RESOURCE AREA	EXISTING HABITAT FEATURES	NOTES/COMMENTS (EXISTING PLANTS, OBSERVED WATER DEPTHS, SPECIES, SIGN ETC.)
Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1 meter above the water's surface	Vernal Pool DP-7 in BVW D15	Present	When the vernal pool is inundated, overhanging shrubs in the vernal pool and on the periphery of the vernal pool provide this characteristic.
	Vernal Pool DP-2 in IVW D7A	Present	When the vernal pool is inundated, overhanging shrubs in the vernal pool and on the periphery of the vernal pool provide this characteristic.
Rock piles, crevices, or hollow logs	BVW D20	Present	One rock pile provides potential habitat for an animal similar in size to a mink.
	BVW D18	Present	A crevice provides potential habitat for an animal similar in size to a mink.
	BVW D7	Present	One crevice (approximate size 1 foot tall by 2.5 feet wide) under a rock provides potential habitat for an animal the size of a bobcat.
Live or dead standing vegetation overhanging water or offering good visibility of open water	BVW D12	Present	Gray birch trees are growing on the wetland edge with branches overhanging into the Copicut Reservoir.
Depressions that may serve as seasonal (vernal/autumnal) pools	Vernal Pool DP-12 in BVW 20	Present	Average water depth (2018): 19 inches Maximum water depth (2018): 19 inches
	Vernal Pool DP-7 in BVW D15	Present	Average water depth (2018): 8 inches Maximum water depth (2018): 13 inches
	Amphibian Breeding Area (DP-8) adjacent to BVW D14 and BVW D15 in the maintained upland access road	Present	Average water depth (2018): 7 inches Maximum water depth (2018): 12 inches
	Vernal Pool DP-4 in BVW D11	Present	Average water depth (2018): 6 inches Maximum water depth (2018): 13 inches
	Amphibian Breeding Area DP-3 located in an ATV tire rut adjacent to Yellow Hill Road in an upland	Present	Average water depth (2018): 6 inches Maximum water depth (2018): 13 inches
	Vernal Pool DP-2 in IVW D7A	Present	Average water depth (2018): 10 inches Maximum water depth (2018): 12 inches
	Vernal Pool DP-5 in BVW D7	Present	Average water depth (2018): 14 inches Maximum water depth (2018): 17 inches
	Vernal Pool LP-1 in BVW L1	Present	Average water depth (2018): 10 inches Maximum water depth (2018): 14 inches
Standing water present at least part of the growing season: Suitable for use by breeding amphibians as well as for non-breeding amphibians for foraging and rehydration			
Suitable for breeding and non-breeding amphibians	Vernal Pool DP-12 in BVW 20	Present	2 wood frog egg masses (2018) ~50 wood frog tadpoles (2018)
Suitable for non-breeding amphibians	Intermittent Stream (SD-20) in BVW 20	Present	
Suitable for non-breeding amphibians	Intermittent Stream (SD-19) in BVW 19A	Present	
Suitable for breeding and non-breeding amphibians	Vernal Pool DP-7 in BVW D15	Present	~50 fairy shrimp (2018) 1 American toad

HABITAT CHARACTERISTICS	WETLAND RESOURCE AREA	EXISTING HABITAT FEATURES	NOTES/COMMENTS (EXISTING PLANTS, OBSERVED WATER DEPTHS, SPECIES, SIGN ETC.)
Suitable for breeding and non-breeding amphibians	Amphibian Breeding Area (DP-8) between BVW D14 and BVW D15 in the maintained upland access road.	Present	1 wood frog egg mass (2018) 3 mating pairs of American toads (2018) 3 single American toads (2018) American toads calling (2018)
Suitable for non-breeding amphibians	BVW12 due to isolated pockets of water from the Copicut Reservoir	Present	
Suitable for non-breeding amphibians	Perennial Copicut River (SD11) in	Present	
Suitable for breeding and non-breeding amphibians	Vernal Pool DP-4 in BVW D11	Present	~30 spotted salamander egg masses (2017) 2 wood frog egg masses (2018) 8 spotted salamander egg masses (2018)
Suitable for breeding and non-breeding amphibians	Amphibian Breeding Area DP-3 located in an ATV tire rut adjacent to Yellow Hill Road.This amphibian breeding area is in no resource areas and is located in upland	Present	20 wood frog egg masses (2017) 1 wood frog adult (2017) 3 spotted salamander egg masses (2017)
Suitable for non-breeding amphibians	Intermittent Stream SD-8 in BVW D8	Present	
Suitable for breeding and non-breeding amphibians	Vernal Pool DP-2 in IVW D7A	Present	5 spotted salamander egg masses (2017) ~20 spotted salamander larvae (2017) 2 wood frog egg masses (2018) 7 spotted salamander egg masses (2018) ~100 fairy shrimp (2018) American toad calling (2018)
Suitable for breeding and non-breeding amphibians	Vernal Pool DP-5 in BVW D7	Present	3 wood frog egg masses (2018) ~hundreds of wood frog tadpoles (2018) ~55 spotted salamander egg masses (2018)
Suitable for non-breeding amphibians	Intermittent Stream (SD-5) in BVW D6	Present	
Suitable for breeding and non-breeding amphibians	Vernal Pool LP-1 in BVW L1	Present	2 wood frog egg masses (one hatching) (2016) ~50 wood frog tadpoles (2018) 2 old wood frog egg masses (2018)
Standing water present at least part of the growing season suitable for use by turtles and foraging waterfowl	Copicut Reservoir	Present	The portion of the Copicut Reservoir within the Project ROW has standing water present earlier in the growing season. During the July-Nov. 2017 surveys, the Copicut Reservoir in the ROW was a majority of exposed shoreline. During the April-June 2018 surveys the previously exposed shoreline was inundated.
Medium to large (>6") flat rocks within a stream	Intermittent Stream (SD-5) and BVW D6	Present	One flat rock was present.
	Perennial Copicut River (SD-11) in BVW D11	Present	Flat rocks are present within the Copicut River near the Quanapoag Road crossing.
Flat rocks and logs on banks or within exposed portions of streambeds	Intermittent Stream (SD-5) in BVW D6	Present	One flat rock was present.
	Perennial Copicut River (SD-11) in BVW D11	Present	Flat rocks are present near the Quanapoag Road crossing.
Areas of ice-free open water in winter	Copicut Reservoir	Present	High potential that areas of the reservoir have ice-free open water in winter.
	Perennial Copicut River (SD-11) in BVW D11	Present	Stream was flowing in Nov. 2017. There is the potential that this perennial stream remains ice-free in winter.

HABITAT CHARACTERISTICS	WETLAND RESOURCE AREA	EXISTING HABITAT FEATURES	NOTES/COMMENTS (EXISTING PLANTS, OBSERVED WATER DEPTHS, SPECIES, SIGN ETC.)
Perennial and intermittent streams	- SD-20 in BVW 20 - SD-19 in BVW D19A - SD-11 in BVW D11 - SD-8 in BVW D8 - SD-5 in BVW D6	Present	Stream SD-11 (Copicut River) is perennial. Streams SD-20, SD-19, SD-8, and SD-5 are intermittent.

TABLE 2 WILDLIFE OBSERVATIONS AND SIGNS IN BORDERING VEGETATED WETLANDS BORDERING LANDS SUBJECT TO FLOODING, AND VERNAL POOLS IN FALL RIVER, MASSACHUSETTS

WETLAND RESOURCE AREA	OBSERVED WILDLIFE SPECIES	OBSERVED WILDLIFE SIGNS
BVW D20 and Intermittent Stream SD20	-Black-capped chickadee (heard) -Gray catbird -Eastern towhee -Yellow warbler	-Eastern white pine cone shells cache and small mammal burrow (likely Eastern chipmunk) -White-tailed deer droppings -Raccoon prints
Vernal Pool DP-12 in BVW D20	-Wood frog egg masses and tadpoles	-No observations at times of site visits
BVW D19 and BVW 19A, Intermittent Stream SD-19	-Gray catbird -Eastern towhee -Eastern box turtle in buffer zone on the south side of the maintenance road	-White-tailed deer droppings -White-tailed deer prints in access road
BVW D17 and D18	-White-tailed deer on access road -Black-capped chickadee -Gray catbird -Eastern towhee	-White- tailed deer droppings
Upland BLSF associated with the Copicut Reservoir	-Black-capped chickadee	-Eastern coyote scat on access road near Copicut Reservoir
BVW D16A, BLSF associated with Copicut Reservoir	-Black-capped chickadee -Hundreds of young American toads headed to the Copicut Reservoir	-White-tailed deer droppings
BVW D15	-Ovenbird in D15 -Eastern chipmunk in D15 -Eastern towhee	-White-tailed deer droppings and beds -Eastern white pine cone shells cache (likely Eastern chipmunk)
Vernal Pool DP-7 in BVW D15	-Fairy shrimp	-No observations at times of site visits
BVW D14	-American toads (mating pairs) -Wood frog egg mass	-White-tailed deer droppings and deer beds
Upland BLSF associated with the Copicut Reservoir	-Eastern towhee	-White-tailed deer trail along edge of Copicut Reservoir -White-tailed deer tracks and droppings
Copicut Reservoir	-Red-tailed hawks (2 juveniles) flying overhead -Great egret -Canada geese -Pickerel frog	-No observations at times of site visits
BVW D12 and BLSF associated with the Copicut Reservoir	-Ruby-throated hummingbird	-White-tailed deer droppings
RFA associated with Perennial Stream SD-11 (the Copicut River)	-No observations at times of site visits	-White tailed deer droppings
BVW D11, Perennial Stream SD-11, RFA, and BLSF	-Gray catbird -Eastern towhee -Yellow warblers	-White-tailed deer droppings -Unidentified bird nest in shrubs -Raccoon hand print
Vernal Pool DP-4 in BVW D11	-Spotted salamander egg masses -Wood frog egg masses	-No observations at times of site visits
BVW D8 and Intermittent Stream SD-8	-No observations at times of site visits	-White-tailed deer droppings -Wild turkey feather near stream SD2

WETLAND RESOURCE AREA	OBSERVED WILDLIFE SPECIES	OBSERVED WILDLIFE SIGNS
DP-2 in IVW D7A	-Spotted salamander egg masses and larvae -Wood frog egg masses -Fairy shrimp -American toad	-No observations at times of site visits
BVW D7	-Gray catbird -Eastern towhee	-Unidentified bird nest -White-tailed deer droppings -Small mammal burrow (likely Eastern chipmunk)
Vernal Pool DP-5 in BVW D7	-Wood frog egg masses and tadpoles -Spotted salamander egg masses	-No observations at times of site visits
BVW D6 and Stream SD-5	-Gray catbird -Eastern towhee -Wood frog tadpoles in DP1	-White-tailed deer droppings
BVW D1, BVW D2, and BVW D3	-Eastern box turtle carapace in D1 -Gray catbird -Eastern towhee	-White-tailed deer browse on shrubs -Eastern coyote scat
BVW L1	-Gray catbird -Eastern towhee -Two red squirrels -Black-capped chickadee -Tufted titmouse	-White-tailed deer droppings
Vernal Pool LP-1 in BVW L1	-Wood frog egg masses and tadpoles	-No observations at times of site visits

3.1.1 Upland / Wetland Food Plants (Hard Mast and Fruit)

A variety of native and invasive shrubs and woody vines in the Survey Area provide fruit and seeds for wildlife food, particularly to birds and mammals inhabiting and using the Survey Area. All BVWs and upland BLSFs associated with North Watuppa Pond and Copicut Reservoir provide food sources for wildlife. Native shrubs serving as a wildlife food source include: highbush blueberry (*Vaccinium corymbosum*), smooth arrowwood (*Viburnum dentatum*), winterberry (*Ilex verticillata*), maleberry (*Lyonia ligustrina*), willows (*Salix* spp.), and raspberries (*Rubus* spp.). The native woody vine roundleaf greenbrier (*Smilax rotundifolia*) provides fruit for wildlife. A variety of tree species provide hard mast for wildlife, predominately small mammals and white-tailed deer. Tree species include white oak and red oak (*Quercus alba* and *Quercus rubra*), American beech (*Fagus grandifolia*), and shagbark hickory (*Carya ovata*). Refer to Table 1 for a list of food plants in each resource area.

3.1.2 Shrub Thickets/Streambeds with Abundant Earthworms

Two BVWs (BVW D20 and BVW D11) contained habitats that may provide American woodcock (*Scolopax minor*) habitat. BVW D20 contained a dense shrub thicket of sweet pepperbush (*Clethra alnifolia*) along portions of intermittent stream SD20 that also have the high potential for abundant earthworms. BVW D11 contained a dense shrub thicket of sweet pepperbush (*Clethra alnifolia*) and highbush blueberry along portions of the perennial stream SD11 (the Copicut River). No American woodcocks were observed during the wildlife habitat evaluations.

3.1.3 Shrub/Herbaceous Vegetation Suitable for Veery Nesting

Seven BVWs contained a dense assemblage of native shrub species which may provide potential nesting opportunities for the veery (*Catharus fuscescens*). These birds prefer dense shrub or woodland habitats which are damp (DeGraaf and Yamasaki 2001). Dense shrub cover in the BVWs included sweet pepperbush and highbush blueberry. No veerys were observed during the habitat evaluations. Refer to Table 1 for a list of BVWs and the species comprising the dense shrub layer cover species.

3.1.4 Trees (Live or Dead) > 30-inch Diameter at Breast Height

A total of three live white pines greater than 30-inches dbh were found in the wetland buffer zones of BVW D12 and BVW D11. The buffer of BVW D12 had a white pine tree with a 32-inch dbh which is located to the northwest of BVW D12 and just over 30 feet north of the Copicut Reservoir. The buffer of BVW D11 had two live white pine trees with dbhs of 32 inches and 33 inches. These two trees were located just to the north of Quanapoag Road.

3.1.5 Standing Dead Trees (Snags)

Standing dead trees, also known as snags, provide feeding, nesting, denning, roosting, or perching areas for wildlife. The particular tree species of the snags were all unidentifiable in the field. Several class ranges were observed throughout the Survey Area. Nine resource areas contained snag trees with a dbh range of 6 to 12 inches. Resource areas with the highest numbers of snag trees include BVW D6 (12 trees) and BVW D20 (five trees). Three trees each were found in the upland BLSF of the Copicut Reservoir and BVW16A and the BLSF of the Copicut Reservoir. The remainder of the resource areas had one to two snags observed. Four snag trees were recorded with a dbh range of 12-18 inches in BVW D7. Refer to Table 1 for more detail on snag trees in each resource area.

Woodpeckers such as the downy woodpecker (*Picoides pubescens*) or the hairy woodpecker (*Picoides villosus*) feed on wood-boring larvae beetles found in snags; thereby creating holes or nesting cavities in snag trees while trying to access the beetles. Several of these snag trees contained woodpecker (Picoides) holes in BVWs D19 and D7. Smaller snags provide nesting or feeding sites for such suburban birds as the black-capped chickadee (*Poecile atricapillus*), tufted titmouse (*Baeolophus bicolor*), and white-breasted nuthatch (*Sitta carolinensis*). Small mammals, such as the Eastern gray squirrel (*Sciurus carolinensis*) may den in tree cavities during the winter (DeGraaf and Yamasaki 2001).

3.1.6 Potential Small Mammal Burrows

Only two resource areas (BVW 20 and BVW D7) contained small mammal burrows, which most likely were Eastern chipmunks (*Tamias striatus*). Eastern chipmunks create underground nests with extensive tunnel systems.

3.1.7 Dense Herbaceous Cover

Herbaceous cover is defined as all non-woody plants regardless of size and woody vegetation less than 3.28 feet tall. Dense herbaceous cover in the BVWs was predominately present as the shrub, sweet pepperbush which was less than 3.28 feet in height. The common non-woody emergent vegetation providing dense herbaceous cover included cinnamon fern (*Osmundastrum cinnamomeum*) and royal fern (Osmunda regalis). In the upland BLSF of the Copicut Reservoir, bracken fern (*Pteridium aquilinum*) and flat-branched tree-clubmoss (*Dendrolycopodium obscurum*) provided dense herbaceous cover. The young

sweet pepperbush and dense fern cover provide a thick cover of vegetation under the established overstory of trees and shrubs. Refer to Table 1 for a list of dense herbaceous cover species within each resource area.

3.1.8 Large Woody Debris on Ground

Large woody debris on the ground was identified near several impact areas. In BVW D19 trees which had been cut were placed on the northern edge of the Survey Area. Natural fallen woody debris was identified in wetlands D11, D6, and D2 as fallen trees. These fallen trees provide potential denning sites within the decaying interior of the logs (Hagan and Grove 1999). Decaying logs also provide food sources for a variety of insects residing within the decaying logs, and cover for specific woodland amphibian species including the red-back salamander (*Plethodon cinereus*) (DeGraaf and Yamasaki 2001).

3.1.9 Logs Under the Water's Surface

Fallen logs and trees are present under the water's surface in three vernal pools. BVW D15 contains vernal pool DP-7 and Isolated Vegetated Wetland (IVW) D7A contains DP-2. An IVW does not border on any creeks, rivers, streams, ponds or lakes and are closed isolated depressions with no inlets or outlets. These logs provide cover for breeding wood frogs (*Lithobates sylvatica*) and spotted salamander (*Ambystoma maculatum*), as well as for the developing larvae of these two amphibian species.

3.1.10 Overhanging Branches at or Within One Meter Above the Water's Surface

Shrubs overhang into two vernal pools (DP-7 and DP-2) when the pools are inundated. These overhanging shrubs, which are predominately sweet pepperbush and highbush blueberry, provide cover for breeding amphibians and developing larvae. The overhanging shrubs also provide shade for egg masses and developing larvae and prevent a high rate of evapotranspiration, thus aiding in a longer hydroperiod for the vernal pools.

3.1.11 Rock Piles and Crevices

Rock piles and crevices provide habitat for denning mammals. A rock pile present in BVW D20 and a crevice present in BVW D18 have the potential to provide habitat for an animal the size of a mink (*Neovison vison*). A larger crevice in BVW D7 contains a crevice approximately 1.0 feet tall and 2.5 feet wide. This crevice has the potential to provide a denning site for bobcat (*Lynx rufus*).

3.1.12 Live Vegetation Overhanging Water or Offering Good Visibility of Open Water

Gray birch (*Betula populifolia*) trees are growing along the edge of BVW D12 and overhang into the Copicut Reservoir water and offer good visibility of the water. These branches provide perching sites for waterbirds to fish in the pond. Potential bird species using these branches in the Project Area may include tree swallows (*Tachycineta bicolor*) and belted kingfishers (*Ceryle alcyon*) (DeGraaf and Yamasaki 2001).

3.1.13 Depressions that may Serve as Vernal Pools/Amphibian Breeding Areas

The WPA defines vernal pool habitat as confined basin depressions that typically hold water for two continuous months during the spring and are free of adult fish populations. These areas provide essential

breeding habitat for a variety of amphibian species such as wood frogs and the spotted salamander. Certified vernal pools (CVPs) are those that have been certified by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) according to the Guidelines for Certification of Vernal Pool Habitat (NHESP 2018) and are protected if they fall under the jurisdiction of the WPA. CVPs are also afforded protection under Section 401 of the federal Clean Water Act, the Massachusetts Surface Water Quality Standards that relate to Section 401, and the Massachusetts Forest Cutting Practices Act. No CVPs are identified to occur in the Survey Area (NHESP 2018). Potential vernal pools (PVPs) have also been mapped by NHESP but do not receive protection under the WPA or under any other state or federal wetlands protection laws (NHESP 2000).

Amphibian Breeding Area refers to areas where signs of amphibian breeding (obligate and/or facultative species) have been observed, but the overall habitat of the area did not meet the specific vernal pool criteria. Obligate vernal pool species observed during the NEP ROW vernal pool investigations include wood frogs, spotted salamanders, and fairy shrimp (*Eubranchipus spp.)*. Facultative species observed during the NEP ROW vernal pool surveys include American toads (*Bufo americanus*) and spring peepers (*Pseudacris crucifer*). If the depression had less than 12 inches of water the pool was classified as an amphibian breeding area due to the unlikelihood of water persisting through the duration of the egg mass development and maturation thus causing the viability of successful amphibian breeding success improbable. An adequate hydroperiod of three to five months allows for a greater chance of the successful development of amphibian species using the pool.

Discretion was also used for classifying vernal pools versus amphibian breeding areas based upon the location of the pool. For example, depressions (e.g., deep tire ruts) located within and along an existing access road or all-terrain vehicle (ATV) trail that were observed to provide amphibian breeding habitat were classified as amphibian breeding areas if they were isolated and not connected to wetland systems. The majority of these isolated depressions within or along anthropogenic areas are located within maintained ROWs in areas with full sun and little or no shrub canopy. There is the likelihood of high evapotranspiration rates within these isolated depressions, causing water levels to decrease. As a result, the depressions may not provide adequate water levels to support the development of obligate vernal pool species.

Surveys along the NEP ROW were conducted from spring 2017-spring 2018, with the exception of LP-1 which also had surveys conducted during spring 2015 and spring 2016. The surveys were scheduled after the first significant rain events, when the majority of evening low temperatures were expected to remain in the 40s (degrees Fahrenheit). These weather conditions promote inward migration of amphibians to the pools for the purpose of breeding. Biologists conducted visual surveys and used dip nets to sweep the water column to determine the presence or absence of amphibians and other vernal pool species. When heard, choruses of breeding frogs were also noted.

Please refer to Appendix I (Vernal Pool Inventory) of the MEPA document for a more detailed summary of vernal pool investigations along the NEP ROW. Table 3 is a list of vernal pools and two amphibian breeding areas that will be impacted by the Project.

TABLE 3 VERNAL POOLS AND AMPHIBIAN BREEDING AREAS TO BE IMPACTED IN THE SURVEY AREA

ID NUMBER	POOL TYPE	EXISTING COVER TYPE	AVERAGE WATER DEPTH (IN.) IN 2018	MAXIMUM WATER DEPTH (IN.) IN 2018	OBLIGATE SPECIES OBSERVED	FACULTATIVE SPECIES OBSERVED
DP-7	Vernal Pool	PFO in BVW D15	8	13	~50 fairy shrimp (2018)	1 American toad (2018)
DP-8	Amphibian Breeding Area	Upland in the maintained access road between BVW D14 and BVW D15	7	12	1 wood frog egg mass	3 mating pairs of American toads (2018) 3 single American toads (2018) American toads calling (2018)
DP-5	Vernal Pool	PFO in BVW D7	14	17	3 wood frog egg masses (2018) ~hundreds of wood frog tadpoles (2018) ~55 spotted salamander egg masses (2018)	
DP-4	Vernal Pool	PSS in BVW D11	6	13	~30 spotted salamander egg masses (2017) 2 wood frog egg masses (2018) 8 spotted salamander egg masses (2018)	
DP-2	Vernal Pool	PSS in IVW 7A	10	12	5 spotted salamander egg masses (2017) ~20 spotted salamander larvae (2017) 2 wood frog egg masses (2018) 7 spotted salamander egg masses (2018) ~100 fairy shrimp (2018)	American toad calling (2018)
LP-1	Vernal Pool	PSS in BVW L1	10	14	2 wood frog egg masses (one hatching) (2016) ~50 wood frog tadpoles (2018) 2 old wood frog egg masses (2018)	
DP-3	Amphibian Breeding Area	Upland in an ATV tire rut	6	13	20 wood frog egg masses (2017) 1 wood frog adult (2017) 3 spotted salamander egg masses (2017)	

3.1.14 Standing Water Present at Least Part of the Growing Season

Shallow pockets of standing water occur throughout several of the BVWs (BVW 20, BVW 19A, BVW 15, BVW D14, BVW 12, BVW 11, BVW D8, BVW D7, BVW D6, and BVW L1) in the Survey Area. These water-filled depressions provide non-breeding amphibians foraging and rehydration opportunities. Water was present in BVWs during the wildlife habitat evaluations in November 2017. The presence of standing water observed during the wetland delineations in summer 2017, as well as during the vernal pool investigations in spring 2018 suggests that standing water remains in these pockets into the growing season.

The Copicut Reservoir provides a permanent water source for breeding amphibians such as green frogs (*Lithobates clamitans*), bullfrogs (*Lithobates catesbeianus*), and pickerel frogs (*Lithobates palustris*). The Reservoir also provides a habitat for turtles and foraging waterfowl.

3.1.15 Flat Rocks within Streams

The presence of flat rocks within streams provides cover for stream salamanders. In intermittent stream (SD5) one medium-sized flat rock was observed in the stream channel which may possibly provide cover for stream salamanders. The perennial Copicut River (SD-11) had several medium-sized flat rocks present in the riverbed where the Copicut River flows under Quanapoag Road.

3.1.16 Areas of Ice-Free Open Water in Winter

The Copicut Reservoir may contain areas of ice-free open water in the winter. These areas provide rehydration and foraging opportunities for resident wildlife species within the Survey Area. The Copicut River (SD-11) also most likely continues to flow during the winter months as it empties into the Copicut Reservoir.

3.1.17 Perennial and Intermittent Streams

Only one perennial stream (SD11), the Copicut River, flows through the Survey Area and is associated with BVW D11. Four intermittent streams are located within the Survey Area. These streams include SD-20 (flowing through BVW D20 and into Dartmouth), SD-19 (flowing through BVW 19A), SD-8 (flowing through BVW D8), and SD-5 (flowing through BVW D6).

Streams provide a variety of purposes in the landscape which include wildlife habitat for birds, amphibians, reptiles, and insects. Streams assist with groundwater recharge, improving water quality, and serve as travel corridors for wildlife species (Mitch and Gosselink 2015).

3.1.18 Wildlife Habitat Characteristics Summary

Summarized in Table 1 are the wildlife habitat characteristics discussed in Sections 3.1.1 through 3.1.17 that were observed at the 17 sites during the field surveys. Wetlands are presented in Table 1 from east to west in the Study Area beginning at the Fall River/Dartmouth Town line and heading west to the Bell Rock Substation.

Wildlife observation and signs were also collected during the field wildlife habitat evaluations and are listed in Table 2.

3.2 Landscape Context

In addition to the site specific habitat characteristics, the MassDEP Guidance more broadly addresses landscape context such as habitat continuity and connectivity, as well as the effects of existing habitat degradation.

The existing utility ROWs in the Survey Area serve as a connector to adjacent areas of habitat and are, therefore, important for connectivity with adjoining natural habitats. The Project area is surrounded by dense upland and wetland forest, providing a large expanse of unfragmented forest habitat. The Project site is located within the Southeastern Massachusetts Bioreserve (Bioreserve), with over 13,600 acres of

protected land in Fall River and Freetown that lies to the east of downtown Fall River. The Bioreserve is managed by the Commonwealth of Massachusetts, the City of Fall River, and the Trustees of Reservation and offers diverse habitats and natural communities. The location of the Bioreserve in southeastern Massachusetts serves as vital habitat since this area is one of the fastest growing regions in the state with residential, commercial, and industrial zones. Wildlife currently inhabiting the Project area are accustomed to the existing utility infrastructure in the area. The existing ROWs extending to the west, south, and east of the existing substation provide natural shrubland habitats embedded within large tracts of continuous and connected forest habitats.

The Project is not anticipated to permanently impact the integrity of the bordering Bioreserve land as a wildlife habitat connector to the adjacent forests. After Project completion the ROWs will continue to serve a role as a landscape connector to wildlife habitats, as well as providing habitats for wildlife species.

3.3 Habitat Degradation

The representative wetland impact areas reviewed during the wildlife habitat evaluation have all been subject to previous alterations, predominately from the existing NEP infrastructure and mild habitat degradation as a result of recreation activities, including ATV usage.

A few wetlands contain invasive species. The dominant invasive species is Japanese stiltgrass (*Microstegium vimineum*) which is present in four BVWs but with a ≤5.0 percent cover. Multiflora rose (*Rosa multiflora*) was also observed in one BVW in the ROW.

No observations of trash dumping, chemical contamination, or erosion and sedimentation problems were observed within the Survey Area while conducting the wildlife habitat evaluation, wetland surveys, and vernal pool investigations.

All wetlands have been altered to some degree from the NEP ROW, chiefly by removal of trees. Temporary disturbances will continue to occur along the existing transmission line ROW since NEP conducts a regular vegetation maintenance program of the existing transmission line ROWs. The vegetation maintenance cycle follows a five-year timeline. NEP's ROW vegetation practices encourage the growth of low-growing shrubs and other vegetation which provide a degree of natural vegetation control. Vegetation management is necessary to ensure the reliable and safe delivery of electric services to NEP customers. This is accomplished by allowing for the proper clearance between vegetation and electrical conductors and supporting structures. Vegetation maintenance will continue to occur in accordance to National Grid's 2014-2018 Vegetation Management Plan, which is in compliance with the Massachusetts Rights-of-Way Management regulations (333 CMR 11.00) administered by the Massachusetts Department of Agricultural Resources) (National Grid 2013).

Tree clearing, earth-disturbing work, and the filling of wetlands will be required for the installation of the new transmission line. Tree-clearing will result in the conversion of forested wetlands to either scrub-shrub or emergent wetlands. Once the trees are removed, these once forested sections will be maintained as scrub-shrub or emergent wetlands. Therefore, a change in wildlife habitat will occur.

4.0 RARE SPECIES

NEP evaluated state agencies' data to determine whether any Massachusetts State-listed, and/or -proposed, -endangered, or -threatened species or critical habitats are known to occur in the Project ROWs. This section addresses the consultation process with the Massachusetts NHESP which is part of the Massachusetts Division of Fisheries and Wildlife. The identified wildlife species are discussed below.

Based on coordination with the Massachusetts NHESP, three NHESP State-listed animal species or priority habitats of rare species are located in the vicinity of the Project including the eastern whip-poor-will (*Caprimulgus vociferus*), eastern box turtle (*Terrapene carolina*), and marbled salamander (*Ambystoma opacum*).

NEP is actively coordinating with the NHESP regarding the species listed above and will continue with this consultation in order to minimize or avoid potential adverse effects on rare species during design, construction, and operation of the Project. Species specific surveys are being conducted for the eastern whip-poor-will and the eastern box turtle. Input from the NHESP on June 21, 2018, concluded that the marbled salamander is documented from sites north and south of the Project area. Therefore, no species-specific surveys are required.

5.0 BEST MANAGEMENT PRACTICES

Throughout the planning and design phases of the Project, wetland impacts have been minimized to the greatest extent possible by using an existing ROW, utilizing existing access roads, and avoiding the placement and construction of structures and access roads in wetlands and watercourses, wherever possible. However, given the scale and landscape setting of the Project, certain wetland and watercourse resource impacts associated with the development of the Project cannot be avoided.

Permanent fill will be placed in wetlands for structure foundations. Trees will be cleared in select locations within wetlands to accommodate on the installation of the new transmission line. However, wetland scrub-shrub and emergent vegetation will remain in these proposed tree clearing areas.

BMPs, as detailed in National Grid's Environmental Guidance document EG-303NE, will be employed to minimize disturbances to wetlands during construction of the Project.

5.1 Structures

Specific measures will be taken when installing structures. Temporary soil erosion controls will be installed around structure work sites in or near wetlands to minimize the potential for soil erosion and sedimentation. All soil erosion and sediment controls and other applicable construction BMPs will be inspected and maintained on a routine basis. Grading in wetlands will be limited for structure foundations. Construction mats will be used in wetlands to provide a safe workspace. Spoil piles will be placed in uplands, where possible, or properly contained on construction mats in wetlands.

5.2 Access Roads

Existing access roads will be used to the extent practicable during the construction phase of the Project to minimize access through wetlands. Where access roads must be improved or possibly developed in certain sections, the roads will be designed, where practical, so as not to interfere with surface water flow or the functions of the wetland. Temporary construction matting for access roads across wetlands will be installed to provide safe passage through the wetlands. The type of stabilization measures to be used in wetlands will depend on soil saturation and depth of organic matter. All temporary access roads through wetlands will be restored following the completion of installation activities by removing the construction mats, re-grading the area to pre-construction elevations to the extent practicable, and re-vegetating the wetlands.

Mat bridges or other bridging techniques will be used to span streams where necessary. Temporary bridging installation will be avoided during peak flows or when the waterway to be crossed is above bankfull width conditions, with the exception of emergency situations or other unforeseen circumstances. If water is present at the time of construction, the ambient water flow will be maintained and water flows will not be constrained or interrupted at any time during construction. In addition, controls will be installed to prevent or minimize turbidity and sediment loading into watercourses. These controls may include the use of crushed stone approach aprons onto mat bridges, stone check dams, water bars, diversion channels, and soil erosion and sediment controls. Existing riparian zone vegetation will also be maintained, to the extent feasible, along the banks of the stream.

5.3 Construction Areas

The size, shape, location, and configuration of work pads were evaluated to minimize impacts to wetlands and watercourses to the extent feasible. Temporary construction matting will be placed on the existing wetland vegetation where wetland impacts could not be avoided. The type of work pad material chosen will depend upon soil saturation and depth of organic matter in the wetland.

Temporary construction matting and other possible construction area materials will be removed upon completion of the Project. Wetlands will be restored to pre-construction configuration and elevations to the extent practicable. Vegetation will also be restored within the wetland through native seeding.

5.4 Wetland and Compensatory Floodplain Mitigation

Compensation for the permanent loss of wetlands and BLSF is still in the preliminary planning phase. Consultation will occur with state and federal agencies, as well as with the City of Fall River Conservation Commission to develop wetland mitigation plans that compensate for unavoidable wetland loss as a result of the Project. Compensatory wetland mitigation options for the Project may include wetland replication and/or enhancement along the Project Area, wetlands creation (on- or off-ROW), wetlands preservation, the Massachusetts Department of Fish and Game In-Lieu Fee Program and/or placement of conservation restrictions to preserve open spaces. NEP will work with the City of Fall River Conservation Commission to develop a mitigation plan for the loss of BLSF associated with the installation of new structures.

5.5 Wildlife Mitigation and Wildlife Habitat Enhancement

In areas where trees will be cleared there are several wildlife habitat mitigation activities which can be performed to enhance wildlife habitat in the surrounding area. Such activities may include: seeding disturbed areas with a conservation seed mix, leaving woody debris to create cover for wildlife, and leaving snag trees as potential wildlife habitat.

6.0 PROJECT IMPACTS AND MITIGATION

Construction of the Project will result in temporary, permanent, and secondary impacts to wetland resources. Secondary impacts generally involve the conversion of forested wetland habitat to scrub-shrub or emergent wetland habitat, whereby the cover type changes but results in a no net-loss of wetlands. The following section describes the permanent and temporary impacts associated with construction of the Project including vegetation removal, excavation for pole structures, access road upgrades, and the installation of the new overhead transmission line. This section also addresses the associated impacts which are most likely to occur to wildlife as a result of the Project and potential mitigation actions which could be implemented.

6.1 Anticipated Temporary Habitat Impacts and Mitigation

Wildlife currently using the forested portion of the NEP ROW that are proposed to be widened will be temporarily impacted by construction of the Project, but large blocks of intact woodland will continue to remain adjacent to the ROW corridor. Larger, more mobile species such as white-tailed deer are expected to temporarily relocate from the construction area, but are unlikely to be permanently impacted by the displacement. Small mammals such as gray squirrels (*Sciurus carolinensis*), woodchucks (*Marmota monax*), skunks (*Mephitis mephitis*) and raccoons (*Procyon lotor*), as well as herpetofauna are also likely to move away from areas of construction activity. Depending upon the time of year, some avifauna may also be temporarily displaced, possibly impacting breeding and nesting activities, but are otherwise likely to return after construction and in subsequent years. In wetlands which will have temporary work pads or temporary construction access, the disturbed areas will be re-graded to pre-existing conditions and allowed to revegetate.

6.2 Anticipated Permanent Habitat Impacts and Mitigation

The removal of mature trees in forested areas of the NEP ROW to accommodate the new overhead transmission line will result in long-term impacts, but these impacts will be incremental and localized on both the vegetation and associated wildlife habitats. The removal of forest vegetation may affect wildlife species composition by favoring species that prefer shrub land, emergent, or open habitats to those that inhabit forested communities. A study conducted in the Northeast region from northern Connecticut into southern New Hampshire along a powerline corridor indicated an increase in early successional plant and wildlife usage of powerline corridors following removal of trees from ROWs (Wagner et al. 2014). Another study in western Massachusetts found transmission line corridors provided habitat for shrub land birds of high regional conservation priority (King et al. 2009). ROWs also serve as open corridors connecting non-contiguous natural areas (Temple 1996).

Based on some of the published literature, the creation of additional shrub land habitat along the NEP ROWs will represent a long-term positive effect on disturbance and shrub-dependent avian species, as well as species from other trophic levels such as bees and butterflies, since shrub land habitat is otherwise declining in New England (King et al. 2009; Wagner et al. 2014). This decline is a result of various factors (e.g., development, ecological succession, absence of fire) (DeGraaf and Miller 1996). Additionally, most of the historic shrub land in the Northeast is irreversibly gone due to permanent human development; therefore, management for shrub habitat dependent species and for biodiversity cannot occur at these locations. Studies conducted in the Northeast have shown that populations of most bird species associated with shrub land habitats have declined sharply and these shrub land species have been shown to make use of human-impacted habitats including utility ROWs (Hunter et al. 2001). Shrub land birds and other disturbance dependent species are now more dependent than ever on human activities to

maintain the habitat required for their survival (King et al. 2009; Confer and Pasco 2003; Confer et al. 2008). Actually, in response to shrub land habitat loss and the decline in shrub land dependent species in the Northeast, the USFWS has recently approved the Great Thicket National Wildlife Refuge, which will be dedicated to managing shrub land wildlife habitat in the Northeast (USFWS 2016). So in this regard, transmission line ROW is considered a major source of shrub land habitat (Saucier 2003).

The management and maintenance of ROW creates early successional habitats dominated by shrub vegetation and open areas with dense grasses and other herbaceous vegetation. These habitats within the ROW can provide wildlife opportunities such as nesting for birds, browsing for deer, and cover for small mammals (Ballard et al. 2004). In addition to the initial tree clearing to accommodate the new transmission line, routine vegetation maintenance will continue within the NEP corridor. Vegetation on the existing ROW is managed in accordance with the NEP vegetation management program (National Grid 2013); accordingly, trees that could interfere with the operation of the transmission lines are routinely removed from the ROW and trees along the edges are periodically pruned or removed. Vegetation will be maintained as low-growth shrubs or grasses and herbs. Vegetation removal for the new transmission line will be performed using mechanized methods. Where removal of woody vegetation is required, vegetation will be cut flush with the ground surface to the extent possible. Where practical, trees will be felled parallel to the ROW to minimize the potential for off-ROW vegetation damage.

NEP designed the Project to first avoid and then minimize permanent impacts to wetlands to the extent practicable, but unavoidable permanent fill of 24 square feet for structures will be required for the new overhead transmission line. With respect to the surrounding available wetland wildlife habitat resources associated with the transmission line ROWs and the Bioreserve, it is not expected this permanent fill would result in a long-term negative impact on the ability of the area to provide valuable wildlife habitat for the existing assemblage of wetland-dependent species.

In areas where trees will be cleared there are several mitigation activities which can be performed to enhance wildlife habitat as a result of tree loss. Such activities may include: seeding disturbed areas with a conservation seed mix, leaving woody debris to create cover for wildlife, and leaving snag trees as potential wildlife habitat.

7.0 CONCLUSION

All wetlands within the NEP Survey Area provide wildlife habitat functions including providing food, shelter, migration, breeding, and overwintering areas for wildlife. Important wildlife habitat characteristics have been identified within the Survey Area. These include:

- Upland/wetland food plants (hard mast and fruit).
- Shrub thickets/streambeds with abundant earthworms.
- Shrub vegetation suitable for veery nesting.
- Live trees (>30-inch diameter at dbh).
- Standing dead trees (snags).
- Potential small mammal burrows.
- Dense herbaceous cover.
- Large woody debris on ground.
- Logs under the water's surface.
- Overhanging shrub branches at, or within one meter above the water's surface.
- Rock piles and crevices suitable as potential habitat.
- Live standing vegetation overhanging water or offering good visibility of open water.
- Depressions that serve as vernal pools and/or amphibian breeding areas.
- Standing water present at least part of the growing season for use by non-breeding amphibians.
- Standing water present at least part of the growing season suitable for use by turtles and foraging waterfowl.
- Flat rocks within exposed portions of streambeds.
- Areas of ice-free open water in winter.
- Perennial and intermittent streams.

NEP will develop a restoration and mitigation plan for the Project ROW. Possible wildlife habitat enhancements that may be proposed include:

- Creating additional snags for denning and nesting sites where possible/available.
- Stockpiling woody debris near to provide cover.

Alterations to wetlands (which include BVW, BLSF, and RFA) which have impacts above the thresholds permitted under the WPA are only permitted if the impacts will have no adverse impact on wildlife habitat. *Adverse effects on wildlife habitat mean the alteration of any habitat characteristic listed in 310 CMR 10.60(2), insofar as such alteration will, following two growing seasons of project completion and thereafter (or, if a project would eliminate trees, upon the maturity of replanted saplings) substantially reduce its capacity to provide the important wildlife habitat functions listed in 310 CMR 10.60(2). Such performance standard, however, shall not apply to the habitat of rare species which are covered by the performance standards established under 310 CMR 10.59.*

There are no adverse effects on wildlife habitat since resource areas within the Survey Area will not be substantially reduced in their function to serve as valuable sources of wildlife habitat in an area. In the areas of proposed tree clearing, where forest habitat will be converted to scrub-shrub and emergent habitats, wildlife will still be able to use the area along the transmission line ROWs.

Suburban wildlife species using the Project area will most likely not be impacted in response to the increase in the scrub-shrub habitat type as a result of the Project. For resource areas lost as a result of the Project, the proper mitigation measures will be taken to compensate for the loss in wildlife habitat.

NEP has identified important habitat features, and incorporated appropriate measures to avoid and/or minimize and mitigate adverse impacts. The proposed alterations will not substantially reduce the long-term capacity of the site to provide food, cover, migratory, and breeding areas, especially when viewed in terms of especially when viewed in terms of landscape scale availability of similar habitat types. While the habitat functions associated with forested wetland will be lost due to tree removal and/or fill in these localized areas, it is expected that adjacent similar habitat types will continue to provide basic habitat requirements of the existing assemblage of wetland-dependent species. NEP will compensate for all permanent loss of wetland per conformance with the requirements of the permitting state and federal agencies. NEP will consult with the City of Fall River Conservation Commission to develop wetland mitigation plans that adequately compensate for wetland loss as a result of the Project. Compensatory wetland mitigation options for the Project may include wetland replication and/or enhancement along the Project Area, wetlands creation (on- or off-ROW), wetlands preservation, the Massachusetts Department of Fish and Game In-Lieu Fee Program and/or placement of conservation restrictions to preserve open spaces.

8.0 REFERENCES

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FIGURES

FIGURE 1 PROJECT OVERVIEW: TOPOGRAPHIC MAP

Bell Rock Substation

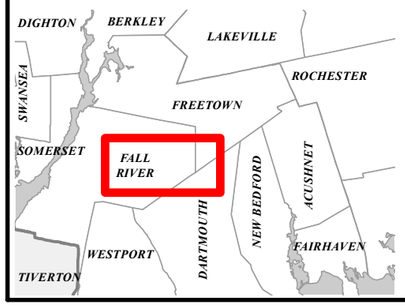
High Hill Substation

City of Fall River

Town of Freetown

Town of Dartmouth

Project Vicinity



Legend

- New 114 Line Extension
- Existing Transmission Line
- Existing Power Facility
- National Grid ROW
- Town Boundary

Fall River to Acushnet Reliability Project

Figure 1

Project Locus Map

Commonwealth of Massachusetts

Bristol County:
City of Fall River

POWER ENGINEERS

nationalgrid

NAD 1983 UTM Zone 18N USFt

N W E S

0 1,000 2,000 3,000 4,000 Feet

NOT FOR CONSTRUCTION

Date: 9/17/2018

1:24,000

Author: TDH

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ATTACHMENT A WILDLIFE HABITAT EVALUATION DATA FORMS

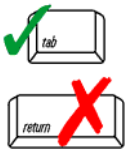
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetlands D1, D2, and D3
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. D2: Secondary (tree clearing converted to shrub or emergent vegetation)		1,146 sf (0.03 acres		0.03 acres
2. D1: Temporary (work pads and access)		1,640 sf (0.04 acres)		0.04 acres
3. D2:Temporary (work pads and access)		834 sf (0.02 acres)		0.02 acres
4. D3: Temporary (work pads and access)		73 sf (0.002 acres		0.002 acres
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 2. Bordering Vegetated Wetlands D1, D2, and Isolated Vegetated Wetland D3
Impact Area (number/name)

11/14/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — Person completing form per 310 CMR 10.60(1)(b)

11/13/2018 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine Subsystem: -

Class: Forested Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☒ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	85	60	5	60	5
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Acer rubrum (40%)*	Shrub	Pinus strobus (10%)
Tree	Pinus strobus (15%)	Shrub	Vaccinium corymbosum (5%)
Tree	Quercus alba (10%)	Herb	Quercus alba (<5%)
Tree	Betula alleghaniensis (10%)	Herb	Ilex verticillata (<5%)
Tree	Fraxinus americana (5%)	Woody Vine	Smilax rotundifolia (5%)*
Shrub	Clethra alnifolia (45%)*		

C. Inventory (Soils)

Whitman FSaL, 0-3% slopes, extremely stony	Very Poorly Drained
Soil Survey Unit	Drainage Class
Organic Fibric (0"-2"), Mucky Silt Loam (2"-10")	10"
Texture (upper part)	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☒ Present ☐ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
0	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☒ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☒ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

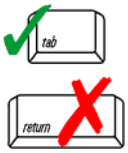
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D6 and Intermittent Stream D5
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		2,013 sf (0.05 acres		0.05 acres
2. Temporary (work pads and access)		976 sf (0.02 acres)		0.02 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

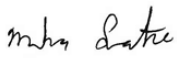
Plot 4. Bordering Vegetated Wetland D6 and Intermittent Stream SD1
Impact Area (number/name)

11/14/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated



II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: -

Class: Forested — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☒ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	50	0	25	15
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Acer rubrum (85%)*		
Tree	Pinus strobus (5%)		
Shrub	Carpinus caroliniana (40%)*		
Shrub	Betula sp. (10%)		
Herb	Grass sp. (10%)*		
Herb	Rubus sp. (5%)		

C. Inventory (Soils)

Ridgebury FSaL, 0-3% slopes, extremely stony Soil Survey Unit	Poorly Drained Drainage Class
Organic fibric (0"-2"), Silt Loam (2"-10") Texture (upper part)	10" Depth
10" Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
12	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☒ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☒ Present ☐ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☒ Present ☐ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☐ Yes	☒ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

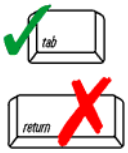
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D7 and Vernal Pool DP-5
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		4,276 sf (0.10 acres)		0.10 acres
2. Temporary (work pads and access)		1,472 acres (0.03 acres)		0.03 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 5. Bordering Vegetated Wetland D7
Impact Area (number/name)

11/14/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: -

Class: Forested — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☒ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	65	10	<5	10
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Quercus rubra (60%)*	Woody Vine	Smilax rotundifolia (10%)*
Tree	Acer rubrum (20%)*		
Tree	Quercus alba (10%)		
Shrub	Vaccinium corymbosum (30%)*		
Shrub	Clethra alnifolia (30%)*		
Herb	Clethra alnifolia (10%)		

C. Inventory (Soils)

Ridgebury FSaL, 0-3% slopes, extremely stony	Poorly Drained
Soil Survey Unit	Drainage Class
Organic (0"-2"), Silt Loam (2"-13")	13"
Texture (upper part)	Depth
13"	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☒ Abundant ☐ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☒ Present ☐ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
2	4	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☒ Present ☐ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☒ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☒ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☒ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☐ Yes	☒ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

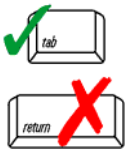
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Vernal Pool DP2 in Isolated Vegetated Wetland D7A
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		375 sf (0.01 acres)		0.01 acres
2.				
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 6. Vernal Pool DV2 and Isolated Vegetated Wetland D7A
Impact Area (number/name)

11/14/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: _____

Class: Scrub-Shrub — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

_____
Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	15	20	0	5	20
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Acer rubrum (10%)*		
Tree	Pinus strobus (5%)*		
Shrub	Vaccinium corymbosum (20%)*		
Herb	Vaccinium corymbosum (20%)*		
Herb	Smilax rotundifolia (5%)		
Herb	Osmunda regalis (<5%)		

C. Inventory (Soils)

Woodbridge FSaL, 0-8% slopes, extremely stony

Moderately Well Drained
Drainage Class

Organic (0"-2"), Silt Loam (2"-4"), Fine Sandy Loam (4"-14")

14"
Depth

NA
Depth to Water Table

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
5	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☒ Present ☐ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☒ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☒ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☐ Yes	☒ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☒ Yes	☐ No
	100 acres in size?	☒ Yes	☐ No
	250 acres in size?	☒ Yes	☐ No
	500 acres in size?	☒ Yes	☐ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

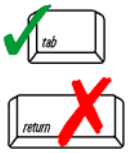
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D8, Intermittent Stream SD8
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		281 sf (0.006 acres)		0.006 acres
2. Temporary (Stream crossing of SD8)		1,626 sf (0.04 acres)		0.04 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

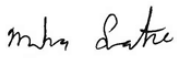
Plot 7. Bordering Vegetated Wetland D8, Intermittent Stream SD2
Impact Area (number/name)

11/14/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated



II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: -

Class: Forested — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☒ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	50	0	25	10
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Quercus alba (40%)*	Shrub	Fagus grandifolia (<5%)
Tree	Pinus strobus (30%)*	Herb	Smilax rotundifolia (<5%)
Tree	Fagus grandifolia (10%)	Herb	Vaccinium corymbosum (<5%)
Tree	Carya ovata (10%)		
Shrub	Corylus cornuta (30%)*		
Shrub	Pinus strobus (20%)*		

C. Inventory (Soils)

Ridgebury FSaL, 3-8% slopes, extremely stony	Poorly Drained
Soil Survey Unit	Drainage Class
Organic (0"-1"), Silt Loam (1"-10"), Fine Sandy Loam (10"-11")	11"
	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
1	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☒ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☐ Yes	☒ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☐ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

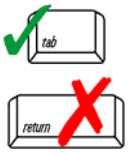
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D11, Vernal Pool DP4, and BLSF associated with the Copicut Reservoir.

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		20,524 sf (0.47 acres)		0.47 acres
2. Temporary (work pads and access)		4,667 sf (0.12 acres)		0.12 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 17. Bordering Vegetated Wetland D11, Vernal Pool DP-4, and Perennial Stream SD11. Riverfront Area, and BLSF associated with the Copicut Reservoir.

11/16/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, Light Rain, 47 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — Person completing form per 310 CMR 10.60(1)(b)

11/13/2018 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine Subsystem: -

Class: Forested Subclass: Needle-Leaved Evergreen/Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	80	65	0	20	40
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Pinus strobus (50%)*	Shrub	Viburnum dentatum (5%)
Tree	Acer rubrum (30%)*	Shrub	Prunus sp. (<5%)
Tree	Quercus alba (5%)	Shrub	Chamaecyparis thyoides (<5%)
Shrub	Clethra alnifolia (45%)*	Herb	Osmundastrum cinnamomeum (30%)*
Shrub	Vaccinium corymbosum (20%)*	Herb	Osmunda regalis (10%)*
Shrub	Smilax rotundifolia (5%)	Herb	Rubus hispidus (<5%)

C. Inventory (Soils)

Whitman FSaL, 0-3% slopes, extremely stony	Very Poorly Drained
Soil Survey Unit	Drainage Class
Organic (0"-3"), Mucky Silt Loam (3"-9")	9"
Texture (upper part)	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☒ Present ☐ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☒ Present ☐ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 2

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
2	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☒ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☒ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☒ Present ☐ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☒ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☒ Present ☐ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☒ Yes	☐ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

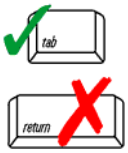
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D12 and Bordering Land Subject to Flooding associated with the Copicut Reservoir

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		2,028 sf (0.05 acres)		0.05 acres
2.Temporary (work pads and access)		202 sf (0.005 acres)		0.005 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 16. Bordering Vegetated Wetland D12 and Bordering Land Subject to Flooding associated with the Copicut Reservoir

11/16/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, Windy, 47 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — Person completing form per 310 CMR 10.60(1)(b)

11/13/2018 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine Subsystem: -

Class: Forested Subclass: Needle-Leaved Evergreen

Hydrology/Water Regime

- ☐ Permanently flooded
- ☒ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	95	10	10	0	0
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Pinus strobus (55%)*		
Tree	Chamaecuparis thyoides (45%)*		
Tree	Fagus grandifolia (<5%)		
Shrub	Vaccinium corymbosum (10%)*		
Woody Vine	Smilax rotundifolia (10%)*		

C. Inventory (Soils)

Paxton FSaL, 0-8% slopes, very stony	Well Drained
Soil Survey Unit	Drainage Class
Organic (0"-3"), Sandy Loam (3"-6"), Silt Loam (6"-12")	12"
	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 1

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
0	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☒ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☒ Yes	☐ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

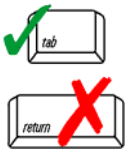
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D15 and Vernal Pool DP-7
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		1,809 sf (0.04 acres)		0.04 acres
2. Temporary (work pads and access)		991 sf (0.02 acres)		0.02 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 14. Bordering Vegetated Wetland D15 and Vernal Pool DP-7
Impact Area (number/name)

11/16/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, Windy, 47 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

Mike Lamothe

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: -

Class: Forested — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	35	5	15	30
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Acer rubrum (60%)*	Shrub	Clethra alnifolia (5%)
Tree	Quercus alba (15%)	Shrub	Fagus grandifolia (<5%)
Tree	Nyssa sylvatica (5%)	Herb	Rubus hispidus (25%)*
Tree	Pinus strobus (5%)	Herb	Grass sp. (5%)
Shrub	Vaccinium corymbosum (20%)*	Woody Vines	Smilax rotundifolia (5%)*
Shrub	Pinus strobus (10%)*		

C. Inventory (Soils)

Ridgebury FSaL, 0-3% slopes, extremely stony	Poorly Drained
Soil Survey Unit	Drainage Class
Organic (0"-2"), Silt Loam (2"-14")	14"
Texture (upper part)	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
0	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☒ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☒ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☒ Yes	☐ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

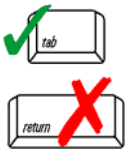
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D16A and Bordering Land Subject to Flooding associated with the Copicut Reservoir

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/31/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		D16A: 2,106 sf (0.05 acres)		0.05 acres
2.				
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 13. Bordering Vegetated Wetland D16A and Bordering Land Subject to Flooding associated with the Copicut Reservoir

11/15/2017
Date(s) of Site Visit(s) and Data Collection

Sunny, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — Person completing form per 310 CMR 10.60(1)(b)

11/13/2018 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine Subsystem: -

Class: Forested Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	85	50	0	20	30
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Acer rubrum (65%)*	Shrub	Kalmia angustifolia (5%)
Tree	Pinus strobus (10%)	Herb	Carex sp. (20%)*
Tree	Betula papyrifera (5%)	Herb	Juncus effusus (10%)*
Tree	Pinus rigida (5%)		
Shrub	Vaccinium corymbosum (40%)*		
Shrub	Clethra alnifolia (10%)		

C. Inventory (Soils)

Udorthents, smoothed	None Listed
Soil Survey Unit	Drainage Class
Organic (0"-2"), Sandy Loam (2"-11"), Loamy Sand with Gravels (11"-17")	17"
	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
3	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☐ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☒ Yes	☐ No
For upland resource areas is the impact area part of contiguous forested habitat at least			
(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

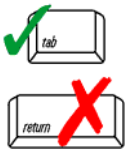
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetlands D17 and D18 and BLSF associated with the Copicut Reservoir

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		D18:15,347 sf (0.35 acres)		D18: 0.35 acres
2. Temporary (work pads and access)		D17: 2,082 sf (0.05 acres)		D17: 0.05 acres
3. Temporary (work pads and access)		D18: 11,321 sf (0.26 acres)		D18: 0.26 acres
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 11. Bordering Vegetated Wetlands D17 and D18
Impact Area (number/name)

11/15/2017
Date(s) of Site Visit(s) and Data Collection

Partly Sunny, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — Person completing form per 310 CMR 10.60(1)(b)

11/13/2018 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine Subsystem: -

Class: Forested Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community): ***Plant community inventoried in BVW D18. BVW D17 is predominately scrub-shrub

% Cover:	90	40	5	30	15
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Betula lenta (45%)*	Herb	Osmundastrum cinnamomeum (10%)*
Tree	Fagus grandifolia (20%)*	Herb	Juncus effusus (5%)*
Tree	Pinus strobus (15%)		
Tree	Acer rubrum (10%)		
Shrub	Vaccinium corymbosum (30%)*		
Shrub	Pinus strobus (10%)*		

C. Inventory (Soils)

Ridgebury FSaL, 3-8% slopes, extremely stony	Poorly Drained
Soil Survey Unit	Drainage Class
Organic fibric (0"-2"), Fine Sand (2"-11")	11"
Texture (upper part)	Depth
3"	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☒ Present ☐ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
0	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☒ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☒ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☒ Yes	☐ No
For upland resource areas is the impact area part of contiguous forested habitat at least			
(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

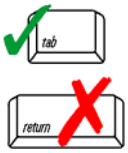
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D19 and D19A
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		D19A: 126 sf (0.003 acres)		0.003 acres
2. Temporary (work pads and access)		D19: 2,425 sf (0.06 acres)		0.06 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 10. Isolated Vegetated Wetland D19
Impact Area (number/name)

11/15/2017
Date(s) of Site Visit(s) and Data Collection

Sunny, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: -

Class: Scrub-Shrub — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☒ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	10	80	0	10	65
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Pinus strobus (5%)*		
Tree	Quercus alba (5%)*		
Shrub	Smilax rotundifolia (70)*		
Shrub	Vaccinium corymbosum (15%)		
Herb	Rubus hispidus (50%)*		
Herb	Grass sp. (15%)		

C. Inventory (Soils)

Ridgebury FSaL, 0-3% slopes, extremely stony	Poorly Drained
Soil Survey Unit	Drainage Class
Organic (0"-3"), Silt Loam (3"-11"), Sandy Loam with gravels (11"-12")	12"
	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☒ Abundant ☐ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
1	0	0	0

Number of Tree Cavities in trunks or limbs of:

1
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☒ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☐ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☐ Yes	☒ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

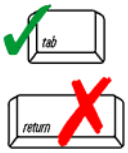
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland D20 and Vernal Pool DP-12
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Permanent (structure footprint)		24 sf (0.001 acres)		0.001 acres
2. Secondary (tree clearing converted to shrub or emergent vegetation)		18,321 sf (0.42 acres)		0.42 acres
3. Temporary (work pads and access)		19,692 sf (0.45 acres)		0.45 acres
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 9. Bordering Vegetated Wetland D20, Intermittent Stream SD4
Impact Area (number/name)

11/15/2017
Date(s) of Site Visit(s) and Data Collection

Sunny, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine — Subsystem: -

Class: Forested — Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	60	0	10	25
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Acer rubrum (45%)*	Shrub	Pinus strobus (20%)
Tree	Quercus alba (30%)*	Shrub	Fagus grandifolia (5%)
Tree	Betula lenta (10%)	Shrub	Carpinus caroliniana (<5%)
Tree	Pinus strobus (5%)	Herb	Clethra alnifolia (15%)*
Tree	Fagus grandifolia (5%)	Herb	Pinus strobus (10%)*
Shrub	Clethra alnifolia (35%)*	Herb	Carex sp. (5%)
		Herb	Smilax rotundifolia (<5%)

C. Inventory (Soils)

Whitman FSaL, 0-3% slopes, extremely stony	Very Poorly Drained
Soil Survey Unit	Drainage Class
Organic (0"-4"), Silt Loam (4"-9"), Fine Sand (9"-15")	15"
	Depth
11"	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☒ Present ☐ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☒ Present ☐ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
5	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☒ Present ☐ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☒ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☒ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☒ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☒ Yes	☐ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

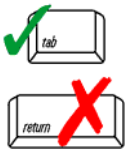
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Bordering Vegetated Wetland L1 and Vernal Pool LP-1
Location

Please refer to breakdown of permanent, secondary, and temporary impacts below.

11/13/2018
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Secondary (tree clearing converted to shrub or emergent vegetation)		660 sf (0.02 acres)		0.02 acres
2. Temporary (Work pads, pull pads)		2,305 sf (0.05 acres)		0.05 acres
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

Plot 1. Bordering Vegetated Wetland L1 and Vernal Pool LV1
Impact Area (number/name)

11/14/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, 44 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — Person completing form per 310 CMR 10.60(1)(b)

11/13/2018 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

Mike Lamothe

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine

Subsystem: -

Class: Forested

Subclass: Needle/Leaved Evergreen and Broad-Leaved Deciduous

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☒ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:

   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)

   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	85	60	5	20	5
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Pinus strobus (60%)*	Herb	Pinus strobus (<5%)
Tree	Acer rubrum (25%)*	Woody Vine	Smilax rotundifolia (5%)
Tree	Quercus rubra (5%)		
Shrubs	Vaccinium corymbosum (35%)*		
Shrubs	Clethra alnifolia (15%)*		
Herb	Vaccinium corymbosum (<5%)		

C. Inventory (Soils)

Whitman FSaL, 0-3% slopes, extremely stony	Very Poorly Drained
Soil Survey Unit	Drainage Class
Organic Hemic (0"-6"), Organic Sapric (6"-8"), Mucky Silt Loam (8"-9")	9"
	Depth
6"	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
1	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☒ Present ☐ Absent

Standing water present at least part of the growing season, suitable for use by

☒ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☒ Yes	☐ No
	10.0 acres in size?	☒ Yes	☐ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

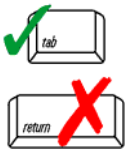
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Acushnet to Fall River Reliability Project
Project Name

Fall River, MA. Upland Bordering Land Subject to Flooding associated with the Copicut Reservoir and Upland RFA associated with Perennial Stream SD20

Please refer to breakdown of permanent and temporary impacts below. — Size of Area Being Impacted

11/13/2018 — Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Permanent (Structure footprint)			BLSF: 47 sf (0.001 acres)	0.001 acres
2. Secondary (tree clearing converted to shrub or emergent vegetation)			BLSF: 39, 373 sf (0.91 acres)	0.91 acres
3. Secondary (tree clearing converted to shrub or emergent vegetation)			RFA: 4,362 sf (0.10 acres)	0.10 acres
4. Temporary (work pads and access)			BLSF: 5.04 sf (0.005 acres)	0.005 acres
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Please refer to attached Wildlife Habitat Evaluation for Fall River which also includes a photographic log.

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

M. Lamothe
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Fall River, MA
Project Location (from NOI page 1)

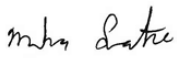
Plot 15. Upland Bordering Land Subject to Flooding associated with the Copicut Reservoir
Impact Area (number/name)

11/16/2017
Date(s) of Site Visit(s) and Data Collection

Cloudy, Windy, 47 degrees for temperature
Weather Conditions During Site Visit (if snow cover, include depth)

M. Lamothe — 11/13/2018
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated



II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: _____ Subsystem: _____

Class: _____ Subclass: _____

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Eastern white pine
Community Name

Eastern white pine is pure or usually predominant. In pure stands the understory is composed primarily of ericaceous shrubs, such as blueberry.

Widespread in central New England from sea level to elevations of 2500 feet. Establishment is often easier on poor sites because hardwood competition is less.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	30	0	0	15
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Pinus strobus (65%)*	Herb	Gaultheria procumbens (<5%)
Tree	Chamaecyparis thyoides (20%)*		
Tree	Betula papyrifera (<5%)		
Shrub	Vaccinium corymbosum (20%)*		
Shrub	Lyonia ligustrina (10%)*		
Herb	Kalmia angustifolia (15%)*		

C. Inventory (Soils)

Udorthents, smoothed	None Listed
Soil Survey Unit	Drainage Class
Organic (0"-3"), Loamy Fine Sand (3"-12")	12"
Texture (upper part)	Depth
NA	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
0	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☐ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☐ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Present ☒ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Present ☒ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☐ Yes	☒ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8

ATTACHMENT B HABITAT CHARACTERISTICS PHOTOGRAPHS

PHOTOGRAPHIC LOG

Site Location: D20 (BVW)

Photo No.	**Date:**
1	11-15-17

Direction Photo Taken:

East

Description:

Potential den habitat that is a suitable size for a mink.



PHOTOGRAPHIC LOG

Site Location: D19 (BVW)

Photo No.	**Date:**
2	08-24-17

Direction Photo Taken:

Southeast

Description:

Roundleaf greenbrier, highbush blueberry, and maleberry provide a food source for wildlife.



PHOTOGRAPHIC LOG

Site Location: D18 (BVW)

Photo No.	**Date:**
3	11-15-17

Direction Photo Taken:

Northwest

Description:

Potential den habitat that is a suitable size for a mink.



PHOTOGRAPHIC LOG

Site Location: D17 (BVW)

Photo No.	**Date:**
4	08-23-17

Direction Photo Taken:

Southeast

Description:

Highbush blueberry, maleberry, and roundleaf greenbrier provide a food source for wildlife in the maintained portion of the ROW.



PHOTOGRAPHIC LOG

Site Location: D16A (BVW)

Photo No.	**Date:**
5	11-15-17

Direction Photo Taken:

East

Description:

A dead standing tree with a 6-12 inch dbh range provides potential for cavities and perches. Three dead standing trees are located within BVW 16A.



PHOTOGRAPHIC LOG

Site Location: Vernal Pool DP-7 in D15 (BVW)

Photo No.	**Date:**
6	04-27-18

Direction Photo Taken:

East

Description:

Vernal pool DP-7 is located within BVW D15. This vernal pool contains fairy shrimp.



PHOTOGRAPHIC LOG

Site Location: D14 (BVW)

Photo No.	**Date:**
7	04-27-18

Direction Photo Taken:

Northwest

Description:

BVW D14 (right) and BVW D15 (left) are shown on the ponded access road. American toads were present in the ponded water. There was an average water depth of seven inches after heavy rains several days prior.



PHOTOGRAPHIC LOG

Site Location: Upland BLSF of the Copicut Reservoir

Photo No.	**Date:**
8	11-16-17

Direction Photo Taken:

Northeast

Description:

Highbush blueberry and maleberry comprise the shrub understory of an Eastern white pine forest. These shrubs are a wildlife food source.



PHOTOGRAPHIC LOG

Site Location: D12 (BVW) and BLSF of the Copicut Reservoir

Photo No.	**Date:**
9	11-16-17

Direction Photo Taken:

Northwest

Description:

Gray birch branches overhang the Copicut Reservoir. The water line of the Reservoir fluctuates. These branches offer perching opportunities for water birds when the water level is higher.



PHOTOGRAPHIC LOG

Site Location: Upland RFA of the Copicut River

Photo No.	**Date:**
10	11-16-17

Direction Photo Taken:

West

Description:

The upland is dominated by relatively large Eastern white pine trees. An Eastern white pine with a dbh of 32 inches is located 20 feet outside the RFA of the Copicut River.



PHOTOGRAPHIC LOG

Site Location: D11 (BVW) and RFA of the Copicut River

Photo No.	**Date:**
11	07-21-17

Direction Photo Taken:

East

Description:

Cinnamon fern and young sweet pepperbush provide dense herbaceous cover during the growing season.



PHOTOGRAPHIC LOG

Site Location: D8 (BVW)

Photo No.	**Date:**
12	11-14-17

Direction Photo Taken:

Southeast

Description:

One dead standing tree in the 6-12 inch dbh range offers the potential for cavities or perches.



PHOTOGRAPHIC LOG

Site Location: Vernal Pool DP-2 in Isolated Vegetated Wetland D7A

Photo No.	**Date:**
13	05-01-17

Direction Photo Taken:

East

Description:

Vernal pool DP-2 is located within an Eastern white pine forest. The vernal pool supports populations of wood frog, spotted salamander, and fairy shrimp.



PHOTOGRAPHIC LOG

Site Location: Vernal Pool DP-5 in D7 (BVW)

Photo No.	**Date:**
14	04-24-18

Direction Photo Taken:

North

Description:

Vernal pool DP-5 located within BVW D7 supports populations of spotted salamanders and wood frogs.



PHOTOGRAPHIC LOG

Site Location: D7 (BVW)

Photo No.	**Date:**
15	11-14-17

Direction Photo Taken:

West

Description:

A standing dead tree in the 12-18 inch dbh range provides the potential for cavities and perches.



PHOTOGRAPHIC LOG

Site Location: D6 (BVW) and Intermittent Stream SD-5

Photo No.	**Date:**
16	11-14-17

Direction Photo Taken:

Southeast

Description:

Intermittent Stream SD-5 provides foraging and rehydration opportunities for non-breeding amphibians for a portion of the growing season.



PHOTOGRAPHIC LOG

Site Location: D6 (BVW)

Photo No.	**Date:**
17	11-14-17

Direction Photo Taken:

South

Description:

Large woody debris on the ground offers potential habitat for small mammals, amphibians, and reptiles.



PHOTOGRAPHIC LOG

Site Location: D3 (BVW)

Photo No.	**Date:**
18	07-11-17

Direction Photo Taken:

Northwest

Description:

D3 has a dense shrub stratum which is dominated by sweet pepperbush and may provide veery nesting habitat.



PHOTOGRAPHIC LOG

Site Location: D2 (BVW)

Photo No.	**Date:**
19	07-11-17

Direction Photo Taken:

Northwest

Description:

A dense herbaceous understory of young sweet pepperbush provides cover for small mammals, amphibians, and reptiles.



PHOTOGRAPHIC LOG

Site Location: D1(BVW)

Photo No.	**Date:**
20	06-29-17

Direction Photo Taken:

Northwest

Description:

Highbush blueberry and roundleaf greenbrier provide a food source for wildlife in the maintained portion of the ROW.



PHOTOGRAPHIC LOG

Site Location:

Photo No.	**Date:**
21	04-24-87

Direction Photo Taken:

Southwest

Description:

Vernal pool LP-1 located within BVW L1 supports populations of spotted salamanders and wood frogs.



APPENDIX K AFRRP WETLAND INVASIVE SPECIES CONTROL PLAN (WISCP)

October 02, 2018

NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY

AND NEW ENGLAND POWER COMPANY d/b/a NATIONAL GRID

Acushnet to Fall River Reliability Project

Wetland Invasive Species Control Plan

PROJECT NUMBER:
151783 and 146784

PROJECT CONTACT:
Karen Hanecak
EMAIL:
Karen.Hanecak@powereng.com
PHONE:
774-643-1821

POWER ENGINEERS

Acushnet to Fall River Reliability Project

Wetland Invasive Species Control Plan

PREPARED FOR: NSTAR ELECTRIC COMPANY D/B/A EVERSOURCE ENERGY AND NEW ENGLAND POWER COMPANY D/B/A NATIONAL GRID

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
Eversource	NSTAR Electric Company d/b/a Eversource Energy
FERC	Federal Energy Regulatory Commission
IVM	Integrated Vegetation Management
kV	kilovolt
NEP	New England Power Company d/b/a National Grid
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NRCS	Natural Resources Conservation Service
POWER	POWER Engineers, Inc.
Project	Acushnet to Fall River Reliability Project
ROW(s)	right(s)-of-way
WISCP	Wetland Invasive Species Control Plan

1.0 INTRODUCTION

NSTAR Electric Company d/b/a Eversource Energy (Eversource) and the New England Power Company d/b/a National Grid (NEP) (herein referred to as "the Companies") are proposing to undertake the Acushnet to Fall River Reliability Project (Project) to improve the electric transmission reliability in the southeastern Massachusetts area. The Project consists of the installation of a new overhead transmission line extending from Eversource's Industrial Park Tap in Acushnet to NEP's existing Bell Rock Substation in Fall River. The proposed Project includes the installation of approximately 12 miles of new overhead electric transmission line traversing the municipalities of Acushnet, New Bedford, Dartmouth, and Fall River in Bristol County, Massachusetts. The new line will be located within existing rights-of-ways (ROWs) currently occupied by existing transmission lines. Of the 12 miles, approximately 7.8 miles are in Eversource service territory traversing Acushnet, New Bedford and Dartmouth, and approximately 4.2 miles are in NEP service territory traversing the city of Fall River.

This Wetland Invasive Species Control Plan (WISCP) addresses measures the Companies will implement to minimize the spread and/or introduction of invasive species in wetlands in the Project Area during construction. Invasive plants are species that are not native or indigenous to a region and can thrive in areas beyond their natural dispersal range, often out-competing native plants for space, nutrients, sunlight, and water (NRCS 2018a). Invasive species are highly adaptable and have few natural control agents in the environment into which they have been introduced, making them very prolific plant species. Invasive species may also be referred to as nuisance, undesirable, noxious, or exotic species.

The WISCP identifies the invasive wetland plant species that are of concern in the Project Area. The "Project Area" is identified as all wetlands surveyed within the limit of work activities associated with the Project. Not all of the wetlands within the Project Area will be impacted; those that are disturbed as a result of Project construction could be more susceptible to colonization by invasive species. In addition, the movement of construction equipment and materials through wetlands that presently contain invasive species could promote the spread of invasive species to nearby, un-infested wetlands.

The overall objective of the WISCP is to define the procedures to be used during Project construction to preserve the value and functions of wetlands in the Project Area and to minimize the further spread of invasive plants within wetlands that already contain them. The specific objectives of this plan are as follows:

- Inventory the invasive plant species known to occur within wetlands in the Project Area as identified during the wetland delineations conducted for the Project.
- As a baseline, identify the wetlands in the Project Area where such invasive species presently exist.
- Describe the Companies existing vegetation management programs, discuss how these existing programs contribute to minimizing the proliferation of invasive species within the Project Area, and explain the constraints to long-term invasive species management along portions of the Project.
- Summarize the procedures that the Companies propose to implement to minimize the potential for the spread of wetland invasive species during the construction of the Project.

Overall, the goal of the WISCP is to protect the ecological conditions of wetlands within the Project Area, specifically focusing on minimizing the spread of invasive species within affected wetlands and avoiding the introduction of invasive species to areas where they are not currently present. It should be noted that wetlands containing invasive plants are located outside of the Project Area and are thereby also another

potential source unrelated to the Project. Therefore, attempting to eradicate invasive species from portions of such wetlands within the proposed work areas is unlikely to be successful and is not considered a practical goal of this WISCP.

2.0 OVERVIEW OF PROJECT ACTIVITIES

The construction of the Project will involve a series of sequential activities. During the Project design process, the Companies implemented measures to avoid and minimize the disturbance to wetland vegetation or soils. However, unavoidable construction activities with the potential to influence the spread of invasive plant species in wetlands include:

- Vegetation clearing within wetlands for the construction and subsequent operation of the new transmission line.
- Temporary improvements to existing access roads or the development of new access roads (temporary) across wetlands.
- Use of temporary access routes across wetlands to facilitate the movement of vegetation clearing equipment.
- Installation of temporary work pads in wetlands.
- Removal of temporary fills (e.g., access roads and work pads) and the restoration of affected wetlands.

3.0 PROJECT WETLAND RESOURCES

As part of the Project planning process, POWER Engineers, Inc. (POWER) conducted field investigations to delineate jurisdictional wetlands within the Project Area. Wetland field assessments occurred in November 2015 and June – August 2017 on the NEP portion of the ROW and May – June 2018 on the Eversource portion of the ROW. As a result of these field studies, a total of 71 wetlands were identified in the Project Area. As part of the wetland delineations, vegetation types and dominant species were identified. A majority of these wetlands have portions located within presently managed areas of the Companies' existing ROWs. However, there are a few wetlands on the NEP ROW that are contained solely within forested areas of the existing transmission line easement. Approximately 63 percent of wetlands (45 wetlands in total) are recorded to contain invasive species.

3.1 Invasive Species of Concern in Wetlands

The federal government and the state of Massachusetts maintain information regarding invasive wetland plants. For example, the Massachusetts Department of Environmental Protection maintains a list of invasive species (Massachusetts Invasive Plant Advisory Group 2005). Similarly, the United States Department of Agriculture, Natural Resource Conservation Service (NRCS) also maintains a list of noxious plants by state (NRCS 2018b).

Based on a review of these lists and the characteristics of the Project Area (as determined by field investigations), the most abundant invasive species located in wetlands along the ROWs are common reed (*Phragmites australis*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), and Asian bittersweet (Celastrus orbiculatus). Where there is an ample seed stock or a system of rhizomes of these invasive species, communities of these plants will tend to be the first "pioneer" species to populate and colonize areas that have been disturbed and left exposed (New York State Department of Transportation 2017). Table 1 lists the common wetland invasive plants that were found in the Project Area.

TABLE 1 COMMON INVASIVE SPECIES FOUND IN WETLANDS IN THE PROJECT AREA

COMMON NAME	LATIN NAME
Asian bittersweet	*Celastrus orbiculatus*
Autumn olive	*Elaeagnus umbellata*
Japanese knotweed	*Fallopia japonica*
Glossy false buckthorn	*Frangula alnus*
Morrow's honeysuckles	*Lonicera morrowii*
Purple loosestrife	*Lythrum salicaria*
Japanese stiltgrass	*Microstegium vimineum*
Reed canary grass	*Phalaris arundinacea*
Common reed	*Phragmites australis*
Black locust	*Robinia pseudoacacia*
Multiflora rose	*Rosa multiflora*

A baseline survey of invasive plant species within each wetland in the Project Area was conducted during the wetland delineations. The extent of each invasive species estimated was based on four cover classes: ≤5 percent; 6 to 25 percent; 26 to 50 percent; and >50 percent. A representative descriptive characterization of the four cover classes is: Sparse (S), Common (C), Abundant (A), and Dominant (D), respectively. In some instances, the invasive species was only observed along the wetland/upland boundary and was characterized as Edge (E).

Table 2 includes a listing of each invasive plant species and the corresponding aerial cover class for each wetland. As seen in Table 2, the invasive species observed make up six percent or more the plant communities identified in the Project Area wetlands. Forty-five of the 71 wetlands crossed by the Project contain three or more invasive species; primarily with a descriptive characterization of Sparse (e.g., ≤ 5 percent). The wetlands with three or more invasive species were all observed in the Eversource portion of the ROW. On the NEP portion of the ROW, six out of 25 wetlands contain invasive species with the most prevalent being Japanese stiltgrass (*Microstegium vimineum*).

Common reed and multiflora rose are the most prevalent invasive species in the Project Area. Common reed was found in 22 of the 71 wetlands. Over 65 percent of these wetlands containing common reed had at least six percent cover of the invasive plant. Multiflora rose was observed in 19 of the wetlands with a percent cover which was either sparse (≤5 percent) or only found along the wetland/upland edge. Japanese knotweed (*Fallopia japonica*) and black locust (*Robinia pseudoacacia*) were the least prevalent and occur in only two individual wetlands each. The survey documents the density of specific invasive species present within each wetland and thereby establishes a baseline for implementing measures to limit spread of invasive plants between wetlands during Project construction.

Where there is an ample seed stock or a system of rhizomes of these invasive species, communities of these plants will tend to be the first "pioneer" species to populate and colonize areas that have been disturbed and left exposed (New York State Department of Transportation 2018).

TABLE 2 EXTENT OF INVASIVE SPECIES FOR EACH WETLAND IN THE PROJECT AREA

ID	TOTAL[1] COVER CLASS	COMMON REED	MULTIFLORA ROSE	HONEY-SUCKLE	AUTUMN OLIVE	PURPLE LOOSE-STRIFE	GLOSSY BUCK-THORN	REED CANARY GRASS	ASIAN BITTER-SWEET	JAPANESE STILT GRASS	JAPANESE KNOTWEED	BLACK LOCUST
Eversource Wetlands												
D66*	None											
D65*	None											
D64	A	A										
D63*	S			E								
D62	S		S	S								
D61	None											
D60	S		S	S								
D59	S		S		S	S						
D58	A	A				S			C			
D57	S							S				
D56	A	A						S	S			
D55	A	A										
D54	S		S									
D53	A	A	C			C						
D52	C	C	S		S							
D51	S	S	E		S							
D50	C	C			E				S			
D49	S	S	S									
D48	S	S	E						S			
D47	A	A	E									
D46	A	A	E									
D45	A	A										
D44	C	S	S						S		E	
D43	C	S	C						C			
D42	A	A										
D41	C		S			S	S		S			
D40	C					S	S		S			
D39	C	C	S		C				C			
D38	C		C									
D37	C	C			E							
D36	None											
D35	C	C	S		E	S			E			S
D34	None											
D33	None											
D32	S	S			E							
D31	E				E							
D30	S	S										
D29	None											

ID	TOTAL[1] COVER CLASS	COMMON REED	MULTIFLORA ROSE	HONEY-SUCKLE	AUTUMN OLIVE	PURPLE LOOSE-STRIFE	GLOSSY BUCK-THORN	REED CANARY GRASS	ASIAN BITTER-SWEET	JAPANESE STILT GRASS	JAPANESE KNOTWEED	BLACK LOCUST
D28	S				S							
D27	None											
D26	S				S				S			
D25	C	C			S							
D24	A	A										
D23	C				S				C			
D22	S				S							
D21	C		C	E					E			
NEP Wetlands												
D20	C				C							
D19A	None											
D19	S									S		
D18	None											
D17	S									S		
D16A	None											
D16	S									S		
D15	None											
D14	S									S		
D13*	C									C		
D12	None											
D11	S		S									
D10	None											
D9*	None											
D8	None											
D7A*	None											
D7	None											
D6	None											
D5	None											
D4	None											
D3	None											
D2	None											
D1	None											
M1	None											
L1	None											

Notes:
[1] "Total" is based upon a visual field estimation of the percent cover of all invasive species within each wetland. This estimate is not based upon species in multiple stratums/layers but instead is for the wetland as a whole.
*Wetland does not meet the jurisdictional criteria of the Massachusetts Wetland Protection Act (WPA M.G.L c. 131, § 40) and associated Regulations (310 CMR 10.00).
Aerial Cover Classes: S = Sparse: ≤5%; C = Common: 6-25%; A = Abundant: 26-50%; D = Dominant: >50%; E = Edge of wetland/upland boundary.

4.0 REVIEW OF EXISTING VEGETATION MANAGEMENT PROGRAMS AND HABITAT BENEFITS

4.1 ROW Vegetation Management Requirements

The Project will be located within existing transmission line ROWs, portions of which are presently managed according to national and regional standards and regulations for electric transmission line operation, including required clearances between conductors and vegetation. These standards and regulations include but are not limited to:

- Federal Energy Regulatory Commission (FERC) standards including North American Electric Reliability Corporation (NERC) Standard FAC-003-1, Commissioner Order 693, FAC-003-2 (effective July 1, 2014).
- NERC Standard FAC-003-1 – Transmission Vegetation Management Program, effective date of April 7, 2006.
- National Electrical Safety Code (NESC) Section 21, Part 2, Rule 218 and the American National Standards Institute (ANSI) pruning standards, A300, Part 1, Part 7, and Z-133.

The Companies have established plans and procedures for applying an Integrated Vegetation Management (IVM) approach to manage vegetation within their existing utility corridors in accordance with these standards. IVM is a system of managing plant communities in which managers set objectives; identify compatible and incompatible vegetation; consider action thresholds; and then evaluate, select and implement the most appropriate control methods to achieve those objectives. IVM provides the Companies with a proven range of techniques to manage ROW vegetation to conform to federal and regional standards for transmission line operation, accommodate the varying interests of stakeholders along the ROW, minimize environmental effects, and balance cost considerations. The Companies use a combination of mechanical and chemical controls (i.e., mowing, hand cutting and select herbicide application) to target vegetation that may impact the operation and safety of the transmission lines. The goal is to manage the upland and wetland vegetation within the ROWs using natural vegetative control. Natural vegetative control is the process of working with the cycles of plant succession and interspecies competition to facilitate the spread and stabilization of native, early successional plant communities that discourage the establishment of taller woody vegetation (Bramble et al. 1990).

Therefore, the Companies target undesirable vegetation such as trees and limbs, tall growing shrubs, vegetation growing around stations, guy wires, access roads, gates, and anywhere vegetation impedes access to the ROW. Because of this IVM approach, ROWs are one of the primary remaining early successional ecological communities in New England. These dense, low growing plant communities can help discourage the establishment of undesirable vegetation, do not hinder access to the ROWs, and do not generally interfere with the operation and maintenance of the transmission lines.

Plant species that are generally encouraged on the ROWs include herbaceous and shrub species and other vegetation that has a mature height of less than approximately 12 feet. As a result of these ROW vegetation management practices, most of the wetland habitats within the managed portions of the ROWs consist of shrub or emergent marsh.

4.2 Habitat Benefits of ROW Management

The management and maintenance of ROW creates early successional habitats dominated by scrub-shrub vegetation and open areas with dense grasses and other herbaceous vegetation. Many animal species use the habitats provided along the ROWs as their homes, feeding and breeding grounds, migration corridors or nurseries, and many plant species adapt to the growing conditions provided within the managed portions of the ROWs. The early successional landscape maintained within the ROWs, however, is not by nature stable; it is instead the sustained result of the IVM program established by the Companies. The removal of the forested areas and subsequent maintenance of the ROW will create a change in habitat type, from forested to scrub-shrub or emergent wetland.

Different types of successional communities have various benefits to flora and fauna. For example, a study in Massachusetts indicated an increase in wildlife use, notably avian species, following clearing of ROWs (Nickerson and Thibodeau 1984). This study attributed the increase in wildlife use to the conversion of forested areas into wetland and upland shrub and emergent plant communities. Creating and maintaining additional shrub-land habitat along the ROWs, in many instances, represents a long-term positive effect on some species, since shrub-land habitat is otherwise declining in New England. This is important because land use trends suggest that this habitat type will continue to decline and ROWs will become increasingly significant (Confer 2003). This decline is a result of various factors (e.g., development, ecological succession, absence of fire). A managed transmission ROW is considered a major source of shrub-land habitat (Saucier 2003; Confer and Pascoe 2003); in fact, in the eastern United States utilities maintain more acreage of managed shrub-lands on ROWs than all other sources of this habitat combined (Confer et al. 2004).

Other studies also have indicated that this change of forested areas into scrub-shrub habitats may be beneficial (King et al. 2009; Yahner et al. 2004; Bramble et al. 1992). Scrub-shrub habitats within the ROW can provide wildlife habitat such as nesting for birds, browse for deer, and cover for small mammals (Ballard et al. 2004). The establishment of low-growing species, i.e., grasses and forbs, is also a form of biological control that reduces the re-invasion of the ROW corridor by tree species (Ballard et al. 2004). Some plant species also have the ability to inhibit the growth or invasion of other species which is referred to as allelopathy (Money 2008). Establishment of such dense shrub and herbaceous emergent plant communities that do not require continued disturbances for management activities may contribute to minimizing the spread of invasive species. In this regard, some invasive plant communities have been shown to provide some beneficial effects such as breeding bird nesting habitat, cover for animals traversing the ROWs, food sources (fruit-bearing plants), buffers to sensitive areas (such as along riparian zones) and, in some instances, serve as a deterrent to unwarranted access (e.g., all-terrain vehicle use) along the ROWs due to the dense thickets and thorn-producing shrubs that may colonize certain areas. The eradication of invasive plants could, therefore, eliminate some of the beneficial uses on the ROWs. In addition, continued regular treatment of invasive plants could inadvertently result in minimizing wildlife use of the ROWs through the frequency of human contact, removal of cover (albeit invasive), and reduction of food sources.

5.0 INVASIVE SPECIES MANAGEMENT IN WETLANDS DURING PROJECT CONSTRUCTION

During the construction of the Project, the Companies will implement measures to control the spread of invasive plant communities during construction. The main objectives will be to:

- Perform construction activities so as to minimize the spread of invasive plant species within wetlands and from wetland-to-wetland along the ROWs.

- Restore wetlands affected by the Project promptly to limit the potential for invasive species to colonize disturbed soils.

Invasive species control requirements will be incorporated into construction contracts for the Project. Prior to construction, the Companies will provide environmental training to the contractors, inspectors, and work crews responsible for implementing the WISCP. The training will include an overview of the WISCP and a review of the ROWs, a discussion and listing of the target species, ways to identify invasive plants in the field, and presentation of the best management practices to be implemented during construction.

The Companies' Project teams will include an environmental monitor who will perform site inspections and will oversee the contractors' compliance with applicable federal, state and local permit conditions; Project plans (including this WISCP); and the Companies' policies and procedures. Care and consideration will be taken during construction to prevent and/or reduce the introduction or the spread of invasive species. Wetland invasive species control efforts will be important throughout the construction of the Project, but the focus of these efforts will be during the following construction phases, which will involve work directly in wetlands and thus will have the greatest potential for construction equipment to come into contact with invasive species:

- Vegetation clearing.
- Placing and removing construction mats, and other temporary access roads and work pads.
- Moving equipment and vehicles through areas containing invasive species, such as for the installation, maintenance, and final removal of temporary soil erosion and sedimentation controls.

To control the spread of invasive plant species, the Companies will require construction contractors to implement the procedures described below, as appropriate to the phase of the construction that each contract will perform:

- All construction equipment, vehicles, and materials (e.g., construction mats) must be clean and free of excess soil, debris, and vegetation before being mobilized to the Project Area.
- Mats or equivalent will be used in wetlands during clearing operations to minimize the spread of invasive species within a wetland by the clearing equipment itself.
- To minimize the potential for spreading invasive plant species from wetland to wetland, any equipment working in or traversing a wetland will be cleaned prior to relocating to another work site. Cleaning of vehicles and other equipment (including the tracks and tires) will involve removal of visible dirt, debris and vegetation through the use of brooms, shovels, and, if needed, compressed air.
- Construction mats or equivalent will be used at wetland crossings so construction vehicles that frequently travel on ROW access roads, such as pickups carrying personnel or material delivery trucks, can avoid direct wetland interaction.
- Construction mats will be cleaned prior to relocation to other work areas or wetlands. Cleaning of matting will involve dropping mats one on top of another to shake any loose sediment and debris. The matting will then be swept to remove loose soil and any plant material.
- Construction equipment and excavated soil material will be contained within the approved limits of work areas within the ROW; these limits of work will be defined on the Project plans.
- Soil excavated from wetlands or riparian areas containing a predominance of invasive plants will be stockpiled separately (to the extent there is sufficient work space) and contained within staked

bales, silt fence or other approved soil erosion and sedimentation control device to minimize the potential of spreading these soils elsewhere on the ROWs.

- Final restoration of the Project Area will be performed in accordance with Eversource's *Construction and Maintenance Environmental Requirements Best Management Practices Manual*: Massachusetts (2016) and National Grid's Environmental Guidance Document EG-303 – *Access, Maintenance and Construction Best Management Practices* (2018).

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APPENDIX 1-2 MEPA CERTIFICATE AND RECORD OF DECISION

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The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Matthew A. Beaton
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

December 28, 2018

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS ON THE EXPANDED ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project
PROJECT MUNICIPALITY	: Acushnet, New Bedford, Dartmouth and Fall River
PROJECT WATERSHED	: Buzzards Bay and Narragansett Bay
EEA NUMBER	: 15941
PROJECT PROPONENT	: New England Power d/b/a National Grid and NSTAR Electric Company d/b/a Eversource Energy
DATE NOTICED IN MONITOR	: November 21, 2018

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G. L. c. 30, ss. 61-62I) and Section 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project **requires** a mandatory Environmental Impact Report (EIR). The Proponent submitted an Expanded Environmental Notification Form (EENF) to support the request that I grant a Phase 1 Waiver pursuant to Section 11.11 of the MEPA regulations. In a separate Draft Record of Decision (DROD), also issued today, I **propose to grant** a Phase 1 Waiver that will allow the reconstruction and expansion of the Bell Rock Substation, as described in the EENF, to proceed to permitting prior to completion of the EIR for the remainder of the project. The Proponent also requested that I allow a Single EIR to be prepared in lieu of a Draft and Final EIR pursuant to 301 CMR 11.06(8). Based on review of the EENF, the Proponent may submit a Single EIR for the remainder of the project in accordance with the Scope included in this Certificate.

Project Description

As described in the Expanded Environmental Notification Form (EENF), Phase 1 of the project consists of the reconstruction and expansion of the Bell Rock Substation located in Fall River. A new

2,304-square foot (sf) substation will be constructed entirely within an existing easement. The footprint of the existing substation yard will be expanded by approximately 22,000 sf. The substation is being reconstructed to accommodate two line connections from the existing M13 line (M13N and M13S) into the substation. To accommodate the two line terminations, the substation needs to be expanded into a breaker-and-a-half-configuration.[1] The expansion will provide eleven breakers in a breaker-and-a-half configuration that will continue to connect the N12, L14 and D21 Lines and provide new line positions in order to connect the M13N and M13S Lines. The expansion will also accommodate the future connection to Line 114 associated with Phase 2 of the project.

Phase 2 of the project consists of the Acushnet to Fall River Reliability Project (AFRRP) which is a joint endeavor by New England Power (NEP) and Eversource. The AFRRP will extend the Line 114 from the Industrial Park Tap in Acushnet, Massachusetts to the reconstructed Bell Rock Substation in Fall River, Massachusetts. The AFRRP includes the installation of new transmission line structures, overhead conductors and wires along 12.1 miles of the southern portion of an existing Right-of-Way (ROW) parallel to several other existing lines. Approximately 118 new structures are required for the overhead transmission line. Seventy-nine of the structures will be direct-embedded steel pole H-frames, four will be steel pole H-frame structures on concrete foundations, 25 will be direct-embedded steel monopoles which will be supplemented by seven monopole and three triple-pole structures requiring reinforced concrete foundations. The new structures will range in height from approximately 55 to 110 feet.

Clearing will be required within the ROW for a distance of approximately 4.2 miles. The cleared ROW width will be expanded approximately 60 feet to the south and within one span between Structures 7-8 (approximately 36,000 sf) in order to accommodate the new line. All tree clearing and vegetation removal is to occur within the boundaries of the existing ROWs.

The Bell Rock Substation reconstruction and the AFRRP will eliminate the potential widespread voltage collapse and loss of load across 17 municipalities by providing an additional transmission source and voltage support at the Bell Rock Substation and several other substations including the Wing Land and High Hill Substations. The need for the project was identified in the New England Independent System Operator (ISO-NE) Southeastern and Rhode Island Area 2026 Solutions study.

Project Site

The approximately 294.75-acre project site consists entirely of existing ROWs owned by New England Power (NEP) and Eversource. The AFRRP project extends from the Industrial Park Tap 12.1 miles to Bell Rock Substation. The 2.75-acre Bell Rock Substation is located on the east side of Bell Rock Road in Fall River and at the junction of the existing D21, L14, N12, and M13 transmission lines. The M13 line crosses over the substation but does not currently connect into the substation.

The approximately 7.9 miles of the AFRRP traversing Acushnet, New Bedford and Dartmouth are located within Eversource's service territory and the approximately 4.2 miles traversing Fall River are within NEP's service territory. A portion of the AFRRP project runs through the Southeastern Massachusetts Bioreserve. The Commonwealth owns or holds conservation restrictions on portions of

[1] This configuration ensures that each transmission line has its own breaker and shares a breaker with another line which allows a breaker-and-a-half to perform any necessary switching.

the Bioreserve, through the Massachusetts Department of Conservation and Recreation (DCR) and the Massachusetts Department of Fish and Game (DFG), including public conservation land that surrounds the ROW. The AFRRP project also runs through or abuts approximately 1 mile of DCR's Acushnet Cedar Swamp State Reservation. The substation site and transmission line ROW includes mapped *Priority and/or Estimated Habitat* as mapped by the Massachusetts Division of Fisheries and Wildlife's (DFW) Natural Heritage and Endangered Species Program (NHESP).

Environmental Impacts and Mitigation

Environmental impacts associated with Phase 1 of the project include the new alteration of approximately 1 acre of land and impacts to 6,611 sf of BVW, of which 3,599 sf are permanent. Impacts associated with Phase 2 of the project include the new alteration of 25.46 acres of land, impacts to 435,758 sf of BVW, 60,897 sf of Riverfront Area, 91,992 sf of Bordering Land Subject to Flooding (BLSF), 202 linear feet (lf) of Bank, 625 sf of Land Under Water, and disturbance of rare-species habitat.

Measures to avoid minimize and mitigate Damage to the Environment include compensatory wetland mitigation for unavoidable impacts to wetlands, streams and other resources, the use of erosion control measures (ECMs) and implementation of turtle protection measures during construction. Best management practices (BMPs) will be implemented to minimize and mitigate stormwater runoff within the project corridor and wetland resource areas.

Jurisdiction and Permitting

The project is undergoing MEPA review and requires the preparation of a mandatory Environmental Impact Report pursuant to 301 CMR Section 11.03 (3)(a)(1)(a) of the MEPA regulations because it requires State Agency Actions and it involves the alteration of more than one acre of BVW. Phase 1 of the project exceeds the ENF threshold at 11.03(3)(b)(1)(c) and 11.03(3)(b)(1)(d): alteration of 1,000 or more sf of outstanding resource waters and alteration of 5,000 or more sf of BVW. It does not exceed a mandatory EIR threshold. The project requires a Section 401 Water Quality Certification (WQC) and may require Chapter 91 Authorization from the Massachusetts Department of Environmental Protection (MassDEP). It requires a Non-vehicular Highway Access Permit from the Massachusetts Department of Transportation (MassDOT) and review under the Massachusetts Endangered Species Act (MESA). The project may require a Construction Access Permit from the DCR The AFFRP (Phase 2) project requires review and approval by the Energy Facilities Siting Board (EFSB). Separate permits are proposed for the two phases of the project.[2]

The project requires Orders of Conditions from the Acushnet, Dartmouth, Fall River and New Bedford Conservation Commissions. In the case of appeal(s), Superseding Orders of Conditions will be required from MassDEP. The project will require consultation with the Massachusetts Historical Commission (MHC) in accordance with Section 106 of the National Historic Preservation Act of 1966, a Clean Water Act Section 404 General Permit from the United States Army Corps of Engineers (ACOE),

[2] The EENF states that the Proponent participated in pre-application meetings with MassDEP, NHESP, DCR, City of Fall River officials, and the ACOE. Based on these meetings, the EENF indicates that the Bell Rock Substation Rebuild Project could be approved and separately permitted in advance of the review and approval of the AFRRP permits.

and a National Pollutant Discharge Elimination System Construction General Permit (NPDES CGP) from the United States Environmental Protection Agency (EPA).

The project is not receiving Financial Assistance from the Commonwealth. Therefore, MEPA jurisdiction is limited to those aspects of the project that are within the subject matter of any required or potentially required State Agency Actions and that may cause Damage to the Environment as defined in the MEPA regulations.

Request for Phase 1 Waiver

The Proponent submitted an EENF in support of its request for a Phase 1 Waiver, which would allow Phase 1 of the project to proceed prior to completion of the EIR for the entire project. Consistent with this request, the EENF was subject to an extended 30-day public comment period and the Proponent requested an additional two-week extension. The comment period closed on December 21, 2018.

The MEPA regulations at 301 CMR 11.11(1) state that I may waive any provision or requirement in 301 CMR 11.00 not specifically required by MEPA and may impose appropriate and relevant conditions or restrictions, provided that I find that strict compliance with the provision or requirement would:

(a) result in an undue hardship for the Proponent, unless based on delay in compliance by the Proponent; and
(b) not serve to avoid or minimize Damage to the Environment.

The MEPA regulations at 301 CMR 11.11(4) state that, in the case of a partial waiver of a mandatory EIR review threshold that will allow the Proponent to proceed with Phase 1 of the project prior to preparing an EIR, I shall base the finding required in accordance with 301 CMR 11.11(1)(b) on a determination that:

(a) the potential environmental impacts of Phase 1, taken alone, are insignificant;
(b) ample and unconstrained infrastructure facilities and services exist to support Phase 1;
(c) the project is severable, such that Phase 1 does not require the implementation of any other future phase of the project or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized or mitigated; and (d) the agency action(s) on Phase 1 will contain terms such as a condition or restriction, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to commencement of any other phase of the project.

Single EIR Request

The EENF included a request to file a Single EIR, rather than a Draft and Final EIR, pursuant to Section 11.06(8) of the MEPA regulations. A Single EIR may be allowed, provided that the EENF: a) describes and analyzes all aspects of the project and all feasible alternatives, regardless of any jurisdictional or other limitation that may apply to the Scope; b) provides a detailed baseline in relation to which potential environmental impacts and mitigation measures can be assessed; and, c) demonstrates

that the planning and design of the Project use all feasible means to avoid potential environmental impacts. The EENF included supporting documentation consistent with the aforementioned requirements that identified potential environmental impacts, described the purpose of the project, and proposed mitigation measures to justify the request for a Single EIR.

Review of the EENF

The EENF includes a detailed project description that facilitated review of the project and development of a scope for the Single EIR. The EENF includes an alternatives analysis, existing and proposed conditions plans, includes a detailed description of the project, cross sections along the project corridor, and conservative estimates of project-related impacts. It identifies measures to avoid, minimize and mitigate environmental impacts.

Alternatives Analysis

The EENF included an alternatives analysis for both Phases of the Project. The alternatives analysis for Phase 1 of the project considered a No-Action Alternative, a Location Alternative, and an Alternative Configuration and Equipment Alternative. The No-action Alternative was dismissed because it would not resolve the regional electrical reliability problems identified by ISO New England. The existing systems will remain at risk for future failure. The Location Alternative considered constructing a new substation at a different location. However, this option was dismissed because the Proponent was unable to identify any land currently under their control which would accommodate the connections of the D21, L14, N12, and M13 lines at one location. The Alternative Configuration and and Equipment Alternative considered the use of air-insulated switchgear (AIS) with either non-individual pole tripping (Non-IPT) gas circuit breakers (Preferred Alternative) or individual pole tripping (IPT) gas circuit breakers. Stability studies demonstrated that AIS IPT breakers are not necessary. The Configuration Alternatives considered three layout alternatives including the Preferred Alternative. All configuration alternatives were based on engineering and zoning requirements, reliability considerations, environmental impacts and cost. The substation ROW abuts several watershed and water supply protection zones and districts, the Watuppa Reservation, Southeastern Massachusetts Bioreserve and mapped rare-species habitat. The Preferred Alternative configuration incorporates the AIS Non-IPT breakers in a configuration which minimizes impacts to surrounding resources. Other configuration alternatives were dismissed because they would result in greater impacts to wetland resources.

The Phase 2 alternatives analysis considered a No-Action alternative, and four transmission line design alternatives, including the Preferred Alternative (AFRRP). The No-Action Alternative was dismissed because it would not meet applicable transmission planning reliability criteria and would not improve system reliability and operability. The transmission alternatives were based on four transmission line solutions identified in the 2016 SEMA-RI solution study. The study identifies the need for two new sources of transmission into the load pocket to avoid voltage collapse and load loss. The Proponents compared the transmission alternatives based on cost, reliability, potential environmental impacts and delivery timeframes.

Alternative 1 consisted of the installation of a new underground cable extending approximately five miles from the Bristol Substation in Rhode Island to a proposed switching station (Boyd's Landing

Switching Station) in Portsmouth, Rhode Island. Alternative 1 requires the permitting and construction of 4.4 miles of underground cable through relatively densely developed roadways, installation of approximately 0.6 mile of undersea cable (beneath Mount Hope Bay adjacent to Mount Hope Bay Bridge), construction of a new switching station, and reconductoring of approximately 5.1 miles of existing overhead transmission lines (F-184).

Alternative 2 consisted of separating the N12 and M13 double circuit transmission ("DCT") lines between the Somerset Substation and the Sykes Road Switching Station (approximately 1.75 miles) via construction of a new primarily underground M13 Line. Alternative 2 would require the acquisition of new property rights, construction of a new major overhead crossing of the Taunton River (adjacent to the existing N12 and M13 DCT Lines beginning at NEP's Somerset Substation), and construction of a new underground cable within city roadways. Alterantive 2 would also require reconductoring of the existing N12 and M13 Lines between the Sykes Road Switching Station and the Bell Rock Substation. For these reasons, Alternative 2 was dismissed.

Alternative 3 involved the installation of a new line extending approximately 3.5 miles (underground for 1.7 miles and overhead for 1.8 miles) from the Somerset Substation in Somerset to the Bell Rock Substation in Fall River. The majority of this transmission line would be constructed underground due to the lack of available space along the existing N12 and M13 Lines ROW. Alternative 3 would require both the construction of approximately 3.5 miles of underground cable within city streets, and if feasible, the reconfiguration and reconstruction of two existing overhead transmission lines and structures from the Sykes Road Switching Station to the Bell Rock Substation, in an attempt to accommodate a third overhead transmission line within the same congested ROW.

The Preferred Alternative consists of the installation of a new line (approximately 12 miles long) extending Line 114 from the Industrial Park Tap in Acushnet to the existing Bell Rock Substation in Fall River. Capacitor banks would need to be installed at the Bell Rock, High Hill and Wing Lane Substations to support voltages under contingency conditions. The AFRRP is preferable to the other three alternatives with respect to its ability to meet the ISO-NE identified need with less risk because of engineering feasibility, constructability and a reduction in the amount of construction required on existing infrastructure.

Land Alteration

As described in the EENF, the project involves the new alteration of approximately 28.62 acres of land associated with the expansion of the Bell Rock Substation, clearing of ROW for the construction of the AFFRP and access road construction and improvements. Land uses surrounding the Bell Rock Substation site primarily consist of forest (69.4%), forested wetland (11.9%), non-forested wetland and water (less than 1%) and utilities (18.2%). Land uses along the AFRRP project primarily consist of forest (61.5%) and utilities (14.5%) and also include pasture, forested and non-forested wetlands, industrial, water, transportation and residential uses. Since the Substation and AFRRP are located entirely within existing transmission line ROW, permanent impacts to adjacent land uses will be minimized. Because acquisition of additional ROW is not required, the AFRRP is not expected to change or significantly impact land uses within the ROW or the adjacent lands.

Wetlands and Waterways

The project will result in direct impacts to BVW, Riverfront Area, Bank, LUW and BLSF which are largely unavoidable because of the location of the ROWs. Wetland resources overlap in many instances (e.g., BVW and Riverfront Area) and may be accounted for multiple times. Approximately 313,427 sf of impacts to BVW are temporary and are associated with the use of swamp maps during the construction period. An additional 40,952 sf of permanent fill is associated with the construction of the Bell Rock Substation and AFRRP transmission line structures. Approximately 94,710 sf of BVW will be converted from forested wetlands to scrub shrub wetlands due to tree clearing.

Phase 1 of the project is anticipated to result in unavoidable temporary and permanent impacts to vegetated wetland resources within the North Watuppa Pond/Reservoir watershed. There are no streams within the Project area and the reservoir itself is not located within 400 feet of the project. Construction of the AFRRP is anticipated to result in unavoidable temporary impacts to vegetated wetland resources within the Copicut Reservoir and North Watuppa Pond watersheds. Temporary wetland impacts within 400 feet of the Copicut Reservoir are also unavoidable due to the proximity of the AFRRP ROW to the northern end of the reservoir. Although the placement of temporary construction mats is proposed within 400 feet of the Copicut Reservoir, the Proponent does not anticipate that a variance will be required based on preliminary coordination with the MassDEP Office of Water Resources.

The Conservation Commissions in Acushnet, New Bedford, Dartmouth, and Fall River will review the project to determine its consistency with the Wetlands Protection Act (WPA), the Wetlands Regulations (310 CMR 10.00), and associated performance standards, including the Stormwater Management Standards (SMS). The project is proposed as a Limited Project under the WPA (310 CMR 10.53(3)(d)). MassDEP will review the project to determine its consistency with the Waterways Regulations (310 CMR 9.00) and the 401 WQC Regulations (314 CMR 9.00). ACOE will review the project to determine its consistency with Section 404 of the Federal CWA.

Climate Change Adaptation and Resiliency

The EENF included information from the Massachusetts Sea Level Rise and Coastal Flooding Viewer for the Bell Rock Substation Rebuild Project and AFRRP areas. As indicated by the map viewer, the National Ocean and Atmospheric Administration's January 2013 sea level rise data indicates that both the Bell Rock Substation Rebuild Project and the AFRRP are located outside the inland extent of inundation projected from a 0- to 6-foot rise in sea level above current mean higher high water mark. The proposed Bell Rock Substation Rebuild Project and AFRRP will reinforce the system reliability in the SEMA-RI region and provide a more robust transmission system in the area of need. The new transmission line conductors are designed to operate at higher temperatures at a higher carrying capacity. The transmission line structures and substation equipment are designed to operate under extreme weather conditions and fluctuations in air temperatures.

The EENF notes that both phases of the project alleviate vulnerabilities of the electrical grid by improving reliability and upgrading infrastructure. The EENF indicates that the Bell Rock Substation Rebuild Project and the installation of the AFRRP transmission line are consistent with the reliability strategies included in the EEA 2011 Climate Change and Adaptation Report in the following ways:

- Provides a new 115 kV source into the load pocket.

- Incorporates new design standards and the latest in design materials.
- Provides needed upgrades to existing electric transmission infrastructure.
- Provides the shortest project delivery time to meet the identified need.
- Minimizes impacts to the natural and social environments because the proposed improvements are located within existing utility substation sites and ROWs.
- Provides a stronger electrical transmission system that is vital to the area's safety, security and economic prosperity.
- Meets growing transmission needs identified by the ISO-NE and supports future growth and forecasted demand within the SEMA-RI area.
- Improves the capability of the existing transmission system to move power more reliably into load centers.
- Improves the efficiency of the transmission system by eliminating loop flows between the Bell Rock and Tiverton Substations.

Rare Species

As described in comments from NHESP, portions of the Project site are mapped as *Priority* and *Estimated Habitat* for multiple state-listed species, including Eastern Box Turtle (*Terrapene carolina*), Eastern Whip-poor-will (*Caprimulgus vociferus,*), Long-leaved Panic-Grass (*Panicum rigidulum ssp. pubescens*), Weak Rush (*Juncus debilis*), Rigid Flax (*Linum medium var texanum*) and Philadelphia Panic-grass (*Panicum philadelphicum ssp. pPhiladelphicum*) according to the *Massachusetts Natural Heritage Atlas* (14th Edition). Phase 1 work is associated with 2.9 acres of disturbance of rare species habitat, 1.3 acres of which is considered temporary. Comments from NHESP indicate that Phase 1 of the project must be conditioned to avoid a prohibited Take of Eastern Box Turtle. Conditions include the implementation of an approved turtle protection plan during construction. Specific mitigation measures recommended by the NHESP are still being evaluated through the consultation process.

The NHESP's review of Phase 2 of the project remains ongoing. Based on information submitted by the Proponent, NHESP anticipates that Phase 2 of the project will likely result in a Take of the Eastern Box Turtle. The project may also result in a take of Long-leaved Panic-grass and Rigid Flax. NHESP is working with the Proponent to assess temporary and permanent impacts and determine if a Take of state-listed plants can be avoided through project redesign.

Traffic and Transportation

As described in the EENF, the AFRRP requires the installation of overhead wires across state roadways by a non-municipal utility and will therefore require a Permit to Access State Highways from MassDOT. The corridor crosses Routes 18 and 140 in New Bedford. The installation could temporarily affect traffic flow but does not involve physical modification of the roadway or roadway ROW.

Historic and Archaeological Resources

Both phases of the project are subject to review under Section 106 of the National Historic Preservation Act of 1966 (36 CFR 800) and by MHC in compliance with M.G.L. c.9 ss.26-27C as amended by Chapter 254 of the Acts of 1988. MHC review is typically undertaken concurrently with Section 106 Review through consultation with the ACOE. As described in the EENF, an intensive

(locational) archaeological survey has been completed for Phase 1 of the project. No significant historic or archaeological resources have been identified. No further survey is recommended for Phase 1 of the project.

Intensive (locational) archaeological surveys are ongoing for Phase 2 of the project. The Proponent will continue to coordinate with ACOE and MHC regarding avoidance of adverse effects associated to any eligible historic and archaeological resources.

Construction

The EENF included a description of NEP and Eversource's policies for minimizing construction related disturbances. Restoration efforts, including removal of construction debris, final grading, stabilization of disturbed soil, and installation of permanent sediment control devices (water bar/diversion channel/rock ford), will be completed following construction. All disturbed areas around structures and other graded locations will be seeded with an appropriate conservation seed mixture and/or mulched to stabilize the soils in accordance with applicable regulations. Temporary sediment control devices will be removed following the stabilization of disturbed areas. Existing walls and fences will be restored. Where authorized by property owners, permanent gates and access road blocks will be installed at key locations to restrict access onto the ROWs by unauthorized persons or vehicles. Regulated environmental resource areas that are temporarily disturbed by construction will be restored in accordance with applicable permit conditions to pre-construction conditions.

Conclusion

The EENF included supporting documentation that identified various project alternatives, potential environmental impacts, described the purpose of the project, and proposed mitigation measures to justify the request for a Single EIR. Although the AFRRP will ultimately terminate at the Bell Rock Substation and will eventually provide a connection for Line 114, the reconstruction of the substation is severable from the AFRRP because the main purpose of the project is to accommodate the bifurcation of the M13 line. In addition, Phase 1 will reduce the risk of thermal overloading and transmission contingency voltage collapse prior to review and construction of the AFRRP. Based on review of the EENF and consultation with State Agencies, I have proposed to grant a Phase 1 Waiver for Bell Rock Substation and to allow the Proponent to submit a Single EIR for the AFRRP.

SCOPE

General

The Single EIR should follow Section 11.07 of the MEPA regulations for outline and content, as modified by this scope.

Project Description and Permitting

The Single EIR should include a detailed description of the proposed project and describe any changes to the project since the filing of the EENF and any proposed phasing of the AFRRP. The

project description should identify individual components of the project and identify environmental impacts associated with each component. The Single EIR should include updated site plans as necessary to reflect modifications to infrastructure design, access roadways, wetland impact areas, and mitigation areas. The Single EIR should provide a brief description and analysis of applicable statutory and regulatory standards and requirements, and a description of how the project will meet those standards. The Single EIR should include a list of required State Agency Permits, Financial Assistance, or other State approvals and provide an update on the status of each of these pending actions. The Single EIR should clarify whether Phase 1 of the project will be permitted separately from the AFRRP. The Single EIR should include an update on the federal permitting process, including coordination efforts and anticipated compliance with regulatory and permitting standards and mitigation requirements. In addition, it should summarize consultation regarding impacts to archaeological resources.

The Single EIR should identify the applicable standards set by the Massachusetts Department of Public Utilities (DPU) or other applicable regulatory agencies that govern the required minimum distances between structures, transmission lines and related equipment, vegetation management requirements, and other design criteria to inform evaluation of whether the Proponent has demonstrated that it will avoid, minimize and mitigate Damage to the Environment to the maximum extent practicable.

Land Alteration

The Single EIR should describe construction access and individually identify the amount of land alteration in upland and wetland areas associated with access, swamp mat placement, work pads, and tree clearing for each component of the project. The EENF indicates that the project will require clearing along areas of the ROW. The Single EIR should clearly identify on project plans the extent of proposed clearing within along access roadways (permanent or temporary), within upland portions of these access roadways, and along the ROW itself. The Single EIR should discuss how the ROW and access routes will be maintained over time to limit encroachment by vegetation (native or invasive), limit impacts to habitat and wildlife, and identify the type and frequency of maintenance activities. The Single EIR should discuss the implementation of measures to limit unauthorized access to the permanent access roadways by off-highway vehicles. The Single EIR should also discuss the Proponent's policies and procedures for notifying municipalities and property owners about proposed clearing and vegetation management along the ROW in conjunction with the project.

The Single EIR should characterize the type of land clearing proposed (i.e., stump removal and grinding, use of wood chips, etc.), selective retention of low-growth vegetation, and invasive species removal. The type and extent of restoration efforts should be clearly described and identified on project plans.

As noted earlier, portions of the ROW abut land owned by DCR, DFG and municipal conservation land and the Southeastern Massachusetts Bioreserve. If the AFRRP Project requires access for construction vehicles across the Bioreserve or DCR's Acushnet Cedar Swamp State Reservation, then a DCR Construction and Access Permit will be required. As described in DCR's comments, land ownership in the Bioreserve along the ROW is a fairly complicated mix of municipal land, DCR/DFG conservation restrictions, and DCR or DFG conservation lands. DCR requests that the Single EIR

include a clarification of land ownership along the portion of the Eversource ROW that passes through the Bioreserve and an explanation of potential construction and access needs.

Rare Species

Projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a Conservation and Management Permit (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species.

The Single EIR should provide an update of meetings and/or correspondence with NHESP which identify project impacts and measures to avoid, minimize and mitigate impacts to Priority and Estimated Habitat for state-listed species including any habitat management plan or other mitigation measures. The Single EIR should identify any design revisions or conditions adopted to prevent a Take of state-listed species habitat.

Wetlands and Stormwater

As noted previously, the project will result in unavoidable impacts to wetlands resource areas. The project includes wetland resource areas and activities that trigger both Federal, State and local wetland permitting jurisdiction, each with its own performance standards and regulations. The Single EIR should demonstrate that the project will avoid, minimize or mitigate wetland resource area impacts to the maximum extent practicable. It should clearly outline a comprehensive wetland mitigation program that meets ACOE, MassDEP, and local bylaw requirements and performance standards. This mitigation program should include construction period measures, post-construction period monitoring and restoration, and measures to promote wildlife habitat and to remove/prevent the establishment of invasive species.

Comments from MassDEP indicate that a c. 91 authorization for the area infrastructure, License No. 4374, was issued on October 3, 1960). Some project elements may qualify as Activities Not Requiring a License pursuant to 310 CMR 9.05(3), and if requested by the Proponent the Department will exercise its discretionary authority to review and potentially approve such, usually through a Minor Modification Request, pursuant to 310 CMR 9.22(3). Otherwise, any new transmission line or other project element not located within an existing Right of Way (ROW) that is located in, on, over or under a c. 91 jurisdictional area may require a c. 91 License pursuant to the Waterways Regulations at 310 CMR 9.0.

The Single EIR should identify the cumulative amount of permanent impact and temporary wetland alteration for each municipality in a tabular format, identify the project's consistency with the WPA, identify proposed wetland replication amounts and locations, and demonstrate compliance with 401 WQC standards at 314 CMR 9.06 that require the project to avoid, minimize, and mitigate the placement of fill in BVW. Wetland replication areas should be designed consistent with the MassDEP

Inland Wetlands Replication Guidance document. The Single EIR should specifically discuss how the locations of replacement or new utility structures were determined to avoid wetland impacts while meeting engineering requirements of utility pole span and conductor clearance.

The Single EIR should identify the location of proposed compensatory flood storage to mitigate fill within BLSF. The Single EIR should clarify how the project will meet the performance standards for redevelopment within RFA. If applicable, the Single EIR should include the results of a Wildlife Habitat Evaluation completed pursuant to the Wetlands Regulations (310 CMR 10.60) and the procedures and methods detailed in MassDEP's *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands.*

The Single EIR should identify impacts to wetland resource areas (i.e. associated with use of swamp mats and general construction activities) that will be subject to ACOE review. ACOE regulations and guidance categorize wetland impacts as either permanent (fill), temporary (disturbance), or secondary. The Single EIR should identify applicable ACOE performance standards and regulations to assist in determining the potential overlap or conflict with State wetland permitting requirements. The Single EIR should include a narrative and supporting data or graphics as necessary to demonstrate that the project can meet all applicable performance standards and regulations. If these standards and regulations cannot be met, the Single EIR should describe how construction of the project may otherwise proceed (i.e., a variance, etc.). The Single EIR should include an update on coordination with various regulatory agencies and stakeholders undertaken since the filing of the EENF.

The Single EIR should discuss how the use of swamp mats will be effectively managed to limit permanent impacts to wetland resource areas. The Single EIR should discuss measures the Proponent will implement to prevent the introduction of invasive species into the ROW such as washing swamp mats prior to installation. The Single EIR should describe how construction sequencing will be conducted to minimize impacts to wetland resource areas. The Single EIR should describe potential monitoring and mitigation (i.e., supplemental plantings, regrading, etc.) efforts to ensure that wetlands will not be permanently impacted and to limit the likelihood of repopulation with invasive species. Any proposed mitigation program should include a discussion of how pre-construction grades and natural wetland vegetation will be restored. The Single EIR should include a discussion of providing a vegetative buffer at roadway crossings.

The Single EIR should evaluate potential impacts from stormwater runoff during construction and post-construction. It should demonstrate that source controls, pollution prevention measures, erosion and sedimentation control measures, and any required post-construction drainage system will be designed in compliance with Stormwater Management Standards of the Wetlands Regulations. The Single EIR should consider use of low impact development (LID) measures as applicable.

The Single EIR should address MassDEP's comments regarding the requirement for c. 91 licensing unless crossings over jurisdictional areas are associated with a bridge or are located underground. The Single EIR should indicate if the Proponent will request that MassDEP exercise its discretionary authority to review and approve project elements which qualify as Activities Not Requiring a License. The Proponent should consult with MassDEP prior to filing the Single EIR and the Single EIR should provide an update.

Traffic and Transportation

The Single EIR should identify jurisdictional roadway crossings and provide an update on any consultation with MassDOT. The Single EIR should include a draft Traffic Management Plan for review by MassDOT. The Proponent and MassDOT should coordinate appropriate times, length and management of roadway shutdowns to limit impacts to travelers.

Climate Change Adaptation and Resiliency

The Single EIR should discuss potential effects of climate change on the project in the context of improving reliability and resiliency of the transmission system. The Single EIR should identify any potential impacts and address how the project will be designed to adapt to and/or sustain such impacts. To assist in this evaluation, the Proponent should review the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan at www.resilientma.com and review data available through the Climate Change Clearinghouse for the Commonwealth. (https://www.mass.gov/files/documents/2018/10/26/SHMCAP-September2018-Full-Plan-web.pdf)

Greenhouse Gas Emissions

The project is subject to the MEPA Greenhouse Gas Policy and Protocol (GHG Policy) because it exceeds thresholds for a mandatory EIR. The GHG Policy includes a de minimus exemption for projects that will produce minimal amounts of GHG emissions. Given the nature of the project, I have concluded that this project falls under the de minimus exemption; therefore, the Proponent is not required to prepare a GHG analysis. The Proponent should continue to incorporate measures to avoid and minimize GHG emissions (and other air pollutants) during the construction period.

Historic and Archaeological Resources

The Single EIR should provide an update on the project's potential impacts to historical and archaeological resources and the outcome of any consultations with ACOE and MHC. The Single EIR should describe additional field work or surveys and the development of avoidance and mitigation plans.

Construction Period

The project must comply with MassDEP's Solid Waste and Air Pollution Control regulations, pursuant to M.G.L. c.40, s.54. The Single EIR should discuss the use of alternative types of equipment for the construction of all, or part, of the project that may serve to reduce overall wetland impacts (e.g., smaller low-pressure equipment, etc.). The Single EIR should clearly identify the proposed locations of both permanent and temporary (i.e., construction period only) access roads to and within the ROW. The Single EIR should identify existing access routes which may require maintenance and improvements to facilitate equipment movement, including the placement of gravel to provide a level surface within the access route and clearing or pruning of overgrown vegetation. The Single EIR should discuss how temporary access routes will be restored to original conditions subsequent to the conclusion of the construction period. The Single EIR should clarify if restoration of temporary access roads will be limited to those within wetland resource areas or if it will also include roads within the 100-foot buffer

zone to BVW. The Single EIR should describe how phasing of the project may be developed to avoid, minimize or mitigate Damage to the Environment. The construction schedule and project phasing should be included in the Single EIR and, as appropriate, mitigation associated with each phase should be identified.

I strongly encourage the Proponent to incorporate construction and demolition (C&D) recycling activities as a sustainable measure for the project, as allowed.

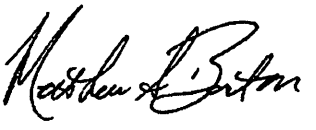
Mitigation and Section 61 Findings

The Single EIR should include a separate chapter summarizing proposed mitigation measures. This chapter should include draft Section 61 Findings for each State Agency that will issue permits for the project. The Single EIR should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Responses to Comments/Circulation

The Single EIR should contain a copy of this Certificate and a copy of each comment letter received. In order to ensure that the issues raised by commenters are addressed, the Single EIR should include direct responses to comments to the extent that they are within MEPA jurisdiction. This directive is not intended, and shall not be construed, to enlarge the scope of the Single EIR beyond what has been expressly identified in this certificate.

The Proponent should circulate the Single EIR to those parties who commented on the EENF, to any State Agencies from which the Proponent will seek permits or approvals, and to any additional parties specified in section 11.16 of the MEPA regulations. A copy of the Single EIR should be made available for review at the Acushnet, Dartmouth, Fall River and New Bedford public libraries.



December 28, 2018
Date

Matthew A. Beaton

Comments received:

12/14/2018 Massachusetts Historical Commission (MHC)
12/21/2018 Massachusetts Department of Conservation and Recreation (DCR)
12/21/2018 Massachusetts Department of Environmental Protection – Southeast Regional Office (MassDEP – SERO)
12/21/2018 Massachusetts Division of Fisheries and Wildlife – Natural Heritage and Endangered Species Program (NHESP)

MAB/EFF/eff

dcr
Massachusetts

December 21, 2018

Secretary Matthew A. Beaton
Executive Office of Environmental Affairs
Attn: Erin Flaherty, MEPA Office
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: EOEEA #15941 Bell Rock Substation Rebuild Project & the Acushnet to Fall River Reliability Project (AFRRP)

Dear Secretary Beaton:

The Department of Conservation and Recreation ("DCR" of "Department") is pleased to submit the following comments in response to the Expanded Environmental Notification Form ("EENF") submitted by New England Power Company d/b/a National Grid ("NEP") and NSTAR Electric Company d/b/a Eversource Energy ("Eversource") (together, the "Proponent") for the Bell Rock Substation Rebuild Project and the Acushnet to Fall River Reliability Project (the "Project").

As described in the EENF, the Project will expand and upgrade the existing Bell Rock Substation that lies within NEP's existing 2.75-acre substation easement. The Project will also improve electric transmission reliability in approximately 12.1 miles of Eversource rights of way ("ROW") in Acushnet, Fall River, Dartmouth, and New Bedford (the "AFRRP Project"). New transmission line structures and overhead conductors and wires will be installed along the southern portion of the ROWs parallel to the existing overhead transmission lines.

A portion of the AFRRP Project runs through the Southeastern Massachusetts Bioreserve ("Bioreserve"). The Commonwealth owns or holds conservation restrictions upon portions of the Bioreserve, through DCR and the Department of Fish and Game ("DFG"), including public conservation land that surrounds stretches of an Eversource ROW totaling approximately 1.65 miles. The AFRRP Project also runs through or abuts approximately 1.0 mile of DCR's Acushnet Cedar Swamp State Reservation. This Reservation was designated as a National Natural Landmark by the National Park Service in 1971. The Project may require a Construction and Access Permit from DCR.

DCR submits the following comments in response to the EENF:

Construction and Access

DCR appreciates the Proponent's outreach in advance of EENF submission to open communication with DCR staff and initiate clarification of land ownership considerations. The Proponent is seeking a Phase One Waiver to allow the Bell Rock Substation Rebuild Project to proceed in advance of filing a Single Environmental Impact Report ("SEIR"). The easement for the substation site is within the City of Fall

Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston MA 02114-2119
617-626-1250 617-626-1351 Fax
www.mass.gov/orgs/department-of-conservation-recreation

Charles D. Baker
Governor

Karyn E. Polito
Lt. Governor

Matthew A. Beaton, Secretary, Executive
Office of Energy & Environmental Affairs

Leo Roy, Commissioner
Department of Conservation & Recreation

River and within an area subject to a conservation restriction that the Commonwealth, through DCR and DFG, holds on a portion of the Fall River Watershed lands. However, the substation easement was granted and recorded (many years) prior to the effective date of the conservation restriction and, therefore, is not subject to the terms and conditions of the conservation restriction.

If the AFRRP Project will include access for construction vehicles across DCR Bioreserve land or DCR's Acushnet Cedar Swamp State Reservation, then a DCR Construction and Access Permit will be required. Land ownership in the Bioreserve along the Eversource ROW is a fairly complicated mix of City, DCR/DFG conservation restrictions, and DCR or DFG conservation lands. DCR requests that the SEIR include a clarification of land ownership along the portion of the Eversource ROW that passes through the Bioreserve and an explanation of potential construction and access needs as described above.

DCR notes and appreciates the ongoing collaboration between the Proponent and the Bioreserve managing partners related to installation and maintenance of gates in key locations to mitigate unauthorized access by off-highway vehicles.

Ecological Considerations

Much of the Eversource ROW that passes through the Bioreserve and the Acushnet Cedar Swamp State Reservation is recognized by the Massachusetts Natural Heritage and Endangered Species Program ("NHESP") as Priority Habitat for Rare Species. There are also a number of vernal pools within the ROW or immediately adjacent to it, and wetland resource areas are common throughout. That being said, the Bioreserve managing partners note that the Proponent has properly utilized Best Management Practices for wetland crossings and other environmental considerations during previous projects in this area, and we appreciate the good stewardship efforts. The EENF indicates that the Proponent is in communication with the NHESP related to the protection of vernal pools and other rare species habitat. DCR requests that the Single EIR include a summary of rare species occurrence (consistent with public disclosure guidelines) and related protection strategies for the stretches of the Eversource ROW that pass through jointly held DCR / DFG Bioreserve and the Acushnet Cedar Swamp State Reservation.

Utility corridors in general provide a pathway for invasive species to become established. DCR requests that the SEIR include a section on Best Management Practices related to preventing the spread of invasive species, and protocols for post-construction monitoring and treatment.

Thank you for the opportunity to comment on the EENF. If you have questions related to our comments, please contact Andy Backman, Director of Regional Planning, at 617-626-1342.

Sincerely,

Leo P. Roy
Commissioner

cc Andy Backman, Tom LaRosa, Nat Tipton

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

December 21, 2018

Mathew A. Beaton,
Secretary of Environment and Energy
Executive Office of Environmental Affairs
ATTN: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: EENF Review EOEEA #15941. ACUSHNET to FALL RIVER. Bell Rock Substation Rebuild & F River Reliability Project at 181 Bell Rock Road and existing transmission ROW in Acushnet, New Bedford, Dartmouth and Fall River (AFRRP)

Dear Secretary Beaton,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Environmental Notification Form (ENF) for the proposed Bell Rock Substation Rebuild & Fall River Reliability Project at 181 Bell Rock Road and existing transmission ROW in Acushnet, New Bedford, Dartmouth and Fall River (AFRRP), Massachusetts (EOEEA # 15941). The Project Proponent provides the following information for the Project:

The proposed Bell Rock Substation Rebuild Project involves the rebuild and expansion of the existing Bell Rock Substation located in Fall River, Massachusetts, the bifurcation of the existing M13 line, and the termination of the resulting M13N and M13S Lines.

The existing transmission line ROW within which the new AFRRP will be installed extends from the Industrial Park Tap to the existing Bell Rock Substation (approximately 12.1 miles) traversing the towns of Acushnet, New Bedford, Dartmouth, and Fall River

The addition of the new AFRRP transmission line will be consistent with the current use of the existing utility ROW. Based on preliminary engineering, of the 118 new structures required for the overhead transmission line, 79 will be direct embed steel pole H frame structures, four will be steel pole H frame structures on concrete foundations, 25 will be direct embed steel single-pole (also referred to as monopole), supplemented by seven monopole and three triple-pole (dead-end and angle) structures requiring reinforced concrete foundations to support heavy loads (refer to Figure 2-5 in Appendix A).

The new structures will range in height from approximately 55 to 110 feet. The structures will support aluminum steel reinforced conductors both in horizontal and vertical configurations. One 3/8-inch extra high strength steel shield wire and one optical ground wire ("OPGW") will be installed to support high speed relaying and communications requirements. Typical cross-sections of the ROW showing existing and proposed structure size and placement are provided in the Figure 2-6 in Appendix A.

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.
TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep

Printed on Recycled Paper

Clearing will be required within the NEP ROW for a distance of approximately 4.2 miles to expand the cleared ROW width approximately 60 feet to the south side of the ROW, and within one span (between Structures 7-8) on the Eversource ROW in order to accommodate the new line. All tree clearing and vegetation removal is to occur within the boundaries of the existing ROWs.

Bureau of Water Resources Comments

Wetlands Comments. The Wetlands Program has reviewed the EENF for the proposed Bell Rock Substation Rebuild Project and the Acushnet to Fall River Reliability Project and offers the following comments. As of this date, the Program has not received Notices of Intent pursuant to M.G.L. c. 131 § 40. The proposed Project will require local Orders of Conditions from the Acushnet, Dartmouth, Fall River and New Bedford Conservation Commissions and a 401 Water Quality Certification from MassDEP. No work can occur within Areas of Jurisdiction until a Final Order and a 401 Water Quality Certificate is issued.

The ENF indicates that the Project is being proposed as a limited Project under 310 CMR 10.53. There are proposed temporary and permanent alterations to Bordering Vegetated Wetland (BVW) (7.2 acres temporary, 3.11 acres permanent), Inland Bank (202 lf temporary, 625 lf permanent), Bordering Land Subject to Flooding (2.11 acres temporary, 285 sf permanent) and Riverfront Area (1.13 acres temporary, 0.17 acre permanent). Per 310 CMR 10.53, in determining whether to exercise discretion to approve the limited Project, the following factors should be considered: the magnitude of the alteration and the significance of the Project site to the interests identified in M.G.L. c. 131 § 40, the availability of reasonable alternatives to the proposed activity, the extent to which adverse impacts are minimized, and the extent to which mitigation measures, including replication or restoration, are provided to contribute to the protection of the interests identified in M.G.L. c. 131 § 40.

A 401 Water Quality Certification application is required per 314 CMR 9.04 and is subject to the Criteria for Evaluation of Applications for the Discharge of Dredged or Fill Material in 314 CMR 9.06 and the requirements of 314 CMR 4.00. An alternatives analysis that demonstrates measures taken to avoid, minimize and mitigate for the dredging and placement of fill must be submitted with the 401 Water Quality Certificate Application. Although there are limited Project provisions in the Wetlands Regulations, the 401 Water Quality Certification Regulations do not contain any such provision. The 401 Regulations state, "No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will avoid and minimize potential adverse impact to bordering or isolated wetlands, land under water or ocean, or the intertidal zone. For discharges to bordering or isolated wetlands, such steps shall include a minimum of 1:1 restoration or replication." If restoration or replication of the lost BVW is not possible, then the Project Proponent may seek a Variance pursuant to 314 CMR 9.08.

The Wetlands Program notes that the proposed Project is within Estimated Habitat of several species and that copies of the Notices of Intent must be sent to the Natural Heritage and Endangered Species Program for their review for compliance with the state-listed rare species protection provisions of the Massachusetts Endangered Species Act, 321 CMR 10.00.

The ENF indicates that a Wildlife habitat evaluation was completed pursuant to 310 CMR 10.60 and the procedures and methods detailed in MassDEP's Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands.

The proposed Project is subject to the Massachusetts Stormwater Standards therefore the Proponent must demonstrate compliance with the DEP Stormwater Management Regulations, 310 CMR 10.05(6)(b) and (k-q).

Waterways Comments. The Waterways Program has reviewed the Expanded ENF (ENF) and after performing a cursory review of its data-base, has found a prior Chapter 91 authorization for the area infrastructure, License No. 4374 (issued October 3, 1960).

Some Project elements may qualify as Activities Not Requiring a License pursuant to 310 CMR 9.05(3), and if requested by the Proponent the Department will exercise its discretionary authority to review and potentially approve such, usually through a Minor Modification Request, pursuant to 310 CMR 9.22(3).

Otherwise, any new transmission line or other Project element not located within an existing Right of Way (ROW) that is located in, on, over or under a Chapter 91 jurisdictional area may require a Chapter 91 License pursuant to the Waterways Regulations at 310 CMR 9.0.

As indicated in the ENF, the Waterways Program will work with the Proponent to discuss Chapter 91 jurisdictional questions and provide guidance to achieve regulatory authorizations.

Construction Stormwater Permit. The Project construction activities are scheduled to disturb 28.62 acres of land and therefore, may require a NPDES Stormwater Permit for Construction Activities. The Proponent can access information regarding the NPDES Stormwater requirements and an application for the Construction General Permit at the EPA website:
https://www.epa.gov/sites/production/files/2017-07/documents/cgp_flow_chart_do_i_need_a_permit2.pdf

Bureau of Waste Site Cleanup Comments
EENF #15941 – Based upon the information provided, the Bureau of Waste Site Cleanup (BWSC) searched its databases for disposal sites and release notifications that have occurred at or might impact the proposed Project area. A disposal site is a location where there has been a release to the environment of oil and/or hazardous material that is regulated under M.G.L. c. 21E, and the Massachusetts Contingency Plan [MCP – 310 CMR 40.0000].

The proposed Project involves twelve miles of new overhead transmission line within existing right-of-ways across four towns. Please be advised that there are many listed BWSC disposal sites located within the proposed Project area. Many of the sites have been closed under the MCP, but many other disposal sites are open and require continued response actions under the MCP. A listing and discussion of each MCP site will not be presented here.

Interested parties may view a map showing the location of BWSC disposal sites using the MassGIS data viewer (Oliver) at: http://maps.massgis.state.ma.us/map_ol/oliver.php Under "Available Data Layers" select "Regulated Areas", and then "DEP Tier Classified 21E Sites". The compliance status and report submittals for specific MCP disposal sites may be viewed using the BWSC Waste Sites/Reportable Release Lookup at: https://eeaonline.eea.state.ma.us/portal#!/search/wastesite

The Project Proponent is advised that if oil and/or hazardous material are identified during the implementation of this Project, notification pursuant to the Massachusetts Contingency Plan (310

CMR 40.0000) must be made to MassDEP, if necessary. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render appropriate opinions. The LSP may evaluate whether risk reduction measures are necessary if contamination is present. The BWSC may be contacted for guidance if questions arise regarding cleanup

Bureau of Air and Waste Comments:

Air Quality. Construction and operation activities shall not cause or contribute to a condition of air pollution due to dust, odor or noise. To determine the appropriate requirements please refer to:

- 310 CMR 7.09 Dust, Odor, Construction, and Demolition
- 310 CMR 7.10 Noise

GHG Emissions Comments: If the Project involves the use of Gas Insulated Switchgear (GIS), the Proponent must follow the state (310 CMR 7.72) and federal regulations to reduce sulfur hexaflouride (SF6) emissions from that switchgear.

Construction-Related Measures. MassDEP requests that all non-road diesel equipment rated 50 horsepower or greater meet EPA's Tier 4 emission limits, which are the most stringent emission standards currently available for off-road engines. If a piece of equipment is not available in the Tier 4 configuration, then the Proponent should use construction equipment that has been retrofitted with appropriate emissions reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified, or MassDEP-approved diesel oxidation catalysts (DOCs) or Diesel Particulate Filters (DPFs). The Proponent should maintain a list of the engines, their emission tiers, and, if applicable, the best available control technology installed on each piece of equipment on file for Departmental review.

Spills Prevention. A spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction activities should be presented to workers at the site and enforced. The plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases.

Massachusetts Idling Regulation. MassDEP reminds the Proponent that unnecessary idling (i.e., in excess of five minutes), with limited exception, is not permitted during the construction and operations phase of the Project (310 CMR 7.11). With regard to construction period activity, typical methods of reducing idling include driver training, periodic inspections by site supervisors, and posting signage. In addition, to ensure compliance with this regulation once the Project is occupied, MassDEP requests that the Proponent install permanent signs limiting idling to five minutes or less on-site.

Solid Waste Comments: As a result of its review of the Environmental Notification Form (ENF) for the Bell Rock Substation Rebuild & Acushnet To Fall River Reliability Projects EEA No. 15941 (Project or Site), the Massachusetts Department of Environmental Protection Solid Waste Management Section (Solid Waste) is providing the following comments regarding the management of solid waste/recyclable and asbestos containing materials in accordance with; 310 CMR 16.00: *Site Assignment Regulations for Solid Waste Facilities*, 310 CMR 19.000: *Solid Waste Management* (Solid Waste Regulations) and 310 CMR 7.15: *Asbestos Regulations*.

Asbestos Comments:

- Building Demolition and Asbestos Containing Waste Material: The proposed Project appears to include the demolition of buildings and other structures which may contain asbestos. The Project

Proponent is advised that demolition activity must comply with both Solid Waste and Air Quality Control regulations. Please note that MassDEP promulgated revised Asbestos Regulations (310 CMR 7.15) that became effective on June 20, 2014. The new regulations contain requirements to conduct a pre-demolition/renovation asbestos survey by a licensed asbestos inspector and post abatement visual inspections by a licensed asbestos Project monitor. The Massachusetts Department of Labor and Work Force Development, Division of Labor Standards (DLS) is the agency responsible for licensing and regulating all asbestos abatement contractors, designers, Project monitors, inspectors and analytical laboratories in the state of Massachusetts.

- In accordance with the revised Asbestos Regulations at **310 CMR 7.15(4),** any owner or operator of a facility or facility component that contains suspect asbestos containing material (ACM) shall, prior to conducting any demolition or renovation, employ a DLS licensed asbestos inspector to thoroughly inspect the facility or facility component, to identify the presence, location and quantity of any ACM or suspect ACM and to prepare a written asbestos survey report. As part of the asbestos survey, samples must be taken of all suspect asbestos containing building materials and sent to a DLS certified laboratory for analysis, using USEPA approved analytical methods.
- If ACM is identified in the asbestos survey, the Proponent must hire a DLS licensed asbestos abatement contractor to remove and dispose of any asbestos containing material(s) from the facility or facility component in accordance with **310 CMR 7.15**, prior to conducting any demolition or renovation activities. The removal and handling of asbestos from the facility or facility components must adhere to the Specific Asbestos Abatement Work Practice Standards required at **310 CMR 7.15(7)**. The Proponent and asbestos contractor will be responsible for submitting an ***Asbestos Notification Form ANF-001*** to MassDEP at least ten (10) working days prior to beginning any removal of the asbestos containing materials as specified at **310 CMR 7.15(6).**
- The Proponent shall ensure that all asbestos containing waste material from any asbestos abatement activity is properly stored and disposed of at a landfill approved to accept such material in accordance with **310 CMR 7.15 (17).** The Solid Waste Regulations at **310 CMR 19.061(3)** lists the requirements for any solid waste facility handling or disposing of asbestos waste. Pursuant to **310 CMR 19.061(3) (b) 1,** no asbestos containing material; including VAT, asphaltic-asbestos felts or shingles; may be disposed at a solid waste combustion facility.
- In accordance with the Air Quality Regulations at **310 CMR 7.09(2),** the Proponent must submit a ***BWP AQ 06 Notification Prior to Construction or Demolition*** form to MassDEP for any construction or demolition of an industrial, commercial or institutional building or residential building with 20 or more dwelling units at least ten (10) working days prior to initiation of said construction or demolition Project. The Proponent should propose measures to prevent or alleviate dust, noise, and odor nuisance conditions, which may occur during the demolition.

Solid Waste Comments:

- All waste materials generated during the Project that are determined to be solid waste (e.g., construction and demolition waste) and/or recyclable material (e.g., wood, metal, asphalt, brick, and concrete) shall be disposed, recycled, and/or otherwise handled in accordance with the Solid Waste Regulations: including 310 CMR 19.017: *Waste Bans.*

- Asphalt, brick and concrete (ABC) rubble, such as the rubble generated by the demolition of buildings must be handled in accordance with Massachusetts solid waste regulations. These regulations allow, and MassDEP encourages, the recycling/reuse of ABC rubble. The Proponent should refer to MassDEP's Information Sheet, entitled "Using or Processing Asphalt pavement,

Brick and Concrete Rubble, revised February 27, 2017", that answers commonly asked questions about ABC rubble and identifies the provisions of the solid waste regulations that pertain to recycling/reusing ABC rubble.

This policy can be found on-line at the MassDEP website:
https://www.mass.gov/files/documents/2018/03/19/abc-rubble.pdf

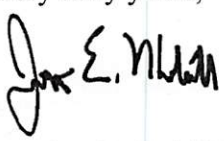
Please contact Cynthia Baran at (508) 946-2887 if you should have any questions pertaining to the Asbestos program comments or Mark Dakers at (508) 946-2847 with any questions pertaining to the Department's comments on solid waste management.

Proposed s.61 Findings

The "Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form" may indicate that this Project requires further MEPA review and the preparation of an Environmental Impact Report. Pursuant to MEPA Regulations 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the Project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

The MassDEP Southeast Regional Office appreciates the opportunity to comment on this proposed Project. If you have any questions regarding these comments, please contact George Zoto at (508) 946-2820.

Very truly yours,



Jonathan E. Hobill,
Regional Engineer,
Bureau of Water Resources

JH/GZ

Cc: DEP/SERO

ATTN: Millie Garcia-Serrano, Regional Director
David Johnston, Deputy Regional Director, BWR
Gerard Martin, Deputy Regional Director, BWSC
Jennifer Viveiros, Deputy Regional Director, ADMIN
Bernadette DeBlander, Wetlands and Waterways, BWR
Carlos Fragata, Wetlands and Waterways, BWR
Jim Mahala, Chief, Wetlands and Waterways, BWR
Mark Dakers, Chief, Solid Waste Management, BWR
Doug Coppi, Solid Waste Management, BWR

Holly Johnson, Regulatory & Permit Ombudsman/Commissioners Office
Allen Hemberger, Site Management, BWSC

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DEC 14 2018
MEPA

December 11, 2018

Secretary Matthew A. Beaton
Executive Office of Energy & Environmental Affairs
Attn: Erin Flaherty, MEPA Unit
100 Cambridge Street, Suite 900
Boston, MA 02114

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

RE: New England Power Company d/b/a National Grid and NSTAR Electric Company d/b/a Eversource Energy Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project, Acushnet, New Bedford, Dartmouth and Fall River, MA. MHC #RC.58972 and RC.64212. **EEA #15941**.

Dear Secretary Beaton:

Staff of the Massachusetts Historical Commission (MHC) have reviewed the Expanded Environmental Notification Form (EENF) submitted for the projects referenced above. The MHC has reviewed the Bell Rock Substation aspect of the overall project since 2015 (MHC #RC.58972). The MHC has previously reviewed the Acushnet to Fall River Reliability Project (AFRRP) as the Line 114 Transmission Line Extension Project (MHC #RC.64212). The projects require review and permitting by federal agencies. The MHC, as the Massachusetts State Historic Preservation Office, is a consulting party with federal agencies for the project pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800).

As noted in EENF Section 8.0, historic properties identification efforts have been ongoing for both project aspects. Historic properties identification efforts for the AFRRP have not yet been completed. Intensive (locational) survey has been conducted by POWER Engineers for the Bell Rock Substation. Intensive (locational) archaeological survey and archaeological site examinations have been and continue to be conducted by the PAL, Inc., for the AFRRP. The MHC looks forward to reviewing the results of archaeological site examinations at six identified archaeological sites within the AFRRP project impact area, and to consultation to avoid, minimize or mitigate adverse effects to significant historic and archaeological resources.

Staff of the MHC reviewed the archaeological report and archaeological report addendum reporting the results of the intensive (locational) archaeological surveys conducted within the Bell Rock Substation by POWER Engineers, including the M13 Bypass aspect of the project. The archaeological surveys yielded no historic or archaeological resources. Since no significant historic or archaeological resources were identified, no further survey is recommended for the Bell Rock Substation aspect of the project, as proposed.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 , as amended (36 CFR 800), Massachusetts General Laws, Chapter 9, Sections 26-27C (950 CMR 70-71), and MEPA (301 CMR 11). If you have any questions concerning this review, please contact Jonathan K. Patton, at this office.

Sincerely,

Brona Simon

Brona Simon
Executive Director
State Historic Preservation Officer
State Archaeologist
Massachusetts Historical Commission

xc: Erin Whoriskey, National Grid
Mitch Zylich, Eversource
Jamie Durand, POWER Engineers
Barbara Newman, USACOE-NED
Kate Atwood, USACOE-NED
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Jamie Donta, POWER Engineers
Deborah C. Cox, PAL, Attn: Jenifer Elam

MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

December 21, 2018

Matthew A. Beaton, Secretary
Executive Office of Energy and Environmental Affairs
Attention: MEPA Office
Erin Flaherty, EEA No. 15941
100 Cambridge St.
Boston, Massachusetts 02114

Project Name:	*Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project*
Proponent:	*New England Power Company d/b/a National Grid and NSTAR Electric Company d/b/a Eversource Energy*
Location:	*181 Bell Rock Road (Bell Rock Substation), Fall River and existing Right-of-way: Acushnet, New Bedford, Dartmouth, Fall River*
Project Description:	*Expand Bell Rock Substation, Widen NEP ROW and install 12mi of 115kV overhead transmission line to Acushnet*
Document Reviewed:	*Expanded Environmental Notification Form*
EEA File Number:	*15941*
NHESP Tracking No.:	*18-37556*

Dear Secretary Beaton:

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife (the Division) has reviewed the *Expanded Environmental Notification Form* (EENF) for the "*Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project*" (the Project) and would like to offer the following comments regarding state-listed species and their habitats.

Portions of the Project site are mapped as *Priority* and *Estimated Habitat* for multiple state-listed species, including Eastern Box Turtle (*Terrapene carolina*; Special Concern), Eastern Whip-poor-will (*Caprimulgus vociferus*, Special Concern), Long-leaved Panic-Grass (*Panicum rigidulum ssp. pubescens*; Threatened), Weak Rush (*Juncus debilis*, Endangered), Rigid Flax (*Linum medium var texanum*, Threatened) and Philadelphia Panic-grass (*Panicum philadelphicum ssp. Philadelphicum*, Special Concern) according to the *Massachusetts Natural Heritage Atlas* (14th Edition). These species and their habitats are protected pursuant to the Massachusetts Endangered Species Act (MGL c.131A) and its implementing regulations (MESA; 321 CMR 10.00). Fact Sheets for state-listed species can be found on our website, www.mass.gov/nhesp.

The Project, as proposed and shown on the site plans (Appendix A of the EENF), will occur in two phases. The first phase (Phase 1) includes expansion of the Bell Rock Substation footprint, access roadway installation and improvements, and temporary reroute of the M13 transmission, totaling approx. 2.9 acres of disturbance, 1.3 acres of which is temporary. The second phase (Phase 2) is the Acushnet to Fall River Reliability Project which is a joint NEP and Eversource project for the installation of a new 12.1

mile transmission line requiring widening on the NEP right-of-way. NEP and Eversource have been consulting proactively with the Division to refine total impacts associated with Phase 2 of the Project. The Division recently determined that that Phase 1 of the Project, as proposed, must be conditioned in order to avoid a prohibited Take of Eastern Box Turtle. Conditions included the implementation of an approved turtle protection plan during construction.

However, the Division's review of Phase 2 pursuant to the MESA remains ongoing. Based on previously submitted information and ongoing consultations with the Proponent, the Division anticipates –that Phase 2 of the Project, as proposed, will likely result in a Take (321 CMR 10.18 (2)(b)) of the Eastern Box Turtle. Based on botanical surveys completed by the Proponent pursuant to Division-approved protocols, the Project may also result in a Take of Long-leaved Panic-Grass and Rigid Flax. The Division is currently working with the Proponent to assess temporary and permanent impacts and determine if a Take of state-listed plants can be avoided through Project redesign.

Projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a Conservation and Management Permit (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species.

The Proponent is coordinating with the Division to assess alternative strategies for avoiding, minimizing and mitigating impacts of Phase 2 to state-listed species and their habitats. Although the details of the long-term net benefit required under a CMP have not yet been finalized, the Division anticipates being able to resolve any outstanding concerns related to state-listed species during the MESA review process. We look forward to continued coordination with the Proponent to ensure that the Project addresses all permitting requirements related to state-listed species.

The Division will not render a final decision until the MEPA review process and associated public and agency comment period is completed, and until all required MESA filing materials are submitted to the Division. As the MESA review for Phase 2 of the Project remains ongoing, no alteration to the soil, surface, or vegetation and no work associated with Phase 2 shall occur until the Division has made a final decision relative to the CMP. If you have any questions or need additional information, please contact Lauren Glorioso, Endangered Species Review Biologist, at lauren.glorioso@state.ma.us or 508-389-6361. We appreciate the opportunity to comment on the Project.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

cc: Erin Whoriskey, National Grid
Mickael Zylich, Eversource
Jamie Durand, POWER
Karen Hanecak, POWER
MassDEP Southeast Regional Office
Town of Acushnet Board of Selectmen
Town of Acushnet Planning Board
Town of Acushnet Conservation Commission
Town of New Bedford Board of Selectmen
Town of New Bedford Planning Board
Town of New Bedford Conservation Commission
Town of Dartmouth Board of Selectmen
Town of Dartmouth Planning Board
Town of Dartmouth Conservation Commission
Town of Fall River Board of Selectmen
Town of Fall River Planning Board
Town of Fall River Conservation Commission

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Matthew A. Beaton
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1081
http://www.mass.gov/eea

December 28, 2018

DRAFT RECORD OF DECISION

PROJECT NAME	: Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project
PROJECT MUNICIPALITY	: Acushnet, New Bedford, Dartmouth and Fall River
PROJECT WATERSHED	: Buzzards Bay and Narragansett Bay
EEA NUMBER	: 15941
PROJECT PROPONENT	: New England Power d/b/a National Grid and NSTAR Electric
DATE NOTICED IN MONITOR	: November 21, 2018

Pursuant to the Massachusetts Environmental Policy Act (MEPA, M.G.L.c.30, ss. 61-62I) and Section 11.11 of the MEPA regulations (301 CMR 11.00), I have reviewed the Expanded Environmental Notification Form (EENF) and hereby **propose to grant** a Phase 1 Waiver that will allow the reconstruction and expansion of the Bell Rock Substation, as described in the EENF, to proceed to permitting prior to completion of the Single Environmental Impact Report (EIR).

Project Description

As described in the Expanded Environmental Notification Form (EENF), Phase 1 of the project consists of the reconstruction and expansion of the Bell Rock Substation located in Fall River. A new 2,304-square foot (sf) substation will be constructed entirely within an existing easement. The footprint of the existing substation yard will be expanded by approximately 22,000 sf. The substation is being reconstructed to accommodate two line connections from the existing M13 line (M13N and M13S) into the substation. To accommodate the two line

terminations, the substation needs to be expanded into a breaker-and-a-half-configuration.[1] The expansion will provide eleven breakers in a breaker-and-a-half configuration that will continue to connect the N12, L14 and D21 Lines and provide new line positions in order to connect the M13N and M13S Lines. The expansion will also accommodate the future connection to Line 114 associated with Phase 2 of the project.

Phase 2 of the project consists of the Acushnet to Fall River Reliability Project (AFRRP) which is a joint endeavor by New England Power (NEP) and Eversource. The AFRRP will extend the Line 114 from the Industrial Park Tap in Acushnet, Massachusetts to the reconstructed Bell Rock Substation in Fall River, Massachusetts. The AFRRP includes the installation of new transmission line structures, overhead conductors and wires along 12.1 miles of the southern portion of an existing Right-of-Way (ROW) parallel to several other existing lines. Approximately 118 new structures are required for the overhead transmission line. Seventy-nine of the structures will be direct-embedded steel pole H-frames, four will be steel pole H-frame structures on concrete foundations, 25 will be direct-embedded steel monopoles which will be supplemented by seven monopole and three triple-pole structures requiring reinforced concrete foundations. The new structures will range in height from approximately 55 to 110 feet.

Clearing will be required within the ROW for a distance of approximately 4.2 miles. The cleared ROW width will be expanded approximately 60 feet to the south and within one span between Structures 7-8 (approximately 36,000 sf) in order to accommodate the new line. All tree clearing and vegetation removal is to occur within the boundaries of the existing ROWs.

The Bell Rock Substation reconstruction and the AFRRP will eliminate the potential widespread voltage collapse and loss of load across 17 municipalities by providing an additional transmission source and voltage support at the Bell Rock Substation and several other substations including the Wing Land and High Hill Substations. The need for the project was identified in the New England Independent System Operator (ISO-NE) Southeastern and Rhode Island Area 2026 Solutions study.

Project Site

The approximately 294.75-acre project site consists entirely of existing ROWs owned by New England Power (NEP) and Eversource. The AFRRP project extends from the Industrial Park Tap 12.1 miles to Bell Rock Substation. The 2.75-acre Bell Rock Substation is located on the east side of Bell Rock Road in Fall River and at the junction of the existing D21, L14, N12, and M13 transmission lines. The M13 line crosses over the substation but does not currently connect into the substation.

The approximately 7.9 miles of the AFRRP traversing Acushnet, New Bedford and Dartmouth are located within Eversource's service territory and the approximately 4.2 miles traversing Fall River are within NEP's service territory. A portion of the AFRRP project runs

[1] This configuration ensures that each transmission line has its own breaker and shares a breaker with another line which allows a breaker-and-a-half to perform any necessary switching.

through the Southeastern Massachusetts Bioreserve. The Commonwealth owns or holds conservation restrictions on portions of the Bioreserve, through the Massachusetts Department of Conservation and Recreation (DCR) and the Massachusetts Department of Fish and Game (DFG), including public conservation land that surrounds the ROW. The AFRRP project also runs through or abuts approximately 1 mile of DCR's Acushnet Cedar Swamp State Reservation. The substation site and transmission line ROW includes mapped *Priority and/or Estimated Habitat* as mapped by the Massachusetts Division of Fisheries and Wildlife's (DFW) Natural Heritage and Endangered Species Program (NHESP).

Environmental Impacts and Mitigation

As described in the EENF, potential environmental impacts associated with the Phase 1 project include: include the new alteration of approximately 1 acre of land and impacts to 6,611 sf of BVW, of which 3,599 sf are permanent. Phase 1 of the project will also impact 2.9 acres of rare-species habitat, of which 1.9 acres if temporary.

Measures to avoid minimize and mitigate Damage to the Environment include compensatory wetland mitigation for unavoidable impacts to wetlands, streams and other resources, the use of erosion control measures (ECMs) and implementation of turtle protection measures during construction. Best management practices (BMPs) will be implemented to minimize and mitigate stormwater runoff. NHESP recently determined that that Phase 1 of the Project, as proposed, must be conditioned in order to avoid a prohibited Take of Eastern Box Turtle. Conditions included the implementation of an approved turtle protection plan during construction.

Jurisdiction and Permitting

The entire project is undergoing MEPA review and requires the preparation of a mandatory Environmental Impact Report pursuant to 301 CMR Section 11.03 (3)(a)(1)(a) of the MEPA regulations because it requires State Agency Actions and it involves the alteration of more than one acre of BVW. Phase 1 of the project exceeds the ENF threshold at 11.03(3)(b)(1)(c) and11.03(3)(b)(1)(d): alteration of 1,000 or more sf of outstanding resource waters and alteration of 5,000 or more sf of BVW. It does not exceed a mandatory EIR threshold. Phase 1 of the project will require a Section 401 Water Quality Certification (WQC) and may require Chapter 91 Authorization from the Massachusetts Department of Environmental Protection (MassDEP) and review under the Massachusetts Endangered Species Act (MESA). The project may require a Construction Access Permit from the DCR

Request for a Phase 1 Waiver

The Proponent submitted an EENF in support of its request for a Phase 1 Waiver, which would allow the Phase 1 project to proceed prior to completion of the EIR for the entire project. The EENF identified the environmental impacts of the project, including Phase 1, and described measures to be undertaken by the Proponent to avoid, minimize, and mitigate Damage to the Environment. The Waiver request was discussed at the MEPA scoping session for the project and addressed in comment letters. Consistent with requirements for a Phase 1 Waiver request,

the EENF was subject to an extended 30-day public comment period. In addition, the Proponent requested an additional two-week extension at the request of commenters. The comment period closed on December 21, 2018.

Standards for All Waivers

The MEPA regulations at 301 CMR 11.11(1) state that I may waive any provision or requirement in 301 CMR 11.00 not specifically required by MEPA and may impose appropriate and relevant conditions or restrictions, provided that I find that strict compliance with the provision or requirement would:

(a) result in an undue hardship for the Proponent, unless based on delay in compliance by the Proponent; and
(b) not serve to avoid or minimize Damage to the Environment.

Determinations for a Phase 1 Waiver

The MEPA regulations at 301 CMR 11.11(4) state that, in the case of a partial waiver of a mandatory EIR review threshold that will allow the proponent to proceed with Phase 1 of the project prior to preparing an EIR, I shall base the finding required in accordance with 301 CMR 11.11(1)(b) on a determination that:

(a) the potential environmental impacts of Phase 1, taken alone, are insignificant;
(b) ample and unconstrained infrastructure facilities and services exist to support Phase 1;
(c) the project is severable, such that Phase 1 does not require the implementation of any other future phase of the project or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized or mitigated; and
(d) the agency action(s) on Phase 1 will contain terms such as a condition or restriction, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to commencement of any other phase of the project.

Findings

Based upon the information provided during MEPA review, consultation with State Agencies, and review of public comments, I find that the Waiver Request has merit and that the Proponent has demonstrated that Phase 1 meets the standards for all waivers at 301 CMR 11.11(1). The EENF included supporting documentation that identified various project alternatives, potential environmental impacts, described the purpose of the project, and proposed mitigation measures to justify the request for a Phase 1Waiver and a Single EIR. Although the AFRRP will ultimately terminate at the Bell Rock Substation and will eventually provide a connection for Line 114, the reconstruction of the substation is severable from the AFRRP because the main purpose of the project is to accommodate the bifurcation of the M13 line. In addition, Phase 1 will reduce the risk of thermal overloading and transmission contingency voltage collapse prior to review and construction of the AFRRP. Based on review of the EENF and consultation with State Agencies, I have proposed to grant a Phase 1 Waiver for Phase 1 of the project and to allow the Proponent to submit a Single EIR for the AFRRP.

In accordance with 301 CMR 11.11(4), the latter finding is based on my determination that:

1. The potential environmental impacts of Phase 1, taken alone, are insignificant.

The environmental impacts associated with Phase 1 have adequately been evaluated in the EENF. Several substation design configurations have been evaluated in an attempt to minimize wetland impacts and reduce overall environmental impacts to the maximum extent possible. The Proponents are working with NHESP to avoid a prohibited Take of state-listed species habitat through the implementation of an approved turtle management plan.

2. Ample and unconstrained infrastructure facilities and services exist to support Phase 1.

The site currently supports a two breaker substation located at the junction of the existing D21, L14, N12 and M13 transmission lines which has been in operation since the 1960's. The station is accessed from a public road in Fall River. The Proponents are able to plan and schedule line outages or non-re-closure assurances, as necessary, to de-energize certain equipment at the station to allow for construction to proceed within the station yard.

3. The project is severable, such that Phase 1 does not require the implementation of any other future phase of the project or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized or mitigated.

The Phase 1 project can function independently without the remaining development phases. Phase 1 does not require the implementation of remaining development phases or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized, or mitigated.

4. The Agency Action(s) on Phase 1 will contain terms such as a condition or restriction, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to commencement of any other phase of the project.

The EENF states that the Proponent participated in pre-application meetings with MassDEP, NHESP, DCR, City of Fall River officials, and the ACOE. Based on these meetings, the EENF indicates that the Bell Rock Substation Rebuild Project could be approved and separately permitted in advance of the review and approval of the AFRRP permits.

Given the foregoing, and subject to the conditions included herein, I find that a requirement to complete MEPA review prior to undertaking Phase 1 is not necessary to demonstrate that the Proponent will avoid, minimize, and mitigate potential Damage to the Environment to the maximum extent practicable, and that a requirement to do so would therefore cause undue hardship and would not serve to minimize Damage to the Environment.

Conclusion

Based on these findings, I have determined that this waiver request has merit, and am issuing this DROD, which will be published in the next edition of the Environmental Monitor on January 9, 2019 in accordance with 301 CMR 11.15(2), which begins the public comment period. The public comment period will last for 14 days and will end on January 23, 2019. Based on written comments received on the DROD, I shall issue a Final Record of Decision (FROD) or a Scope within seven days after the close of the public comment period, in accordance with 301 CMR 11.15(6).

December 28, 2019
Date

Matthew A. Beaton

Comments received:

12/14/2018	Massachusetts Historical Commission (MHC)
12/21/2018	Massachusetts Department of Conservation and Recreation (DCR)
12/21/2018	Massachusetts Department of Environmental Protection – Southeast Regional Office (MassDEP – SERO)
12/21/2018	Massachusetts Division of Fisheries and Wildlife – Natural Heritage and Endangered Species Program (NHESP)

MAB/EFF/eff

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Matthew A. Beaton
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1081
http://www.mass.gov/eea

January 25, 2018

FINAL RECORD OF DECISION

PROJECT NAME	: Bell Rock Substation Rebuild Project and Acushnet to Fall River Reliability Project
PROJECT MUNICIPALITY	: Acushnet, New Bedford, Dartmouth and Fall River
PROJECT WATERSHED	: Buzzards Bay and Narragansett Bay
EEA NUMBER	: 15941
PROJECT PROPONENT	: New England Power d/b/a National Grid and NSTAR Electric
DATE NOTICED IN MONITOR	: January 9, 2019

Pursuant to the Massachusetts Environmental Policy Act (MEPA, M.G.L.c.30, ss. 61-62I) and Section 11.11 of the MEPA regulations (301 CMR 11.00), I have reviewed the Expanded Environmental Notification Form (EENF) and hereby **grant** a Phase 1 Waiver to allow the reconstruction and expansion of the Bell Rock Substation, as described in the EENF, to proceed to permitting prior to completion of the Single Environmental Impact Report (EIR).

Project Description

As described in the Expanded Environmental Notification Form (EENF), Phase 1 of the project consists of the reconstruction and expansion of the Bell Rock Substation located in Fall River. A new 2,304-square foot (sf) substation will be constructed entirely within an existing easement. The footprint of the substation yard will be expanded by approximately 22,000 sf. The substation is being reconstructed to accommodate two line connections from the existing M13 line (M13N and M13S) into the substation. To accommodate the two line terminations, the

substation needs to be expanded into a breaker-and-a-half-configuration.[1] The expansion will provide eleven breakers in a breaker-and-a-half configuration that will continue to connect the N12, L14 and D21 Lines and provide new line positions in order to connect the M13N and M13S Lines. The expansion will also accommodate the future connection to Line 114 associated with Phase 2 of the project.

Phase 2 of the project consists of the Acushnet to Fall River Reliability Project (AFRRP) which is a joint endeavor by New England Power (NEP) and Eversource. The AFRRP will extend the Line 114 from the Industrial Park Tap in Acushnet, Massachusetts to the reconstructed Bell Rock Substation in Fall River, Massachusetts. The AFRRP includes the installation of new transmission line structures, overhead conductors and wires along 12.1 miles of the southern portion of an existing Right-of-Way (ROW) parallel to several other existing lines. Approximately 118 new structures are required for the overhead transmission line. Seventy-nine of the structures will be direct-embedded steel pole H-frames, four will be steel pole H-frame structures on concrete foundations, 25 will be direct-embedded steel monopoles which will be supplemented by seven monopole and three triple-pole structures requiring reinforced concrete foundations. The new structures will range in height from approximately 55 to 110 feet.

Clearing will be required within the ROW for a distance of approximately 4.2 miles. The cleared ROW width will be expanded approximately 60 feet to the south and within one span between Structures 7-8 (approximately 36,000 sf) in order to accommodate the new line. All tree clearing and vegetation removal is to occur within the boundaries of the existing ROWs.

The Bell Rock Substation reconstruction and the AFRRP will eliminate the potential widespread voltage collapse and loss of load across 17 municipalities by providing an additional transmission source and voltage support at the Bell Rock Substation and several other substations including the Wing Land and High Hill Substations. The need for the project was identified in the New England Independent System Operator (ISO-NE) Southeastern and Rhode Island Area 2026 Solutions study.

Project Site

The approximately 294.75-acre project site consists entirely of existing ROWs owned by New England Power (NEP) and Eversource. The AFRRP project extends from the Industrial Park Tap 12.1 miles to Bell Rock Substation. The 2.75-acre Bell Rock Substation is located on the east side of Bell Rock Road in Fall River and at the junction of the existing D21, L14, N12, and M13 transmission lines. The M13 line crosses over the substation but does not currently connect into the substation.

The approximately 7.9 miles of the AFRRP traversing Acushnet, New Bedford and Dartmouth are located within Eversource's service territory and the approximately 4.2 miles traversing Fall River are within NEP's service territory. A portion of the AFRRP project runs

[1] This configuration ensures that each transmission line has its own breaker and shares a breaker with another line which allows a breaker-and-a-half to perform any necessary switching.

through the Southeastern Massachusetts Bioreserve. The Commonwealth owns or holds conservation restrictions on portions of the Bioreserve, through the Massachusetts Department of Conservation and Recreation (DCR) and the Massachusetts Department of Fish and Game (DFG), including public conservation land that surrounds the ROW. The AFRRP project also runs through or abuts approximately 1 mile of DCR's Acushnet Cedar Swamp State Reservation. The substation site and transmission line ROW includes mapped *Priority and/or Estimated Habitat* as mapped by the Massachusetts Division of Fisheries and Wildlife's (DFW) Natural Heritage and Endangered Species Program (NHESP).

Environmental Impacts and Mitigation

As described in the EENF, potential environmental impacts associated with the Phase 1 project include: include the new alteration of approximately 1 acre of land and impacts to 6,611 sf of BVW, of which 3,599 sf are permanent. Phase 1 of the project will also impact 2.9 acres of rare-species habitat, of which 1.9 acres if temporary.

Measures to avoid minimize and mitigate Damage to the Environment include compensatory wetland mitigation for unavoidable impacts to wetlands, streams and other resources, the use of erosion control measures (ECMs) and implementation of turtle protection measures during construction. Best management practices (BMPs) will be implemented to minimize and mitigate stormwater runoff. NHESP recently determined that that Phase 1 of the Project, as proposed, must be conditioned in order to avoid a prohibited Take of Eastern Box Turtle. Conditions included the implementation of an approved turtle protection plan during construction.

Jurisdiction and Permitting

The entire project is undergoing MEPA review and requires the preparation of a mandatory Environmental Impact Report pursuant to 301 CMR Section 11.03 (3)(a)(1)(a) of the MEPA regulations because it requires State Agency Actions and it involves the alteration of more than one acre of BVW. Phase 1 of the project exceeds the ENF threshold at 11.03(3)(b)(1)(c) and11.03(3)(b)(1)(d): alteration of 1,000 or more sf of outstanding resource waters and alteration of 5,000 or more sf of BVW. It does not exceed a mandatory EIR threshold. Phase 1 of the project will require a Section 401 Water Quality Certification (WQC) and may require Chapter 91 Authorization from the Massachusetts Department of Environmental Protection (MassDEP) and review under the Massachusetts Endangered Species Act (MESA). The project may require a Construction Access Permit from the DCR

Request for a Phase 1 Waiver

The Proponent submitted an EENF in support of its request for a Phase 1 Waiver, which would allow the Phase 1 project to proceed prior to completion of the EIR for the entire project. The EENF identified the environmental impacts for both phases of the project and described measures to be undertaken by the Proponent to avoid, minimize, and mitigate Damage to the Environment. The Waiver request was discussed at the MEPA scoping session for the project and addressed in comment letters. Consistent with requirements for a Phase 1 Waiver request,

the EENF was subject to an extended 30-day public comment period. The comment period closed on December 21, 2018.

Standards for All Waivers

The MEPA regulations at 301 CMR 11.11(1) state that I may waive any provision or requirement in 301 CMR 11.00 not specifically required by MEPA and may impose appropriate and relevant conditions or restrictions, provided that I find that strict compliance with the provision or requirement would:

(a) result in an undue hardship for the Proponent, unless based on delay in compliance by the Proponent; and
(b) not serve to avoid or minimize Damage to the Environment.

Determinations for a Phase 1 Waiver

The MEPA regulations at 301 CMR 11.11(4) state that, in the case of a partial waiver of a mandatory EIR review threshold that will allow the proponent to proceed with Phase 1 of the project prior to preparing an EIR, I shall base the finding required in accordance with 301 CMR 11.11(1)(b) on a determination that:

(a) the potential environmental impacts of Phase 1, taken alone, are insignificant;
(b) ample and unconstrained infrastructure facilities and services exist to support Phase 1;
(c) the project is severable, such that Phase 1 does not require the implementation of any other future phase of the project or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized or mitigated; and
(d) the agency action(s) on Phase 1 will contain terms such as a condition or restriction, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to commencement of any other phase of the project.

Findings

Based upon the information provided during MEPA review, consultation with State Agencies, and review of public comments, I find that the Waiver Request has merit and that the Proponent has demonstrated that Phase 1 meets the standards for all waivers at 301 CMR 11.11(1). The EENF included supporting documentation that identified various project alternatives, potential environmental impacts, described the purpose of the project, and proposed mitigation measures to justify the request for a Phase 1Waiver and a Single EIR. Although the AFRRP will ultimately terminate at the Bell Rock Substation and will eventually provide a connection for Line 114, the reconstruction of the substation is severable from the AFRRP because the main purpose of the project is to accommodate the bifurcation of the M13 line. In addition, Phase 1 will reduce the risk of thermal overloading and transmission contingency voltage collapse prior to review and construction of the AFRRP.

In accordance with 301 CMR 11.11(4), the finding is based on my determination that:

1. The potential environmental impacts of Phase 1, taken alone, are insignificant.

The environmental impacts associated with Phase 1 have been evaluated adequately in the EENF. Several substation design configurations have been evaluated in an attempt to minimize wetland impacts and reduce overall environmental impacts to the maximum extent possible. The Proponents are working with NHESP to avoid a prohibited Take of state-listed species habitat through the implementation of an approved turtle management plan. Impacts and measures to avoid, minimize and mitigate impacts are summarized in the Environmental Impacts section of this FROD and included in the EENF.

2. Ample and unconstrained infrastructure facilities and services exist to support Phase 1.

The site supports a two breaker substation located at the junction of the existing D21, L14, N12 and M13 transmission lines which has been in operation since the 1960's. The station is accessed from a public road in Fall River. The Proponents will plan and schedule line outages or non-re-closure assurances, as necessary, to de-energize certain equipment at the station to allow for construction to proceed within the station yard.

3. The project is severable, such that Phase 1 does not require the implementation of any other future phase of the project or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized or mitigated.

The Phase 1 project can function independently. Phase 1 does not require the implementation of remaining development phases or restrict the means by which potential environmental impacts from any other phase of the project may be avoided, minimized, or mitigated.

4. The Agency Action(s) on Phase 1 will contain terms such as a condition or restriction, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to commencement of any other phase of the project.

The EENF states that the Proponent participated in pre-application meetings with MassDEP, NHESP, DCR, City of Fall River officials, and the ACOE. Based on these meetings, the EENF indicates that the Bell Rock Substation Rebuild Project could be approved and separately permitted in advance of the review and approval of the AFRRP permits. State Permits for Phase 1 will require the Proponent to comply with MEPA for the AFRRP prior to commencement of the AFRRP.

Given the foregoing, I find that a requirement to complete MEPA review prior to undertaking Phase 1 is not necessary to demonstrate that the Proponent will avoid, minimize, and mitigate potential Damage to the Environment to the maximum extent practicable, and that a requirement to do so would therefore cause undue hardship and would not serve to minimize Damage to the Environment.

Conclusion

Based on these findings, I have determined that this waiver request has merit. A DROD was issued on December 28, 2019, and was published in the *Environmental Monitor* on January 9, 2019 in accordance with 301 CMR 11.15(2), which began the public comment period. The public comment period lasted for 14 days and concluded on January 23, 2019. Accordingly, I hereby **grant** a Phase 1 Waiver that will allow the reconstruction and expansion of the Bell Rock Substation, as described in the EENF, to proceed to permitting prior to completion of the Single Environmental Impact Report (EIR).

January 25, 2019
Date

Matthew A. Beaton

Comments received:

None.

MAB/EFF/eff

APPENDIX 2-1 SOUTHEASTERN MASSACHUSETTS AND RHODE ISLAND AREA 2026 SOLUTIONS STUDY, REVISION 1

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Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study, Revision 1

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Transmission Planning

MARCH 2017

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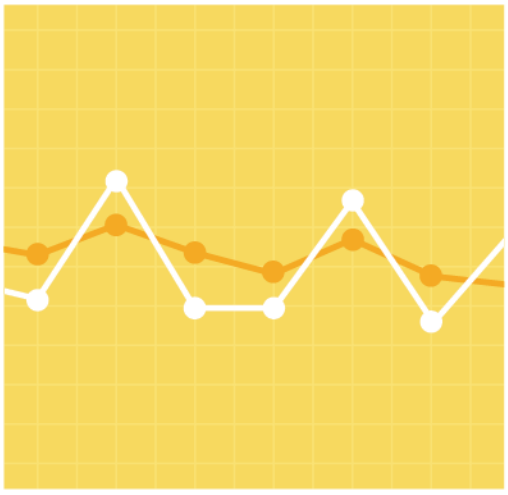

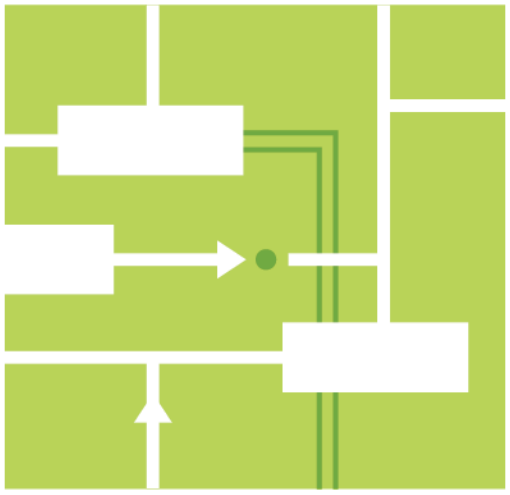



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Section 1
Executive Summary

1.1 Needs Assessment Results and Problem Statement

The objective of Southeastern Massachusetts and Rhode Island (SEMA-RI) Needs Assessment study was to evaluate the reliability performance and identify reliability-based transmission needs in the SEMA-RI study area for the year 2026 while considering the following:

- Future load growth
- Reliability over a range of generation patterns and transfer levels
- Limited short circuit margin in the SEMA-RI area
- Coordination with plans in Boston, Northeastern Massachusetts and Eastern Connecticut
- Existing and Forward Capacity Market-cleared supply resources
- All applicable North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Corporation (NPCC) and ISO New England (ISO-NE) transmission planning reliability standards

The 2026 Needs Assessment[1] was a follow-up to the 2022 Needs Assessment for this study area. The 2022 Needs Assessment PAC presentation[2] identified a number of criteria violations in the SEMA-RI area.

The 2026 Needs Assessment used the following study assumptions:

- 2026 summer peak 90/10 peak load based on the 2015 CELT report: 35,310 for New England
- All future transmission projects with Proposed Plan Application (PPA) approval as of the May 2015 Regional System Plan (RSP) Project Listing
- The Aquidneck Island Reliability Projects (RSP ID: 1669, 1670, and 1671) were included because they are located in the SEMA-RI study area and could eliminate potential needs
- All future generation projects with a Capacity Supply Obligation (CSO) as of Forward Capacity Auction #9 (FCA #9)
- Two significant new resources in the study area that received obligations in FCA #10, QP 449 and QP 489
- All Demand Resources (DR) cleared in FCA #9. In addition, any accepted Non-Price Retirement (NPR) requests or DR and any DR terminations in SEMA-RI for FCA #10 were also taken into account
- Forecasted energy efficiency (EE) through 2026 based on the 2015 CELT forecast
- Transfer levels
    - High East-West with High North-South
    - High West-East with Low North-South
    - High West-East with Medium North-South
- Generation dispatch scenarios included one or two relevant generation units out-of-service

[1] https://smd.iso-ne.com/operations-services/ceii/pac/2016/05/final_sema_ri_needs_assessment_report.pdf

[2] https://smd.iso-ne.com/planning/ceii/reports/2010s/archive/sema_ri_area_needs_assessment_critical_load_level_analysis.pdf

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(OOS) combined with different New York – New England transfer stresses.

Results of the N-0 testing identified there was one thermal criteria violation and no voltage criteria violations.

Results of the N-1 testing identified one 345/115 kV element and twenty-nine 115 kV elements that were found to be overloaded under N-1 outage conditions. Additionally there were nine 115 kV buses that were found to have voltage violations under N-1 outage conditions.

Results of the N-1-1 testing identified a substantial number of thermal and voltage violations in the study area, including the subareas of Farnum, West Medway/West Walpole, South Shore, Industrial Park, Somerset/Newport, Cape Cod and Boston Area. The majority of N-1-1 violations could not be addressed by operational adjustments including existing Special Protection Systems (SPSs) or generation re-dispatch.

The critical load level for the majority of criteria violations in the 2026 Needs Assessment are prior to the 2016 summer peak.

Transmission needs identified have been deemed time-sensitive if they have a year of need within three years of the completion of this Needs Assessment and met the requirements of Section 4.1(j) of the Tariff.[3] Since the publishing date of this Needs Assessment occurred before June 1, 2016, the threshold for determining time-sensitive needs has been determined to be any issues that occur before the 2019 summer peak. See Section 9, Appendix A for a listing of time-sensitive and non-time-sensitive needs.

Short circuit results from the Needs Assessment indicate there were no over-duty circuit breakers in the study area. Overall results of short circuit testing indicated that there were a total of thirteen 345 kV circuit breakers and five 115 kV circuit breakers that could see fault current levels over 95% of their interrupting capability.

1.2 Recommended Solution

The preferred solution alternatives are comprised of several solution components as shown in Table 1-1. A more detailed description of each component can be found in Section 5.3.1 and the station one line diagrams of the preferred solution components can be found in Section 16, Appendix H.

Table 1-1: SEMA-RI Solution Components

ID	Solution Components
1	Grand Army 115 kV GIS switching station and loop the existing E-183E, F-184, X3 and W4 lines into the station
2	Upgrades at Brayton Point (new 115 kV breaker, new 345/115 kV transformer and upgrades to E-183E, F-184 station equipment)
3	Increase clearances on E-183E & F-184 lines between Brayton Point & Grand Army (~1.5 miles each)
4	Separate X3/W4 DCT and reconductor X3, W4 lines between Somerset and Grand Army (~2.7 miles each).

[3] https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_2/oatt/sect_ii.pdf - pages 361-362

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ID	Solution Components
5	Robinson Ave 115 kV circuit breaker addition and re-terminate Q10 line at the station
6	Install 45.0 MVAR capacitor bank at Berry Street
7	Separate N12/M13 DCT & reconductor N12 & M13 lines between Somerset and Bell Rock (~3.5 miles)
8	Install new breaker in series with the N12/D21 tie breaker and upgrade the D21 Line switch at Bell Rock
9	Install a third breaker in a bay to terminate Line 114 at Bell Rock
10	Extend Line 114 – Eversource/NGRID border to Bell Rock (~4.2 miles)
11	Extend Line 114 – Industrial Park Tap to Eversource/NGrid border (~7.9 miles)
12	Install capacitors at Bell Rock (37.5 MVAR), High Hill (35.3 MVAR) and Wing Lane (35.3 MVAR)
13	Reconfigure Bell Rock to breaker and a half station and split M13 line at Bell Rock
14	Reconductor the 108-4 line from Bourne to the Horse Pond Tap (1.9 miles)
15	Reconductor the M13 and L14 lines from Bell Rock to Bates St Tap (8.3 miles)
16	Reconductor the 112 line from Tremont to the Industrial Park Tap (10.3 miles)
17	Replace wave trap on 114 line at Tremont
18	Replace Kent County T3 345/115 kV transformer
19	Loop 201-502 line into the Medway station to form the 201-502N and 201-502S lines
20	Rerate the Eversource portion of the 323 line from Millbury #3 to West Medway by replacing the West Medway substation disconnect switches 107A, 107B, 108A and 108B with 3000A disconnects
21	Install new line from Carver to Kingston (approximately 8.0 miles)
22	Install a bay position at Kingston for new line from Carver
23	Rebuild the Middleborough Gas and Electric Department (MGED) portion of E-1 line from Bridgewater to Middleboro (2.5 miles)
24	Install a new line from Bourne to West Barnstable (approximately 13.0 miles) which requires terminal work at West Barnstable and Bourne
25	Separate the 122/135 line DCT
26	Retire the Barnstable SPS
27	Separate the 325/344 DCT from West Medway to West Walpole (approximately 50 structures)

The total estimated cost of the preferred solution is $305.8M.

1.3 NERC Compliance Statement

In accordance with North American Electric Reliability Corporation (NERC) Transmission Planning (TPL) Standard, this assessment provides:

- A written summary of plans to address the time-sensitive system performance issues described in the "*Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment*", dated May, 2016[4], and the "*Addendum Analysis Report to the Southeastern Massachusetts and Rhode Island Area 2026 Needs* Assessment", dated October 2016[5]
- A schedule for implementation as shown in Section 8.3
- A discussion of expected required in-service dates of facilities and associated load level when required as shown in Section 8.3
- A discussion of lead times necessary to implement plans in Section 8.3

[4] https://smd.iso-ne.com/operations-services/ceii/pac/2016/05/final_sema_ri_needs_assessment_report.pdf
[5] https://smd.iso-ne.com/operations-services/ceii/pac/2016/10/sema_ri_needs_assessment_addendum_v3.pdf

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Section 2
Needs Assessment Results Summary

2.1 Introduction

The Southeastern Massachusetts and Rhode Island Needs Assessment ("SEMA-RI Need Assessment") was conducted for the SEMA-RI study area to evaluate transmission system performance against transmission reliability standards for the projected 2026 system conditions. This assessment, detailed in the report "*Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment*", dated May, 2016[6], and the "*Addendum Analysis Report to the Southeastern Massachusetts and Rhode Island Area 2026 Needs* Assessment", dated October 2016[7] indicated that there are a significant number of thermal overloads and unacceptable voltages across a number of subareas within the SEMA-RI study area.

The study area focused on the portion of the system within the SEMA-RI Interface shown by the black line in Figure 2-1. The SEMA-RI Interface encompasses the areas within Massachusetts located south of Boston as well as the entire state of Rhode Island. This study also coordinated with other surrounding area Needs Assessment and Solutions Studies, such as those conducted for Eastern Connecticut (ECT) and Greater Boston (GB).

The SEMA-RI study area transmission performance was tested for steady state performance with all lines in-service, as well as under N-1 and N-1-1 contingency conditions, under a number of possible operating conditions. Thermal overloads were observed for a number of N-0, N-1, and N-1-1 contingency conditions. Additionally, unacceptable voltages were observed for a number of N-1-1 contingency conditions. Short circuit testing revealed that there were no over-dutied circuit breakers in the study area.

2.2 Needs Assessment Review

An overview of the results of the testing was organized by sub-areas within the study area. The set of the defined sub-areas were developed based on a review of the thermal and voltage reliability performance that was specific to particular areas within the SEMA-RI study area. The SEMA-RI study area results were grouped into six sub-areas as shown in Figure 2-1 and as follows:

[6] https://smd.iso-ne.com/operations-services/ceii/pac/2016/05/final_sema_ri_needs_assessment_report.pdf
[7] https://smd.iso-ne.com/operations-services/ceii/pac/2016/10/a7_sema_ri_2026_needs_assessment_update.pdf

1) **Farnum Subarea** – This is an area that runs along the northern section of SEMA-RI across northern Rhode Island.
2) **West Medway/West Walpole Subarea** – This is the area running across northern SEMA-RI from the Rhode Island boarder to the Walpole area.
3) **South Shore Subarea** – This is an area that runs along the northern section of SEMA-RI from the area south of Boston to the Massachusetts southern shore line.
4) **Industrial Park Subarea** – This is an area running across southern SEMA-RI from the New Bedford area through to the Cape Cod Canal.
5) **Somerset/Newport Subarea** – This is an area that runs along the lower part of SEMA-RI from lower Rhode Island through to lower southeastern Massachusetts.
6) **Cape Cod Subarea** – This area includes Cape Cod and the islands of Martha's Vineyard and Nantucket.

The SEMA-RI study area borders the Boston Import Interface to the north and the Connecticut Import Interface to the West.

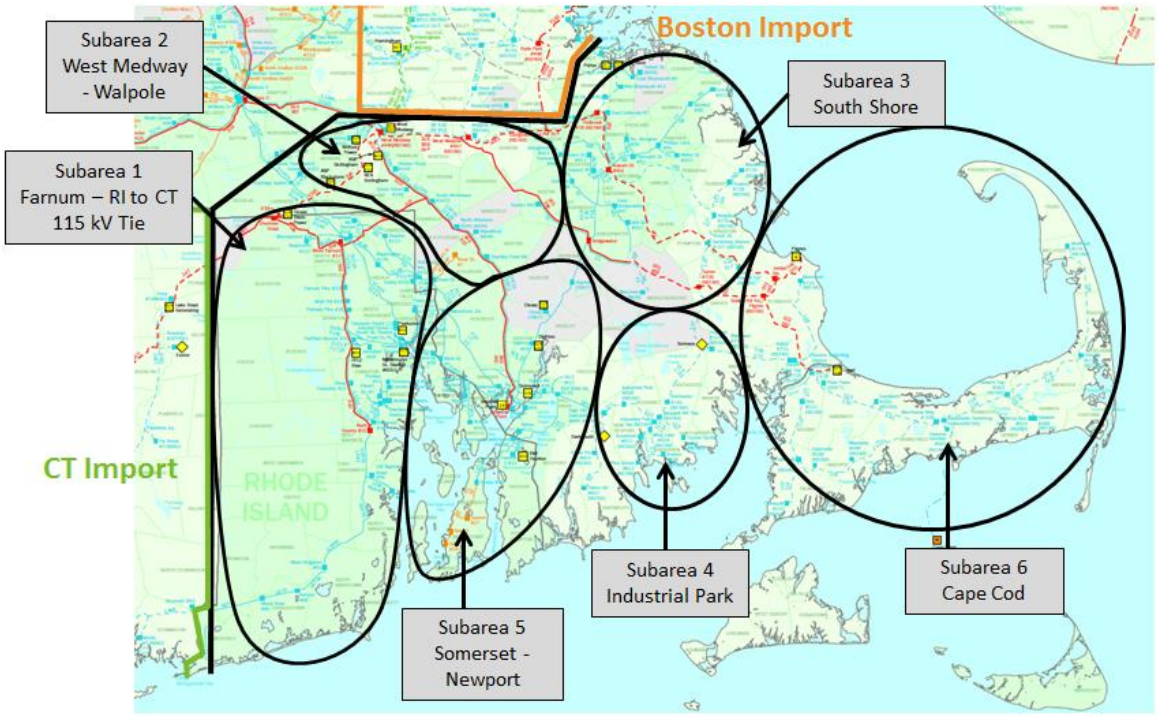

Figure 2-1: SEMA-RI Area Map

2.1.1 Steady State Testing Results

The results of the analysis for all of the study work completed indicated that there were a number of thermal overloads and voltage violations for N-1 and N-1-1 conditions. One thermal overload was observed for N-0 conditions.

2.1.2 Review of N-0 Testing

N-0 (also known as "all-lines-in") conditions were reviewed for the cases modeled. The results indicated that under all tested dispatch and transfer level conditions there was one 115 kV element N-0 thermal overload observed. Additionally, there were no N-0 voltage criteria violations observed.

2.1.3 Review of N-1 Testing

N-1 testing was performed for all the system conditions described in Section 1.1. Overall, by 2026, N-1 contingency overloads were observed for elements within the SEMA-RI study area across the 115 kV and 345 kV transmission facilities.

There were a total of one 345/115 kV element and twenty-nine 115 kV elements that were found to be overloaded under N-1 outage conditions. Additionally there were nine 115 kV buses that were found to have voltage violations under N-1 outage conditions.

Table 2-1: Number of N-1 Criteria Violations

Subarea	2026 Study Year	
	LTE Overloaded Elements	Voltage Violations
Farnum	10	0
West Medway/West Walpole	0	0
South Shore	2	0
Industrial Park	5	4
Somerset/Newport	13	5
Cape Cod	0	0
Boston Area	0	0
Total	30	9

2.1.4 Review of N-1-1 Testing

Initial element-out-of-service (N-1-1) testing included all 115 kV and 345 kV transmission lines as well as 345 kV autotransformers in the SEMA-RI study area and along the border of the eastern Connecticut and the Greater Boston study areas that are considered Bulk Electric System (BES) elements. These element-out-of-service conditions were tested against the full set of contingencies used in the N-1 tests, with noted exceptions made for the treatment of no-fault contingencies as described in Appendix H of the Transmission Planning Technical Guide.[8]

[8] https://www.iso-ne.com/static-assets/documents/2016/08/transmission_planning_technical_guide_8_12_2016.pdf

Table 2-2 provides a summary of the total number of elements by subarea that had thermal or voltage criteria violations under N-1-1 contingency conditions, as well as the critical load level range (in terms of projected net New England load) and earliest reported year of need. No N-1-1 high voltage violations were observed. The values shown include all 115 kV, and 345 kV elements in the study area.

Table 2-2: Number of N-1-1 Criteria Violations

Subarea	2026 Study Year			
	LTE Overloaded Elements	Voltage Violations	Critical Load Level Range (MW)	Earliest Year of Need
Farnum	21	9	19,527 – 29,750	Prior to 2016
West Medway/West Walpole	8	5	26,501 – 29,346	Prior to 2016
South Shore	9	12	27,162 – 30,228	Prior to 2016
Industrial Park	6	5	10,063 – 28,198	Prior to 2016
Somerset/Newport	25	13	12,216 – 30,000	Prior to 2016
Cape Cod	2	4	28,108 – 30,307	2016
Boston Area	13	0	21,917 – 29,346	Prior to 2016
Total	**84**	**48**		

In addition to the noted N-1-1 criteria violations, a number of non-convergent cases were observed for various contingency combinations associated with 115 kV line outages into the Cape area along with loss of 345 kV support into the area from West Barnstable.

See Section 9, Appendix A for Critical Load Level and Year of Need results.

2.1.5 Review of Minimum Load Testing

The minimum load analysis for the SEMA-RI study area is being conducted under a separate effort. At the time of this report, the minimum load analysis is in the Needs Assessment phase. Once the minimum load needs have been identified, solutions will be identified that will solve the identified time-sensitive needs and work in concert with the Preferred Solutions which will be selected by the result of this Solutions Study.

2.1.6 Short Circuit Testing

A short circuit assessment was also conducted for this study. The results indicated that no stations had any breakers that would be over-dutied for modeled system conditions. Overall results of short circuit testing indicated that there were a total of thirteen 345 kV circuit breakers and five 115 kV circuit breakers that could see fault current levels over 95% but under 100% of their interrupting capability.

2.3 Year of Need/Critical Load Level Analysis

The critical load level for the majority of criteria violations in the study area are prior to the 2016 summer peak. In today's system, these violations are prevented in operations by such steps as

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restricting transfers, running generation out-of-merit, and posturing the system for these critical contingencies.

Transmission needs identified in the Needs Assessment study have been deemed time-sensitive if they have a year of need within three years of the completion of this Needs Assessment. Since the publishing date of the Needs Assessment report occurred before June 1, 2016, the threshold for determining time-sensitive needs has been determined to be any issues that occur before the 2019 summer peak.

Table 9-1, Table 9-2, and Table 9-3 in Section 9 list the needs in the SEMA-RI study area that have been determined to be time-sensitive as part of this Needs Assessment. To address these needs, ISO-NE utilized the Solutions Study process described in Section 4.2 of Attachment K and developed solutions to address them in cooperation with Eversource Energy, National Grid, and Middleborough Gas and Electric Department (MGED).

Table 9-4 and Table 9-5 in Section 9 list the needs in the SEMA-RI study area that have been determined to be not time-sensitive as part of this Needs Assessment. These needs occur only for projected system conditions in the 2019 study year and beyond. During the Solutions Study phase, specific transmission solutions were not developed to address these needs. However, due to the nature of transmission solutions, it is quite likely that many of the needs determined to be non-time sensitive will be resolved. Once the solution to address the time-sensitive needs in the SEMA-RI study area has been fully developed, any of these needs that remain will be re-evaluated pursuant to the requirements of Attachment K, Section 4.1(j).

Section 3
Study Assumptions

3.1 Analysis Description

The purpose of the Solutions Study was to investigate system reinforcement options to determine feasible long-term transmission alternative plans to remedy the time-sensitive SEMA-RI study area criteria violations. Long-term transmission plans were not developed for any non-time-sensitive criteria violations. The study was based on 2026 system conditions that included planned system upgrades expected to be in-service. The study analyses included a steady-state thermal and voltage study and a short circuit study. The Solutions Study was conducted in accordance with applicable NERC, NPCC and ISO-NE standards and criteria.

The transmission needs in the SEMA-RI study area required the evaluation of numerous transmission alternative solutions. In many cases there were two or more competing alternatives that could potentially meet the needs of each SEMA-RI subarea. The multiple competing alternatives for each of the subareas resulted in a large number of competing solutions. To manage the evaluation of the competing solutions, the SEMA-RI working group evaluated the competing solutions in sequential phases. As the solutions were developed, some of the solution alternatives solve needs across the subarea designations that were created during the Needs Assessment phase. Due to this finding, the SEMA-RI study area was partitioned into new groups for the Solutions Study as shown in Figure 3-1.

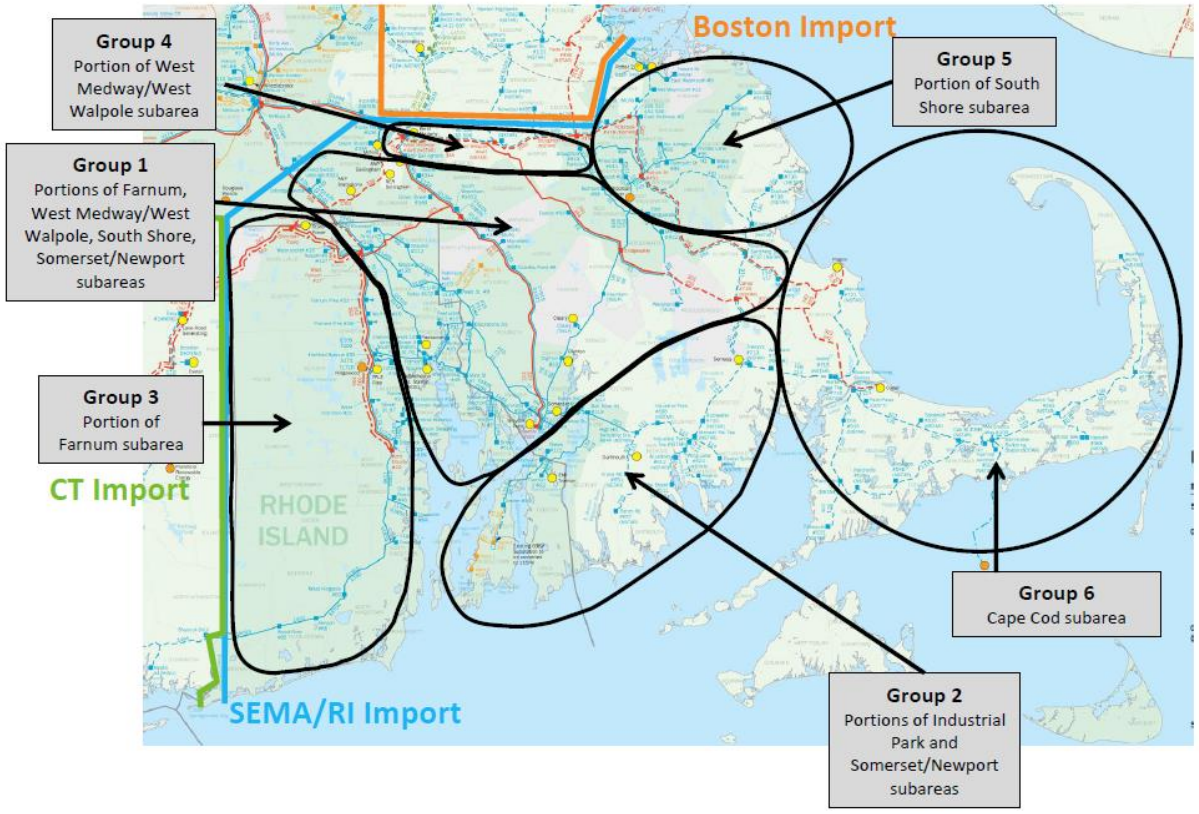

Figure 3-1: SEMA-RI Solutions Study Groups Map

Several software modeling tools were used for the evaluations. These include:

- Transmission Adequacy and Reliability Assessment (TARA) version 8.50[9] was used to conduct all steady state contingency analysis presented in this report. This application allowed for interactive adjustment of phase shifter settings to capture operational responses, re-dispatch of generation to minimize overloads, processing of multiple base cases against a large number of contingencies and reporting of results in an effective manner.
- PSS/E version 32.2.3 was used to set up the system topologies for steady-state contingency analysis
- ASPEN version 14 was used to conduct the short circuit analysis

3.2 Steady State Model Assumptions

3.2.1 Study Assumptions

The regional steady-state model was developed to be representative of the 10-year projection of the 90/10 summer peak system demand levels to assess reliability performance under stressed system conditions. The assumptions include consideration of area generation unit unavailability conditions as well as variations in surrounding area regional interface transfer levels. These study assumptions are consistent with ISO-NE Planning Procedure No. 3 (PP-3), "Reliability Standards for the New England Area Bulk Power Supply System".

3.2.2 Source of Power Flow Models

The power flow study cases used in this study were obtained from the ISO Model on Demand (MOD) system with selected upgrades to reflect the system conditions in 2026. A detailed description of the system upgrades included is described in later sections of this report.

3.2.3 Transmission Topology Changes

Transmission projects with Proposed Plan Application (PPA) approval in accordance with Section I.3.9 of the Tariff, as of the May 2015 RSP Project Listing, have been included in the study base case. In addition, any projects in the listing that were considered "Proposed" and determined to have an effect on the SEMA-RI study area were included. The Aquidneck Island Reliability Projects (RSP ID: 1669, 1670, and 1671) were also included in the base case because they are located in the SEMA-RI study area and could eliminate potential needs. A listing of the major future projects in Massachusetts, Rhode Island, and Connecticut is included below:

Massachusetts

- Greater Boston Upgrades (RSP ID: 965, 1199, 1212, 1213, 1220, 1260, 1327, 1329, 1330, 1335-1339, 1352-1357, 1363-1365, 1516, 1518-1522, 1527, 1528, 1549-1554, 1558, 1636, 1637, 1640, 1645-1647)
- Central/Western Massachusetts Upgrades (RSP ID: 937, 945, 946, 949-951, 953-955)

[9] TARA (Transmission Adequacy and Reliability Assessment) is a load flow software tool for identifying and analyzing transmission bottlenecks, DC (linear) & AC (non-linear) contingency analysis, Security Constrained Economic Dispatch (SCED, and Security Constrained Reliability Dispatch (SCRD).

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- NEEWS – Interstate Reliability Project (RSP ID: 190, 1094, 1293)
- Pittsfield/Greenfield Project (RSP ID: 1208-1210, 1221-1226)

Rhode Island

- NEEWS – Interstate Reliability Project (RSP ID: 794, 1233, 1252, 1298)
- Chase Hill (Crandall Street) Substation (RSP ID: 1253)
- Aquidneck Island Reliability Projects (RSP ID: 1669, 1670, 1671)
- Brayton Point Non-Price Retirement Short-Term Reliability Upgrades (RSP ID: 1623)[10]

Connecticut

- NEEWS – Interstate Reliability Project (RSP ID: 191, 802, 1245)
- Southwestern Connecticut (SWCT) Transmission Solutions (RSP ID: 1380, 1381, 1383-1386, 1389, 1399, 1400, 1559-1579, 1620-1622)
- Greater Hartford/Central Connecticut (GHCC) Transmissions Solutions (RSP ID: 1580-1605, 1659)

3.2.4 Generation Assumptions (Additions & Retirements)

All generation projects in New England with a Forward Capacity Market (FCM) Capacity Supply Obligation (CSO) as of Forward Capacity Auction 9 (FCA #9) were included in the study base case. In addition, two generators that received CSOs in the most recent Forward Capacity Auction (FCA # 10) in the SEMA-RI area were also included. A listing of the major new future projects cleared in FCA #1 through FCA #10 and not yet in service in the SEMA-RI study area is included below:

- QP 444 – Medway Peakers (195 MW - FCA #9)
- QP 449 – Canal #3 (333 MW - FCA #10)
- QP 489 – Burrillville Energy Center (485 MW - FCA #10)

A summary of major Non-Price Retirement (NPR) requests in southern New England is provided in Table 3-1.

Table 3-1: Summary of Non-Price Retirement Requests

Resource Name	Summer Qualified Capacity (MW)	NPR Request Date	NPR Determination Date
AES Thames	182.653	9/18/2012	11/19/2012
Bridgeport Harbor 2	0.000	9/20/2013	10/16/2013
Brayton Point 1	228.205	10/6/2013	12/20/2013
Brayton Point 2	225.750	10/6/2013	12/20/2013
Brayton Point 3	610.000	10/6/2013	12/20/2013
Brayton Point 4	422.000	10/6/2013	12/20/2013
John Street 3	2.000	9/26/2013	10/16/2013

[10] The West Farnum 175T and Kent County 3X 345/115 kV autotransformer rating increases also proposed as part of this set of upgrades were not listed in the RSP Project Listing. These rating increases have been included in the study base cases.

Resource Name	Summer Qualified Capacity (MW)	NPR Request Date	NPR Determination Date
John Street 4	2.000	9/26/2013	10/16/2013
John Street 5	1.900	9/26/2013	10/16/2013
Norwalk Harbor 1	162.000	9/30/2013	12/20/2013
Norwalk Harbor 2	168.000	9/30/2013	12/20/2013
Norwalk Harbor 10	11.925	9/30/2013	12/20/2013
Pilgrim Nuclear Power Station	677.284	10/12/2015	12/18/2015

Due to the NPR request submitted for the Pilgrim Nuclear Power Station for FCA #10, the unit was modeled as OOS in all study base cases. No other significant NPR requests were submitted for FCA #10 that would have an effect on the SEMA-RI study area; therefore, these NPRs were not reflected in the study. All other NPR requests across New England through FCA #9 were modeled as OOS in the study base case. An 11.8 MW Active DR partial NPR was also submitted in SEMA-RI, but the acceptance of this NPR has a negligible effect on the study area and was not included in the study. While other generator retirements may occur between the issuance of this report and 2026, consistent with Attachment K of the OATT, the ISO has not modeled generators other than those noted above as retired.

Real-Time Emergency Generation (RTEG) are distributed generation which have air permit restrictions that limit their operations to ISO Operating Procedure 4 (OP-4), Action 6 – an emergency action which also implements voltage reductions of five percent (5%) of normal operating voltage that require more than 10 minutes to implement. RTEG cleared in the FCM was not included in the reliability analyses because in general, long-term analyses should not be performed such that the system must be in an emergency state as required for the implementation of OP-4, Action 6. It should be noted that in 2017, the ISO Tariff is being revised to eliminate the RTEG resource type.

3.2.5 Explanation of Future Changes Not Included

The following projects were not included in the study base cases:

- Transmission projects that have not been fully developed and were not classified as "Proposed" as of the May 2015 RSP Project Listing. These projects were not modeled in the study base case due to the uncertainty concerning their final development or lack of an impact on the SEMA-RI study area.
- With the exception of the Greater Boston projects, transmission projects outside of the SEMA-RI area that have received PPA approval since the May 2015 RSP Project Listing was published. These projects were not modeled due to the lack of an impact on the SEMA-RI study area.

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3.2.6 **Forecasted Load**

A ten-year planning horizon was used for this study based on the most recently available Capacity, Energy, Loads, and Transmission (CELT) Report issued in May 2015. This study was based on the forecasted 2026 peak demand load levels for the ten-year horizon[11].

The 2026 summer peak 90/10 demand forecast for New England is 35,310 MW.

The CELT load forecast includes both system load and losses (transmission & distribution) from the power system. Since power flow modeling programs calculate losses on the system, the actual system load modeled in the case was reduced to account for system losses which are explicitly calculated in the system model.

Demand Resources (DR) are treated as capacity resources in the Forward Capacity Auctions (FCA). DR is split into two major categories, Passive and Active DR. Passive DR is largely comprised of energy efficiency and is expected to lower the system demand during designated peak hours in the summer and winter. Active DR is commonly known as Demand Side Management (DSM) and can be dispatched on a zonal basis if a forecasted or real-time capacity shortage occurs on the system. Starting in 2012, forecasting passive DR has become part of the annual load forecasting process. This forecast takes into account additional electrical efficiency (EE) savings beyond FCM results across the ten-year planning horizon. This forecast is primarily based on forecasted financial investment in state-sponsored EE programs and its correlation with historical data on reduction in peak demand per dollar spent. This EE forecast was published in the annual CELT Report beginning in spring 2012.

Active DR are modeled in the base case at the levels of the FCA #9, multiplied by a Performance Factor of 75% based on historical performance of similar resources. Passive DR are modeled at 2026 levels based on the passive DR cleared through FCA #9 (2010-2019) and the aforementioned EE forecast for the years until 2026 (2020-2026).

Since Demand Resources are modeled at the low side of the distribution bus in the power flow model, all DR values were increased by 5.5% to account for the reduction in losses on the local distribution network. Passive DR is modeled by load zone and Active DR is modeled by dispatch zone. The amounts modeled in the cases are listed in Table 3-2 and Table 3-3 and detailed reports can be seen in Section 10.

Table 3-2: 2026 Passive DR through FCA #9 and EE Forecast

Load Zone	Passive DR (FCA #1-9) DRV[12] (MW)	EE Forecast (2020-2026) DRV[12] (MW)	Total Passive DR DRV[12] (MW)
Maine	168	104	227
New Hampshire	95	64	159
Vermont	117	102	219
Northeast Massachusetts &	527	363	890

[11] The 2015 CELT forecast only has projected peak demands for the years 2015-2024. To determine the 2026 peak demand forecasted load, the growth rate from years 2023-2024 was applied to the 2024 forecast twice.

[12] DRV = Demand Reduction Value = the actual amount of load reduced measured at the customer meter; these totals are forecasted values for the commitment period beginning June 1, 2025. These values exclude transmission and distribution losses.

Boston			
Southeast Massachusetts	284	192	476
West Central Massachusetts	331	225	556
Rhode Island	189	132	321
Connecticut	425	324	749
New England Total[13]	**2,135**	**1,506**	**3,641**

Table 3-3: Active DR Values through FCA #9

Dispatch Zone	Active DR (FCA #1-9) DRV[12] (MW)
Bangor Hydro	27
Maine	97
Portland, ME	17
New Hampshire	13
New Hampshire Seacoast	2
Northwest Vermont	24
Vermont	5
Boston, MA	50
North Shore Massachusetts	18
Central Massachusetts	32
Springfield, MA	8
Western Massachusetts	15
Lower Southeast Massachusetts	7
Southeast Massachusetts	41
Rhode Island	56
Eastern Connecticut	8
Northern Connecticut	28
Norwalk-Stamford, Connecticut	3
Western Connecticut	32
New England Total[13]	**484**

3.2.7 Forecasted Photovoltaic (PV) Generation

In addition to the resources that cleared the FCM, the PV generation forecast was used to model PV generation in the study base cases. The 2015 CELT PV generation forecast includes the PV generation that has been installed as of the end of 2014 and provides a forecast by state of the total PV (by AC Nameplate) that is expected to be in service by the end of each forecast year for the next 10 years. As an example, the 2015 PV forecast provides data on the PV that is in service as of the end of 2014 as well as an annual forecast for the PV that will be in service for end of 2015, end of 2016 and so on until the end of 2024. For years beyond 2024, the rate of PV generation growth from 2023-2024 was used to extrapolate the PV generation forecast.

An availability factor of 26% was applied to the values from the PV generation forecast. Table 3-4 summarizes the PV generation modeled for the initial study files for New England.

[13] The sum of individual values may not equal the total value due to rounding.

Table 3-4: Forecasted PV Generation Modeled in New England Modeled in Study Base Cases

Load Zone		2026 Peak
New England	A - PV generation (nameplate) in New England	1,937
	B - 5.5% Reduction in Distribution Losses	107
	C - Unavailable PV generation (A+B)*(1-26%)	1,512
	PV Generation Modeled in Case as Negative Load (A+B)-C	**531**

3.2.8 Load Levels Studied

Consistent with ISO-NE planning practices, transmission planning studies utilize the ISO extreme weather 90/10 forecast assumptions for modeling summer peak load profiles in New England. A breakdown of the load modeled in the 2026 cases, taking into account transmission and distribution losses, is shown in Table 3-5. A more detailed report of the loads modeled and how the numbers were derived from the CELT values can be seen in Section 10.

Table 3-5: Load Levels Studied

State	2026 CELT 90/10 Load[14] (MW)
Maine[15]	2,525
New Hampshire	3,350
Vermont	1,265
Massachusetts	16,545
Rhode Island	2,550
Connecticut	9,075
New England Total	**35,310**

After taking into account the aforementioned transmission losses, the contributions of demand resources and forecasted EE, and the addition of non-CELT and station service loads, the actual load level modeled in the base cases for this study was approximately 31,103 MW.

3.2.9 Load Power Factor Assumptions

Load power factors consistent with the local transmission owner's planning practices were applied uniformly at each substation. Eversource Energy's load power factor was modeled as 0.983 in SEMA. National Grid's load power factor was modeled as 0.995 in SEMA and 0.996 in RI. Demand resource power factors were set to match the power factor of the load at that bus in the model. A list of overall power factors by company territory can be found in the detailed load report in Section 10, Appendix B.

3.2.10 Transfer Levels

In accordance with the reliability criteria of the NERC, NPCC and the ISO, the regional transmission power grid must be designed for reliable operation during stressed system conditions. A detailed list of all transfer levels can be found in the study base summaries in Section 12. The following external transfers were utilized for the study.

[14] These values exclude transmission and distribution losses.

[15] The value does not include 365 MW of paper mill load where the mills have on site generation located behind their meter.

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Table 3-6: Interface Levels Tested

Case	Interface Level Condition	North-South Transfers	East-West Transfers	West to East Transfers	Boston Import	CT Import
A	High East to West with High North-South	High	High	Low	Low	High
B	High West to East with Low North-South	Low	Low	High	Low	Low
C	High West-East with Medium North-South	Medium	Low	High	Medium	Low

Case A: This case represents a scenario with high East-West flows. In this case, the stress is from East-to-West with SEMA-RI transfer levels being dictated by the load in the area and unit unavailability. All units in the Boston area were assumed in-service for this scenario. Imports from Hydro-Quebec over the HVDC circuits and on the New-Brunswick to New England (NB-NE) ties were adjusted accordingly to achieve a high East-to-West bias. Flows over the New-York tie lines were allowed to adjust within acceptable limits to meet New England load.

Case B: This case represents a scenario with high West-East flows. In this case, the North-South interface was held at a low value with SEMA-RI zone being stressed from the West. In this scenario, all units in the Boston area were assumed in service. The flows on the HVDC tie from Quebec and NB-NE were adjusted as needed to maintain a high West-to-East interface flow. Flows over the New-York tie lines were allowed to adjust within acceptable limits to meet New England load.

Case C: This case represents a scenario with high West-East flows. In this scenario, one unit in the Boston area was assumed out-of-service. Imports from Hydro-Quebec over the HVDC circuits and on the New-Brunswick to New England (NB-NE) ties were adjusted accordingly to achieve a high West-East interface flow. Imports/Exports over New-York tie lines were allowed to adjust within acceptable limits to meet New England load.

Generation Dispatch ScenariosTable 3-7 shows a list of the generating units in the study area and their modeled generation capacities.

Table 3-7: Modeled Generating Capacities of Study Area Units

Generating Unit	Modeled Capacity (MW)	Fast-Start Unit[16]
NEA Bellingham	277.621	No
Edgar / Fore River	700.000	No
ANP Blackstone 1	239.634	No
ANP Blackstone 2	245.314	No

[16] "Fast-start" generators are those units that can go from being off-line to their full Seasonal Claimed Capability in 10 minutes. These units do not need to participate in the 10-minute reserve market to be considered a fast-start unit in planning studies.

Generating Unit	Modeled Capacity (MW)	Fast-Start Unit[16]
SEMASS 1	46.955	No
SEMASS 2	22.174	No
Canal 1	547.059	No
Canal 2	545.125	No
Canal 3 (FCA #10)	333.000	No[17]
Dartmouth Power	62.156	No
Potter	73.927	No
Milford Power	149.000	No
ANP Bellingham 1	237.102	No
ANP Bellingham 2	243.587	No
Cleary 8	24.825	No
Cleary 9/9A	104.931	No
Dighton Power	160.539	No
Ocean State Power G1/G2/S1	270.901	No
Ocean State Power G3/G4/S2	270.180	No
Manchester / Franklin Square 9/9A	149.000	No
Manchester / Franklin Square 10/10A	149.000	No
Manchester / Franklin Square 11/11A	149.000	No
Pawtucket Power	59.810	No
Tiverton Power	244.086	No
RISE	543.455	No
Ridgewood Landfill	26.000	No
Burrillville Energy Center (FCA #10)	485.000	No[17]
Lake Road 1[18]	245.792	No
Lake Road 2[18]	251.213	No
Lake Road 3[18]	255.000	No
West Medway Jet 1[19]	42.000	Yes
West Medway Jet 2[19]	40.835	Yes
West Medway Jet 3[19]	35.441	Yes
West Tisbury	5.568	Yes
Oak Bluffs	8.120	Yes
Thomas A. Watson	105.200	Yes

[17] Since this unit's ramping capability has not yet been tested and verified, this study has assumed that it is not a fast-start unit.

[18] While these units are located outside of the SEMA-RI area, they do have a significant influence on the performance of the study area and are therefore listed.

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At all locations in the study area where a single fast-start unit is available, that unit was assumed out of service (OOS) for each dispatch. For subareas where there are multiple fast-start units, one of the fast-start units was taken out of service and the rest were assumed online and available in that subarea.

Of all the fast-start units available in SEMA-RI study area, approximately 20% of them were considered OOS for each dispatch. The rest of the fast-start units were assumed available for dispatch. For all cases except Edgar or Edgar and Potter out-of-service, West Medway Jet 2 and Oak Bluffs are considered the best helpers[19], and were assumed OOS. For Edgar or Edgar and Potter OOS, Thomas A. Watson 1 is considered the best helper, and was assumed OOS. In all cases, approximately 80% of the fast-starts were assumed in-service.

Generating units in the rest of the New England system outside of the SEMA-RI study area were dispatched to create the stress conditions shown in Table 3-6.

The most up-to-date voltage schedules obtained from ISO-NE Operating Procedure 12 (OP-12) were utilized in this study. The fast-start dispatch assumptions detailed above were turned on in the base case and no adjustments were made to these fast-start units post-first contingency. Canal 3 and Burrillville Energy Center are in service in all cases.

Table 3-8 and Table 3-9 show the dispatch scenarios and the list of units that were assumed unavailable in each of the base cases. These scenarios have been set up to stress different parts of SEMA-RI study area.

New one-unit-out and two-units-out generation dispatches were not required for the Canal 3 and Burrillville Energy Center due to their interconnection points which are shared with other units or are within the same proximity. Canal 3 will be connected with the other Canal units at the Canal substation and the Burrillville Energy Center will be connected into the Sherman Road 345 kV substation, similar to the Ocean State Power generation units. The existing two-units-out generation dispatches serve as the worst case scenario. Canal 3 and Burrillville Energy Center are in service in all cases.

[19] In this case, a "helper" unit is the fast-start unit that would be most beneficial, for the given situation, to turn on in order to help offset the loss of a certain base generation unit.

[redacted]

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Table 3-8: One-Unit-Out Generation Dispatches

Unit OOS	Modeled Capacity (MW)	One Unit OOS Dispatch Number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Canal 2	545.1	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Edgar	688.3	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Potter	74.2	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Tiverton	244.6	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Dighton	160.3	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Cleary / Taunton	130.8	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
RISE	548	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Manchester/ Franklin Square 11	149	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON
NEA Bellingham	277.6	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON
ANP Bellingham 1	236.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON
Ocean State Power C1, C2, S1	270.9	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
ANP Blackstone 1	221.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
Lake Road 1	245.8	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON
SEMASS	69.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON
Dartmouth Power	83.1	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON
Milford Power	149	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON
Pawtucket Power	61.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF

Table 3-9: Two-Units-Out Generation Dispatches

Unit OOS	Modeled Capacity (MW)	Two Units OOS Dispatch Number														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Canal 1	549.9	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Canal 2	545.1	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Edgar	688.3	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Potter	74.2	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Tiverton	244.6	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	OFF
Dighton	160.3	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Cleary/Taunton	130.8	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF
RISE	548	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Manchester / Franklin Square 11	149	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	OFF	ON	ON
Manchester / Franklin Square 10	149	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON
NEA Bellingham	277.6	ON	ON	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	ON
ANP Bellingham 1	236.4	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON
ANP Blackstone 1	221.4	ON	ON	ON	ON	ON	ON	ON	OFF	ON	OFF	ON	ON	ON	ON	ON
Ocean State Power G3, G4, S2	270.2	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON
Ocean State Power G1, G2, S1	270.9	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Lake Road 2	251.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON
Lake Road 1	245.8	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON
Dartmouth Power	83.1	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	OFF	ON
Pawtucket Power	61.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON
SEMASS	69.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON

[redacted]

3.2.11 Reactive Resource and Dispatch Assumptions

All area shunt reactive resources were assumed available and dispatched when required. Reactive output of generating units was modeled to reflect defined limits. A summary of the reactive output of units and shunt devices connected to the transmission system that played a significant role in the study area can be found in the power flow case summaries included in Section 12.

3.2.12 Demand Resources

As stated in Section 3.2.6, Passive DR as forecasted for the year 2026 and Active DR that cleared as of FCA #9 in 2015 were modeled for this study. Passive DR was assumed to perform to 100% of their qualified amount. The passive DR included the forecasted EE which were assumed to perform to 100% of the forecasted amount. Active DR was assumed to perform to 75% of their qualified amount. A summary of assumed DR performance is shown in Table 3-10. Real Time Emergency Generation (RTEG) was not modeled, consistent with all needs and solutions planning analyses.

Table 3-10: New England Demand Resource Performance Assumptions

Region	Passive DR	Active DR	Forecasted EE	RTEGs
New England	100%	75%	100%	0%

3.2.13 Protection and Control System Devices Included in the Study Area

There are five Special Protection Systems that are in operation in the SEMA-RI study area:

1. Barnstable SPS – NPCC Type III
2. Bellingham Plant #2 (BEL2) SPS – NPCC Type III
3. Edgar Station SPS – NPCC Type III
4. L14/M13 Tiverton SPS – NPCC Type III
5. Stoughton Station SPS – NPCC Type III

The Barnstable SPS is a flow-based SPS which will initiate load shedding on the Cape based on [redacted].

The Bellingham Plant #2 (BEL2) SPS will trip the Bellingham Unit #2 generator breaker following [redacted].

[redacted]

The Edgar SPS trips specific Edgar station generation (EDG1, EDST) if [redacted].

The L14/M13 Tiverton SPS is a flow-based SPS that reduces the output of [redacted].[20]

The Stoughton SPS trips certain lines in the Boston area for N-1-1 conditions. The operation of this SPS is needed to avoid [redacted].

Contingencies affected by the operation of these SPSs were tested both with the SPS operating and out-of-service.

3.2.14 **Explanation of operating Procedures and Other Modeling Assumptions**

The SEMA-RI area transmission power flows are managed on a daily basis through the use of generation dispatch. For the purposes of the contingency testing conducted as part of this study generation adjustments were modeled in the analysis to reflect system adjustments that could occur between outages under N-1-1 contingency conditions. These adjustments were primarily limited to unit back-downs in the SEMA-RI study area and HVDC terminal adjustments. The reductions in resource output were limited to a total of 1,200 MW across the New England system to reflect consistency with operating reserve constraints.

Additionally, the SEMA-RI area has an operating guide for the operation of the Canal 1 and 2 generating units when certain facilities are out of service or following the loss of certain facilities. This procedure serves to limit the output of the Canal units to avoid potential loss of generation due to instability following specific contingency events. Modeling of this operating procedure was captured through base case dispatch conditions and/or through system adjustments performed between contingency events.

[20] https://www.iso-ne.com/static-assets/documents/2016/06/tiverton_generator_uprate_i_3_9.pdf and https://smd.iso-ne.com/operations-services/ceii/rc/2016/06/a3_3_tiverton_generator_uprate_lvl3_sps_retirement_ppa.pdf

REDACTED

3.3 Stability Modeling Assumptions

Not applicable for this study.

3.4 Short Circuit Model Assumptions

3.4.1 **Study Assumptions**

The short circuit study evaluated the available fault current levels around the SEMA-RI area. It also included the effects of area reliability project upgrades as well as proposed generation interconnection projects as outlined in Sections 3.2.3 and 3.2.4.

3.4.2 **Short Circuit Model**

The ASPEN Circuit Breaker Rating Module software was used to calculate all circuit breaker duties. The case for the short circuit study was obtained from the 2015 short circuit base case library and all "Proposed", "Planned", and "Under Construction" projects from the May 2015 RSP Project Listing, as discussed in Section 3.2.3 of this scope document, were added to that model. In addition, the Aquidneck Island Reliability Projects (RSP ID: 1669, 1670, and 1671) were also included in the case.

3.4.3 **Contributing Generation Assumptions (Additions & Retirements)**

The model included proposed generation interconnection projects that have PPA approval as well as those generator projects that have FCA Capacity Supply Obligations (CSOs).

The following relevant proposed generation projects were modeled in the Needs Assessment study and were included in this study:

- QP 444 – Medway Peakers (195 MW - FCA #9)
- QP 449 – Canal #3 (333 MW - FCA #10)
- QP 489 – Burrillville Energy Center (485 MW - FCA #10)

In addition, if new generation resources which could impact the SEMA-RI study area entered into the Feasibility Study (FS) or System Impact Study (SIS) phase, those resources were also modeled in this short circuit testing. The additional new generation resources included in this short circuit testing but not included in the Needs Assessment short circuit testing are:

- QP 588 – 50 MW
- QP 596 – 1120 MW
- QP 598 – 575 MW

The Non-Price Retirements listed in Table 3-1 were reflected in the short circuit base cases.

3.4.4 **Generation and Transmission System Configurations**

NPCC Regional Reliability Reference Directory #1, "Design and Operation of the Bulk Power System" and PP-3 required short circuit testing to be conducted with all transmission and generation facilities in-service for all potential operating conditions.

REDACTED

3.4.5 **Boundaries**

This study included testing of all 115 kV and 345 kV substations and breakers in the SEMA-RI study area as well as select substations and breakers in neighboring portions of the Greater Boston and Eastern Connecticut study areas.

3.4.6 **Other Relevant Modeling Assumptions**

Not applicable for this study.

REDACTED

Section 4
Analysis Methodology

4.1 Planning Standards and Criteria

The applicable NERC, NPCC and ISO-NE standards and criteria were tested as part of this evaluation. Descriptions of each of the NERC, NPCC and ISO-NE standard tests that were used to assess system performance are discussed later in this section.

4.2 Performance Criteria

4.2.1 **Steady State Criteria**

The Solutions Study was performed in accordance with NERC TPL-001-4 Transmission Planning System Standards, NPCC "Regional Reliability Reference Directory #1, Design and Operation of the Bulk Power System", dated 09/30/15, and ISO-NE Planning Procedure No. 3, "Reliability Standards for the New England Area Bulk Power Supply System", dated 03/01/13. The contingency analysis steady-state voltage and loading criteria, solution parameters and contingency specifications that were used in this analysis are consistent with these documents.

NERC Reliability Standards require that the system thermal and voltage levels remain within applicable limits after the events as described in "Table I – Steady State & Stability Performance Planning Events" of the NERC Reliability Standard TPL-001-4.

In this study report, only criteria violations on Pool Transmission Facility (PTF) transmission elements and substations were reported. Information on non-PTF violations can be found in Section 14, but was not considered in transmission solution development.

4.2.1.1 *Steady State Thermal and Voltage Limits*

Loadings were monitored on all transmission facilities rated at 115 kV and above in the SEMA-RI study area and in the Greater Boston and Eastern Connecticut study areas, which are in close proximity to the SEMA-RI study area. The thermal violation screening criteria defined in Table 4-1 was applied.

Table 4-1: Steady State Thermal Criteria

System Condition	Maximum Allowable Facility Loading
Pre-Contingency (All Lines In)	Normal Rating
Post-Contingency	Long Time Emergency (LTE) Rating

Voltages were monitored at all buses with voltages 115 kV and above in the study area and in the Greater Boston and Eastern Connecticut study area which is in close proximity to the SEMA-RI study area. System bus voltages outside of limits identified in Table 4-2 were identified for all normal (pre-contingency) and post-contingency conditions.

Table 4-2: Steady State Voltage Criteria

Transmission Owner	Voltage Level	Bus Voltage Limits (Per-Unit)	
		Normal Conditions (Pre-Contingency)	Emergency Conditions (Post-Contingency)
National Grid	230 kV and above	0.98 to 1.05	0.95 to 1.05
	115 kV and below	0.95 to 1.05	0.90[21] to 1.05
Eversource Energy	69 kV & above	0.95 to 1.05	0.95 to 1.05
Eversource Energy (NSTAR)	230 kV and above	0.95 to 1.05	0.95 to 1.05
	115 kV and below	0.95 to 1.05	0.95 to 1.05
Millstone / Seabrook[22]	345 kV	1.00 to 1.05	1.00 to 1.05
Pilgrim[22]	345 kV	0.995 to 1.05	0.99 to 1.05
Vermont Yankee[22]	115 kV	1.00 to 1.05	1.00 to 1.05

4.2.1.2 *Steady State Solution Parameters*

The steady-state analysis was performed with pre-contingency solution parameters that allowed for adjustment of load tap-changing transformers (LTCs), static VAR devices (SVDs, including automatically-switched capacitors), and phase angle regulators (PARs). Table 4-3 summarizes the solution parameters used in the study.

Table 4-3: Study Solution Parameters

Case	Area Interchange Control	Tap Adjustments	Adjust Phase Shift	Switched Shunt Adjustments
Base	Tie Lines and Loads Enabled	Stepping	Enabled	Enabled
Contingency	Disabled	Stepping	Disabled	Disabled

[21] This minimum voltage criterion only applies to [redacted] designated substations. [redacted] stations must be >0.95 post contingency.

[22] This is in compliance with NUC-001-2, *"Nuclear Plant Interface Coordination Reliability Standard,"* adopted August 5, 2009.

REDACTED

4.2.2 **Stability Performance Criteria**

Not applicable for this study.

4.2.3 **Short Circuit Performance Criteria**

This study was performed in accordance with appropriate IEEE C37 standards and specific design parameters of the circuit breakers. This includes specific considerations for total-current rated and symmetrical-current rated breakers as appropriate.

The circuit breakers were evaluated for short circuit adequacy based on the following criteria:

- *Acceptable-duty*: Circuit breaker fault interrupting duty less than 100% of the available fault current. No action required.
- *Over-duty Condition*: Circuit Breaker Fault Interrupting Duty greater than 100%. This is considered an unacceptable operating condition requiring a solution to be developed to eliminate the over-duty condition.

4.2.4 **Other Performance Criteria**

Not applicable for this study.



Section 5
Development of Alternative Solutions

The 2026 Needs Assessment identified numerous system weaknesses on the existing 115 kV network in SEMA-RI. Most involved large pockets of load being served from a few weak connections to the high voltage network. When a combination of these connections along with the critical units that were removed during N-1-1 analysis, the remaining lines in-service were unable to handle the increased loading and resulted in thermal overloads and low voltage to potential voltage collapse in the load pocket. For example, [redacted] caused load loss over 300 MW.

Other violations occurred due to lack of sufficient transmission capacity to serve load under multiple line and critical unit outage scenarios. For example, outage of one [redacted] traversing the SEMA-RI study area and results in overloads of facilities in the Boston area.

The alternative solutions were developed to find ways to strengthen these connections to the load pockets and the 345 kV facilities by: adding new sources into the load pocket, improving the remaining elements after N-1-1 contingency events to adequately handle the additional loading, or eliminating the contingency condition causing the violations. A description of all the alternative solutions is in Section 5.3. All of the alternative solutions were first evaluated to ensure that the solution components resolve all the identified time-sensitive criteria violations identified in the Needs Assessment. These evaluations are described in Section 6. The next step was to compare the alternative solution components in terms of cost, constructability, environmental concerns, and several other criteria. These comparisons are described in Section 7.

At the October 2016 PAC meeting, the ISO presented the addition of the [redacted][23] contingency to the Needs Assessment analysis. The [redacted] share two structures together at the entrance to the Taunton station. The worst N-1-1 contingency results in a loading of 108.93% LTE seen on the U6 line between Bridgewater and Raynham [redacted]. NPCC Directory 1 allows for the automatic exclusion of a DCT contingency if the DCT is used only for station entrance and exit and it doesn't exceed five towers at each station. The ISO has reviewed the low likelihood of the DCT contingency in the context of the proposed changes to PP-3 and has concluded that the DCT will be exempted as part of the solutions in the study area.

[23] [redacted]

[redacted]

REDACTED

5.1 Preliminary Screen of Alternative Solutions

Only time-sensitive needs, as identified in the Needs Assessment, were evaluated for a regulated transmission solution. The working group disregarded non-time-sensitive needs during solution alternative development. It should be noted that a solution alternative which solves a time-sensitive need may also resolve a non-time-sensitive need; however, the working group did not develop transmission solutions with the expressed intent of solving non-time-sensitive needs.

During the conceptual phase of the Solutions Study, several solutions were proposed to address the identified needs. The addition of new 115 kV lines or new 345/115 kV autotransformers were discussed as possible solutions to serve the load pockets. At the onset it was determined that any additional 345 kV lines in the area would be far more costly than 115 kV projects and would have many challenges in the densely populated region of SEMA-RI. Therefore, 345 kV line alternatives were eliminated from consideration when developing solution alternatives for the area.

5.2 Coordination of Alternative Solutions with Other Entities

The working group included representatives from Eversource, National Grid, MGED and ISO-NE. This working group helped ensure that the study of alternatives included other planned transmission system changes outside of the SEMA-RI study area as well as the impact that the alternative solution had on facilities outside of the study area. Coordination with other ongoing working groups adjacent to SEMA-RI was also done throughout the process. In particular, a joint Eastern Connecticut and SEMA-RI working group was created to address violations on the border of Connecticut and Rhode Island. The working group also coordinated efforts with the ongoing generator system impact studies in the SEMA-RI area to ensure all proposed projects would work together and not cause each other adverse impacts.

5.3 Description of Alternative Solutions

From the Needs Assessment report, the needs were categorized into six subareas which were selected based on the transmission topology as well as geographic orientation of facilities. For the development of solution alternatives, the SEMA-RI working group partitioned the study area into new geographic groups shown below.[24] Within each new group are needs that are interrelated and driven by common system conditions (dispatch and contingencies). The needs in each new group are relatively independent of needs in other groups. Therefore it made sense to develop solution alternatives for each of these new groups sequentially by addressing the needs in each group. The new groups are:

1) **Group 1 –**Portions of Farnum, West Medway/West Walpole, South Shore, and Somerset/Newport subareas
2) **Group 2** – Portions of Industrial Park and Somerset/Newport subareas
3) **Group 3** – Portion of Farnum subarea
4) **Group 4** – Portion of West Medway/West Walpole subarea
5) **Group 5** – Portion of South Shore subarea
6) **Group 6** – Cape Cod subarea

[24] To observe the relationship between the Subareas developed in the Needs Assessment and the Groups formed in this Solutions Study, refer to Section 9, Appendix A.

The geographic locations on the defined subareas listed above are shown in Figure 5-1.

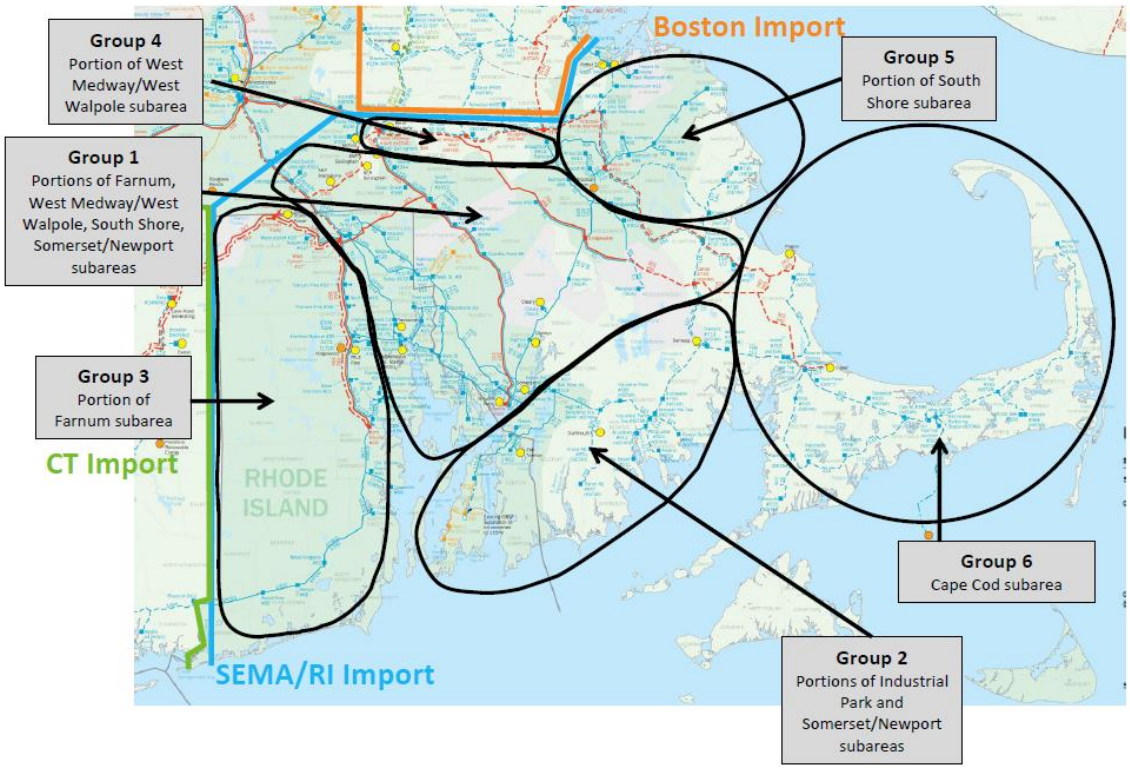

Figure 5-1: SEMA-RI Solutions Study Groups Map

5.3.1 Group 1 – Portions of Farnum, West Medway/West Walpole, South Shore, and Somerset/Newport Subareas

Needs in the Group 1 boundary are driven by generation unavailability in the [redacted]. Insufficient injection at Somerset station causes the majority of the overloads. The nearest 345 to 115 kV sources to the Somerset area are Bridgewater, West Farnum, and Carver. Brayton Point is a 345 kV to 115 kV source but is only connected to the Somerset area via 115 kV lines through northern Rhode Island. Under various stress scenarios and N-1-1 conditions, power flows on the 115 kV system from Brayton Point to northern RI to the Somerset area, from West Farnum to the Somerset area or from Bridgewater to the Somerset area.[25] Under these conditions, the 115 kV lines overload in northern Rhode Island (H17, V-148S, R9, J16S, P11, and Q10) and in the Somerset area (K15, U6, V5, S8, and W4). This event was the catalyst for the new Group 1 boundary. Three alternative solutions were developed to solve Group 1 needs.

Alternative #1 was developed after the Group 1 boundary was established. Solution Alternative #1 simply solved each thermal and voltage overload individually. Taking this approach required the

[25] Any needs that appear from power flowing from the Carver 345 to 115 kV source to the Somerset area will be addressed in Group 2.

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reconductoring of fourteen 115 kV lines for approximately 117 miles and installing numerous reactive devices to solve voltage violations.

For Alternative #2 National Grid offered a solution alternative which would tie Brayton Point to Somerset by utilizing existing transmission lines. This can be accomplished by building a new GIS switching station to tie the 115 kV X3, W4, E-183E and F-184 lines in a breaker and a half station on land owned by National Grid between existing New England Power (NEP) and EUA ROW in Somerset, MA. See Figure 5-2.

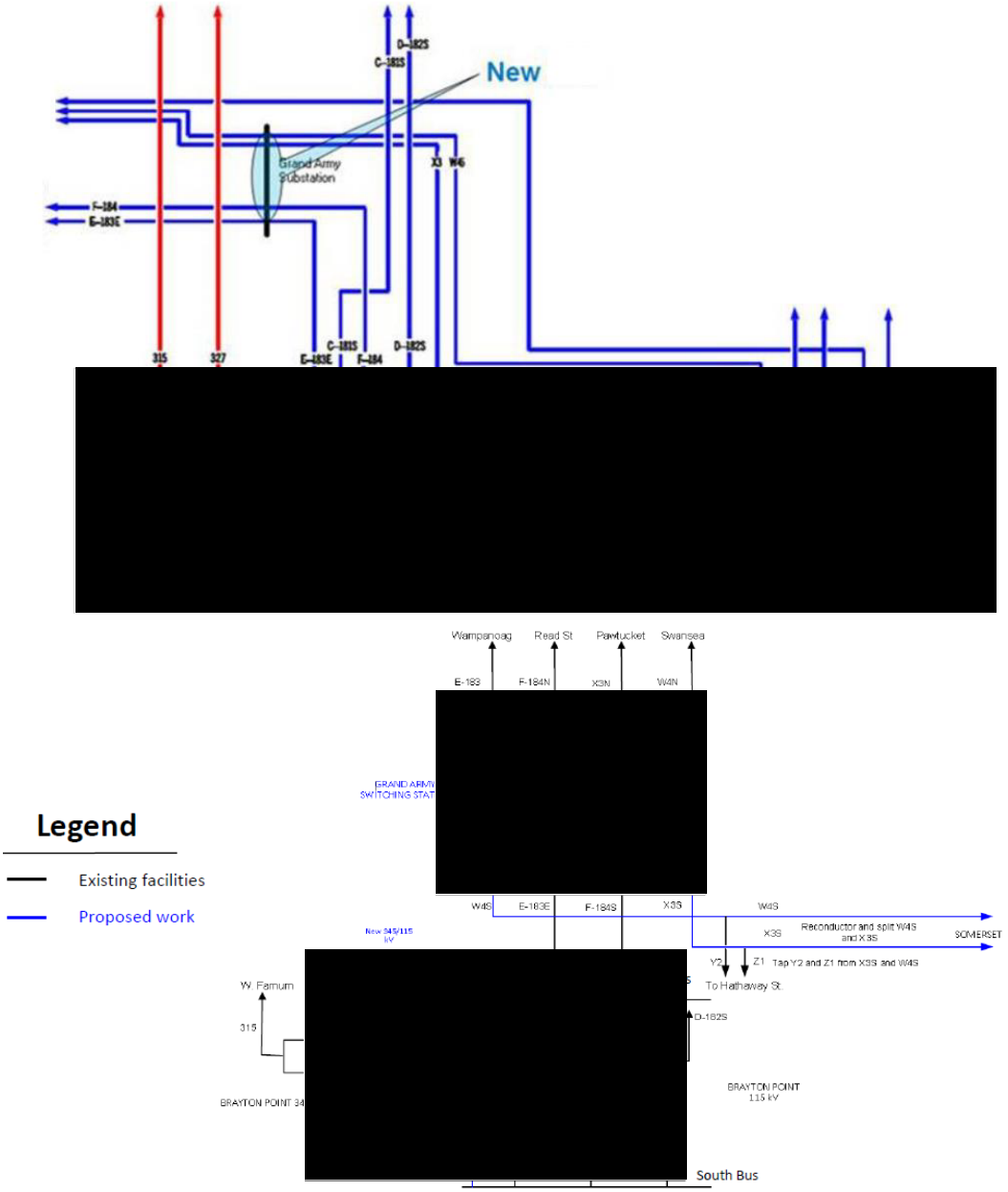

Figure 5-2: Solution Alternative #2 – New Grand Army Station

By utilizing the existing 115 kV lines and constructing a new station in close proximity to Brayton Point and Somerset, the system performance achieved by this Solution Alternative #2 is equivalent to Solution Alternative #3. The solution components which make up the Solution Alternative #2 are shown Table 5-1.

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Table 5-1: Solution Alternative #2 Solution Components

Solution Components
Grand Army 115 kV GIS switching station and loop the E-183E, F-184, X3 and W4 lines
Upgrades at Brayton Point (new 115 kV breaker, new 345/115 kV transformer and upgrades to E183E, F184 station equipment)
Increase clearances on E-183E & F-184 lines between Brayton Point & Grand Army (~1.5 miles each)
Separate X3/W4 DCT and reconductor X3, W4 lines between Somerset and Grand Army (~2.7 miles each). [26]

Alternative #3 was created to introduce a new supply into the Somerset/Fall River/Aquidneck Island/ New Bedford/Industrial load pocket. The nearest 345 kV source for the load pocket is Brayton Point. The distance between Brayton Point and Somerset stations is less than four miles. The idea to construct a direct tie between the stations is not a new one based on a component of the Greater Rhode Island (GRI) Transmission Projects which received Proposed Plan Application (PPA) approval in 2008.[27] Under GRI, a new 115 kV line would be constructed from Brayton Point to Somerset. Due to the advent of the NERC Bulk Electric System (BES) designation[28], an additional line was added from Brayton Point to Somerset to meet the new contingency criteria. By connecting the existing stations, the working group found that the proposed solution of two new 115 kV lines between Brayton Point and Somerset solved many of the time-sensitive needs across numerous subareas originally defined in the SEMA-RI 2026 Needs Assessment.[29] See Figure 5-3.

[26] The separation of the X3/W4 DCT was not required to solve the needs however based on the lowest cost construction plan to solve the needs, the X3 and W4 lines will be separated. The reconductoring of the W4 line will be accomplished by moving the W4 line to the double circuit towers that currently support the Y2 and Z1 lines, installing new conductors on the double circuit towers and bussing the phases together to make a higher capacity W4 line. The X3 line will be reconductored by installing new conductors on the existing X3/W4 double circuit towers and bussing the phases together to make a higher capacity X3 line. The Y2 and Z1 lines will then be tapped off the X3 and W4 lines. This proposed work makes use of most of the existing towers and provides increased rating at the lowest cost. A by-product of this arrangement is the separation of X3 and W4 DCT.

[27] National Grid withdrew the GRI PPAs on May 13, 2015. https://smd.iso-ne.com/operations-services/ceii/rc/2015/05/a3_7_greater_ri_ppa_withdrawal_letter.pdf

[28] NERC defined BES facilities using a bright line of 100 kV and above with some inclusions and exceptions.

[29] This proposed solution alternative became Solution Alternative #3 in Group 1.

[redacted]

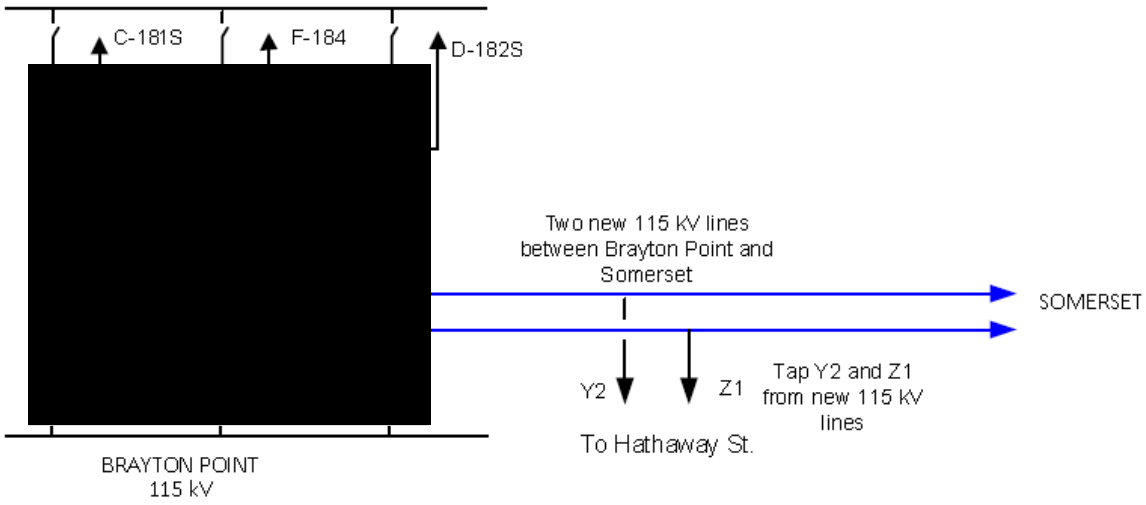

Figure 5-3: Group 1 Solution Alternative #3

The solution components which make up the Solution Alternative #3 are shown Table 5-1.

Table 5-2: Solution Alternative #3 Solution Components

Solution Components
Install 2 new OH 115 kV lines between Brayton Point and Somerset (~3.7 miles each). Relocate F-184, E-183E and D-182S to make space in ROW for new lines
Upgrades at Brayton Point substation (new 345/115 kV XFMR, new 115 kV breaker and station work to accommodate two new lines)
Upgrades at Somerset substation to accommodate two new lines

Common Upgrades:

Alternative #2 or #3 does not solve the needs driven by the [redacted]. In addition, the [redacted] takes the whole Robinson Ave substation out of service since these two lines are not terminated adjacent to each other in the four breaker ring. ([redacted].) By installing a new 115 kV breaker and re-terminating the Q10 line at Robinson Ave, all of the remaining needs in Group 1 are resolved.[30] The installation of a new 115 kV breaker and the re-termination of the Q10 line at Robison Ave are considered common solutions for Alternative #2 and #3.

With the new configuration of the system in the Brayton Point and Somerset area, National Grid performed a [redacted] to determine if stations in the area would

[30] The 115 kV H17-2 (Farnum Tap to Riverside) and R9 (Riverside to Valley) lines were shown as time-sensitive needs in the Needs Assessment but are not solved by this study because the needs will be solved by the QP 489 – Burrillville Energy Center project.

become [redacted] following implementation of the transmission solution. Their preliminary testing showed [redacted] would [redacted] stations. National Grid's minimum requirements for post contingency voltages are 0.95 p.u. for 230 and 345 kV buses. Also, National Grid buses that are part of the Bulk Power System, and other buses deemed critical by operations, are also required to meet the criteria for 345 kV and 230 kV buses. For all other National Grid buses, the minimum voltage requirement is 0.9 p.u. If Berry Street [redacted], then a 45.0 MVAR capacitor would be needed to correct the voltage to the 0.95 p.u. voltage criterion. It should be noted that the [redacted] at this time and results can change when the PPA study is conducted in the future. The PPA study will identify the continued need for the capacitor at Berry Street and other upgrades needed if [redacted]. At this time, the installation of a 45.0 MVAR capacitor at Berry Street is considered a common solution to Alternative #2 and #3.

In the July PAC presentation[33] a common project to Alternatives #2 and #3 was listed to reconductor the H17-2 line from Farnum Tap to Riverside (3.4 miles). The addition of this project was an error because the upgrade of this line is currently part of Burrillville Energy Center generator interconnection system upgrades.

5.3.2 **Group 2 – Portions of Industrial Park and Somerset/Newport Subareas**

The Group 2 load pocket could be subjected to events which violated the consequential load loss threshold of 300 MW or voltage collapse concerns on the 115 kV system. The loss of [redacted] disconnects approximately 450 MW of load in the load pocket. See Figure 5-4.

[31] Under the latest [redacted] Berry Street 115 kV is [redacted] however it would be [redacted] once the Brayton Point resources retire.

[32] Somerset will be rebuilt due to asset condition and the new construction will insure [redacted].

[33] https://smd.iso-ne.com/operations-services/ceii/pac/2016/07/a3_sema_ri_2026_solution_study_update.pdf

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Figure 5-4: Consequential Load Loss Event

[redacted] Under these conditions, the load pocket is [redacted]. Voltage collapse is expected to spread beyond this load pocket affecting approximately 600 MW of load in the entire area. See Figure 5-5.

[redacted]



Figure 5-5: Voltage Collapse Event

To solve the consequential load loss and voltage collapse issues, the working group developed solution components to create new transmission supplies to serve the load pocket. In the case of the voltage collapse issue, two new transmission feeds are needed. [redacted] if only one new transmission feed was created, the loss of the new transmission feed and [redacted] would result in the same existing system configuration that leads to voltage collapse. The working group developed four new solution alternatives to serve the load pocket:

- Alternative #1
  - Install a new undersea line from Bristol substation to a new switching station named Boyd's Lane in Portsmouth, RI (approximately 5.0 miles)
  - Reconductor F-184 115 kV line from Merriman Junction to Warren to Bristol (5.1 miles)
- Alternative #2
  - Separate the M13/N12 DCT from Somerset to Sykes Road
  - Reconductor M13 and N12 from Somerset to Bell Rock (3.5 miles)
  - Loop the M13 line into Bell Rock
  - Reconfigure Bell Rock to a breaker and a half configuration
- Alternative #3

- Install a new line from Somerset to Bell Rock
- Loop the M13 line into Bell Rock
- Reconfigure Bell Rock to a breaker and a half configuration

- Alternative #4
  - Extend the 114 line from the Industrial Park Tap to either High Hill or Bell Rock
    - High Hill (6.6 miles) and rebuild High Hill substation or
    - Bell Rock (approximately 12.0 miles) and convert Bell Rock to a breaker and a half configuration
  - Resolve M13/N12 thermal violations by reconductoring or bussing the lines together
  - Install reactive devices to address voltage violations
    - 37.5 MVAR capacitor at Bell Rock
    - 35.3 MVAR capacitor at High Hill
    - 35.3 MVAR capacitor at Wing Lane
  - Install a new breaker in series with the N12/D21 tie breaker at Bell Rock

Solution alternatives to solve the consequential load loss and voltage collapse issues would require two of the four solution alternatives listed above. Selecting two of the four solution components would result in a total of six solution alternatives. However, the total of combinations is reduced to five because solution Alternatives #2 and #3 cannot be combined together due to space constraints within the right of way between Somerset and Bell Rock. In addition, Alternative #2 and #3 are unique alternatives when combined with Alternative #1, however, Alternatives #2 and #3 propose work in the same right of way from Somerset toward Bell Rock and, when combined with Alternative #4, are essentially the same from an electrical performance and cost standpoint. See Figure 5-6. Therefore, the combination of Alternative #2 and Alternative #4 is the same as the combination of Alternative #3 and Alternative #4. This combination will be referred to as Alternative #2/#3 and Alternative #4.

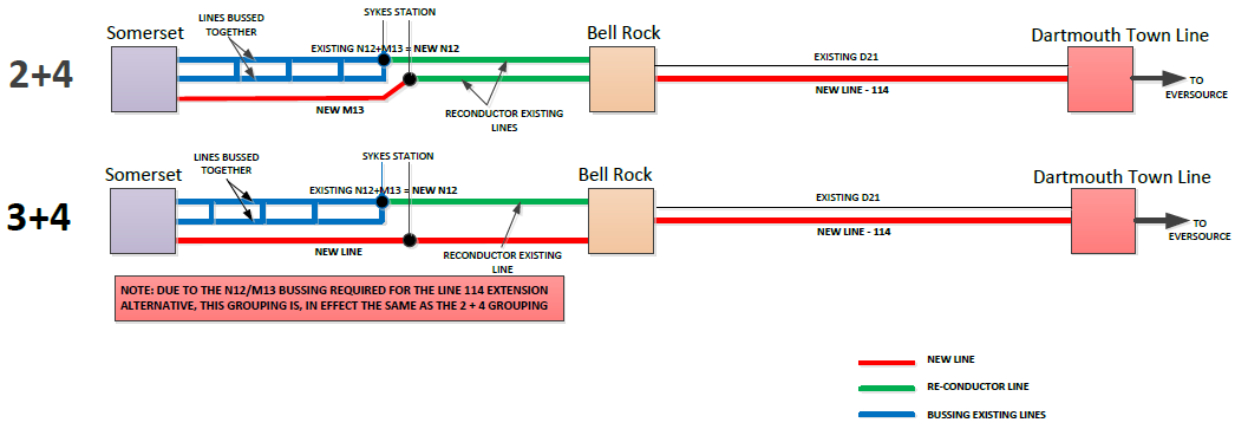

Figure 5-6: Comparison between Alternative #2 and #4 and Alternative #3 and #4

Alternative #4 proposed an extension of the 114 Line from the Industrial Tap to either High Hill (6.6 miles) or Bell Rock (12.0 miles) with station work required at both High Hill and Bell Rock. Even though the proposed line extension to Bell Rock is longer in distance, the amount of station

work required at High Hill was more costly and therefore the line extension to High Hill was dropped from consideration

The remaining four combinations are shown in Table 5-3 below.

Table 5-3: Group 2 Solution Alternative Combinations

ID	Solution Components	Alt #1 & Alt #2	Alt #1 & Alt #3	Alt #1 & Alt #4	Alt #2/#3 & Alt #4
1	Install a new line from Bristol substation to a new switching station named Boyd's Lane in Portsmouth, RI (approximately 5.0 miles). Includes cost for Horizontal Directional Drilling (HDD) submarine cable across Mt. Hope Bay	X	X	X	
2	Bristol station upgrades and add new 115 kV breaker	X	X	X	
3	Install new 115 kV station with a 5 breaker ring at Boyd's Lane in Portsmouth, RI. Terminate new 115 kV line & loop L14/M13 in/out of the station	X	X	X	
4	Reconductor F-184 115 kV line from Merriman Junction to Warren to Bristol (5.1 miles)	X	X	X	
5	Separate N12/M13 DCT & reconductor N12 & M13 between Somerset and Bell Rock (~3.5 miles)	X			X
6	Install new 115 kV line (UG-1.7 mi and OH-1.8 mi) between Somerset and Bell Rock (~3.5 miles). Add circuit breaker at Somerset for new line		X		
7	Install new breaker in series with the N12/D21 tie breaker and upgrade the D21 Line switch upgrade at Bell Rock				X
8	Reconductor N12 & M13 (No DCT Split) between Somerset and Bell Rock (~3.5 miles)			X	
9	Install a third breaker in a bay to terminate Line 114 at Bell Rock			X	X
10	Extend Line 114 – Eversource/NGRID border to Bell Rock (~4.2 miles)			X	X
11	Extend Line 114 – Industrial Park Tap to Eversource/NGrid border (~7.9 miles)			X	X

12	Install capacitors at Bell Rock, High Hill and Wing Lane	X	X

In addition to the four solution alternatives, there are a number of common projects to solve the remaining time-sensitive needs in Group 2. See Table 5-4 below.

Table 5-4: Group 2 Common Solution Components

Common Solution Components
Reconfigure Bell Rock to breaker and a half station and split M13 line at Bell Rock
Reconductor the 108-4 line from Bourne to the Horse Pond Tap (1.9 miles)
Reconductor the M13 and L14 line from Bell Rock to the Bates St Tap (8.3 miles)
Reconductor the 112 line from Tremont to the Industrial Park Tap (10.3 miles)
Replace wave trap on 114 line at Tremont

5.3.3 **Group 3 – Portion of Farnum Subarea**

Most of the time-sensitive needs in this Group were located on the 115 kV lines which make up the Connecticut and Rhode Island tie. The Connecticut to Rhode Island tie is comprised of the 1280 line from Montville to Mystic, CT, the 1465 line from Mystic, CT to Shunock, the 1870S line from Shunock to Wood River, the 1870 line from Wood River to Kenyon, the 1870N line from Kenyon to West Kingston and the G185S and L190 lines from West Kingston to Kent County. The current Eastern Connecticut working group is also conducting a Solutions Study to solve time-sensitive needs on the Connecticut side of the Connecticut to Rhode Island tie. Since contingencies in one study area drive time-sensitive needs in the other study area and vice versa, the development of solution alternatives needs to be a coordinated effort between both study groups. Both study working groups have held some preliminary meetings and it is anticipated that preferred solutions will be developed and presented to the PAC in 2017.

Outside of the Connecticut and Rhode Island tie, there was only one remaining time-sensitive need. The preferred solution to solve the time-sensitive need is to replace the Kent County T3 345/115 kV transformer.

5.3.4 **Group 4 – Portion of West Medway/West Walpole Subarea**

In this Group, all of the thermal time-sensitive needs were located on the C-129N line and all of the voltage time-sensitive needs were located at stations served by the C-129N line when [redacted]. Two solution alternatives were developed for this group.

- Alternative #1- See Figure 5-7
  - Loop 201-502 line into the Medway station to form the 201-502N and 201-502S lines.
- Alternative #2 – See Figure 5-8
  - Reconductor/rebuild the C-129N line (11.7 miles) from Millbury to Purchase St Tap
  - Reconductor/rebuild the C-129N line (2.2 miles) from Purchase St Tap to Rocky Hill Tap
  - Install reactive devices to address voltage

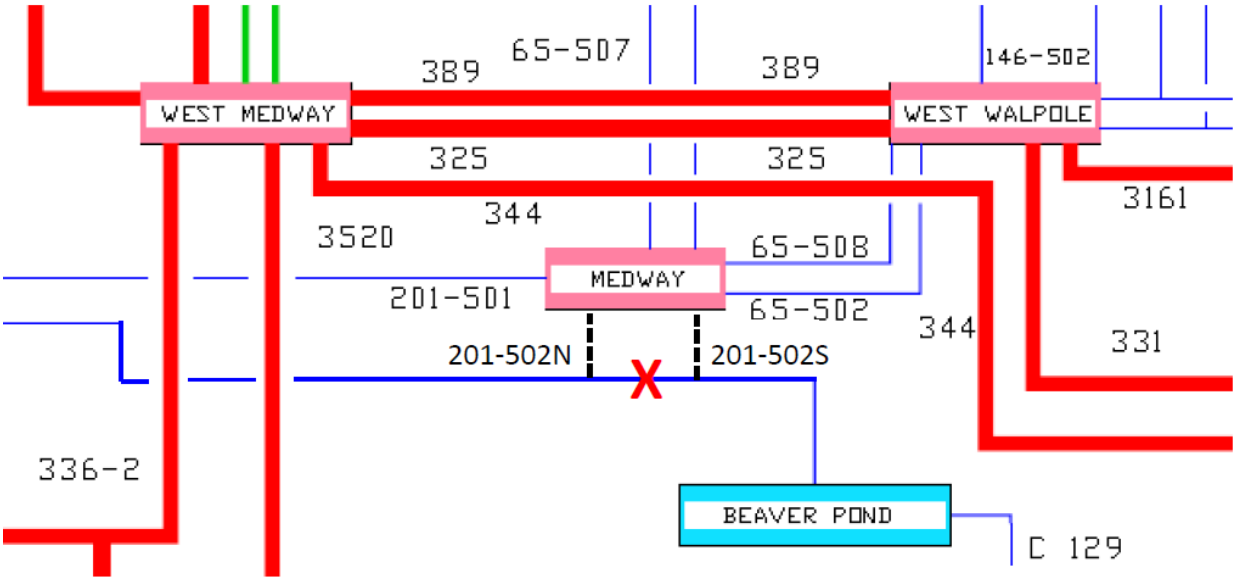

Figure 5-7: Loop 201-502 Line into Medway

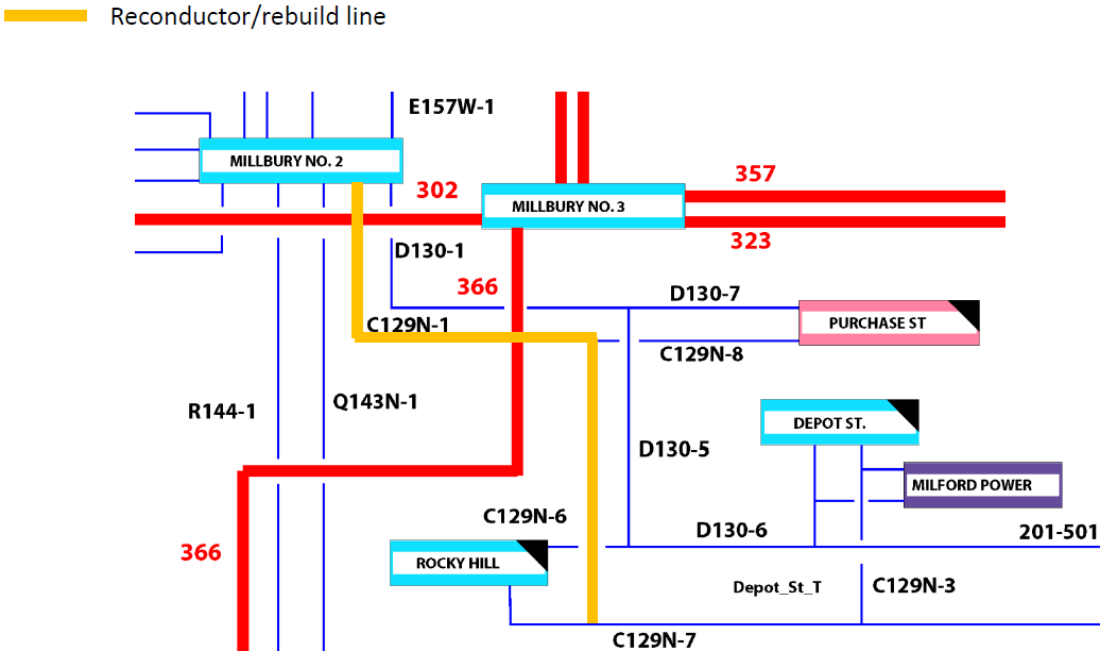

Figure 5-8: Reconductor/rebuild the C-129N line (approximately 14.0 miles) from Millbury to Rocky Hill Tap

In addition to the two solution alternatives in Group 4, additional work which is common to Alternative #1 and #2 is needed to rerate the Eversource portion of the 323 line from Millbury #3

to West Medway by replacing the West Medway substation disconnect switches 107A, 107B, 108A and 108B with 3000A disconnects.

5.3.5 Group 5 – Portion of South Shore Subarea

As part of the solution development for Group 5, Eversource brought forth plans to rebuild the Kingston substation due to asset condition needs. Eversource presented the Kingston Substation #735 Asset Condition Replacement project at the December 2016 PAC meeting.[34] Eversource stated that the Kingston substation replacement project would include:

- the replacement of aged equipment due to asset condition needs,
- the addition of PTF related equipment where the costs would not be regionalized under the Regional Network Service (RNS) rate, and
- work to terminate new lines as a result of solution alternative development to solve time-sensitive needs in the Group 5 area

Since Eversource would have mobilized crews to rebuild the Kingston substation, the cost to incorporate potential solution alternatives from the SEMA-RI study would be reduced due to synergies between the projects. The potential reduced costs for some of the solution components will be discussed and compared in Section 7 of this report.

Group 5 is a load pocket served by the 115 kV 191 line (Auburn to Kingston), 194 line (Auburn to Brook Street) and the 116 line (Carver to Brook Street). The loss of the [redacted] results in a thermal overload of the 191 line (Auburn to Kingston) and in low voltage at the Brook Street and Kingston substations. In addition, the loss of the [redacted] results in an overload of the 117 line (Carver to Brook St).

There are two strategies to solve the time-sensitive needs in Group 5. One strategy is to create a new source into the load pocket. The other strategy is to increase the capacity of the existing lines that serve the load pocket.

The working group developed four new solution alternatives to serve the load pocket:

- Alternative #1– See Figure 5-9
  - Reconductor the 117 line from Brook St to Kingston (3.1 miles)
  - Reconductor the 191 line from Auburn to Kingston (15.3 miles)
  - Replace terminal equipment at Kingston
- Alternative #2– See Figure 5-10
  - Install new line from Carver to Kingston (approximately 8.0 miles)
  - Rebuild Kingston to a breaker and a half configuration
- Alternative #3– See Figure 5-11
  - Install new line from Manomet to Kingston (approximately 6.0 miles new, 9.2 miles existing)
  - Install breakers at Manomet to accommodate new line

[34] https://smd.iso-ne.com/operations-services/ceii/pac/2016/12/a2_kingston_substation_asset_conditions.pdf

- Rebuild Kingston to a breaker and a half configuration

- Alternative #4– See Figure 5-12
  - Install a parallel line from Brook St to Carver (4.9 miles)
  - Reconductor the 117 line from Brook St to Kingston (3.1 miles)
  - Replace terminal equipment at Kingston

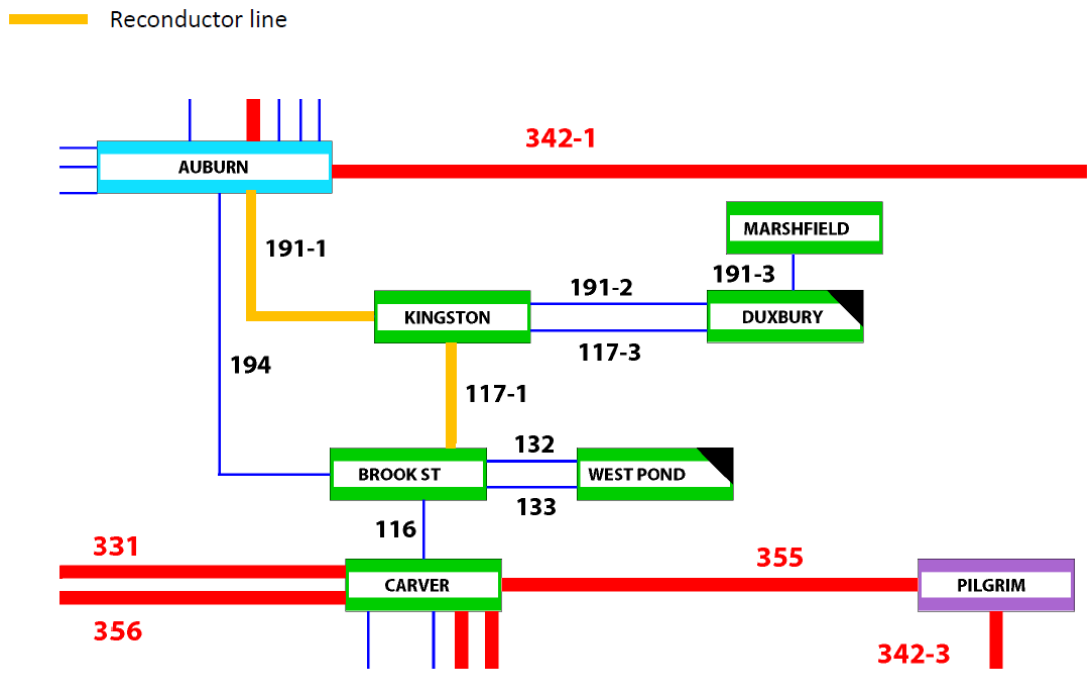

Figure 5-9: Reconductor 117 and 191 Lines

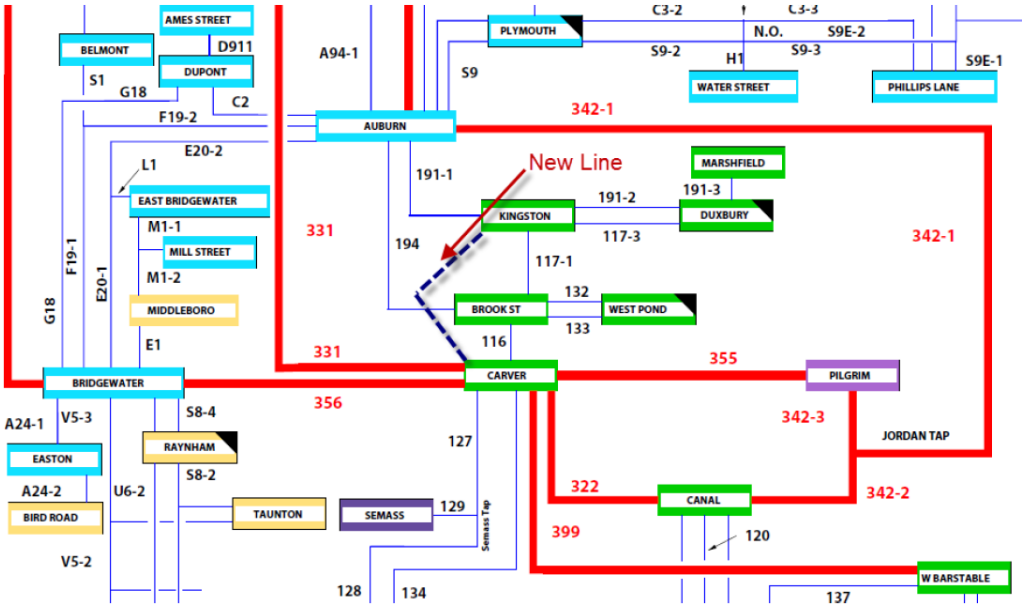

Figure 5-10: Install New Line from Carver to Kingston and Rebuild Kingston

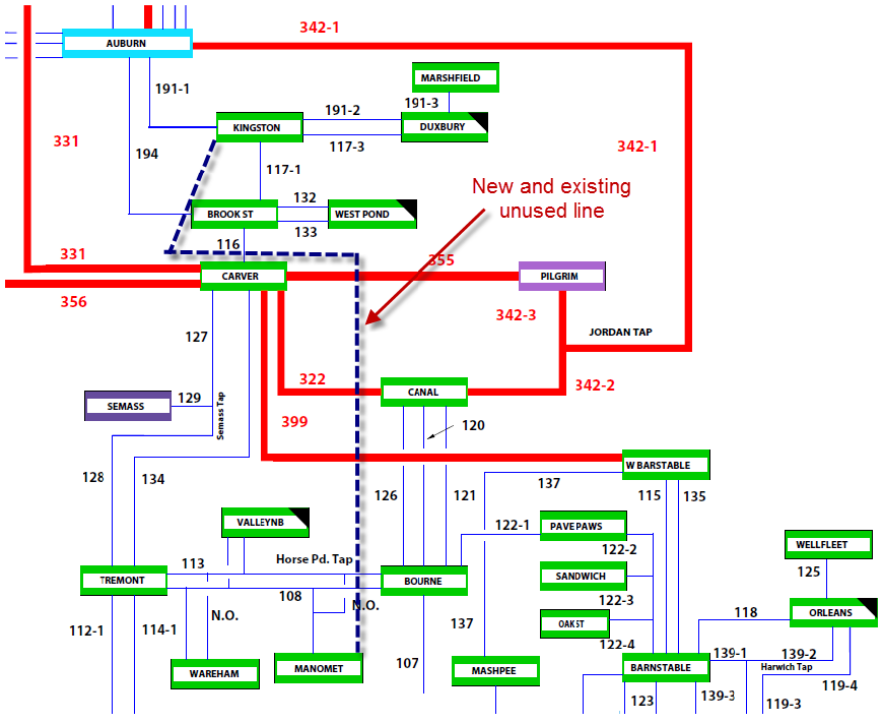

Figure 5-11: Install New Line from Manomet to Kingston and Rebuild Kingston

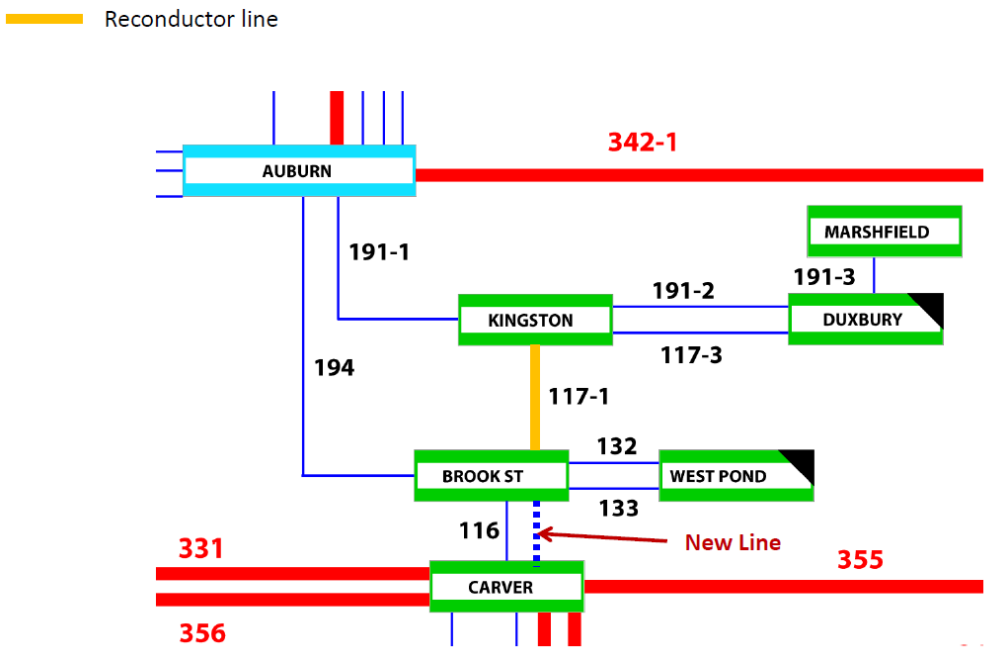

Figure 5-12: Install a New Line from Brook Street to Carver and Reconductor the 117 Line

There was one common solution component for Group 5. It was the rebuild of the MGED portion of E1 line from Bridgewater to Middleboro (2.5 miles).

5.3.6 **Group 6 – Cape Cod Subarea**

As part of the solution development for Group 6, Eversource brought forth plans to rebuild the Bourne station due to asset condition needs. Eversource presented the Bourne Station #917 Condition Assessment and Solution project at the November 2016 PAC meeting.[35] The Bourne station rebuild would be required due to asset condition regardless of the solution alternatives developed for the SEMA-RI study.

Group 6 or the Cape Cod Subarea is a large load pocket. From the Bourne station the 345 kV 399 line (Carver to West Barnstable), the 115 kV 122 line (Bourne to Barnstable) and the 115 kV 107 line (Bourne to Falmouth Tap) serve all of Cape Cod's load. [redacted] as shown by the numerous non-converged load flow results. The strategy to solve the time-sensitive needs in Group 6 is to add a new source into the load pocket.

The working group developed two new solution alternatives to serve the load pocket:

- Alternative #1– See Figure 5-13
  - Install a new 115 kV line from Bourne to West Barnstable (approximately 13.0 miles)
- Alternative #2– See Figure 5-14

[35] https://smd.iso-ne.com/operations-services/ceii/pac/2016/11/a3_bourne_asset_conditions_preferred_solutions.pdf

- Reconductor/rebuild the 107 line from Bourne to Falmouth Tap (10.0 miles)
- Reconductor/rebuild the 136 line (formerly the 115 line) from Falmouth Tap to West Barnstable (16.5 miles)
- Reconductor/rebuild the 122 line from Bourne to Barnstable (16.6 miles)
- Terminal equipment upgrades at Barnstable and Falmouth Tap

In addition to the two solution alternatives, additional work which is common to Alternative #1 and #2 is needed. The common solution components are:

- The separation of the 122 and 135 lines from West Barnstable to Barnstable (3.3 miles) and
- The retirement of the Barnstable SPS.

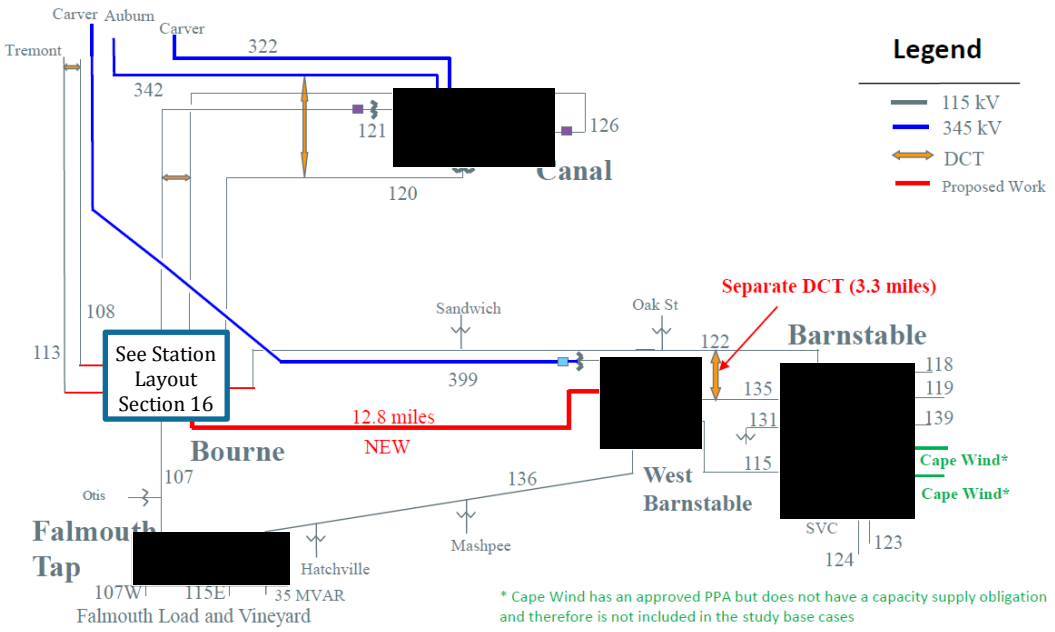

Figure 5-13: Group 6 - Alternative #1

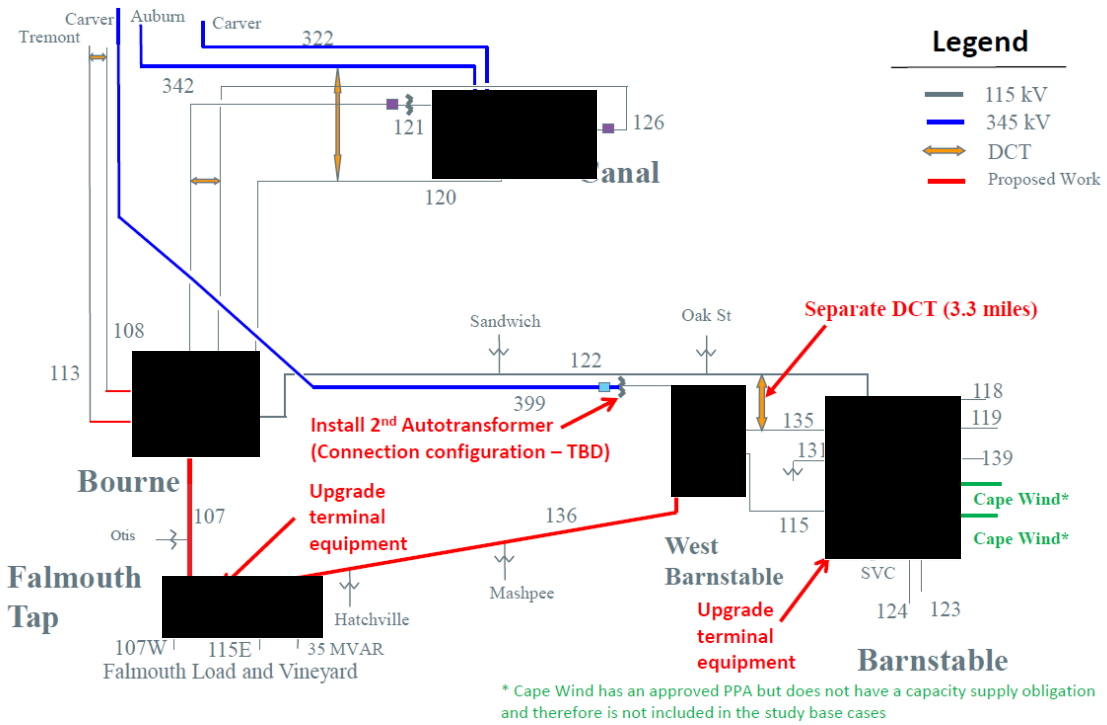

Figure 5-14: Group 6 - Alternative #2

5.3.1 **Boston Area**

A number of time-sensitive needs appeared in the Boston area due to contingencies in the SEMA-RI study area. All of the time-sensitive needs were the result of the loss of the [redacted] and results in overloads of facilities in the Boston area. There are two strategies to solve the time-sensitive needs in the Boston area. One strategy is to eliminate the DCT contingency by splitting the DCT. The other strategy is to increase the capacity of the existing facilities that overload in the Boston area.

The working group developed two new solution alternatives to serve the load pocket.

- Alternative #1– See Figure 5-15
  - Separate the 325 and 344 lines from West Medway to West Walpole (approximately 50 structures)
- Alternative #2– See Figure 5-16
  - Replace the 345A and 345B autotransformers at Kingston
  - Reconductor the 329-531 cable from North Cambridge to Brighton (2.9 miles)
  - Reconductor the 385-512 and 385-513 cables from Kingston to K St (2.3 miles)
  - Reconductor the 385-510 and 385-511 cables from K St to High St to Kingston (2.2 miles)

- Terminal equipment upgrades at Barnstable and Falmouth Tap

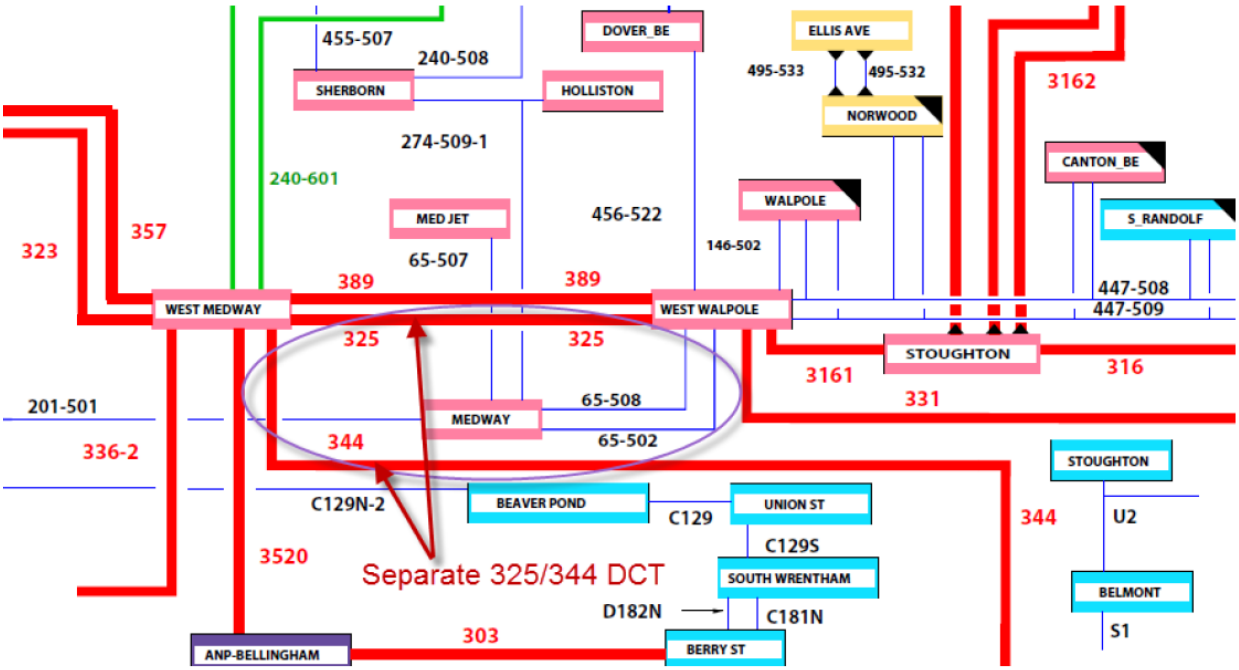

Figure 5-15: Boston Area - Alternative #1

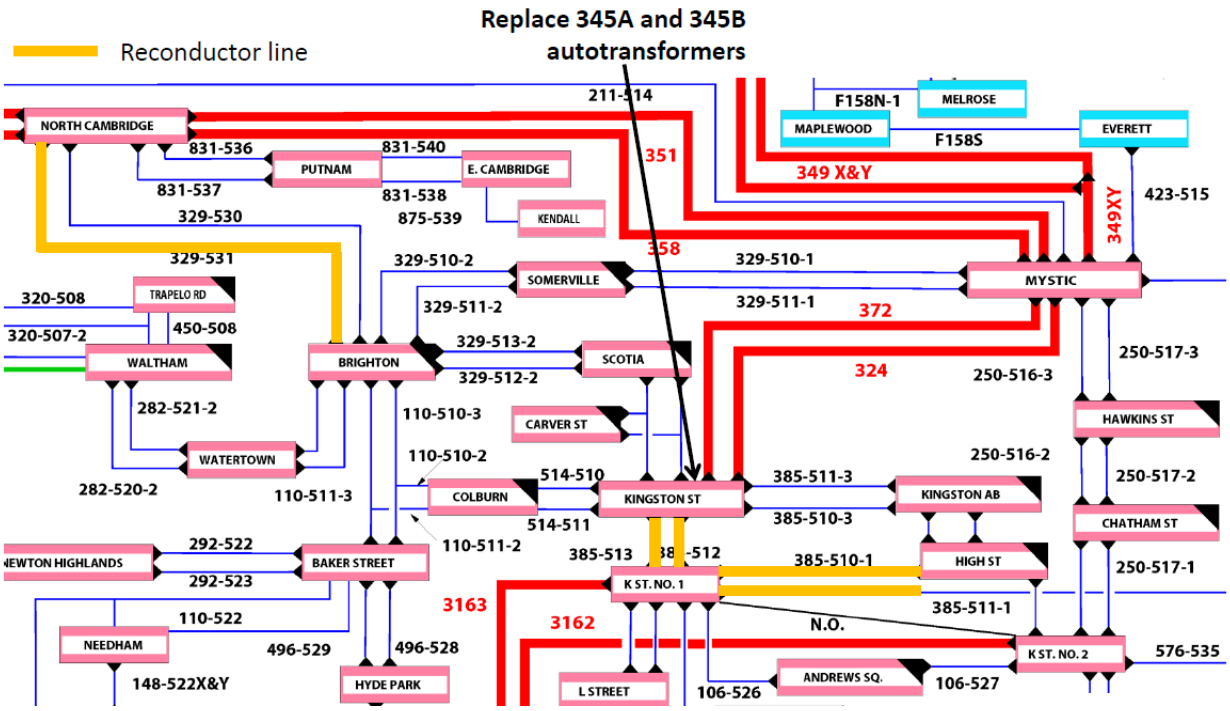

Figure 5-16: Boston Area - Alternative #2

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Section 6
Alternative Solution Performance Testing and Results

6.1 Steady State Performance Results

All combinations of solution alternatives resolved the thermal and voltage criteria violations found in the Needs Assessment. A detailed description of the results of the solution alternatives is described in the following sections.

6.1.1 N-0 Thermal and Voltage Performance Summary

There was one time-sensitive N-0 thermal violation identified in the SEMA-RI 2026 Needs Assessment testing. Each transmission solution alternative for each Group was tested against the identified time- sensitive needs, and was augmented until a complete solution package was developed to address the needs identified in the Needs Assessment. As such, the N-0 thermal criterion is fully satisfied with the full combination of each Group's solution alternatives.

6.1.2 N-1 Thermal and Voltage Performance Summary

Each transmission solution alternative for each Group was tested against the identified time-sensitive needs, and was augmented until a complete solution package was developed to address the time-sensitive needs identified in the Needs Assessment. As such, the N-1 thermal and voltage criteria are fully satisfied with the full combination of each Group's solution alternatives.

6.1.3 N-1-1 thermal and Voltage Performance Summary

Each transmission solution alternative for each Group was tested against the identified time-sensitive needs, and was augmented until a complete solution package was developed to address the time-sensitive needs identified in the Needs Assessment. As such, the N-1-1 thermal and voltage criteria are fully satisfied with the full combination of each Group's solution alternatives.

6.2 Stability Performance Results

Not applicable for this study.

6.3 Short Circuit Performance Results

After the solution alternatives were selected, each transmission owner (TO) studied short circuit duties within their service territory. Detailed study reports of the short circuit studies performed by National Grid and Eversource are found in Appendix G: Short Circuit Analysis Results.

6.3.1 Short Circuit Performance Results

All the preferred solution alternatives as shown in Section 7 were used for the short circuit testing and the results are summarized in Table 6-1.

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Table 6-1: Preferred Solution Alternatives Short Circuit Study Summary

Station	kV	Over Duty (Above 100%)	High Duty (95.1-100%)	Marginal Duty (90-95.0%)
West Medway	345	--	12 (50 kA)	1 (50 kA)
Medway	115	--	5 (40 kA)	--
Drumrock	115	--	--	5 (40 kA)
Bridgewater	115	--	--	5 (50 kA)

As a result of the short circuit testing, no breakers become over-dutied due to the preferred solution alternatives.

6.4 Other Assessment Performance Results

6.4.1 Special Protection System Screening Test

As described in Section 3.2.13, the study area has several special protection systems (SPS). An assessment was completed on each SPS to ensure if it was still required after the preferred solution was implemented. The same base cases, generator dispatches, and system stresses were tested in the screening study as in the Solutions Study. The results of the test are described for each SPS in the following sections.

6.4.1.1 *Barnstable SPS – NPCC Type III*

The assessment of the Barnstable SPS is shown in Table 6-2.

Table 6-2: Barnstable SPS Evaluation

[redacted]

Based on the results of the analysis, the Barnstable SPS will be retired.

[redacted]

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6.4.1.2 *Bellingham Plant #2 (BEL2) SPS – NPCC Type III*

It was determined that preferred solution does not cause a significant change to system topology that would alter the current need for the Bellingham Plant #2 (BEL2) SPS. No change will be made to the current SPS.

6.4.1.3 *Edgar Station SPS – NPCC Type III*

It was determined that preferred solution does not cause a significant change to system topology that would alter the current need for the Edgar Station SPS. No change will be made to the current SPS.

6.4.1.4 *L14/M13 Tiverton SPS – NPCC Type III*

Due to the Tiverton Generator Uprate Project the L14/M13 SPS will be retired.

6.4.1.5 *Stoughton Station SPS – NPCC Type III*

It was determined that preferred solution does not cause a significant change to system topology that would alter the current need for the Stoughton Station SPS. No change will be made to the current SPS.

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Section 7
Comparison of Alternative Solutions

7.1 Factors Used to Compare Alternative Solutions

When the estimated cost (+50/-25% accuracy) was similar, the key factors used to compare the solution alternatives included:

- Expected ease of permitting (e.g. environmental, siting, etc.)
- Ease of constructability (during the construction phase)
- Fewer and shorter construction outages (number and length of outages)
- Reduced environmental impact
- Reduced abutter impact
- Overall system performance
- Shorter length of time to construct or earlier expected in-service date (ISD)

The siting issues took into consideration easements along existing rights-of-way (ROW) as well as available space in existing substation. Total cost estimates were used to consider differences between all solution alternatives.

7.2 Cost Estimates and Comparison for Selected Alternative Solutions

All cost estimates were developed consistent with ISO-NE cost estimation procedures as defined in Attachment D of ISO-NE Planning Procedure No. 4.0. All cost estimates in this report were developed with +50/-25% accuracy.

Cost estimates for some proposed solution alternatives were not developed because the scope of work and resulting costs for the solution alternative were determined to be far greater than those of a competing solution alternative. In this case, the solution alternative with the greater scope of work and resulting higher cost was dropped from further consideration.

Cost estimates were developed by the transmission owners (TO) for each solution component and solution components were added together to form solution alternatives for each group. The total cost for each solution alternative was compared against the other solution alternatives in a group. If a solution alternative had a far lower cost than the other solution alternatives, then the lower cost alternative became the preferred solution based on cost. If the cost of the solution alternatives were very close to each other, then the factors shown in Section 7.1 were used to compare the solution alternatives and select the preferred solution. The comparison of non-cost factors is shown in Section 7.3.

7.2.1 Group 1 – Portions of Farnum, West Medway/West Walpole, South Shore, and Somerset/Newport Subareas

Solution Alternative #1 was dropped from consideration because it was cost prohibitive due to the amount of reconductoring and reactive devices required. The remaining solution alternatives for Group 1 are shown below.

Table 7-1: Group 1 Cost Estimates

[redacted]

ID	Solution Components	Solution Alternatives Reported in $M at +50/-25% Accuracy	
		Alt #2	Alt #3
1	Grand Army 115 kV GIS switching station and loop the E-183E, F-184, X3 and W4 lines	43.8	
2	Upgrades at Brayton Point (new 115 kV breaker, new 345/115 kV transformer and upgrades to E183E, F184 station equipment)	13.1	
3	Increase clearances on E-183E & F-184 lines between Brayton Point & Grand Army (~1.5 miles each)	3.4	
4	Separate X3/W4 DCT and reconductor X3, W4 lines between Somerset and Grand Army (~2.7 miles each). Reconfigure Y2 and Z1	14.6	
5	Install 2 new OH 115 kV lines between Brayton Point and Somerset (~3.7 miles each). Relocate F-184, E-183E and D-182S to make space in ROW for new lines		52.6
6	Upgrades at Brayton Point substation (new 345/115 kV XFMR, new 115 kV breaker and station work to accommodate two new lines)		19.9
7	Upgrades at Somerset substation to accommodate two new lines		2.8
8	Robinson Ave 115 kV circuit breaker addition and re-terminate Q10 line	2.0	2.0
9	Install 45.0 MVAR capacitor bank at Berry Street	1.6	1.6
Group 1 Solution Alternative Total in $M		**78.5**	**78.9**

Since the cost for both solution alternatives are very close to each other, the factors shown in Section 7.1 were used to compare the solution alternatives and select the preferred solution. Further discussion is provided in Section 7.3.1.

7.2.2 Group 2 – Portions of Industrial Park and Somerset/Newport Subareas

As discussed in Section 5.3.2, the combination of Alternative #2 and #3 is not feasible and the combinations of Alternative #2 and #4 and Alternative #3 and #4 are the same from an electrical performance and cost standpoint. These combinations are shown as Alt #2/#3 & Alt #4 in the table below. The remaining solution four alternatives for Group 2 are shown below.

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Table 7-2: Group 2 Cost Estimates

ID	Solution Components	Solution Alternatives Reported in $M at +50/-25% Accuracy			
		Alt #1 & Alt #2	Alt #1 & Alt #3	Alt #1 & Alt #4	Alt #2/#3 & Alt #4
1	Install a new line from Bristol substation to a new switching station named Boyd's Lane in Portsmouth, RI (approximately 5.0 miles) Includes cost for Horizontal Directional Drilling (HDD) submarine cable across Mt. Hope Bay	70.4	70.4	70.4	
2	Bristol station upgrades and add new 115 kV breaker	5.5	5.5	5.5	
3	Install new 115 kV station with a 5 breaker ring at Boyd's Lane in Portsmouth, RI. Terminate new 115 kV line & loop L14/M13 in/out of the station	14.4	14.4	14.4	
4	Reconductor F-184 115 kV line from Merriman Junction to Warren to Bristol (5.1 miles)	12.0	12.0	12.0	
5	Separate N12/M13 DCT & reconductor N12 & M13 between Somerset and Bell Rock (~3.5 miles)	39.0			39.0
6	Install new 115 kV line (UG-1.7 mi and OH-1.8 mi) between Somerset and Bell Rock (~3.5 miles). Add circuit breaker at Somerset for new line[36]		47.0		
7	Install new breaker in series with the N12/D21 tie breaker and upgrade the D21 Line switch upgrade at Bell Rock				0.6
8	Reconductor N12 & M13 (No DCT Split) between Somerset and Bell Rock (~3.5 miles)			10.3	
9	Install a third breaker in a bay to terminate Line 114 at Bell Rock			1.0	1.0
10	Extend Line 114 – Eversource/NGRID border to Bell Rock (~4.2 miles)			12.3	12.3
11	Extend Line 114 – Industrial Park Tap to Eversource/NGrid border (~7.9 miles)			16.2	16.2
12	Install capacitors at Bell Rock, High Hill and Wing Lane			4.3	4.3
13	Reconfigure Bell Rock to breaker and a half station and split M13	16.0	16.0	16.0	16.0

[36] Due to space limitations in the right of way, a portion of the new line will need to be constructed underground

	line at Bell Rock				
14	Reconductor the 108-4 line from Bourne to the Horse Pond Tap (1.9 miles)	0.9	0.9	0.9	0.9
15	Reconductor the M13 and L14 line from Bell Rock to the Bates St Tap (8.3 miles)	29.2	29.2	29.2	29.2
16	Reconductor the 112 line from Tremont to the Industrial Park Tap (10.3 miles)	4.8	4.8	4.8	4.8
17	Replace wave trap on 114 line at Tremont	0.2	0.2	0.2	0.2
	Group 2 Solution Alternative Total in $M	**192.4**	**200.4**	**197.5**	**124.5**

When comparing the cost of all four combinations, the Alternative #2/#3 and Alternative #4 cost is $67.9M lower than the next cheapest combination (Alternative #1 and Alternative #2). Due to the large gap in cost between the solution alternatives, Alternative #2/#3 and Alternative #4 is selected as the preferred solution.[37]

7.2.3 Group 3 – Portion of Farnum Subarea

Only one solution component was developed in Group 3 and therefore it becomes the preferred solution for Group 3.

Table 7-3: Group 3 Cost Estimate

ID	Solution Components	Solution Alternatives Reported in $M at +50/-25% Accuracy
1	Replace Kent County T3 345/115 kV transformer	8.1
	Group 3 Preferred Solution Total in $M	**8.1**

7.2.4 Group 4 – Portion of West Medway/West Walpole Subarea

Solution Alternative #2 was dropped from consideration because it was cost prohibitive due to the amount of reconductoring and reactive devices required. The remaining solution alternative for Group 4 is shown below. Since only one solution alternative remains for Group 4, it becomes the preferred solution for Group 4.

[37] National Grid is considering construction of Alternative #1 rather than the preferred solution. https://www.iso-ne.com/static-assets/documents/2016/12/a3_sema_ri_ngrid_presenattion.pdf. The regionalization of the additional costs for construction of Alternative #1 would not be supported by ISO New England. https://smd.iso-ne.com/operations-services/ceii/pac/2016/12/a3_sema_ri_2026_preliminary_preferred_solutions.pdf

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Table 7-4: Group 4 Cost Estimates

ID	Solution Components	Solution Alternatives Reported in $M at +50/-25% Accuracy
1	Loop 201-502 line into the Medway station to form the 201-502N and 201-502S lines	7.8
2	Rerate the Eversource portion of the 323 line from Millbury #3 to West Medway by replacing the West Medway substation disconnect switches 107A, 107B, 108A and 108B with 3000A disconnects	0.2
Group 4 Preferred Solution Total in $M		**8.0**

7.2.5 Group 5 – Portion of South Shore Subarea

All four solution alternatives for Group 5 are shown below.

Table 7-5: Group 5 Cost Estimates

ID	Solution Components	Solution Alternatives Reported in $M at +50/-25% Accuracy			
		Alt #1	Alt #2	Alt #3	Alt #4
1	Reconductor the 117 line from Brook St to Kingston (3.1 miles)[38]	4.7			4.7
2	Reconductor the 191 line from Auburn to Kingston (15.3 miles)[32]	22.9			
3	Install new line from Carver to Kingston (approximately 8.0 mile)		19.6		
4	Install a bay position at Kingston for new line from Carver[39]		2.7	2.7	
5	Install new line from Manomet to Kingston (approximately 6.0 miles new, 9.2 miles existing)[40]			20.8	

[38] Cost estimate for the replacement of terminal equipment at Kingston is included in the cost estimate for the line work terminating at the Kingston station.

[39] The work is in addition to asset condition and local load reliability need work to be done at Kingston for approximately $13.0M.

[40] Cost estimate for the installation of breakers at Manomet is included in the cost of the new line terminating at Manomet

[redacted]

6	Install a parallel line from Brook St to Carver (4.9 miles) which requires station work and an underground getaway of the new line at Brook Street				19.6
7	Rebuild the Middelborough Gas and Electric (MGE) portion of E1 line from Bridgewater to Middleboro (2.5 miles)[41]	2.9	2.9	2.9	2.9
Group 5 Solution Alternative Total in $M		**30.5**	**25.2**	**26.4**	**27.2**

Since the cost for the four solution alternatives are very close to each other, the factors shown in Section 7.1 were used to compare the solution alternatives and select the preferred solution. Further discussion is provided in Section 7.3.2.

7.2.6 Group 6 – Cape Cod Subarea

The two solution alternatives for Group 5 are shown below.

Table 7-6: Group 6 Cost Estimates

ID	Solution Components	Solution Alternative #1 Reported in $M at +50/-25% Accuracy	Solution Alternative #2 Reported in $M at +50/-25% Accuracy
1	Install a new line from Bourne to West Barnstable (approximately 13.0 miles) which requires terminal work at West Barnstable and Bourne	36.0	
4	Separate the 122 and 135 line DCT	7.4	7.4
5	Retire the Barnstable SPS	0.2	0.2
6	Reconductor/rebuild the 107 line from Bourne to Falmouth Tap (10.0 miles)		17.4
7	Reconductor/rebuild the 136 line (formerly the 115 line) from Falmouth Tap to West Barnstable (16.5 miles)		16.4
8	Reconductor/rebuild the 122 line from Bourne to Barnstable (16.6 miles)		14.3
10	Terminal equipment and switch upgrades at		3.2

[41] The E1 line was shown as a need in the Needs Assessment but this work was not listed in the Southeastern Massachusetts and Rhode Island (SEMA-RI) 2026 Solutions Study Update PAC presentation delivered in July 2016

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Barnstable and Falmouth Tap		
Group 6 Solution Alternative Totals in $M	**43.6**	**58.9**

Due to the large gap in cost between the solution alternatives, Alternative #1 is selected as the preferred solution. A comparison of the factors shown in Section 7.1 and is also provided in Section7.3.3 Group 6 Comparison Matrixto be consistent with the December 2016 presentation to the Planning Advisory Committee.[42] The ISO received the comparison information from the Transmission Owner and unnecessarily included it in the presentation. The results of the comparison exercise were not used in the preferred solution determination due to the large cost differential between the solution alternatives.

7.2.7 Boston Area

Solution Alternative #2 was dropped from consideration because it was cost prohibitive due to the amount of reconductoring and new autotransformers required. The remaining solution alternative for the Boston area is shown below. Since only one solution alternative remains for the Boston area, it becomes the preferred solution for the Boston area.

Table 7-7: Boston Area Cost Estimate

ID	Solution Components	Solution Alternatives Reported in $M at +50/-25% Accuracy
1	Separate the 325 and 344 lines from West Medway to West Walpole (approximately 50 structures)	17.9
Boston Area Preferred Solution Total in $M		**17.9**

7.3 Comparison Matrix of Alternative Solutions

The primary factor in selecting the preferred solution was cost. Other factors included expected ease of permitting, ease of constructability, fewer and shorter construction outages reduced environmental impact, better system performance, and reduced abutter impact. The comparison matrix was used for Groups 1 and 5. A check mark ✓ in the matrix is applied to the alternative which better achieves the objective and an x mark ✗ in the matrix is applied to the alternative which does not achieve the objective as well as the other alternative.

7.3.1 Group 1 Comparison Matrix

To recap, Alternative #2 is the Grand Army solution alternative and Alternative #3 is the solution alternative which installs two new 115 kV lines from Brayton Point to Somerset.

[42] https://smd.iso-ne.com/operations-services/ceii/pac/2016/12/a3_sema_ri_2026_preliminary_preferred_solutions.pdf

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Table 7-8: Group 1 Comparison Matrix

Key Factors	Alt #2	Alt #3
Overall System Performance	The overall system performance for these two alternatives is equivalent	
Expected ease of permitting	✓	✗
Ease of constructability	✓	✗
Fewer and shorter construction outages	✓	✗
Shorter length of time to construct	✓	✗
Reduced environmental impact	✓	✗
Reduced abutter impact	✓	✗
Preferred Solution	✓	✗

Based on the expected ease of permitting, ease of constructability, fewer and shorter construction outages, shorter length of time to construct, reduced environmental impact and reduced abutter impact, Alternative #2 is the preferred solution.

7.3.2 Group 5 Comparison Matrix

To recap, Alternative #1 reconductors the 117 (Brook Street to Kingston) and 191 (Auburn to Kingston) lines, Alternative #2 installs a new line from Carver to Kingston, Alternative #3 installs a new line from Manomet to Kingston, and Alternative #4 installs a parallel line from Brook Street to Carver.

Table 7-9: Group 5 Comparison Matrix

Key Factors	Alt #1	Alt #2	Alt #3	Alt #4
Cost	✗	✓	✗	✗
Overall System Performance	✗	✓	✗	✗
Expected ease of permitting	✓	✗	✗	✗
Ease of constructability	✗	✓	✗	✗
Fewer and shorter construction outages	✗	✓	✗	✗
Shorter length of time to construct	✗	✓	✗	✗
Reduced environmental impact	✗	✗	✗	✓
Reduced abutter impact	✗	✗	✗	✓
Preferred Solution	✗	✓	✗	✗

Based on the cost, overall system performance, ease of constructability, fewer and shorter construction outages, and shorter length of time to construct, Alternative #2 is the preferred solution.

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7.3.3 Group 6 Comparison Matrix

To recap, Alternative #1 installs a new line from Bourne to West Barnstable and Alternative #2 reconductors the 107 (Bourne to Falmouth Tap), 136 (Falmouth Tap to West Barnstable), and the 122 (Bourne to Barnstable) lines. Due to the large gap in cost between the solution alternatives, Alternative #1 is selected as the preferred solution.

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Section 8
Conclusion

Comparison of solutions alternatives was based on the estimated cost and in some cases on other key factors like the overall system performance, expected ease of permitting, ease of constructability, fewer and shorter construction outages, shorter length of time to construct, reduced environmental impact and reduced abutter impact. The preferred solution alternatives to resolve the time-sensitive criteria violations found in the 10-year planning horizon are:

- Alternative #2 from Group 1
- Alternative #2/#3 and Alternative #4 from Group 2
- Replace Kent County T3 345/115 kV transformer from Group 3
- Alternative #1 from Group 4
- Alternative #2 from Group 5
- Alternative #1 from Group 6
- Alternative #1 from the Boston Area

8.1 Recommended Solution Description

The summation of all of the preferred solution alternatives is comprised of several solution components as described in Table 8-1. A more detailed description for each solution component can be found in Section 5.3 and the station one line diagrams of the preferred solution components can be found in Section 16, Appendix H.

Table 8-1: SEMA-RI Solution Components

ID	Solution Components
1	Grand Army 115 kV GIS switching station and loop the E-183E, F-184, X3 and W4 lines
2	Upgrades at Brayton Point (new 115 kV breaker, new 345/115 kV transformer and upgrades to E183E, F184 station equipment)
3	Increase clearances on E-183E & F-184 lines between Brayton Point & Grand Army (~1.5 miles each)
4	Separate X3/W4 DCT and reconductor X3, W4 lines between Somerset and Grand Army (~2.7 miles each).
5	Robinson Ave 115 kV circuit breaker addition and re-terminate Q10 line
6	Install 45.0 MVAR capacitor bank at Berry Street
7	Separate N12/M13 DCT & reconductor N12 & M13 between Somerset and Bell Rock (~3.5 miles)
8	Install new breaker in series with the N12/D21 tie breaker and upgrade the D21 Line switch upgrade at Bell Rock
9	Install a third breaker in a bay to terminate Line 114 at Bell Rock
10	Extend Line 114 – Eversource/NGRID border to Bell Rock (~4.2 miles)
11	Extend Line 114 – Industrial Park Tap to Eversource/NGrid border (~7.9 miles)
12	Install capacitors at Bell Rock (37.5 MVAR), High Hill (35.3 MVAR) and Wing Lane (35.3 MVAR)

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13	Reconfigure Bell Rock to breaker and a half station and split M13 line at Bell Rock
14	Reconductor the 108-4 line from Bourne to the Horse Pond Tap (1.9 miles)
15	Reconductor the M13 and L14 line from Bell Rock to the Bates St Tap (8.3 miles)
16	Reconductor the 112 line from Tremont to the Industrial Park Tap (10.3 miles)
17	Replace wave trap on 114 line at Tremont
18	Replace Kent County T3 345/115 kV transformer
19	Loop 201-502 line into the Medway station to form the 201-502N and 201-502S lines
20	Rerate the Eversource portion of the 323 line from Millbury #3 to West Medway by replacing the West Medway substation disconnect switches 107A, 107B, 108A and 108B with 3000A disconnects
21	Install new line from Carver to Kingston (approximately 8.0 mile)
22	Install a bay position at Kingston for new line from Carver
23	Rebuild the Middelborough Gas and Electric Department (MGED) portion of E1 line from Bridgewater to Middleboro (2.5 miles)
24	Install a new line from Bourne to West Barnstable (approximately 13.0 miles) which requires terminal work at West Barnstable and Bourne
25	Separate the 122 and 135 line DCT
26	Retire the Barnstable SPS
27	Separate the 325 and 344 lines from West Medway to West Walpole (approximately 50 structures)

Table 8.2 shows the cost estimate for the preferred solution alternative for each group and the total SEMA-RI preferred solution cost.

Table 8-2: Preferred Solution Cost Summary

Group	Cost Estimate Reported in $M at +50/-25% Accuracy
Group 1 – Alternative #2	78.5
Group 2 – Alternatives #2 and #4	124.5
Group 3 - Kent County T3 345/115 kV transformer replacement	8.1
Group 4 – Alternative #1	8.0
Group 5 – Alternative #2	25.2
Group 6 – Alternative #1	43.6
Boston Area – Alternative #1	17.9
Preferred Solution Total in $M	**305.8**

8.2 Solution Component Year of Need

As discussed in Section 2.3 and in greater detail in Section 9, the findings of the Needs Assessment show that the majority of violations occur in today's system or earlier. Currently operations postures the system by generation re-dispatch and other system adjustments to prevent violations. The projected in-service date of all solution components is by the end of 2021.

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8.3 Schedule for Implementation, Lead Times and Documentation of Continuing Need

In accordance with NERC TPL Standards, this assessment provides:

- A written summary of plans to address the time-sensitive system performance issues described in the *Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment*, dated May 2016[43] and the *Addendum Analysis Report to the Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment*, dated October 2016[44]
- A schedule for implementation as described below
- A discussion of expected required in-service dates of facilities and associated load level when required as described below
- A discussion of lead times necessary to implement plans.

The planned completion date of the preferred solution, as described in Section 8.1, is 2021. With this schedule, the preferred solution will be in-service after the potential violations of the NERC Standards occur. Currently, system operators posture the system by generation re-dispatch and other system adjustments to prevent these violations. While these steps prevent violations of NERC operating criteria, they are not sufficient to address the requirements of NERC planning criteria. The longest lead time item required to complete the project is the Kent County 345/115 kV autotransformer with a projected lead time of eighteen months.

[43] https://smd.iso-ne.com/operations-services/ceii/pac/2016/05/final_sema_ri_needs_assessment_report.pdf
[44] https://smd.iso-ne.com/operations-services/ceii/pac/2016/10/sema_ri_needs_assessment_addendum_v3.pdf

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Section 9
Appendix A: Year of Need/Critical Load Level Results

Table 9-1: SEMA-RI Time-Sensitive Thermal Needs

Solutions Study Group	Needs Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
3	**Farnum**	**Kent County 3X**	Kent County 3X 345/115 kV Autotransformer	26,158	Prior to 2016
3	**Farnum**	**L190-4**	Tower Hill to West Kingston 115 kV Line	27,280	Prior to 2016
3	**Farnum**	**L190-5**	Tower Hill to Davisville Tap 115 kV Line	25,537	Prior to 2016
1	**Farnum**	**V148S-1**	V148 Tap to Washington RI 115 kV Line	16,388	Prior to 2016
1	**Farnum**	**H17-1**	West Farnum to Farnum Tap 115 kV Line	24,960	Prior to 2016
1	**Farnum**	**H17-2**	Riverside to Farnum Tap 115 kV Line	23,141	Prior to 2016
1	**Farnum**	**R9**	Riverside to Valley 115 kV Line	16,130	Prior to 2016
1	**Farnum**	**Valley P11/R9 Bus Tie**	Valley 205 115 kV Bus Equipment	19,682	Prior to 2016
1	**Farnum**	**J16S**	Staples to Highland Drive 115 kV Line	23,792	Prior to 2016
1	**Farnum**	**P11-1**	Pawtucket to P11 Tap 115 kV Line	24,791	Prior to 2016
1	**Farnum**	**P11-2**	Valley to P11 Tap 115 kV Line	19,527	Prior to 2016
1	**Farnum**	**P11-3**	Robinson Ave to P11 Tap 115 kV Line	23,922	Prior to 2016
1	**Farnum**	**Q10**	Robinson Ave to Staples 115 kV Line	27,990	2016
3	**Farnum**	**West Farnum 175T**	West Farnum 345/115 kV Transformer	28,083	2016

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Solutions Study Group	Needs Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
3	**Farnum**	**1870**	Kenyon to Wood River 115 kV Line	20,993	Prior to 2016
3	**Farnum**	**1870S**	Wood River to Chase Hill 115 kV Line	24,871	Prior to 2016
3	**Farnum**	**1870S-1**	Chase Hill to Shunock 115 kV Line	28,740	2018
4	**West Medway/ West Walpole**	**323 (Eversource)**	West Medway to Millbury 345 kV Line	28,929	2018
4	**West Medway/West Walpole**	**C-129N-1**	Millbury to Purchase Tap 115 kV Line Section	26,501	Prior to 2016
4	**West Medway/ West Walpole**	**C-129N-6**	Rocky Hill to Purchase Tap 115 kV Line Section	28,669	2017
5	**South Shore**	**191**	Kingston to Auburn 115 kV Line	27,720	2016
5	**South Shore**	**117**	Kingston to Brook St 115 kV Line	28,444	2017
1	**South Shore**	**F19-2**	Auburn St to Belmont Tap 115 kV Line Section	27,913	2016
5	**South Shore**	**E1**	Bridgewater to Middleboro 115 kV Line	28,646	2017
1	**South Shore**	**C2**	Dupont to Auburn St 115 kV Line	27,433	Prior to 2016
1	**South Shore**	**L1**	East Bridgewater to East Bridgewater Tap 115 kV Line Section	27,162	Prior to 2016
2	**Industrial Park**	**111-1**	High Hill to Industrial Park 115 kV Line Section	17,961	Prior to 2016
2	**Industrial Park**	**112-1**	Tremont to Rochester 115 kV Line Section	14,976	Prior to 2016
2	**Industrial Park**	**112-2**	Rochester to Crystal Spring Tap 115 kV Line Section	10,063	Prior to 2016
2	**Industrial Park**	**112-3**	Industrial Park to Crystal Spring Tap 115 kV Line Section	10,270	Prior to 2016
2	**Industrial Park**	**112-4**	Industrial Park to Industrial Park Tap 115 kV Line Section	17,025	Prior to 2016

[redacted]

Solutions Study Group	Needs Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
2	Industrial Park	114-1	Tremont to Rochester 115 kV Line Section	26,310	Prior to 2016
1	Somerset/Newport	F184-3	Mink St to Read St 115 kV Line Section	19,181	Prior to 2016
1	Somerset/ Newport	S8-1	Somerset to S8 Tap 115 kV Line Section	24,471	Prior to 2016
1	Somerset/ Newport	S8-2	Raynham to S8 Tap 115 kV Line Section	23,572	Prior to 2016
1	Somerset/ Newport	S8-4	Bridgewater to Raynham 115 kV Line Section	22,645	Prior to 2016
1	Somerset/ Newport	V5-1	Somerset to Dighton 115 kV Line Section	29,124	2018
1	Somerset/ Newport	V5-2	Dighton to V5 Tap 115 kV Line Section	27,802	2016
1	Somerset/ Newport	V5-3	Bridgewater to V5 Tap 115 kV Line Section	25,909	Prior to 2016
2	Somerset/ Newport	N12-1	Somerset to Sykes Rd 115 kV Line Section	25,159	Prior to 2016
2	Somerset/ Newport	N12-2	Sykes Rd to Bell Rock 115 kV Line Section	25,524	Prior to 2016
2	Somerset/ Newport	D21	Bell Rock to High Hill 115 kV Line	28,656	2017
1	Somerset/ Newport	U6-1	Somerset to Dighton 115 kV Line Section	23,207	Prior to 2016
1	Somerset/ Newport	U6-3	Dighton to Dighton Tap 115 kV Line Section	23,214	Prior to 2016
1	Somerset/Newport	K15	Swansea to Robinson Ave 115 kV Line	27,888	2016
2	Somerset/ Newport	M13-3	Bent Rd to Tiverton Tap 115 kV Line Section	25,864	Prior to 2016
2	Somerset/ Newport	M13-4	Somerset to Sykes Rd 115 kV Line Section	15,095	Prior to 2016
2	Somerset/ Newport	M13-5	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	19,699	Prior to 2016
2	Somerset/ Newport	M13-6	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	17,812	Prior to 2016
2	Somerset/	M13-7	Canonicus to Dexter	27,059	Prior to

Solutions Study Group	Needs Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
	Newport		115 kV Line Section		2016
2	**Somerset/ Newport**	**M13-8**	Sykes Rd to Tiverton Tap 115 kV Line Section	16,457	Prior to 2016
2	**Somerset/ Newport**	**L14-3**	Bent Rd to Tiverton Tap 115 kV Line Section	22,277	Prior to 2016
2	**Somerset/ Newport**	**L14-4**	Bell Rock to Tiverton Tap 115 kV Line Section	21,799	Prior to 2016
2	**Somerset/ Newport**	**L14-5**	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	15,373	Prior to 2016
2	**Somerset/ Newport**	**L14-6**	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	12,216	Prior to 2016
2	**Somerset/ Newport**	**L14-7**	Canonicus to Dexter 115 kV Line Section	19,303	Prior to 2016
6	**Cape Cod**	**108-4**	Bourne to Horse Pond Tap 115 kV Line	28,108	2016
Boston	**Boston**	**Kingston 345A**	Kingston 345A 345/115 kV Autotransformer	25,464	Prior to 2016
Boston	**Boston**	**Kingston 345B**	Kingston 345B 345/115 kV Autotransformer	24,748	Prior to 2016
Boston	**Boston**	**329-531**	Brighton to North Cambridge 115 kV Line	28,392	2016
Boston	**Boston**	**385-512**	Kingston St to K Street 1 115 kV Line	23,292	Prior to 2016
Boston	**Boston**	**385-513**	Kingston St to K Street 1 115 kV Line	23,292	Prior to 2016
Boston	**Boston**	**385-510-1**	High St to K Street 1 115 kV Line Section	24,019	Prior to 2016
Boston	**Boston**	**385-510-2**	Kingston St to High St 115 kV Line Section	21,917	Prior to 2016
Boston	**Boston**	**385-511-1**	High St to K Street 2 115 kV Line Section	24,019	Prior to 2016
Boston	**Boston**	**385-511-2**	Kingston St to High St 115 kV Line Section	21,946	Prior to 2016

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Table 9-2: SEMA-RI Time-Sensitive Voltage Needs

Solutions Study Group	Needs Subarea	Bus Name	Base kV	Critical Load Level (MW)	Year of Need
1	Farnum	Highland Drive	115	27,243	Prior to 2016
1	Farnum	Riverside	115	27,192	Prior to 2016
1	Farnum	Robinson Avenue	115	27,628	Prior to 2016
1	Farnum	Staples	115	27,327	Prior to 2016
1	Farnum	Valley	115	27,033	Prior to 2016
3	Farnum	Drumrock	115	28,647	2017
3	Farnum	Kenyon	115	25,264	Prior to 2016
3	Farnum	Wood River	115	22,901	Prior to 2016
3	Farnum	West Kingston	115	28,539	2017
4	West Medway/ West Walpole	Beaver Pond	115	27,947	2016
4	West Medway/ West Walpole	Depot Street	115	28,047	2016
4	West Medway/ West Walpole	Purchase Street	115	28,483	2017
4	West Medway/ West Walpole	Rocky Hill	115	28,199	2017
4	West Medway/ West Walpole	Union Street	115	27,913	2016
5	South Shore	Brook Street	115	27,546	Prior to 2016
5	South Shore	Kingston	115	27,950	2016
2	Industrial Park	High Hill	115	28,198	2016
2	Industrial Park	Industrial Park	115	15,279	Prior to 2016
2	Industrial Park	Tremont	115	27,624	Prior to 2016
2	Industrial Park	Acushnet	115	15,415	Prior to 2016
2	Industrial Park	SEMASS	115	27,974	2016
2	Somerset/ Newport	Bell Rock	115	16,827	Prior to 2016

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Solutions Study Group	Needs Subarea	Bus Name	Base kV	Critical Load Level (MW)	Year of Need
2	Somerset/ Newport	Canonicus	115	16,713	Prior to 2016
2	Somerset/ Newport	Dexter	115	16,719	Prior to 2016
2	Somerset/ Newport	Jepson	115	17,126	Prior to 2016
2	Somerset/ Newport	Tiverton	115	16,205	Prior to 2016
1	Somerset/ Newport	Mink Street	115	27,637	Prior to 2016
1	Somerset/ Newport	Dighton	115	28,604	2017
1, 2	Somerset/ Newport	Somerset	115	27,579	Prior to 2016
2	Somerset/ Newport	Sykes Road	115	27,380	Prior to 2016
1	Somerset/ Newport	Swansea	115	26,368	Prior to 2016
1	Somerset/ Newport	Pawtucket	115	25,865	Prior to 2016
1	Somerset/ Newport	Phillipdale	115	25,988	Prior to 2016
1	Somerset/Newport	Wampanoag	115	27,462	Prior to 2016
6	Cape Cod	Valley_NB	115	29,093	2018
6	Cape Cod	Wareham	115	28,261	2017

Table 9-3: SEMA-RI Time-Sensitive Non-Convergence Needs

Solutions Study Group	Element OOS	Contingency	Critical Load Level (MW)	Year of Need
6	[redacted]	[redacted]	29,189	2018
			29,189	2018
6			29,189	2018
			29,189	2018

[redacted]

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Solutions Study Group	Element OOS	Contingency	Critical Load Level (MW)	Year of Need
6	[redacted]		29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
6	[redacted]		29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018
			29,189	2018

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Table 9-4: SEMA-RI Thermal Needs Determined to be Not Time-Sensitive

Needs Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
Farnum	**V148S-3**	V148 Tap to Washington RI 115 kV Line Section	29,568	2021
Farnum	**V148N**	Washington to Woonsocket 115 kV Line	29,346	2019
Farnum	**G185N**	Drumrock to Kent County 115 kV Line	29,750	2023
Farnum	**K189**	Drumrock to Kent County 115 kV Line	29,723	2022
West Medway/ West Walpole	**323 (NGrid)**	Millbury to West Medway 345 Line kV	29,346	2019
West Medway/ West Walpole	**325**	West Medway to West Walpole 345 kV Line	29,346	2019
West Medway/ West Walpole	**357 (Eversource)**	West Medway to Millbury 345 kV Line	29,349	2019
West Medway/ West Walpole	**389**	West Medway to West Walpole 345 kV Line	29,346	2019
West Medway/ West Walpole	**331 (Eversource)**	West Walpole to Carver 345 kV Line	29,346	2019
South Shore	**451-536**	Holbrook to East Holbrook Tap 115 kV Line	29,729	2022
South Shore	**Bridgewater 162X**	Bridgewater 345/115 kV Autotransformer	30,021	2024
South Shore	**E20-2**	Auburn St to East Bridgewater Tap 115 kV Line Section	29,897	2024
Somerset/ Newport	**L14-1**	Bent Rd to Canonicus 115 kV Line Section	30,000	2024
Cape Cod	**120W**	Bourne to Canal 115 kV Line	30,307	2026
Boston (External)	**324**	Mystic to Kingston 345 kV Line	29,346	2019
Boston (External)	**372**	Mystic to Kingston 345 kV Line	29,346	2019
Boston (External)	**329-530**	Brighton to Blair Pond 115 kV Line	29,346	2019

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Needs Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
Boston (External)	**509-530**	North Cambridge to Blair Pond 115 kV Line	29,346	2019

Table 9-5: SEMA-RI Voltage Needs Determined to be Not Time-Sensitive

Needs Subarea	Bus Name	Base kV	Critical Load Level (MW)	Year of Need
South Shore	**Middleboro**	115	30,228	2025
South Shore	**East Bridgewater**	115	29,215	2019
South Shore	**Mill Street**	115	29,346	2019
South Shore	**Church Hill**	115	29,346	2019
South Shore	**Edgar**	115	29,335	2019
South Shore	**Grove Street**	115	29,346	2019
South Shore	**Holbrook**	115	29,346	2019
South Shore	**Middle Street**	115	29,346	2019
South Shore	**Potter**	115	29,346	2019
South Shore	**Plain Street**	115	29,346	2019
Cape Cod	**Bourne**	115	29,539	2021
Cape Cod	**Canal**	115	29,829	2023

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Section 10
Appendix B: Load Forecast

Table 10-1: 2015 CELT Seasonal Peak Load Forecast Distributions

		Peak Load Forecast at Milder Than Expected Weather				Reference Forecast at Expected Weather	Peak Load Forecast at More Extreme Than Expected Weather				
Summer (MW)	2015	27145	27395	27440	27825	28251	28700	29165	29825	30600	31270
	2016	27548	27803	27848	28238	28673	29133	29603	30278	31053	31733
	2017	27921	28181	28226	28626	29066	29531	30011	30696	31481	32171
	2018	28323	28583	28633	29033	29483	29958	30443	31138	31933	32628
	2019	28686	28951	28996	29406	29861	30341	30831	31541	32341	33051
	2020	28992	29262	29307	29722	30182	30667	31167	31877	32697	33417
	2021	29287	29557	29607	30022	30487	30977	31482	32202	33037	33762
	2022	29589	29864	29914	30334	30804	31299	31809	32539	33389	34124
	2023	29901	30181	30231	30656	31131	31631	32146	32886	33746	34491
	2024	30214	30494	30544	30974	31455	31964	32479	33224	34104	34859
	WTHI (1)	**78.49**	**78.73**	**79.00**	**79.39**	**79.88**	**80.30**	**80.72**	**81.14**	**81.96**	**82.33**
	Dry-Bulb Temperature (2)	**88.50**	**88.90**	**89.20**	**89.90**	**90.20**	**91.20**	**92.20**	**92.90**	**94.20**	**95.40**
	Probability of Forecast Being Exceeded	**90%**	**80%**	**70%**	**60%**	**50%**	**40%**	**30%**	**20%**	**10%**	**5%**
Winter (MW)	2015/16	22325	22440	22535	22595	22740	22890	23050	23150	23400	23755
	2016/17	22500	22620	22715	22775	22920	23070	23230	23335	23580	23935
	2017/18	22685	22800	22895	22960	23105	23255	23420	23520	23765	24120
	2018/19	22855	22975	23070	23130	23280	23435	23595	23700	23935	24295
	2019/20	23000	23120	23220	23280	23430	23585	23750	23850	24085	24445
	2020/21	23140	23260	23360	23420	23570	23725	23890	23995	24225	24585
	2021/22	23280	23400	23500	23565	23715	23870	24040	24145	24370	24730
	2022/23	23430	23550	23650	23715	23865	24020	24190	24295	24520	24880
	2023/24	23580	23705	23805	23865	24020	24180	24345	24455	24680	25035
	2024/25	23735	23855	23955	24020	24175	24335	24505	24610	24835	25190
	Dry-Bulb Temperature (3)	**10.72**	**9.66**	**8.84**	**8.30**	**7.03**	**5.77**	**4.40**	**3.58**	**1.61**	**(1.15)**

FOOTNOTES:

(1) WTHI - a three-day weighted temperature-humidity index for eight New England weather stations. It is the weather variable used in producing the summer peak load forecast. For more information on the weather variables see http://www.iso-ne.com/system-planning/system-plans-studies/celt .

(2) Dry-bulb temperature (in degrees Fahrenheit) shown in the summer season is for informational purposes only.

(3) Dry-bulb temperature (in degrees Fahrenheit) shown in the winter season is a weighted value from eight New England weather stations.

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Table 10-2: 2026 Detailed Load Distributions by State and Company

ISO New England Basecase DB - Load File Report by Company

Study Date : 07/01/2026 **Study Name :** SEMA_RI_Needs_Reassessment

File Created : 2015-10-19 **CELT Forecast :** 2015 **Forecast Year :** 2026

Season : Summer Peak **Weather :** 90/10 **Load Distribution :** N+10_SUM

ISO-NE CELT : 35305 MW **% of Peak :** 100.000% **Tx Losses :** 2.50%

State CELT L&L		2.50% Tx Losses		Non-CELT Load		Station Service		Area 104 NE Load		Area 101 Load
35310 MW	-	817.4 MW	+	367.6 MW	+	933.9 MW	-	0.0MW	=	35794.6 MW

1: State CELT L&L: This represents the sum of the 6 State CELT forecasts. This number can sometimes be 5-10 MW different than the ISO-NE CELT forecast number due to round-off error.
2: Non-CELT Load: This is the sum of all load modeled in the case that is not included in the CELT forecast. An example is the "behind the meter" paper mill load in Maine.
3: Station Service: This is the amount of generator station service modeled. If station service is off-line, the Area 101 report totals will be different since off-line load is not counted in totals.
4: Area 104 NE Load: This load is load modeled in northern VT that is electrically served from Hydro Quebec. To make Area interchange load independent, this load is assigned Area 104.

Maine State Load = 2525 MW - 2.50% Tx Losses = 2466.55 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
CMP	86.10%	2123.74	689.73	0.951	342.41
EM	13.90%	342.81	122.09	0.942	14.29

New Hampshire State Load = 3350 MW - 2.50% Tx Losses = 3272.45 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
PSNH	78.56%	2570.86	366.33	0.990	5.80
UNITIL	12.08%	395.38	56.35	0.990	
GSE	9.36%	306.23	28.97	0.996	1.85

Vermont State Load = 1265 MW - 2.50% Tx Losses = 1235.72 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
VELCO	100.00%	1235.80	212.90	0.985	92.51

Massachusetts State Load = 16545 MW - 2.50% Tx Losses = 16162.01 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
BECO	28.27%	4568.36	1165.13	0.969	37.79
COMEL	11.47%	1852.98	377.78	0.980	
MA-NGRID	39.09%	6317.83	420.66	0.998	38.49
WMECO	7.03%	1136.36	161.89	0.990	
MUNI:BOST-NGR	3.36%	543.33	96.49	0.985	
MUNI:BOST-NST	1.25%	202.19	31.84	0.988	
MUNI:CNEMA-NGR	2.06%	332.61	42.74	0.992	
MUNI:RI-NGR	0.86%	138.83	16.70	0.993	
MUNI:SEMA-NGR	1.82%	293.82	30.15	0.995	
MUNI:SEMA-NST	1.70%	275.05	50.64	0.983	
MUNI:WMA-NGR	0.94%	151.77	15.37	0.995	
MUNI:WMA-NU	2.16%	349.26	49.73	0.990	

Rhode Island State Load = 2550 MW - 2.50% Tx Losses = 2490.97 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
RI-NGRID	100.00%	2490.94	210.82	0.996	45.44

Connecticut State Load = 9075 MW - 2.50% Tx Losses = 8864.93 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
CLP	76.70%	6799.04	968.86	0.990	107.42
CMEEC	4.58%	406.10	57.87	0.990	
UI	18.72%	1659.78	166.62	0.995	10.00

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Table 10-3: 2026 Detailed Demand Response Distributions by Zone

ISO New England Basecase DB - Demand Resources File Report

Study Date : 07/01/2026 **Study Name :** SEMA_RI_Needs_Reassessment
File Created : 2015-10-19 **CCP :** 2018/2019 **Load Season :** 2026 - Summer Peak
Load Distrb : N+10_SUM **Distrb Losses :** 5.50% **DR Season :** SUM

	Demand Reduction Value (DRV)		Load Dependent Capability Assumption (LDCA)		Performance Assumption (PA)		Distribution Losses Gross-Up		Area 104 DR		Area 101 DR
Passive :	2134.81 MW	X	100.00%	X	100.00%	+	117.41 MW	-	0.00 MW	=	2252.20 MW
Forecast EE :	1506.44 MW		100.00%		100.00%		82.85 MW		0.00 MW		1589.31 MW
Active RTDR :	484.06 MW		100.00%		75.00%		19.97 MW		0.00 MW		383.01 MW
Active RTEG :	N/A		N/A		N/A		N/A		N/A		N/A

Demand Reduction Value (DRV): Amount of DR measured at the customer meter without any gross-up values for transmission or distribution losses.
Load Dependent Capability Assumption (LDCA): De-rate factor applied based on % of CELT load. (i.e. Light load is 45% of 50/50 load, so the LDCA would be 45%.)
Performance Assumption (PA): De-rate factor applied based on expected performance of DR after a dispatch signal from Operations.
Area 104 DR: This load is modeled in northern VT and is electrically served from Hydro Quebec. To make Area Interchange load independent, this load is assigned Area

Passive Demand Resources - (On-Peak and Seasonal Peak)

DR Modeled = (DRV_SUM * 100.00% LDCA * 100.00% PA) + 5.50% Distrb Losses Gross-Up

Zone	ID	Description	DRV (MW)	Total P (MW)	Total Q (MVAR)
DR_P_ME	20	Load Zone - Maine	-167.54	-176.76	-61.87
DR_P_NH	21	Load Zone - New Hampshire	-94.90	-100.12	-13.84
DR_P_VT	22	Load Zone - Vermont	-116.80	-123.22	-21.12
DR_P_NEMABOS	23	Load Zone - Northeast Massachusetts & Boston	-526.86	-555.84	-121.69
DR_P_SEMA	24	Load Zone - Southeast Massachusetts	-284.19	-299.82	-33.16
DR_P_WCMA	25	Load Zone - West Central Massachusetts	-330.58	-348.76	-31.57
DR_P_RI	26	Load Zone - Rhode Island	-188.58	-198.96	-16.84
DR_P_CT	27	Load Zone - Connecticut	-425.34	-448.73	-60.40

Forecasted Energy Efficiency

DR Modeled = (DRV_EE * 100.00% LDCA * 100.00% PA) + 5.50% Distrb Losses Gross-Up

Zone	ID	Description	DRV (MW)	Total P (MW)	Total Q (MVAR)
DR_P_ME	20	Load Zone - Maine	-104.02	-109.74	-38.41
DR_P_NH	21	Load Zone - New Hampshire	-63.89	-67.40	-9.32
DR_P_VT	22	Load Zone - Vermont	-101.86	-107.47	-18.43
DR_P_NEMABOS	23	Load Zone - Northeast Massachusetts & Boston	-363.29	-383.27	-83.90
DR_P_SEMA	24	Load Zone - Southeast Massachusetts	-192.26	-202.83	-22.43
DR_P_WCMA	25	Load Zone - West Central Massachusetts	-224.57	-236.92	-21.44
DR_P_RI	26	Load Zone - Rhode Island	-132.41	-139.69	-11.82
DR_P_CT	27	Load Zone - Connecticut	-324.15	-341.98	-46.03

Active Demand Resources - (Real-Time Demand Resource - RTDR)

DR Modeled = (DRV_SUM * 100.00% LDCA * 75.00% PA) + 5.50% Losses Gross-Up

Zone	ID	Description	DRV (MW)	Total P (MW)	Total Q (MVAR)
DR_A_ME_EME	30	Dispatch Zone - ME - Emerea Maine	-27.25	-21.56	-9.29
DR_A_ME_MAIN	31	Dispatch Zone - ME - Maine	-96.93	-76.70	-26.41
DR_A_ME_PORT	32	Dispatch Zone - ME - Portland Maine	-16.59	-13.13	-4.25
DR_A_NH_NEWH	33	Dispatch Zone - NH - New Hampshire	-13.21	-10.45	-1.43
DR_A_NH_SEAC	34	Dispatch Zone - NH - Seacoast	-1.65	-1.31	-0.19
DR_A_VT_NWVT	35	Dispatch Zone - VT - Northwest Vermont	-24.49	-19.38	-3.24
DR_A_VT_VERM	36	Dispatch Zone - VT - Vermont	-5.04	-3.99	-0.72
DR_A_MA_BOST	37	Dispatch Zone - MA - Boston	-50.30	-39.80	-10.07
DR_A_MA_NSHR	38	Dispatch Zone - MA - North Shore	-17.79	-14.07	-1.70
DR_A_MA_CMA	39	Dispatch Zone - MA - Central Massachusetts	-32.00	-25.32	-2.13
DR_A_MA_SPFD	40	Dispatch Zone - MA - Springfield	-7.79	-6.16	-0.85
DR_A_MA_WMA	41	Dispatch Zone - MA - Western Massachusetts	-15.39	-12.18	-0.79
DR_A_MA_LSM	42	Dispatch Zone - MA - Lower Southeast Massachusetts	-7.11	-5.63	-1.01
DR_A_MA_SEMA	43	Dispatch Zone - MA - Southeast Massachusetts	-41.03	-32.46	-2.60
DR_A_RI_RHOD	44	Dispatch Zone - RI - Rhode Island	-55.90	-44.23	-3.74
DR_A_CT_EAST	45	Dispatch Zone - CT - Eastern Connecticut	-7.90	-6.25	-0.89
DR_A_CT_NRTH	46	Dispatch Zone - CT - Northern Connecticut	-28.37	-22.45	-3.20
DR_A_CT_NRST	47	Dispatch Zone - CT - Norwalk-Stamford	-3.36	-2.66	-0.36
DR_A_CT_WEST	48	Dispatch Zone - CT - Western Connecticut	-31.97	-25.30	-3.30

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Section 11
Appendix C: Upgrades Included in Base Case

A summary of the future generation and transmission projects included in the study base cases can be found in the file shown below and is located in the Appendices folder:

Appendix_C_2026_SEMA_RI_Needs - 2026-07-01 - Project Summary Report

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Section 12
Appendix D: Case Summaries

Study base case summaries can be found in the files shown below and is located in the Appendices folder:

Appendix_D1_Stress_A_Case_Summary

Appendix_D2_Stress_B_Case_Summary

Appendix_D3_Stress_C_Case_Summary

Section 13
Appendix E: Contingency List

A summary of the contingencies used in the study can be found in the file shown below and is located in the Appendices folder:

Appendix_E_SEMA-RI_Contingency_Summary

Table 13-1: N-1-1 Transmission Line Element-Out Scenarios

Line	kV	Description	[redacted]
342	345	Pilgrim to Canal to Auburn	Yes
322	345	Carver to Canal	Yes
327	345	Brayton Point to Berry Street	Yes
355	345	Carver to Pilgrim	Yes
331	345	West Walpole to Carver	Yes
356	345	Bridgewater to Carver	Yes
399	345	Carver to Bourne to Oak Street	Yes
341	345	Lake Road to West Farnum	Yes
359	345	Kent County to West Farnum	Yes
344	345	West Medway to Bridgewater	Yes
335	345	Holbrook to Auburn Street	Yes
316	345	Stoughton to Holbrook	Yes
3161	345	West Walpole to Stoughton	Yes
3162	345	Stoughton to K Street	Yes
3163	345	Stoughton to K Street	Yes
3164	345	Stoughton to Hyde Park	Yes
3348	345	Killingly to Lake Road	Yes
389	345	West Medway to West Walpole	Yes
325	345	West Medway to West Walpole	Yes
303	345	ANP Bellingham to Brayton Point	Yes
315	345	Brayton Point to West Farnum	Yes
3520	345	ANP Bellingham to West Medway	Yes
333	345	Sherman Road to Ocean State	Yes
336	345	ANP Blackstone to NEA Bellingham to West Medway	Yes
3361	345	ANP Blackstone to Sherman Road	Yes
3271	345	Lake Road to Card Street	Yes
330	345	Lake Road to Card Street	Yes
332	345	West Farnum to Kent County	Yes
328	345	Sherman Road to West Farnum	Yes
347	345	Sherman Road to Killingly	Yes
366	345	Millbury to West Farnum	Yes
107	115	Bourne to Otis to Falmouth Tap	Yes
108	115	Tremont to Wareham to Valley to Manomet to Bourne	Yes
109	115	High Hill to Cross Road to Fisher Road	No
111	115	Industrial Park to High Hill to Dartmouth to Cross Road	No

Line	kV	Description	[redacted]
112	115	Tremont to Rochester to Crystal Spring to Industrial Park to Wing Lane to Arsene to Acushnet	Yes
112-8	115	Acushnet to Pine Street	No
113	115	Tremont to Wareham to Valley to Manomet to Bourne	Yes
114	115	Tremont to Rochester	Yes
114-5	115	Acushnet to Pine Street	No
115-10-16	115	Middle Street to Potter Station	No
115-16-17	115	Potter Station to TA Watson	No
115-4-8	115	Plain Street to Church Hill	No
115-8-10	115	Middle Street to Church Hill	No
115-9-4	115	Plain Street to Grove Street	No
116	115	Carver to Brook Street	Yes
117	115	Kingston to Duxbury	No
118	115	Barnstable to Lothrop Ave. to Harwich to Orleans	No
119	115	Barnstable to Lothrop Ave. to Harwich to Orleans	No
120W	115	Bourne to Canal	Yes
121	115	Bourne to Canal	No
122	115	Bourne to Pave Paws to Sandwich	No
123	115	Barnstable to Hyannis Junction	No
124	115	Barnstable to Hyannis Junction	No
125	115	Wellfleet to Orleans	No
126	115	Bourne to Canal	Yes
126-501	115	Hopkinton Tap to Hopkinton	No
126-502	115	Hopkinton Tap to Hopkinton	No
127	115	SEMass Tap to Carver	Yes
128	115	SEMass Tap to Tremont	Yes
129	115	SEMass Tap to SEMass	Yes
130	115	Acushnet to Pine Street	No
131	115	Barnstable to Merchants Way	No
132	115	Brook Street to West Pond	No
133	115	Brook Street to West Pond	No
134	115	Tremont to Carver	Yes
135	115	West Barnstable to Barnstable	No
136	115	Falmouth Tap to Mashpee	No
137	115	West Barnstable to Mashpee	No
142	115	Acushnet to Pine Street	No
143	115	Acushnet to Pine Street	No
146-502	115	West Walpole to Walpole	Yes
1505	115	Killingly to Brooklyn to Tunnel	No
1607	115	Killingly to Exeter to Fry Brook to Tunnel	No
1621	115	Killingly to Tracy	No
1742	115	Killingly to Tracy	No
1870	115	Kenyon to Wood River	No
1870N	115	Kenyon to West Kingston	No
1870S	115	Wood River to Shunock	No
191	115	Auburn Street to Kingston to Duxbury to Marshfield	Yes

Line	kV	Description	[redacted]
194	115	Auburn Street to Brook Street	Yes
274-509	115	Medway to Sherborn	No
398-537	115	Holbrook to East Holbrook	Yes
447-508	115	West Walpole to Walpole to Canton to South Randolph to Holbrook	Yes
447-509	115	West Walpole to Walpole to Canton to South Randolph to Holbrook	Yes
451-536	115	Holbrook to East Holbrook to Auburn Street	Yes
456-522	115	Dover to West Walpole	Yes
478-502	115	Edgar to Swift's Beach to Holbrook	Yes
478-503	115	Edgar to East Weymouth to Hobart Street to Holbrook	Yes
478-508	115	Edgar to East Weymouth to Hobart Street to Holbrook	Yes
478-509	115	Edgar to Mid Weymouth to Grove Street to Holbrook	Yes
495-532	115	Ellis Avenue to Norwood	No
495-533	115	Ellis Avenue to Norwood	No
517-524	115	North Quincy to Dewar Street	No
517-525	115	North Quincy to Dewar Street	No
517-532	115	North Quincy to Field Street to Edgar	No
517-533	115	North Quincy to Field Street to Edgar	No
65-502	115	Medway to West Walpole	Yes
65-507	115	Medway Jet to West Medway	No
65-508	115	Medway to West Walpole	Yes
A24	115	Bridgewater to Easton to Bird Road	No
A94	115	Auburn Street to Avon to Park View	Yes
B23	115	West Farnum to Nasonville	Yes
C-129	115	Beaver Pond to Union Street	No
C-129N / 201-502	115	Beaver Pond to Depot Street to Milford Power to Rocky Hill to Hopkinton to Millbury	Yes
C-129S	115	Union Street to South Wrentham	No
C-181N	115	South Wrentham to North Attleboro to Mansfield to Chartley Pond	No
C-181S	115	Brayton Point to Chartley Pond	Yes
C2	115	Dupont to Auburn	Yes
C3	115	Auburn Street to Plymouth to North Abington to Hanover to Norwell	Yes
D-130 / 201-501	115	Medway to Depot Street to Milford Power to Hopkinton to Millbury	Yes
E105	115	Franklin Square to Hartford Avenue	Yes
E183E	115	Brayton Point to Warren to Mink Street to Wampanoag	Yes
E183W	115	Manchester Street to Phillipsdale to Wampanoag	No
E20 / L1	115	Bridgewater to East Bridgewater to Auburn Street	Yes
F106	115	Franklin Square to Hartford Avenue	Yes
F184	115	Brayton Point to Warren to Bristol to Mink Street to Read Street	Yes
F19 / S1	115	Bridgewater to Belmont to Auburn Street	Yes
G18	115	Dupont to Bridgewater	Yes
G185N	115	Drumrock to Kent County	Yes

Line	kV	Description	[redacted]
G185S	115	Kent County to Old Baptist Road to Davisville to West Kingston	Yes
I187	115	Drumrock to Blackburn to Kilvert to Pontiac Avenue to Lincoln Avenue to Sockanosset	Yes
J16	115	Riverside to Staples	No
J188	115	Drumrock to Blackburn to Pontiac Avenue to Lincoln Avenue to Sockanosset	Y
K15	115	Swansea to Robinson Avenue	No
K189	115	Drumrock to Kent County	Yes
L14	115	Canonicus to Bent Road to Bates Street to Tiverton to Bell Rock	No
L190	115	Kent County to Old Baptist Road to Davisville to West Kingston	Yes
P11	115	Pawtucket to Valley to Robinson Avenue	No
Q10	115	Robinson Avenue to Staples	No
Q143N	115	Millbury to Whitins Pond to Uxbridge	Yes
Q143S	115	Uxbridge to Woonsocket to Clarkson to Admiral Street to Franklin Square	Yes
R144	115	Woonsocket to Clarkson to Admiral Street to Franklin Square	Yes
R9	115	Riverside to Valley	No
S171	115	Hartford to Johnston to Rise to Ridgewood	Yes
S171N	115	Woonsocket to West Farnum to Farnum Pike to Wolf Hill to Putnam Pike to Hartford Avenue	Yes
S171S	115	Drumrock to West Cranston to Rise to Johnston to Hartford Avenue	Yes
S8	115	Bridgewater to Raynham to Taunton Cleary to Somerset	Yes
S9 / H1	115	Auburn Street to Plymouth to Hanover to Water Street	Yes
T172N	115	Woonsocket to West Farnum to Farnum Pike to Wolf Hill to Putnam Pike to Hartford Avenue	Yes
T172S	115	Hartford Avenue to Johnston to Rise to West Cranston to Drumrock	Yes
T7	115	Somerset to Pawtucket	Yes
U2	115	Stoughton to Parkview to Belmont	No
U6	115	Bridgewater to Raynham to Dighton to Somerset	Yes
V148N/S	115	Woonsocket to Washington to Robinson Avenue to Read Street	Yes
V5	115	Bridgewater to Dighton to Somerset	Yes
W4	115	Swansea to Somerset	Yes
X3	115	Pawtucket to Phillipsdale to Somerset	Yes
Y2	115	Somerset to Hathaway Street	Yes
Z1	115	Somerset to Hathaway Street	Yes
H17	115	West Farnum to Farnum to Riverside	Yes
A94	115	Auburn Street to Park View	Yes
M1	115	East Bridgewater to Mill Street to Middleboro	No
L14	115	Bell Rock to Tiverton to Bates Street to Canonicus to Dexter	No

Line	kV	Description	[redacted]
M13	115	Somerset to Sykes Road to Tiverton to Bell Rock to Bates Street to Canonicus to Dexter	No
D21	115	High Hill to Bell Rock	No
N12	115	Somerset to Sykes Road to Bell Rock	Yes
D911	115	Dupont to Ames Street	Yes
D-182N	115	Berry Street to South Wrentham	Yes
D182S	115	Brayton Point to Mansfield to Sherman Street to North Attleboro to Berry Street	Yes
E1	115	Bridgewater to Middleboro	Yes
1505	115	Killingly to Brooklyn to Fry Brook to Plainfield to Tunnel	Yes
Ridgewood Gen Lead	115	Ridgewood	Yes
3763	69	Jepson to Navy Tap to Newport	No
W23W	69	Northboro Road to Mass Water Resources Authority to Woodside to South Marlboro to Marlboro	No

Table 13-2: N-1-1 Autotransformer Element-Out Scenarios

Autotransformer	kV	Description	[redacted]
Auburn 210X	345/115	Auburn Street 210X Autotransformer	Yes
Auburn 220X	345/115	Auburn Street 220X Autotransformer	Yes
Berry 1X	345/115	Berry Street 1X Autotransformer	Yes
Brayton Point 3XA	345/115/20	Brayton Point 3XA Autotransformer	Yes
Bridgewater 161X	345/115	Bridgewater 161X Autotransformer	Yes
Bridgewater 162X	345/115	Bridgewater 162X Autotransformer	Yes
Canal 120X	345/115	Canal 120X Autotransformer	Yes
Canal 121X	345/115	Canal 121X Autotransformer	Yes
Canal 126X	345/115	Canal 126X Autotransformer	Yes
Carver 345A	345/115	Carver 345A Autotransformer	Yes
Carver 345B	345/115	Carver 345B Autotransformer	Yes
Card 5X	345/115	Card Street 5X Autotransformer	Yes

Autotransformer	kV	Description	[redacted]
Holbrook 345A	345/115	Holbrook 345A Autotransformer	Yes
Kent County 3X	345/115	Kent County 3X Autotransformer	Yes
Kent County 4X	345/115	Kent County 4X Autotransformer	Yes
Kent County 8X	345/115	Kent County 8X Autotransformer	Yes
Killingly 2X	345/115	Killingly 2X Autotransformer	Yes
West Barnstable 345A	345/115	West Barnstable 345A Autotransformer	No
West Farnum 174T	345/115	West Farnum 174T Autotransformer	Yes
West Farnum 175T	345/115	West Farnum 175T Autotransformer	Yes
West Walpole 345A	345/115	West Walpole 345A Autotransformer	Yes

Table 13-3: N-1-1 Generator Element-Out Scenarios

Generator	Station
ANP Bellingham 1	ANP-Bellingham
ANP Bellingham 2	ANP-Bellingham
ANP Blackstone 1	ANP-Blackstone
ANP Blackstone 2	ANP-Blackstone
Canal 1	Canal
Canal 2	Canal
Cleary 8	Cleary
Cleary 9	Cleary
Dartmouth	Dartmouth
Dighton	Dighton
Edgar	Edgar
Lake Road 1	Lake Road
Lake Road 2	Lake Road
Lake Road 3	Lake Road
Manchester 9	Franklin Square
Manchester 10	Franklin Square
Manchester 11	Franklin Square
Milford Power 2	Milford Power
NEA Bellingham	NEA-Bellingham
Oak Bluffs	Falmouth

Generator	Station
Ocean State 1	Ocean State
Ocean State 2	Ocean State
Pawtucket Power	Admiral Street
Pilgrim	Pilgrim
Potter 2	Potter Station
Medway Peaker 1	Medway
Medway Peaker 2	Medway
Ridgewood	Ridgewood
Rise	Rise
SEMASS 1	SEMASS
SEMASS 2	SEMASS
Tiverton	Tiverton
TA Watson 1	Potter Station
TA Watson 2	Potter Station
West Medway Jet	West Medway
West Tisbury	Falmouth

Table 13-4: N-1-1 Shunt Device Element-Out Scenarios

Reactive Device	Station	MVAR
115 kV Capacitor	Barnstable	35.3
Static VAR Compensator	Barnstable	112.5
115 kV Reactor R1	Edgar	40.0
115 kV Reactor R2	Edgar	40.0
115 kV Capacitor	Falmouth	35.3
115 kV Capacitor	Franklin Square	37.8
115 kV Capacitor	Harwich	21.2
115 kV Capacitor	Hyannis Junction	39.0
115 kV Capacitor C2	Kent County	63.0
115 kV Capacitor C5	Kent County	144.0
115 kV Capacitor	Mashpee	35.3
115 kV Capacitor	Orleans	13.6
115 kV Reactor R1	Pine Street	10.0
115 kV Reactor R2	Pine Street	10.0
345 kV Stoughton R1	Stoughton	110.0
345 kV Stoughton R2	Stoughton	110.0
345 kV Stoughton R3	Stoughton	110.0
345 kV Stoughton R4	Stoughton	70.0
115 kV Wing Lane	Wing Lane	35.3

REDACTED

Section 14
Appendix F: Steady State Analysis Results

A summary of the steady state analysis results can be found in the files shown below and are located in the Appendices folder:

Appendix_F1_SEMA-RI_2026_N-1_Thermal_Results

Appendix_F2_SEMA-RI_2026_N-1_Voltage_Results

Appendix_F3_SEMA-RI_2026_N-1-1_Thermal_Results

Appendix_F4_SEMA-RI_2026_N-1-1_Voltage_Results

REDACTED

Section 15
Appendix G: Short Circuit Analysis Results

The complete set of short circuit analysis results can be found in the file shown below and located in the Appendices folder:

Appendix G_SEMA-RI_Short_Circuit_Results

Section 16
Appendix H: Preferred Solution One Line Diagrams

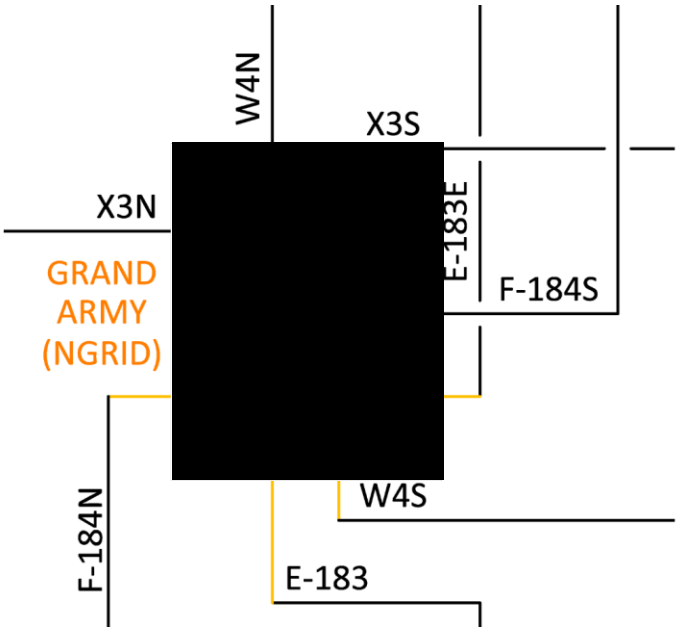

Figure 16-1: Grand Army 115 kV GIS switching station and loop the existing E-183E, F-184, X3 and W4 lines into the station

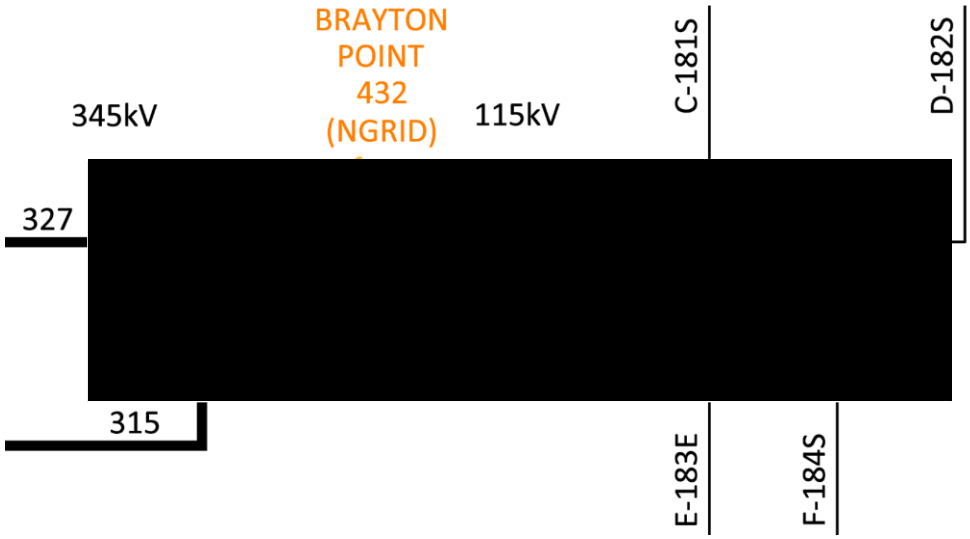

Figure 16-2: Upgrades at Brayton Point (new 115 kV breaker and new 345/115 kV transformer)



Figure 16-3: Robinson Ave 115 kV circuit breaker addition and re-terminate Q10 line at the station

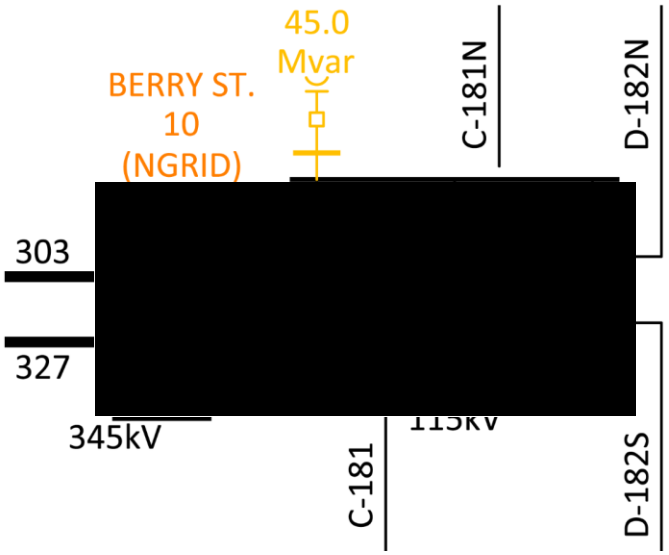

Figure 16-4: Install 45.0 MVAR capacitor bank at Berry Street

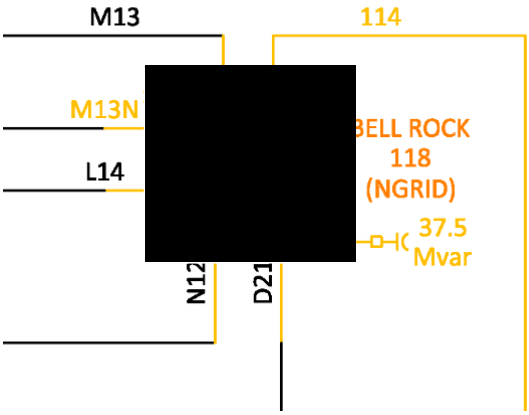

Figure 16-5: Bell Rock Station Upgrades

Bell Rock station upgrades include the following.

- Reconfigure Bell Rock to breaker and a half station and split M13 line
- Install a 37.5 MVAR capacitor
- Install a third breaker in a bay to terminate Line 114
- Install new breaker in series with the N12/D21 tie breaker and upgrade the D21 Line switch

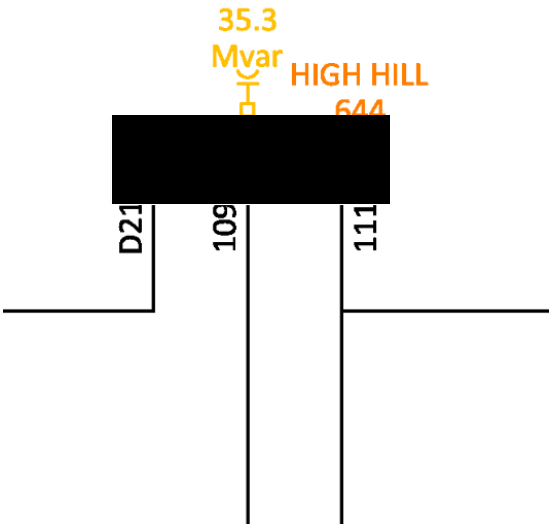

Figure 16-6: Install a 35.3 MVAR capacitor at High Hill

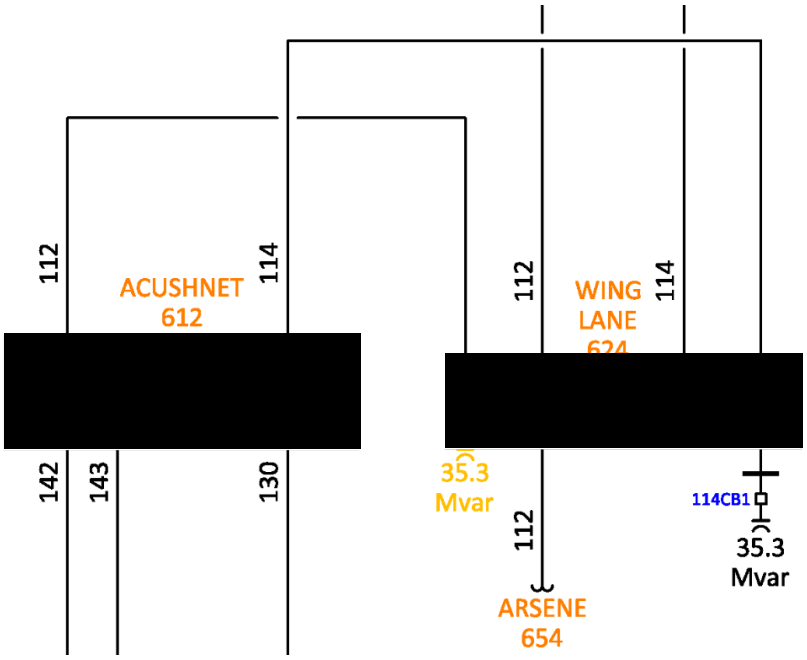

Figure 16-7: Install a 35.3 MVAR capacitor at Wing Lane

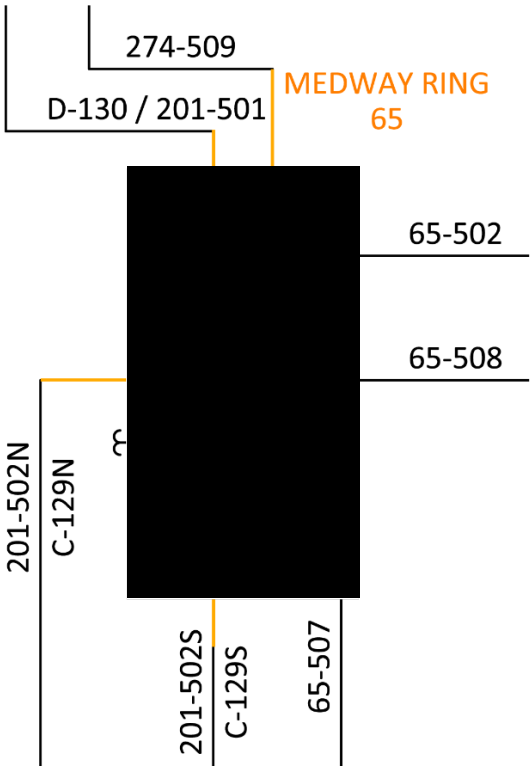

Figure 16-8: Loop 201-502 line into the Medway station to form the 201-502N and 201-502S lines

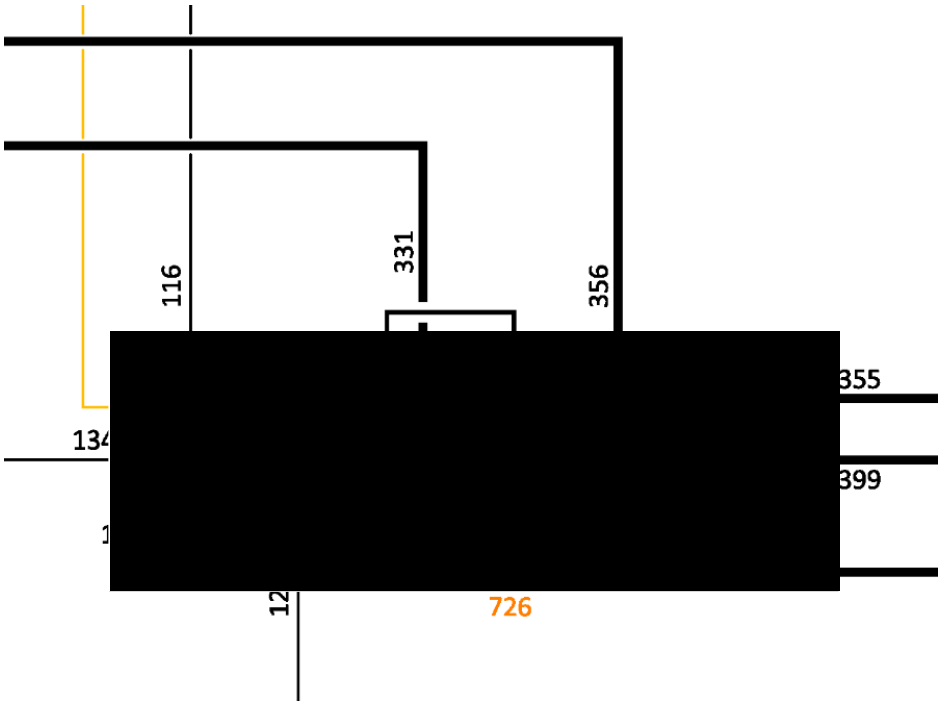

Figure 16-9: Install new line from Carver to Kingston (Termination at Carver)

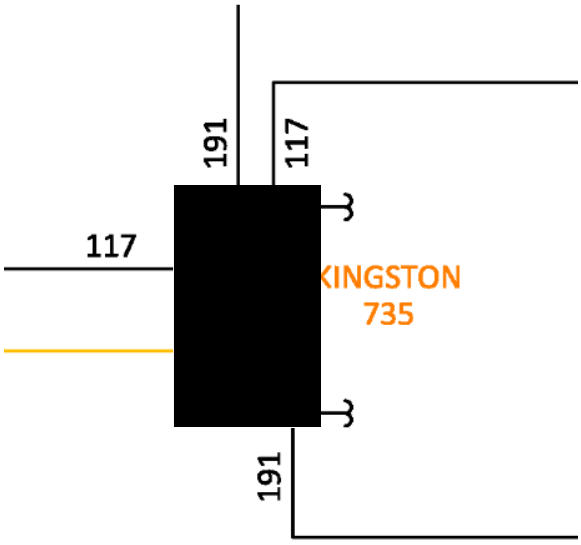

Figure 16-10: Install new line from Carver to Kingston (Termination at Kingston) and rebuild Kingston under separate asset condition and local reliability upgrade projects[45]

[45] https://smd.iso-ne.com/operations-services/ceii/pac/2016/12/a2_kingston_substation_asset_conditions.pdf

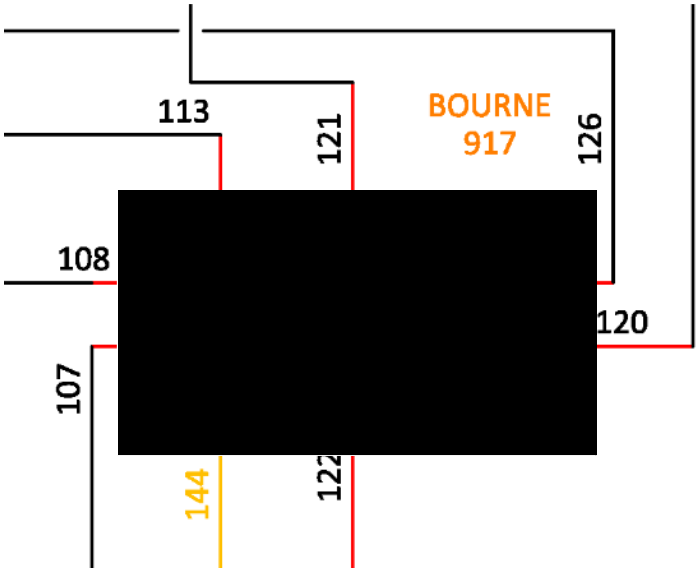

Figure 16-11: Install new line from Bourne to West Barnstable (Termination at Bourne) and rebuild Bourne under a separate asset condition project shown in red[46]

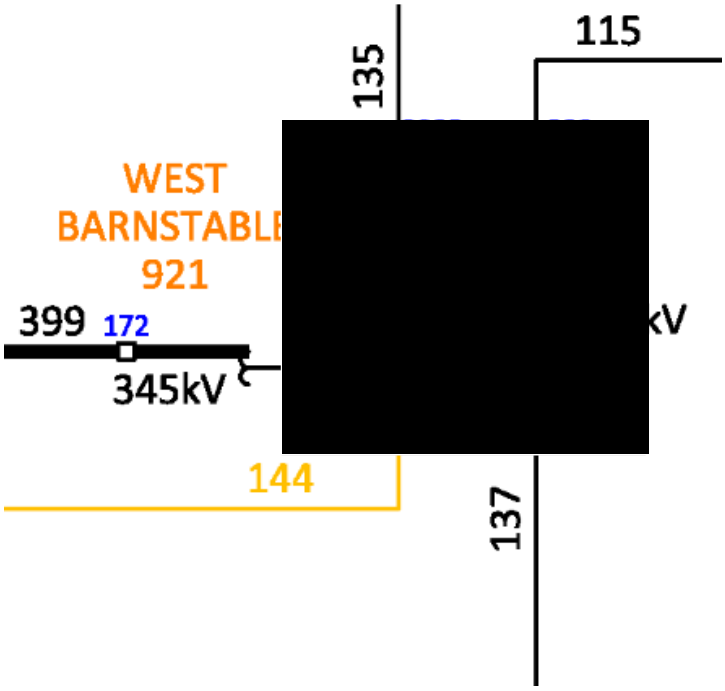

Figure 16-12: Install new line from Bourne to West Barnstable (Termination at West Barnstable)

[46] https://smd.iso-ne.com/operations-services/ceii/pac/2016/11/a3_bourne_asset_conditions_preferred_solutions.pdf

APPENDIX 2-2 REVISED SEMA/RI 2029 NEEDS ASSESSMENT UPDATE, REVISION 1

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Revised SEMA/RI 2029 Needs Assessment Update

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NOVEMBER 2020 - Revision 1

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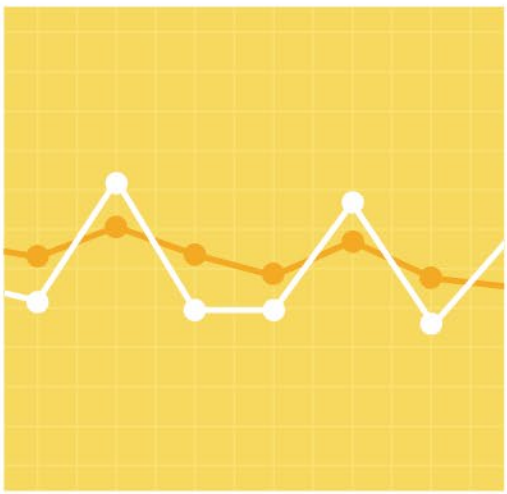

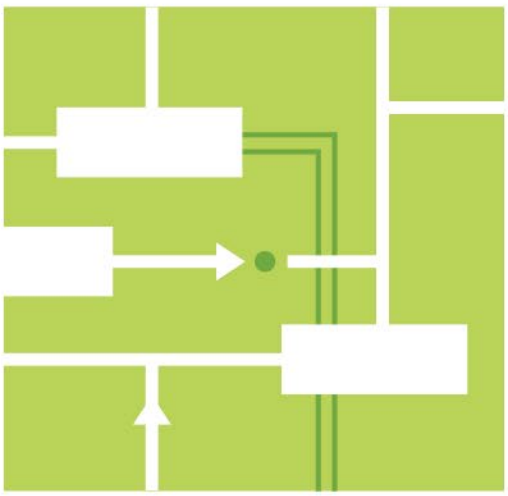



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Section 1
Objective and Background

1.1 Study Objective

The objective of the Revised SEMA/RI 2029 Needs Assessment Update was to evaluate the solution components from the SEMA/RI 2026 Solutions Study[1] that have not started construction to determine if the solution components or a combination of the solution components were still needed to solve any criteria violations identified in the SEMA/RI study area for the year 2029. The results of the Revised SEMA/RI 2029 Needs Assessment Update were compared to the results of the SEMA/RI 2026 Needs Assessment and Addendums[2].

The Revised SEMA/RI 2029 Needs Assessment Update considered the following:

- Future load conditions to reflect the 2020 Capacity, Energy, Loads, and Transmission (CELT) forecast[3]
- Reliability over a range of generation patterns used in the SEMA/RI 2026 Needs Assessment and transfer levels
- Solution components from the SEMA/RI 2026 Solutions Study that have not started construction were excluded from the cases. The excluded solution components are shown in Appendix I (Section 16). Conversely, the solution components that are under construction or in service were included in the cases and are shown in Appendix J (Section 17)
- Resource changes in the study area based on FCA 13 results[4]
- Retirement of the Mystic 8 and 9 generators
- All applicable North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Corporation (NPCC) and ISO New England transmission planning reliability standards

The Revised SEMA/RI 2029 Needs Assessment Update was restricted to an evaluation of 2029 peak load conditions because the solution components from the SEMA/RI 2026 Solutions Study were developed to address peak load needs. Short circuit and stability analysis were not conducted.

At the April 23, 2020 PAC meeting,[5] stakeholders requested the following sensitivities to be studied.

- Non-coincident peak loads on the Cape – Appendix A (Section 8)

[1] https://smd.iso-ne.com/operations-services/ceii/pac/2017/02/final_sema_ri_2026_solutions_study_report_rev1.pdf

[2] https://smd.iso-ne.com/operations-services/ceii/pac/2016/05/final_sema_ri_needs_assessment_report.pdf, https://smd.iso-ne.com/operations-services/ceii/pac/2016/12/sema_ri_2026_needs_assessment_addendum.pdf, and https://smd.iso-ne.com/operations-services/ceii/pac/2018/06/sema_ri_2026_needs_assessment_seconf_addendum.pdf

[3] 2020 CELT Forecast data link: https://www.iso-ne.com/static-assets/documents/2020/04/2020_celt_report.xlsx

[4] FCA 14 for retirement and permanent de-list bids. A review of the final FCA 14 results (both for de-lists and new capacity supply obligations) showed no need to further modify the study assumptions for the SEMA/RI 2029 Needs Assessment Update.

[5] The SEMA/RI 2029 Needs Assessment Update presentation was presented at the meeting. https://smd.iso-ne.com/operations-services/ceii/pac/2020/04/sema_ri_2029_needs_assessment_update_04232020_v50.pdf. The presentation showed that the needs corresponding to the new line from Bourne to West Barnstable were not observed in 2029 due to the assumptions used in the SEMA/RI 2029 Needs Assessment Update. The Revised SEMA/RI 2029 Needs Assessment Update results show a thermal overload on the 136-1 line from Hatchville to Falmouth Tap for an N-1-1 contingency event.

- Reduced OSW output applied to existing OSW projects (Vineyard Wind and Revolution Wind) – Appendix B (Section 9)
- Addition of future off shore wind (OSW) (Vineyard Wind 2 and Mayflower Wind) projects – Appendix C (Section 10)

1.2 Area Studied

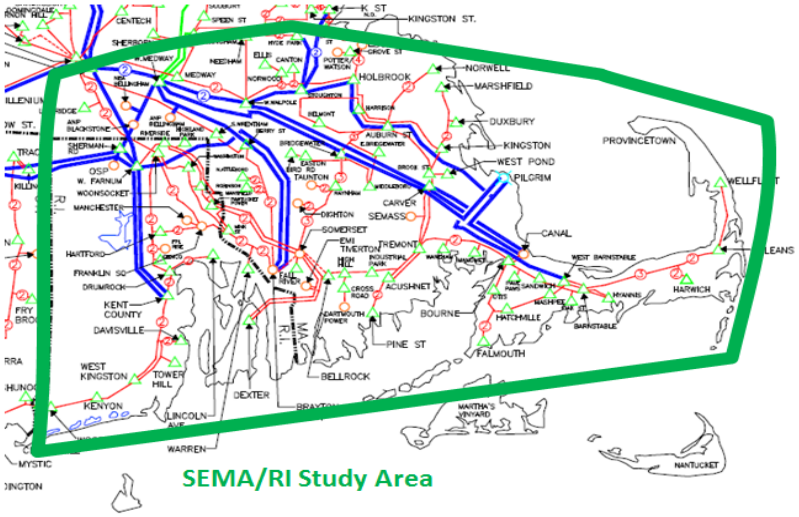


Figure 1-1: SEMA/RI Study Area Map[6]

The study area focused on two load zones, namely, the SEMA and RI load zones as shown in Figure 1-1. This combination of load zones is collectively known as the SEMA/RI load zone and was the study area evaluated in this analysis. These load zones encompass the areas within Massachusetts located south of Boston as well as the entire state of Rhode Island.

The SEMA/RI Interface borders the Boston Import Interface to the north and Connecticut Import Interface to the West.

Figure 1-2 shows the one-line diagram of the study area.

[6] This area map is for illustrative purposes only. It does not show any future projects in the study area. A high-resolution version of the geographical map is available at https://www.iso-ne.com/about/key-stats/maps-and-diagrams.

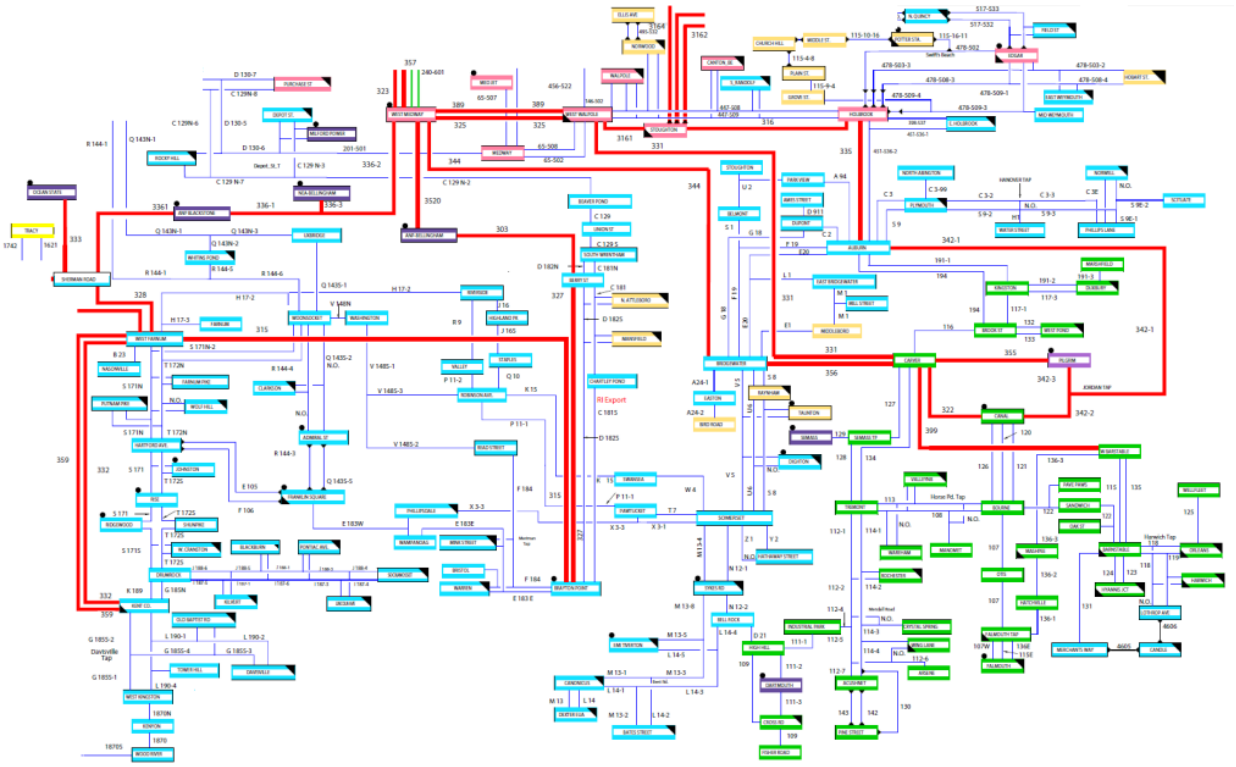


Figure 1-2: SEMA/RI Study Area One Line Diagram[7]

1.3 Study Horizon

This study was focused on the 2029 summer peak load level for the ten-year horizon utilizing the 2020 Capacity, Energy, Loads and Transmission (CELT) Report Forecast.

1.4 Analysis Description

The study included the evaluation of the reliability of the transmission system serving the SEMA/RI study area for the projected system conditions in 2029. The system was tested under N-0 (all-facilities-in), N-1 (all-facilities-in, first contingency), and N-1-1 (facility-out, first contingency) conditions for a number of possible operating scenarios with respect to generating unit unavailability conditions and import levels from external areas.

The following types of analysis were performed:

- **Thermal Analysis** – studies to determine the level of steady-state power flows on transmission circuits under base case conditions and following planned contingency events.
- **Voltage Analysis** – studies to determine steady-state voltage levels and performance under base case conditions and following planned contingency events.

The Needs Assessment was performed in accordance with relevant NERC, NPCC, and ISO criteria.

[7] The diagram is for illustrative purposes to show the study area. It does not show any future projects in the area. A high resolution version of the system diagram is available at: https://www.iso-ne.com/about/key-stats/maps-and-diagrams

For all thermal and voltage violations observed at peak load levels, an analysis was performed to determine if any related needs are time sensitive.

The thermal and voltage analysis was performed using Siemens PTI PSS®E version 33.12.1 and PowerGEM TARA v1802 software.

Section 2
Study Assumptions

2.1 Steady-State Model Assumptions

The case used for the Revised SEMA/RI 2029 Needs Assessment Update was created from the Year 10 Needs Assessment Peak Load Steady-state Base Case – A 2029 topology with 90/10 summer peak load representation – 2029_NA_PK_SS_Case found in the 2019 Transmission Planning Base Case Library.

For a description of the transmission and generation related details included in the case used for the Revised SEMA/RI 2029 Needs Assessment Update refer to the Summary Document for 2019 Transmission Planning Base Case Library[8] in the sections shown below.

- Existing topology
- Maine mill load modeling – This section is not applicable for the Revised SEMA/RI 2029 Needs Assessment Update
- Load power factor assumptions
- Demand resource assumptions
- Photovoltaic (PV) generation modeling and assumptions
- Net load levels studied
- Transmission upgrades included in the base cases
- Generators and ETUs included in the base cases
- Generator profiles (Real and reactive power limits)
- Source for system models outside New England
- Sections on dynamic models are not applicable to the Revised SEMA/RI 2029 Needs Assessment Update

The 2020 Capacity, Energy, Loads, and Transmission (CELT) report was used to determine the forecasted loads for the peak load demand level evaluated. A 90/10 summer peak load was used to represent the peak demand level for 2029. The load, EE, and PV forecasts in the 2020 CELT show a significant reduction in the net load to be served compared to what was assumed in the prior assessments as shown in Table 2-1.

[8] https://www.iso-ne.com/static-assets/documents/2019/11/final_summary_document_for_2019_transmission_planning_base_case_library.pdf

Table 2-1:
Comparison of the net load modeled in New England between the SEMA/RI 2026 Needs Assessment and SEMA/RI 2029 Needs Assessment Update

Category	SEMA/RI 2026 Needs Assessment Summer Peak 2026 90/10 Load (MW) CELT 2015 Data	Revised SEMA/RI 2029 Needs Assessment Update Summer Peak 2029 90/10 Load (MW) CELT 2020 Data	Change in Load (MW) (CELT 2020– CELT 2015)
Gross 90/10 Peak Loads (Excludes Transmission Losses)	34,461	32,946	-1,515
Non-CELT Manufacturing load in New England	364	301	-63
Available EE Forecast for study year (modeled as negative load)	NA	-5,595	-5,359
Available FCA 2015 CELT EE Forecast for study year (modeled as negative load)	-1,590	NA	1,590
Available FCA 14 ADCR (modeled as negative load)	NA	-552	-552
Available FCA 9 Passive DR (modeled as negative load)	-2,253	NA	2,253
Available FCA 9 Active DR (modeled as negative load)	-384	NA	384
Available PV Forecast for study year (modeled as negative load)	-531	-2,055	-1,524
Net load modeled in New England (Excludes Station Service)	30,068	25,045	-5,023

2.2 Transfer Levels

In accordance with the reliability criteria of the NERC, NPCC and the ISO, the regional transmission power grid must be designed for reliable operation during stressed system conditions. The transfer levels used in the Revised SEMA/RI 2029 Needs Assessment Update are the same transfer levels used in the SEMA/RI 2026 Needs Assessment. Please refer to the SEMA/RI 2026 Needs Assessment, section 3.1.10 for further information regarding the transfer levels used in the Revised SEMA/RI 2029 Needs Assessment Update.

2.3 Generation Dispatch Levels

All of the two generator OOS dispatches from the SEMA/RI 2026 Needs Assessment were used with the exception of the dispatch with Pawtucket Power which has since retired. Table 14-3 in Appendix G (Section 14) shows the one unit and two unit generation dispatches used in the Revised SEMA/RI 2029 Needs Assessment Update. Please refer to the SEMA/RI 2026 Needs Assessment, section 3.1.11 for further information regarding the generation dispatch scenarios used in the Revised SEMA/RI 2029 Needs Assessment Update.

2.4 Protection and Control System Devices Included in the Study Area

Refer to the SEMA/RI 2026 Needs Assessment, section 3.1.14 for further information regarding the protection and control system devices included in the Study Area used in the Revised SEMA/RI 2029 Needs Assessment Update.

2.5 Stability Modeling Assumptions

Not applicable for this study.

2.6 Short Circuit Model Assumptions

Not applicable for this study.

Section 3
Analysis Methodology

Refer to the SEMA/RI 2026 Needs Assessment, Section 4.2 for further information regarding the performance criteria used in the Revised SEMA/RI 2029 Needs Assessment Update.

3.1 Contingencies Evaluated

Table 3-1 summarizes the normal contingencies evaluated in the Revised SEMA/RI 2029 Needs Assessment Update.

Table 3-1:
Summary of Normal Contingencies Evaluated

Contingency Type		Number of Element Out Scenarios	Number of Contingencies Tested For N-1 Analysis	Number of Contingencies Tested For N-1-1 Analysis
GN	Generator	34	108	108
LN	Transmission Circuit	172	422	422
TF	Transformer	70	181	181
SD	Shunt Device	24	80	80
SPDC	Single Pole of a DC Line	0	2	2
NF	Opening of a Line Section w/o a Fault	N/A	262	N/A
BO	Opening of a Line Section w/o a Fault	N/A	100	100
BS	Bus Section Fault	N/A	46	46
BF	Internal Breaker Fault (non-Bus-tie Breaker)	N/A	950	950
BF_FR	Failure of a Relay	N/A	1	1
BT	Internal Breaker Fault (Bus-tie Breaker)	N/A	7	7
DC	Double Circuit Tower	N/A	126	126
HVDC	Loss of a bipolar DC Line	0	2	2
SPS	SPS	N/A	2	2
SPSF	SPS Failure	N/A	2	2
	TOTAL	**300**	**2291**	**2029**

3.2 ISO Planning Procedure

ISO Planning Procedure No. 3, "Reliability Standards for the New England Area Pool Transmission Facilities", was updated on 09/15/2017, which was after the completion of the SEMA/RI 2026 Needs Assessment. In the new PP-3 procedure, N-1-1 contingencies, where the second contingency was a multiple facility event (double circuit tower or breaker failure), for non BPS facilities were no longer respected. Under the Revised SEMA/RI 2029 Needs Assessment Update, these N-1-1 contingencies were respected as this evaluation is an update to SEMA/RI 2026 Needs Assessment study.

3.3 Generation Re-dispatch Testing

As outlined in PP3, allowable actions after the first contingency event and prior to the second contingency event include re-dispatch of generation available within ten minutes. This is also consistent with NPCC Directory #1 and NERC TPL-001-4 where system adjustments are permitted in between contingencies for N-1-1 testing. To simulate these actions in power flow analysis, the Security Constrained Re-Dispatch (SCRD) tool in the TARA software package was used.

During the analysis, all on-line generation in the study area was allowed to be reduced or turned off to mitigate a thermal violation, with the exception of nuclear units. Simultaneously, up to 1200 MW of allocated reserves could be dispatched on. For base cases with imports modeled from adjacent areas, the transfer levels on the import interface could be reduced up to 0 MW while respecting the maximum of 1,200 MW of resources that could be dispatched on within New England.

3.4 Time-Sensitivity and Need-by Date Determination

A time sensitivity analysis was performed as a part of a Needs Assessment for each Pool Transmission Facility (PTF) need that is identified at peak load levels as a part of steady-state analysis.

3.5 Summary of Major Study Assumption Changes for the Revised Needs Assessment Update

The major assumption changes are:

- All SEMA/RI 2026 solution components were included in the cases with the exception of the projects that have not started construction as shown in Appendix I (Section 16)
- Mystic generation was in-service in the SEMA/RI 2026 Needs Assessment but was retired in the Revised SEMA/RI 2029 Needs Assessment Update
- Vineyard Wind was not modeled in the SEMA/RI 2026 Needs Assessment but was modeled at 160 MW[9] in the Revised SEMA/RI 2029 Needs Assessment Update
- Revolution Wind was not modeled in the SEMA/RI 2026 Needs Assessment but was modeled at 120 MW[9] in the Revised SEMA/RI 2029 Needs Assessment update

[9] Per section 2.3.7 the Transmission Planning Technical Guide, off shore wind is modeled at 20% of its nameplate rating.

Section 4
Study Results

The system was tested with all SEMA/RI components in service, except those that have not advanced to the Construction in Progress phase as reported in the June 2020 NEPOOL Participants Committee Report[10].

The results shown in Table 4-1, Table 4-2, Table 4-3, Table 4-4, and Section 4.5 show the same elements with thermal, voltage, and consequential load loss violations as identified in the SEMA/RI 2026 Needs Assessment and Addendums. Therefore, the elements with thermal, voltage, and consequential load loss violations seen in both the Revised SEMA/RI 2029 Needs Assessment Update and the SEMA/RI 2026 Needs Assessment and Addendums are deemed confirmed needs.

The results shown in Table 4-5 and Table 4-6 show elements where thermal and voltage violations identified in the SEMA/RI 2026 Needs Assessment are no longer observed in the Revised SEMA/RI 2029 Needs Assessment Update.

4.1 Confirmed N-1 Thermal Results

Table 4-1:
N-1 Thermal Results

Element ID	Element	Dispatch	Contingency	LTE Rating (MVA)	N-1 %LTE Loading in the Revised 2029 Needs Assessment Update
112-4	Industrial Park Tap to Industrial Park			246	153.7
111-1	High Hill to Industrial Park			243	138.7
L14-3	Bent Rd to Tiverton			210	119.0
L14-4	Bell Rock to Tiverton			250	111.8
L14-7	Canonicus to Dexter W			165	101.8

[10] https://www.iso-ne.com/static-assets/documents/2020/06/june-2020-coo-report.pdf

4.2 Confirmed N-1 Voltage Results

Table 4-2:
N-1 Voltage Results

Bus Name	Base kV	Dispatch	Contingency	Revised 2029 Needs Assessment Update Post Contingency Pre-switching Voltage (p.u.)	Revised 2029 Needs Assessment Update Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115			>0.90	0.924
Hopkinton 501	115			>0.90	0.924
Jepson	115			0.727	0.672
Wing Lane	115			>0.90	0.884
High Hill	115			0.826	0.796
Dexter W	115			0.730	0.676
Bell Rock	115			0.796	0.758
Industrial Park	115			0.848	0.822

4.3 Confirmed N-1-1 Thermal Results

Table 4-3:
N-1-1 Thermal Results

Element ID	Element	Dispatch	Element OOS	Contingency	LTE Rating (MVA)	N-1-1 %LTE Loading in the Revised 2029 Needs Assessment Update
J16S	Staples to Highland Park				115	100.3
C129N-1	Millbury to Purchase				218	117.1
112-1	Tremont N. To Rochester				357	138.2
112-2	Rochester to Crystal Tap				357	137.3
112-3	Industrial Park Tap to Crystal Tap				357	137.3
112-4	Industrial Park Tap to Industrial Park				246	155.3
111-1	High Hill to Industrial Park				243	139.8
L14-3	Bent Rd to Tiverton				210	120.4
L14-4	Bell Rock to Tiverton				250	112.8
L14-7	Canonicus to Dexter W				165	103.6
N12-1	Somerset to Sykes Rd				284	125.9
N12-2	Sykes Rd to Bell Rock				284	115.2
M13-4	Somerset to Sykes Rd				284	129.8
M13-8	Tiverton to Sykes Rd				250	134.9
136-1	Hatchville to Falmouth Tap				257	101.1

4.4 Confirmed N-1-1 Voltage Results

Table 4-4:
N-1-1 Voltage Results

Bus Name	Base kV	Dispatch	Element OOS	Contingency	Revised 2029 Needs Assessment Update Post Contingency Pre-switching Voltage (p.u.)	Revised 2029 Needs Assessment Update Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115	[redacted]	[redacted]	[redacted]	0.789	0.785
Hopkinton 501	115	[redacted]	[redacted]	[redacted]	0.789	0.785
Union Street	115	[redacted]	[redacted]	[redacted]	0.854	0.853
Jepson	115	[redacted]	[redacted]	[redacted]	0.637	0.584
Wing Lane	115	[redacted]	[redacted]	[redacted]	0.784	0.760
High Hill	115	[redacted]	[redacted]	[redacted]	0.725	0.692
Dexter W	115	[redacted]	[redacted]	[redacted]	0.639	0.588
Bell Rock	115	[redacted]	[redacted]	[redacted]	0.698	0.659
Industrial Park	115	[redacted]	[redacted]	[redacted]	0.745	0.716
Brook Street	115	[redacted]	[redacted]	[redacted]	>0.90	0.942

4.5 Confirmed Consequential Load Loss

In 2029, the loss of [redacted] followed by the loss of the [redacted] results in the loss of 467 MW of gross load in the Cape area.

In 2029, the loss of [redacted] followed by the loss of the [redacted] results in the loss of 449 MW of gross load in the Industrial Park and Somerset/Newport areas.

4.6 N-1-1 Thermal Needs No Longer Observed

Table 4-5:
N-1-1 Thermal Needs No Longer Observed

Element ID	Element	Element OOS	Contingency	LTE Rating (MVA)	N-1-1 % LTE Loading in the Revised 2029 Needs Assessment Update
324	Mystic to Kingston 345 kV Line			650	<100
372	Mystic to Kingston 345 kV Line			674	<100
Kingston 345A	Kingston 345A 345/115 kV Autotransformer			540	<100
Kingston 345B	Kingston 345B 345/115 kV Autotransformer			540	<100
329-530	Brighton to Blair Pond 115 kV Line			231	<100
329-531	Brighton to North Cambridge 115 kV Line			231	<100
509-530	North Cambridge to Blair Pond 115 kV Line			231	<100
385-512	Kingston St to K Street 1 115 kV Line			190	<100
385-513	Kingston St to K Street 1 115 kV Line			190	<100
385-510-1	High St to K Street 1 115 kV Line Section			190	<100
385-510-2	Kingston St to High St 115 kV Line Section			190	<100
385-511-1	High St to K Street 2 115 kV Line Section			190	<100
385-511-2	Kingston St to High St 115 kV Line Section			190	<100
Kent County 3X	Kent County 3X 345/115 kV Autotransformer			587	<100
L14-1	Bent Rd to Canonicus 115 kV Line section			210	<100
L14-5	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section			180	<100
L14-6	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section			180	<100
M13-3	Bent Rd to Tiverton Tap 115 kV Line Section			244	<100

Element ID	Element	Element OOS	Contingency	LTE Rating (MVA)	N-1-1 % LTE Loading in the Revised 2029 Needs Assessment Update
M13-5	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	[redacted]	[redacted]	180	<100
M13-6	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	[redacted]	[redacted]	180	<100
M13-7	Canonicus to Dexter 115 kV Line Section	[redacted]	[redacted]	165	<100

4.7 N-1-1 Voltage Needs No Longer Observed

Table 4-6:
N-1-1 Voltage Needs No Longer Observed

Bus Name	Base kV	Element OOS	Contingency	Revised 2029 Needs Assessment Update Post Contingency Pre-switching Voltage (p.u.)	Revised 2029 Needs Assessment Update Post Contingency Post-switching Voltage (p.u.)
Berry Street	115	[redacted]	[redacted]	>0.95	>0.95
Kingston	115	[redacted]	[redacted]	>0.90	>0.95

Section 5
Time-Sensitivity Testing

For each confirmed transmission need identified at peak load levels in the steady-state analysis, additional analysis was performed to determine the time-sensitivity of the confirmed need. Transmission needs identified in this study have been deemed time-sensitive if they have a year of need within three years of the completion of this Needs Assessment. Since the publishing date of this assessment occurs after May 31, 2020, the threshold for determining time-sensitive needs is the 2023 summer peak. If a transmission need identified in this study (2029) exists in cases that represent the 2023 summer peak, then those needs are deemed time-sensitive.

5.1 Creation of Time-Sensitive Base Cases

The time-sensitive base cases are created by modifying the loads in the 10-year projection of the 90/10 summer peak load base case (study horizon base cases) to represent the time-sensitive year summer peak load levels. The 2029 peak load base cases were modified to represent 2023 peak load base cases. Table 5-1 provides a comparison of loads between the study horizon year and time-sensitive year base cases.

Table 5-1:
Comparison of Net NE Load Levels Study Horizon Year vs Time-Sensitive Year (Excluding Transmission Losses)

Category	Summer Peak 2029 90/10 Load (MW)	Summer Peak 2023 90/10 Load (MW)
CELT 2020 Forecast	32,946	31,191
Non-CELT Manufacturing load in New England	301	301
Available FCA-14 ADCR (modeled as negative load)	-552	-552
Available 2020 CELT EE Forecast for study year (modeled as negative load)	-5,595	-4,181
Available 2020 CELT PV Forecast for study year (modeled as negative load)	-2,055	-1,377
Net load modeled in New England (Excludes Station Service)	25,045	25,382

The transmission and generation topology in the study horizon base cases is maintained in the time-sensitive base cases.

There are no study area generators that are assumed to be retired in the study horizon year that are expected to be online in the time-sensitive year. Therefore, no generators were added to the time-sensitive year base cases that are not included in the study horizon year base cases.

5.2 Generator Dispatch in Time-Sensitive Base Cases

Since there are no retired generators in the study area and therefore no differences in the generators included in the time-sensitive base cases when compared to the study horizon base

cases, the following dispatches for the study horizon base cases were used for the time-sensitive base cases.

- D04 – West-East stress with Edgar and Potter out of service
- D07 – West-East stress with a Milford unit out of service
- D14 – West-East stress with Tiverton and Dartmouth out of service
- D19 – East-West stress with Edgar and Potter out of service
- D22 – East-West stress with a Milford unit out of service
- D23 – East-West stress with Tiverton and Dartmouth out of service

These dispatch cases were selected to be used for the time-sensitivity analysis because the worst thermal and voltage violations in the study horizon cases were observed with these dispatch cases.

5.3 Results of Time-Sensitivity Testing

The time-sensitive results are shown in Table 5-2, Table 5-3, Table 5-4, Table 5-5, and Section 5.4. All thermal and voltage violations identified in the 2029 peak load conditions are time-sensitive needs.

Table 5-2:
N-1 Thermal Results

Element ID	Element	Dispatch	Contingency	LTE Rating (MVA)	N-1 % LTE Loading in the Revised 2023 Needs Assessment Update
112-4	Industrial Park Tap to Industrial Park			246	155.2
111-1	HighHill to Industrial Park			243	139.6
L14-3	Bent Rd to Tiverton			210	118.1
L14-4	Bell Rock to Tiverton			250	110.9
L14-7	Canonicus to Dexter W			165	101.3

Table 5-3:
N-1 Voltage Results

Bus Name	Base kV	Dispatch	Contingency	Revised 2023 Needs Assessment Update Post Contingency Pre-switching Voltage (p.u.)	Revised 2023 Needs Assessment Update Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115	[redacted]	[redacted]	>0.90	0.921
Hopkinton 501	115	[redacted]	[redacted]	>0.90	0.921
Jepson	115	[redacted]	[redacted]	0.722	0.668
Wing Lane	115	[redacted]	[redacted]	>0.90	0.881
High Hill	115	[redacted]	[redacted]	0.821	0.791
Dexter W	115	[redacted]	[redacted]	0.725	0.672
Bell Rock	115	[redacted]	[redacted]	0.790	0.753
Industrial Park	115	[redacted]	[redacted]	0.843	0.818

Table 5-4:
N-1-1 Thermal Results

Element ID	Element	Dispatch	Element OOS	Contingency	LTE Rating (MVA)	N-1-1 %LTE Loading in the Revised 2023 Needs Assessment Update
J16S	Staples to Highland Park				115	100.6
C129N-1	Millbury to Purchase				218	117.6
112-1	Tremont N. To Rochester				357	140.3
112-2	Rochester to Crystal Tap				357	139.3
112-3	Industrial Park Tap to Crystal Tap				357	139.3
112-4	Industrial Park Tap to Industrial Park				246	156.9
111-1	High Hill to Industrial Park				243	140.9
L14-3	Bent Rd to Tiverton				210	119.5
L14-4	Bell Rock to Tiverton				250	112.0
L14-7	Canonicus to Dexter W				165	103
N12-1	Somerset to Sykes Rd				284	127.6
N12-2	Sykes Rd to Bell Rock				284	116.9
M13-4	Somerset to Sykes Rd				284	132.4
M13-8	Tiverton to Sykes Rd				250	137.6
136-1	Hatchville to Falmouth Tap				257	107.1

Table 5-5:
N-1-1 Voltage Results

Bus Name	Base kV	Dispatch	Element OOS	Contingency	Revised 2023 Needs Assessment Update Post Contingency Pre-switching Voltage (p.u.)	Revised 2023 Needs Assessment Update Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115	[redacted]	[redacted]	[redacted]	0.784	0.780
Hopkinton 501	115	[redacted]	[redacted]	[redacted]	0.784	0.780
Union Street	115	[redacted]	[redacted]	[redacted]	0.854	0.852
Jepson	115	[redacted]	[redacted]	[redacted]	0.630	0.579
Wing Lane	115	[redacted]	[redacted]	[redacted]	0.777	0.754
High Hill	115	[redacted]	[redacted]	[redacted]	0.718	0.685
Dexter W	115	[redacted]	[redacted]	[redacted]	0.632	0.583
Bell Rock	115	[redacted]	[redacted]	[redacted]	0.698	0.659
Industrial Park	115	[redacted]	[redacted]	[redacted]	0.738	0.710
Brook Street	115	[redacted]	[redacted]	[redacted]	>0.90	0.935
Kingston	115	[redacted]	[redacted]	[redacted]	>0.90	0.944

5.4 Time-Sensitive Consequential Load Loss

In 2023, the loss of [redacted] followed by the loss of the [redacted] results in the loss of 436 MW of gross load in the Cape area.

In 2023, the loss of [redacted] followed by the loss of the [redacted] results in the loss of 417 MW of gross load in the Industrial Park and Somerset/Newport areas.

5.5 Non-Transmission Options

The Revised SEMA/RI 2029 Needs Assessment Update already considers existing and new generating capacity resources with FCM obligations, and all resources with a binding contract. There are no Elective Transmission Upgrades (ETUs) in the SEMA/RI study area with a Forward Capacity Auction commitment that would resolve these violations. Non-transmission options are not adequate to relieve the reliability criteria violations in SEMA/RI.

5.6 Determination

All of the confirmed needs identified in the Revised SEMA/RI 2029 Needs Assessment Update, as shown in Table 4-1, Table 4-2, Table 4-3, Table 4-4, and Section 4.5 are confirmed to be time-sensitive.

The needs in the SEMA/RI area were first identified in the SEMA/RI 2026 Needs Assessment which was posted to the PAC section of the external website on May 26, 2016 and the SEMA/RI 2026

Needs Assessment Addendum was posted on December 15, 2016, and the SEMA/RI 2026 Needs Assessment Second Addendum was posted on July 13, 2018.

The Revised SEMA/RI 2029 Needs Assessment Update is being done due to the significant reduction in the net load to be served compared to what was assumed in the prior assessments.

The result of the Revised SEMA/RI 2029 Needs Assessment Update shows that the reliability criteria violations shown in Table 4-1, Table 4-2, Table 4-3, Table 4-4, and Section 4.5 seen in the SEMA/RI 2026 Needs Assessment are still present and are still deemed time-sensitive in the Revised SEMA/RI 2029 Needs Assessment Update. The ISO will continue to work with the following Participating Transmission Owners, Eversource and National Grid, to bring the identified projects to completion shown in Table 6-1 and Table 6-5.

Section 6
Project Resolution Based on Updated Study Results

6.1 Projects with Needs that Still Exist

The following projects solve the confirmed needs shown in Table 4-1, Table 4-2, Table 4-3, Table 4-4, and Section 4.5. These projects are being retained and Eversource and National Grid should bring the identified projects to completion.

Table 6-1:
Projects to be Retained

Project ID	Project Description
1732	Loop the 201-502 line into the Medway substation to form the 201-502N and 201-502S lines
1726	Separate the 135/122 DCT
1720	Separate the N12/M13 DCT and reconductor the N12 and M13 lines between Somerset and Bell Rock substations
1722	Extend Line 114 – Dartmouth town line to Bell Rock
1730	Extend Line 114 – Eversource/National Grid border to Industrial Park tap
1721	Install a 37.5 MVAR capacitor at Bell Rock, reconfigure Bell Rock to breaker-and-a-half station, split the M13 line at Bell Rock substation, and terminate 114 line at Bell Rock; install a new breaker in series with N12/D21 tie breaker, and upgrade D21 line switch
1731	Install a 35.3 MVAR capacitor at High Hill substation and install a 35.3 MVAR capacitor at Wing Lane substation
1728	Build a new 115 kV line from Carver to Kingston substations and add a new Carver terminal
1729	Install a new bay position at Kingston substation to accommodate new 115 kV line
1782	Reconductor the J16S line
1725	Build a new 115 kV line (144 line) from Bourne to West Barnstable substations which includes associated terminal work

6.2 Projects which are Candidates for Cancellation

The following projects are candidates to be cancelled because the needs solved by these projects are no longer observed as shown by Table 4-5 and Table 4-6.

Table 6-2:
Projects to be cancelled

Project ID	Project Description
1733	Separate the 325/344 DCT – West Medway to West Walpole
1719	Install a 45.0 MVAR capacitor bank at Berry Street substation
1723	Reconductor L14 and M13 lines from Bell Rock substation to Bates Tap
1724	Replace the Kent County T3 345/115 kV transformer

6.3 Feedback from the Transmission Owners

For the four projects with needs no longer observed, the ISO contacted Eversource and National Grid and collected additional information to understand the exact status of each solution component. Table 6-3 shows the amount of project spending for each project alongside of the latest cost estimate from the June 2020 Project List.

Table 6-3:
Estimated cost versus Project spending

Project ID	Project Description	June 2020 Project List Estimated Cost ($M)	Project Spending ($M)	Percentage % (Project Spending / Estimated Cost)
1733	Separate the 325/344 DCT – West Medway to West Walpole	$17.9	$1.1	6.1
1719	Install a 45.0 MVAR capacitor bank at Berry Street substation	$5.0	$1.5	30.0
1723	Reconductor L14 and M13 lines from Bell Rock substation to Bates Tap	$38.7	$2.6	6.7
1724	Replace the Kent County T3 345/115 kV transformer	$5.9	$3.0	50.8

In addition to the project spending information received, National Grid also shared the following additional information on the Project ID 1724 - Replace the Kent County T3 345/115 kV transformer.

- The existing Kent County T3 transformer is a McGraw Edison shell type transformer installed in 1971 and is National Grid's last remaining transformer of its kind in their 345 kV autotransformer fleet
- Short circuit levels have increased to 40 kA on the 115 kV system at the Kent County station due to the addition of two new autotransformers and other sources in the network

- There has been a trend of similar units failing over the years due to short circuit events outside of the transformer protection scheme

6.4 Determination

Due to the revised assessment on need and the status of the projects, including the small percentage of project spending versus the projects' estimated costs, Table 6-4 shows the projects which will be cancelled.

Table 6-4:
Projects Cancelled

Project ID	Project Description	Status
1733	Separate the 325/344 DCT – West Medway to West Walpole	Cancelled
1719	Install a 45.0 MVAR capacitor bank at Berry Street substation	Cancelled
1723	Reconductor L14 and M13 lines from Bell Rock substation to Bates Tap	Cancelled

Based on the current age of the Kent County T3 (approximately 50 years), the short circuit considerations, and known asset family history, this unit is a significant concern. In addition, National Grid has spent a high percentage of the estimated cost (approximately 50%). Therefore, Project ID# 1724 – Replace the Kent County T3 345/115 kV transformer will be retained. National Grid had placed the project on hold late last year awaiting the results of the ISO's Needs Assessment Update effort. The new in-service date for the project is March 2022.

Table 6-5:
Project Retained

Project ID	Project Description	Status	Updated In-service Date (ISD)
1724	Replace the Kent County T3 345/115 kV transformer	Retained	March 2022

Section 7
Conclusion

7.1 Confirmed Needs

The results of the steady-state assessment conducted of the SEMA/RI area transmission performance against transmission reliability standards for the projected 2029 system conditions in this study indicate that there are PTF thermal and voltage violations under peak load conditions in the study area. Almost all of the thermal and voltage violations identified were also observed in the SEMA/RI 2026 Needs Assessment and Addendums. See Table 4-1, Table 4-2, Table 4-3, Table 4-4, and Section 4.5. The thermal and voltage violations observed in both the Revised SEMA/RI 2029 Needs Assessment Update and SEMA/RI 2026 Needs Assessment and Addendums indicate that the SEMA/RI area transmission system fails to meet the reliability criteria standards in the study area under the design case testing performed.

7.2 Needs No Longer Observed

In addition, some of the needs identified in the SEMA/RI 2026 Needs Assessment are no longer observed as needs in the Revised SEMA/RI 2029 Needs Assessment Update due to the significant reduction in the net load to be served. See Table 4-5 and Table 4-6.

7.3 Time-Sensitivity Results

7.3.1 Review of Time-Sensitive Needs

Table 5-2, Table 5-3, Table 5-4, Table 5-5, and Section 5.4 list the time-sensitive needs observed at the peak load levels in the SEMA/RI study area. The need-by date for the peak load time-sensitive needs is set to June 1, 2023.

7.3.2 Review of Non-Transmission Options

The Revised SEMA/RI 2029 Needs Assessment Update already considers existing and new generating capacity resources with FCM obligations, and all resources with a binding contract. There are no Elective Transmission Upgrades (ETUs) in the SEMA/RI study area with a Forward Capacity Auction commitment that would resolve these violations. Non-transmission options are not adequate to relieve the reliability criteria violations in ME.

7.3.3 Discussion on if the Identified Time-Sensitive Needs were Previously Seen

The needs in the SEMA/RI area were first identified in the SEMA/RI 2026 Needs Assessment which was posted to the PAC section of the external website on May 26, 2016 and the SEMA/RI 2026 Needs Assessment Addendum was posted on December 15, 2016, and the SEMA/RI 2026 Needs Assessment Second Addendum was posted on July 13, 2018.

7.3.4 Time-Sensitivity Determination

The result of the Revised SEMA/RI 2029 Needs Assessment Update shows that the reliability criteria violations shown in Table 4-1, Table 4-2, Table 4-3, Table 4-4, and Section 4.5 seen in the SEMA/RI 2026 Needs Assessment are still present and are still deemed time-sensitive in the Revised SEMA/RI 2029 Needs Assessment Update. The ISO will continue to work with the

following Participating Transmission Owners, Eversource and National Grid, to bring the identified projects to completion.

7.4 Projects to be Retained

The eleven projects shown in Table 6-1 solve the confirmed needs shown in Table 4-1, Table 4-2, Table 4-3, Table 4-4, and Section 4.5. These projects are being retained and Eversource and National Grid should bring the identified projects to completion.

One additional project, Project ID# 1724 – Replace the Kent County T3 345/115 kV transformer will be retained based on asset condition related information and the project spending amount received from National Grid.

7.5 Project to be Cancelled

Due to the revised assessment on need and the status of the projects, including the small percentage of project spending versus the projects' estimated costs, Table 6-4 shows the projects which will be cancelled.

Section 8
Appendix A: Non-Coincident Peak Loads on the Cape

At the April 2020 PAC meeting, Eversource provided comments to the ISO indicating that the loads that were included in 2029 SEMARI Needs Assessment Update presented were significantly lower than the actual loads observed on Cape Cod.

8.1 Tremont-East Load Area

The Tremont East load area (Tremont East) includes the loads on Cape Cod, plus a few substations that are not on Cape Cod. Tremont East is a defined load area for which aggregate data was readily available. More than 85% of Tremont East load is on Cape Cod. Figure 8-1 and Figure 8-2 show the one line diagram and geographical map of the Tremont East.

Figure 8-1:
Tremont East One Line Diagram

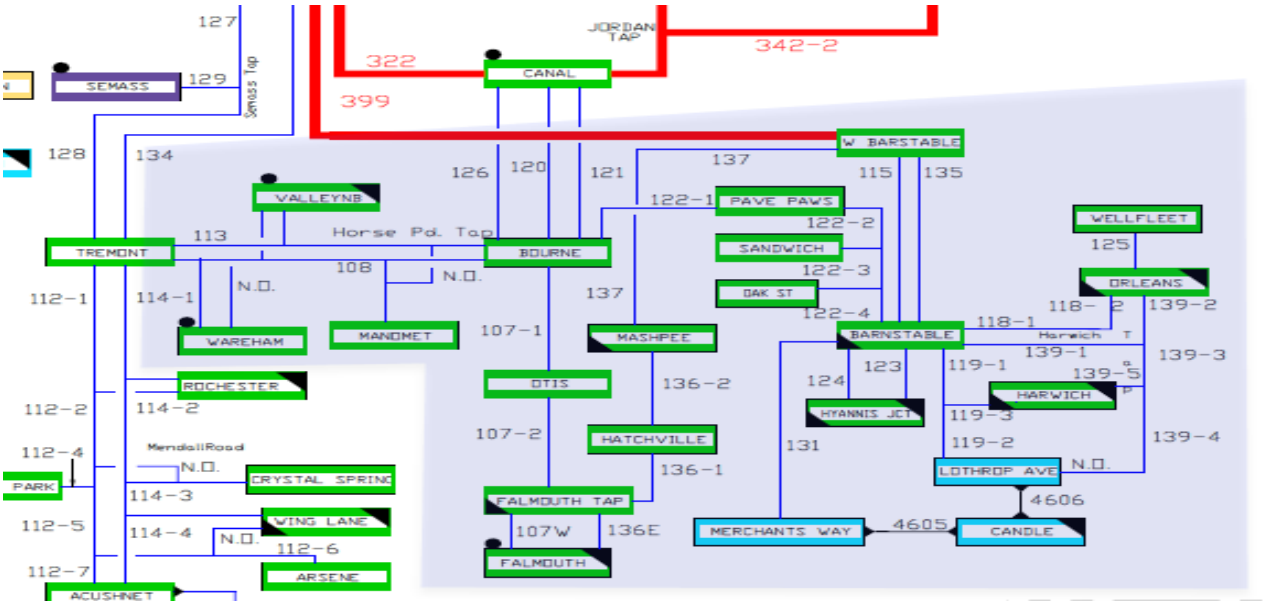
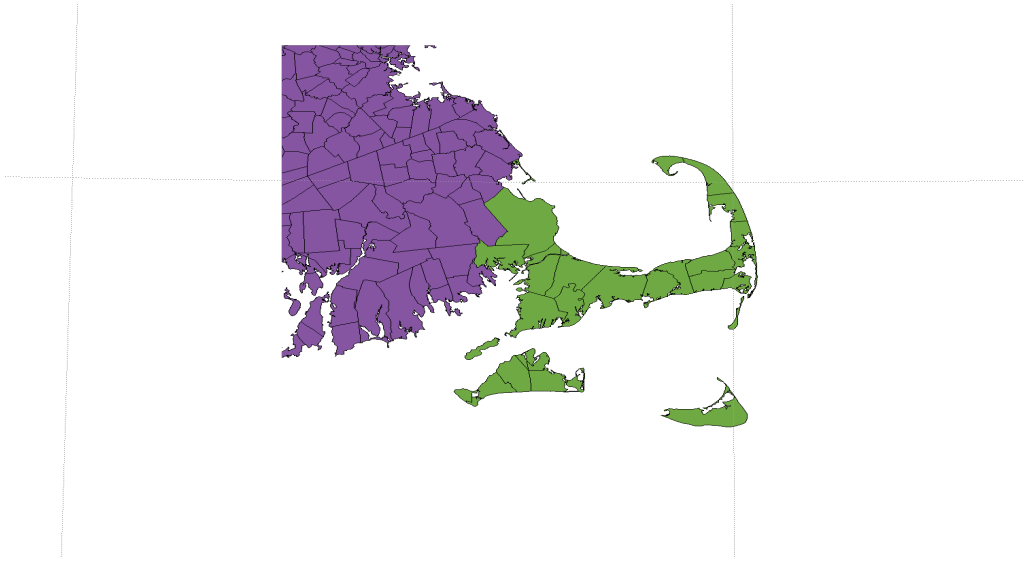


Figure 8-2:
Tremont East Geographical Map



8.2 Historical Loads Versus 2029 Study Loads for Tremont East

The net load for Tremont East in the 2029 study cases that were presented at the April PAC meeting was 556 MW.[11] In the Revised SEMA/RI 2029 Needs Assessment Update study cases based on 2020 CELT data, the net load for the Tremont East area is 587 MW.

There were 25 days in the 2016 to 2019 period when the observed net peak load hour in Tremont East exceeded 570 MW.[12] These net loads include the impact of EE, Active DR and BTM PV.

Table 8-1 show the net peak loads for 2016 to 2019 period, all of which occurred between 17:00 and 19:00.

[11] The load in the study cases presented at the April PAC meeting was based on the 2019 CELT data.

[12] 570 MW was selected as a load level higher than that studied for the April 2020 PAC discussion.

Table 8-1:
Peak load hours

Time	Load (MW)	Time	Load (MW)	Time	Load (MW)
8/14/2016 18:00	688	8/8/2018 18:00	597	8/9/2018 18:00	585
7/21/2019 18:00	665	8/22/2019 18:00	595	7/25/2016 18:00	584
7/20/2019 18:00	646	8/7/2018 18:00	592	7/31/2019 18:00	583
8/12/2016 17:00	637	7/22/2016 18:00	591	8/13/2016 19:00	582
8/11/2016 18:00	623	8/3/2018 18:00	588	7/4/2018 18:00	578
8/6/2018 18:00	609	7/5/2018 18:00	586	8/17/2018 18:00	576
8/19/2019 18:00	606	7/1/2018 18:00	586	8/16/2016 18:00	573
7/30/2019 18:00	604	8/16/2018 18:00	586	7/3/2018 19:00	571
8/15/2016 18:00	600				

The net Summer Peak load hour (includes BTM PV) for Tremont East occurs significantly later than the net Summer Peak load hour for the ISO-NE region. This is at least partially attributed to a higher level of PV penetration in Tremont East compared to the ISO-NE region.

On average, Tremont East net load peaks on weekends when compared to weekdays. In contrast, on average the ISO-NE region net load peaks on weekdays.

The historical data provides information on the net loads that can be expected in the short term, say 2020. However, additional analysis was performed to determine the net load levels to model for Tremont East in 2029 by taking into account future load growth, future EE, future PV and future ADCR.

Table 8-2 summarizes the net loads in the 2020 and 2029 study models.

Table 8-2:
Load comparison

	2020 Study Year (MW)	2029 Study Year (MW)	Delta (MW) 2029 minus 2020
Gross Load (2020 CELT Data)	771	854	83
Load Reduction based on EE Forecast (2020 CELT Data)	-104	-170	-66
Load Reduction based on ADCR (FCA 11 for 2020 and FCA 14 for 2029)	-3.4	-7.1	-3.7
Load Reduction based on PV Forecast (2020 CELT Data)	-41.1	-90.4	-49.3
Net Loads	622.5	586.5	-36.0

8.3 Historical Net Loads Reconstituted for PV

When the net 2029 loads for the Tremont East area are reconstituted for PV, we see a small increase in the net loads reconstituted for PV from 2020 to 2029. It was considered reasonable to assume that net loads reconstituted for PV in 2029 would be comparable to historical net loads reconstituted for PV.

Using PV production data and PV installed capacity data for the towns in the Tremont East load area, the historical net loads were reconstituted for PV. The towns in green in Figure 8-2 were considered to be in the Tremont East load area

Figure 8-3 shows the PV reconstitution for July 21, 2019 and the net load reconstituted for PV for the 25 days where the net peak load hour for Tremont East exceeded 570 MW.

Figure 8-3:
Peak Net Load Reconstituted for PV Curve

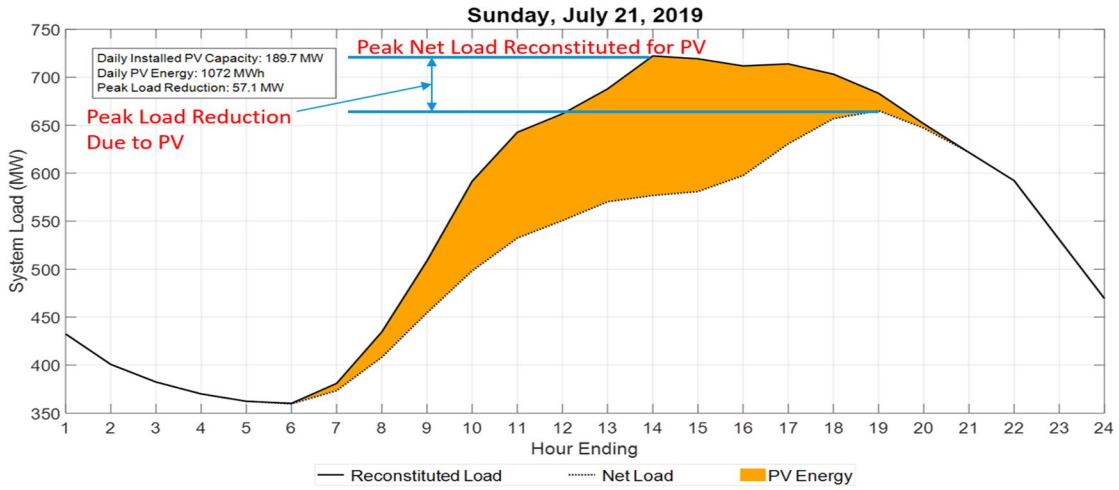
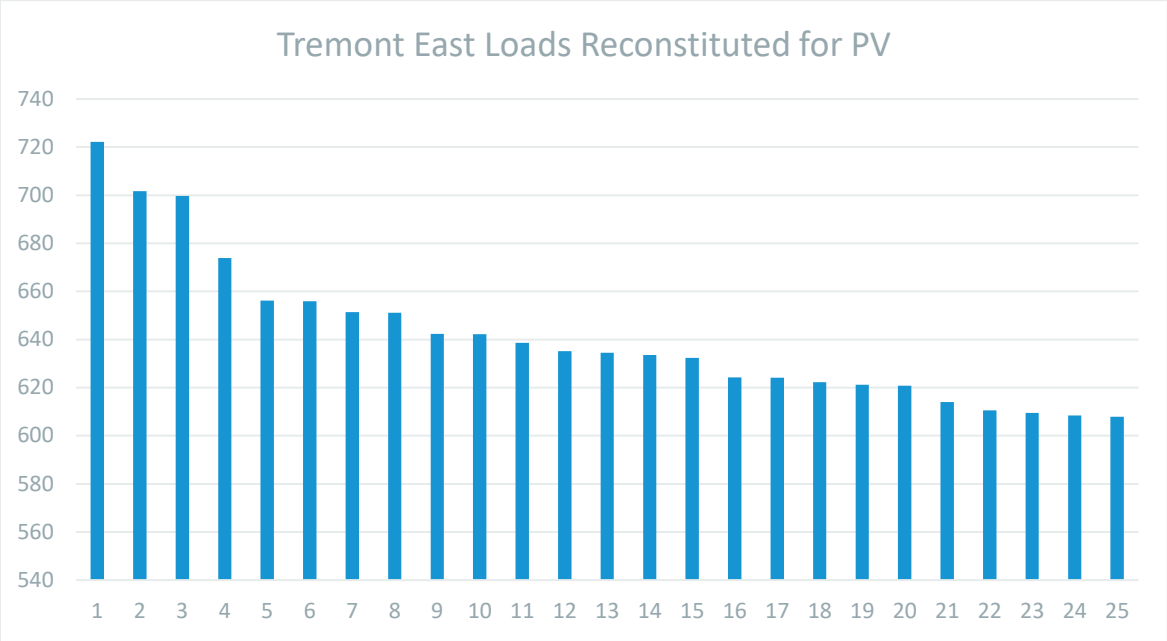


Figure 8-4 shows the range of daily peaks for Tremont East loads reconstituted for PV. The values range between 608 to 722 MW and the time of the daily peak for Tremont East load reconstituted for PV ranges from 1300 to 1700 hours.

Figure 8-4:
Tremont East Load Reconstituted for PV



8.4 Cape Cod Load Sensitivity #1 (CCL1)

The first sensitivity case for the Cape Cod loads (CCL1) was analyzed by adjusting the gross loads, EE forecast and ADCR in Tremont East such that:

- Load – (EE + DR) = 720 MW

The value of 720 MW was selected because historical net loads reconstituted for PV in Tremont East have exceeded 720 MW and forecasted net loads without PV do not change significantly in the planning horizon (2020 to 2029). The CCL1 sensitivity results in an effective increase of the net Tremont East load by 43 MW.

For the CCL1 sensitivity, the assumed availability for the PV in Tremont East was unchanged.[13]

8.5 Cape Cod Load Sensitivity #2 (CCL2)

Tremont East has a high forecasted PV penetration of 330 MW of PV in 2029. For a 720 MW peak load level, the PV penetration level is about 46% of the peak. At such high PV penetration levels, the assumed 26% availability for PV may be too high.

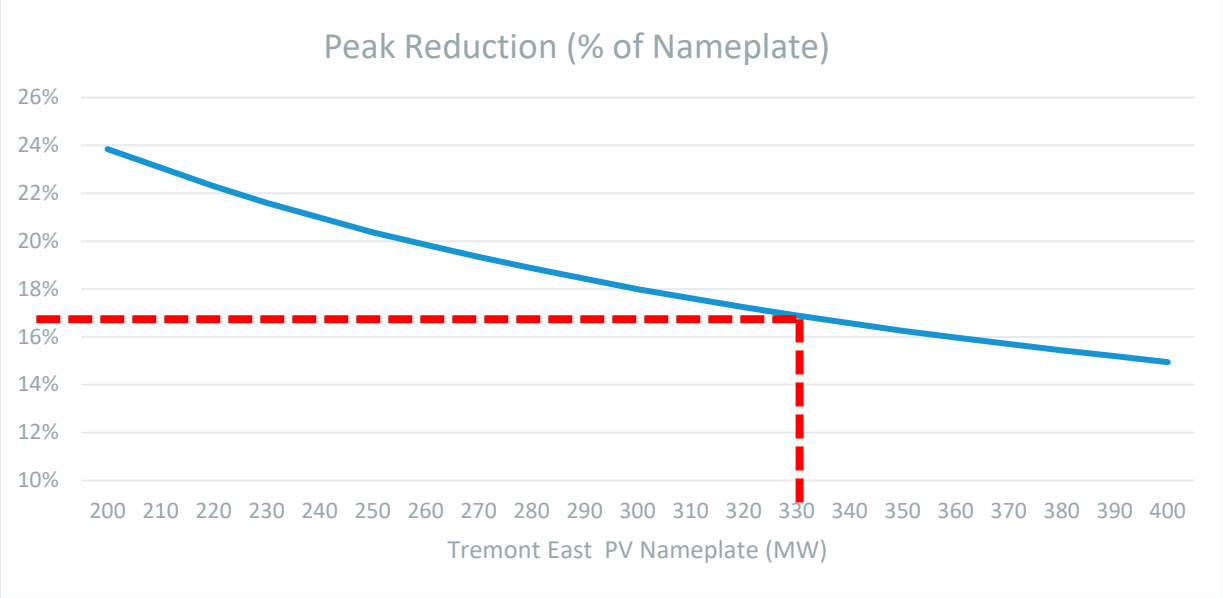
[13] A 26% availability was utilized for the 330 MW of assumed PV in the Tremont East area.

Based on an analysis performed by the ISO, Figure 8-5 shows the peak reduction as a percentage of PV nameplate for Tremont East.[14] The top 10 peak days of reconstituted PV were used for Tremont East. The net load was calculated by the formula:

- Net Load = Net Load reconstituted for PV – (Peak Reduction Percentage x PV Nameplate)

Since there are 330 MW of PV in Tremont East for the 2029 study year, a 17% availability may be more appropriate for the 2029 study year.

Figure 8-5:
Peak Reduction (% of Nameplate)



The second sensitivity for the Cape Cod loads (CCL2) was to evaluate the impact of the reduced PV availability, and higher gross load based on historical data for Tremont East. A peak load level for Tremont East is set at 720 MW and a PV availability percentage of 17% is used. The CCL2 sensitivity results in an effective increase of the net Tremont East load by 74 MW.

8.6 CCL1 and CCL2 Sensitivity Results

The sensitivity analysis was done with a focus on the Cape Cod area. Only criteria violations observed in the Cape Cod area are reported. There are no N-1 thermal or voltage violations. In addition there are no N-1-1 voltage violations. There are N-1-1 thermal overloads observed for the non-coincident peak loads on the Cape sensitivity (CCL1 and CCL2) and are shown in Table 8-3.

[14] The same analytical framework described in the April 29, 2020 presentation titled "Estimating Summer Peak Demand Reductions from Behind-the-Meter Photovoltaics" (https://www.iso-ne.com/static-assets/documents/2020/04/final_btm_pv_peak_reduction.pdf) for the regional summer peak demand was used for load and PV for the Tremont East area.

Table 8-3:
N-1-1 Thermal in Tremont East Area

Element ID	Element	Dispatch	Element OOS	Contingency	LTE Rating (MVA)	N-1-1 % LTE Loading in the Revised 2029 Needs Assessment Update 26% PV	N-1-1 % LTE Loading in the 2029 Needs Assessment Update 720 MW & 26 % PV (CCL1)	N-1-1 % LTE Loading in the 2029 Needs Assessment Update 720 MW & 17% PV (CCL2)
136-1	Hatchville to Falmouth Tap				257	101.1	115	125.1
136-2	Hatchville to Mashpee				243	<100	108.1	118.1
107-1	Otis to Bourne				407	<100	<100	105.9
137	W Barnstable to Mashpee				243	<100	<100	100.7

8.7 CCL1 and CCL2 Sensitivity Summary

A review of historical data for Cape Cod area loads indicated that the net load in the Cape Cod area may peak non-coincidentally from ISO-NE and therefore the power flow models representing ISO-NE coincident peaks may not capture the peak loads observed on Cape Cod.

To reflect the expected non-coincident peak loads in the Cape Cod area in 2029, two Cape Cod area load sensitivities were studied with varying assumptions for load, DR, EE and PV availability. These sensitivities resulted in an effective increase in load ranging from 43 MW to 74 MW in the Tremont East area when compared to the base scenario.

The two sensitivity scenarios (CCL1 and CCL2) lead to N-1-1 thermal overloads on elements on the 115 kV system in the Cape Cod area.

The sensitivity scenario with the highest loads (CCL2 = 74 MW) increase of net Tremont East loads results in four elements with N-1-1 thermal overloads.

- 136-1 line from Hatchville to the Falmouth Tap
- 136-2 line from Hatchville to Mashpee
- 107-1 line from Otis to Bourne
- 137 line W Barnstable to Mashpee

Project ID# 1725 – Build a new 115 kV line (144 line) from Bourne to West Barnstable substations identified in the Revised 2029 SEMA/RI Needs Assessment Update will also resolve additional needs observed in the CCL1 and CCL2 sensitivities.

Section 9
Appendix B: Reduced OSW output applied to existing OSW projects (Vineyard Wind and Revolution Wind)

9.1 Reduced OSW Output Applied to Existing OSW Projects Sensitivity

Recent data on offshore wind speeds obtained by ISO-NE shows that offshore wind generation output will be highly variable under summer peak load conditions. Observed wind speeds during peak load conditions would result in wind generation output as low as 1.47% of turbine nameplate ratings. Given this information, an output of 5% of nameplate captures reasonably likely conditions.[15]

For this sensitivity, the Revised SEMA/RI 2029 Needs Assessment Update cases were updated to include the following for the reduced OSW output applied to existing OSW projects:

- Vineyard Wind and Revolution Wind were modeled at 5% of their nameplate rating
- The Cape Cod Load sensitivity CCL2 is included
    - Load-DR-EE for Tremont Area set to 720 MW
    - PV availability of 17% was used
    - The CCL2 sensitivity results in an effective increase of the net Tremont East load by 74 MW

9.2 Reduced OSW Output Applied to Existing OSW Projects Sensitivity Results

The results of the sensitivity to reduced OSW output applied to existing OSW projects are shown in Table 9-1, Table 9-2, Table 9-3, and Table 9-4 and are compared to the results of the Revised SEMA/RI 2029 Needs Assessment Update.

[15] https://www.iso-ne.com/static-assets/documents/2020/02/a7a_wind_power_time_series_isone.pdf

Table 9-1:
N-1 Thermal Violation Results

Element ID	Element	Dispatch	Contingency	LTE Rating (MVA)	N-1 %LTE Loading in the Revised 2029 Needs Assessment Update	N-1 %LTE Loading in the Reduced OSW Output Applied to Existing OSW Projects Sensitivity
112-4	Industrial Park Tap to Industrial Park			246	153.7	153.4
111-1	High Hill to Industrial Park			243	138.7	138.5
L14-3	Bent Rd to Tiverton			210	119.0	118.8
L14-4	Bell Rock to Tiverton			250	111.8	111.6
L14-7	Canonicus to Dexter W Line			165	101.8	101.6

Table 9-2:
N-1 Voltage Violation Results

Bus Name	Base kV	Dispatch	Contingency	Revised 2029 Needs Assessment Update Worst Case Post Contingency Pre-switching Voltage (p.u.)	Reduced OSW Output Applied to Existing OSW Projects Sensitivity Post Contingency Pre-switching Voltage (p.u.)	Revised 2029 Needs Assessment Update Worst Case Post Contingency Post-switching Voltage (p.u.)	Reduced OSW Output Applied to Existing OSW Projects Sensitivity Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115	[redacted]	[redacted]	>0.90	>0.90	0.924	0.924
Hopkinton 501	115	[redacted]	[redacted]	>0.90	>0.90	0.924	0.924
Jepson	115	[redacted]	[redacted]	0.727	0.726	0.672	0.671
Wing Lane	115	[redacted]	[redacted]	>0.90	>0.90	0.884	0.883
High Hill	115	[redacted]	[redacted]	0.826	0.825	0.796	0.795
Dexter W	115	[redacted]	[redacted]	0.730	0.729	0.676	0.675
Bell Rock	115	[redacted]	[redacted]	0.796	0.794	0.758	0.757
Industrial Park	115	[redacted]	[redacted]	0.848	0.847	0.822	0.821

Table 9-3:
N-1-1 Thermal Violation Results

Element ID	Element	Dispatch	Element OOS	Contingency	LTE Rating (MVA)	Revised N-1-1 %LTE Loading in the 2029 Needs Assessment Update	N-1-1 %LTE in the Reduced OSW Output Applied to Existing OSW Projects Sensitivity
J16S	Staples to Highland Park				115	100.3	100.3
C129N-1	Millbury to Purchase Tap				218	117.1	117.1
112-1	Tremont N. To Rochester				357	138.2	138.1
112-2	Rochester to Crystal Tap				357	137.3	137.1
112-3	Industrial Park Tap to Crystal Tap				357	137.3	137.1
112-4	Industrial Park Tap to Industrial Park				246	155.3	155.2
111-1	High Hill to Industrial Park				243	139.8	139.8
L14-3	Bent Rd to Tiverton				210	120.4	120.2
L14-4	Bell Rock to Tiverton				250	112.8	112.7
L14-7	Canonicus to Dexter W				165	103.6	103.5
N12-1	Somerset to Sykes Rd				284	125.9	125.9
N12-1	Sykes Rd to Bell Rock				284	115.2	115.2
M13-4	Somerset to Sykes Rd				284	129.8	129.7
M13-8	Tiverton to Sykes Rd				250	134.9	134.9

Element ID	Element	Dispatch	Element OOS	Contingency	LTE Rating (MVA)	Revised N-1-1 %LTE Loading in the 2029 Needs Assessment Update	N-1-1 %LTE in the Reduced OSW Output Applied to Existing OSW Projects Sensitivity
107-1	Otis to Bourne				407	<100	146.6
107-2	Falmouth Tap to Otis				408	<100	140.0
136-1	Hatchville to Falmouth Tap				257	101.1	187.2
136-2	Hatchville to Mashpee				243	<100	182.9
137	W Barnstable to Mashpee				243	<100	165
122-1	Bourne to Pave Paws				463	<100	110.1
122-2	Pave Paws to Sandwich				466	<100	109
122-3	Sandwich to Oak St				466	<100	104.3
122-4	Barnstable to Oak St				410	<100	110.2

Table 9-4:
N-1-1 Voltage Results

Bus Name	Base kV	Dispatch	Element OOS	Contingency	Revised 2029 Needs Assessment Update Worst Case Post Contingency Pre-switching Voltage (p.u.)	Reduced OSW Output Applied to Existing OSW Projects Sensitivity Post Contingency Pre-switching Voltage (p.u.)	Revised 2029 Needs Assessment Update Worst Case Post Contingency Post-switching Voltage (p.u.)	Reduced OSW Output Applied to Existing OSW Projects Sensitivity Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115				0.789	0.789	0.785	0.785
Hopkinton 501	115				0.789	0.789	0.785	0.785
Union Street	115				0.854	0.854	0.853	0.853
Jepson	115				0.637	0.635	0.584	0.584
Wing Lane	115				0.784	0.782	0.760	0.759
High Hill	115				0.725	0.724	0.692	0.691
Dexter W	115				0.639	0.638	0.588	0.587
Bell Rock	115				0.698	0.696	0.695	0.658
Industrial Park	115				0.745	0.744	0.716	0.715
Brook Street	115				>0.90	>0.90	0.942	0.942
Falmouth	115				>0.90	>0.90	>0.95	0.929
Hatchville	115				>0.90	>0.90	>0.90	0.938

The results show a larger number and more severe thermal overload levels on the 115 kV lines along the path between Bourne and West Barnstable than the results of the non-coincident peak loads on the Cape sensitivity. All other results are relatively unchanged when compared to the Revised SEMA/RI 2029 Needs Assessment Update results.

The reduced OSW output applied to existing OSW projects sensitivity results in eleven elements becoming needs due to N-1-1 thermal overloads.

- 107-1 line from Bourne to Otis
- 107-2 line from Otis to Falmouth Tap

- 136-1 line from Falmouth Tap to Hatchville
- 136-2 line from Hatchville to the Falmouth Tap
- 137 line from Mashpee to West Barnstable
- 122-1 line from Bourne to Pave Paws
- 122-2 line from Pave Paws to Sandwich
- 122-3 line from Sandwich to Oak Street
- 122-4 line from Oak Street to Barnstable
- Low voltage at Falmouth and Hatchville

Project ID# 1725 – Build a new 115 kV line (144 line) from Bourne to West Barnstable substations identified in the Revised 2029 SEMA/RI Needs Assessment Update will also resolve additional needs observed in the Reduced OSW Output Applied to Existing OSW Projects sensitivity.

Section 10
Appendix C: Addition of future OSW projects at a reduced OSW output (Vineyard Wind 2 and Mayflower Wind)

10.1 Addition of Future OSW Projects at a Reduced OSW Output Sensitivity

As per stakeholder comments at April 2020 PAC meeting, Vineyard Wind 2[16] and Mayflower Wind[17] projects were close to, signing the binding contracts.

The Revised SEMA/RI 2029 Needs Assessment Update cases were updated to include the following for the Addition of Future OSW Projects sensitivity:

- Vineyard Wind 2 and Mayflower Wind were added and modeled at 5% of the their nameplate rating
- Vineyard Wind and Revolution Wind are modeled at 5% of their nameplate rating
- The Cape Cod Load sensitivity (CCL2) is included
    - Load-DR-EE for Tremont Area set to 720 MW
    - PV availability of 17% used
    - The CCL2 sensitivity results in an effective increase in Tremont East load of 74 MW

10.2 Addition of Future OSW Projects at a Reduced OSW Output Sensitivity Results

The results of the addition of future OSW projects at a reduced OSW output sensitivity are shown in Table 10-1, Table 10-2, Table 10-3, and Table 10-4 and are compared to the results of the Revised SEMA/RI 2029 Needs Assessment Update.

[16] Vineyard Wind 2 is an 800 MW off shore wind project that connects to the 345 kV at West Barnstable substation in Massachusetts (https://www.vineyardwind.com/vineyard-wind-2)

[17] Mayflower Wind was modeled as an 804 MW* off shore wind project connected to the 345 kV at West Barnstable substation in Massachusetts (https://www.mayflowerwind.com/). The referenced memo provides further information regarding the modeling of Mayflower Wind at West Barnstable. https://www.iso-ne.com/static-assets/documents/2020/11/sema_ri_pac_announcement.pdf

Table 10-1:
N-1 Thermal Violation Results

Element ID	Element	Dispatch	Contingency	LTE Rating (MVA)	N-1 %LTE Loading in the Revised 2029 Needs Assessment Update	N-1 %LTE Loading in the Addition of Future OSW Projects at a Reduced OSW Output Sensitivity
112-4	Industrial Park Tap to Industrial Park			246	153.7	153.1
111-1	High Hill to Industrial Park			243	138.7	138.1
L14-3	Bent Rd to Tiverton			210	119.0	118.5
L14-4	Bell Rock to Tiverton			250	111.8	111.2
L14-7	Canonicus to Dexter W Line			165	101.8	101.4

Table 10-2:
N-1 Voltage Violation Results

Bus Name	Base kV	Dispatch	Contingency	Revised 2029 Needs Assessment Update Post Contingency Pre-switching Voltage (p.u.)	Addition of Future OSW Projects at a Reduced OSW Output Sensitivity Post Contingency Pre-switching Voltage (p.u.)	Revised 2029 Needs Assessment Update Post Contingency Post-switching Voltage (p.u.)	Addition of Future OSW Projects at a Reduced OSW Output Sensitivity Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115	[redacted]	[redacted]	>0.90	>0.90	0.924	0.924
Hopkinton 501	115	[redacted]	[redacted]	>0.90	>0.90	0.924	0.924
Jepson	115	[redacted]	[redacted]	0.727	0.724	0.672	0.669
Wing Lane	115	[redacted]	[redacted]	>0.90	>0.90	0.884	0.880
High Hill	115	[redacted]	[redacted]	0.826	0.822	0.796	0.792
Dexter W	115	[redacted]	[redacted]	0.730	0.727	0.676	0.673
Bell Rock	115	[redacted]	[redacted]	0.796	0.792	0.758	0.754
Industrial Park	115	[redacted]	[redacted]	0.848	0.844	0.822	0.819
Falmouth	115	[redacted]	[redacted]	>0.90	>0.90	>0.95	0.942

Table 10-3:
N-1-1 Thermal Violation Results

Element ID	Element	Dispatch	Element OOS	Contingency	LTE Rating (MVA)	N-1-1 % LTE Loading in the Revised 2029 Needs Assessment Update	N-1-1 % LTE Loading in the Addition of Future OSW Projects at a Reduced OSW Output Sensitivity
J16S	Staples to Highland Park Line				115	100.3	100.3
C129N-1	Millbury to Purchase Line				218	117.1	117.1
112-1	Tremont N. To Rochester				357	138.2	138.4
112-2	Rochester to Crystal Tap				357	137.3	137.5
112-3	Industrial Park Tap to Crystal Tap				357	137.3	137.5
112-4	Industrial Park Tap to Industrial Park Line				246	155.3	154.9
111-1	High Hill to Industrial Park Line				243	139.8	139.4
L14-3	Bent Rd to Tiverton Line				210	120.4	119.8
L14-4	Bell Rock to Tiverton Line				165	112.8	112.3
L14-7	Canonicus to Dexter W Line				250	103.6	103.1
N12-1	Somerset to Sykes Rd				284	125.9	125.9
N12-1	Sykes Rd to Bell Rock				284	115.2	115.2

Element ID	Element	Dispatch	Element OOS	Contingency	LTE Rating (MVA)	N-1-1 % LTE Loading in the Revised 2029 Needs Assessment Update	N-1-1 % LTE Loading in the Addition of Future OSW Projects at a Reduced OSW Output Sensitivity
M13-4	Somerset to Sykes Rd				284	129.8	129.7
M13-8	Tiverton to Sykes Rd				250	134.9	134.9
107-1	Otis to Bourne				407	<100	118.3
107-2	Falmouth Tap to Otis				408	<100	111.9
136-1	Hatchville to Falmouth Tap				257	101.1	144.0
136-2	Hatchville to Mashpee				243	<100	137.7
137	W Barnstable to Mashpee				243	<100	120.3

Table 10-4:
N-1-1 Voltage Results

Bus Name	Base kV	Dispatch	Element OOS	Contingency	Revised 2029 Needs Assessment Update Post Contingency Pre-switching Voltage (p.u.)	Addition of Future OSW Projects at a Reduced OSW Output Sensitivity Post Contingency Pre-switching Voltage (p.u.)	Revised 2029 Needs Assessment Update Post Contingency Post-switching Voltage (p.u.)	Addition of Future OSW Projects at a Reduced OSW Output Sensitivity Post Contingency Post-switching Voltage (p.u.)
Purchase Street	115				0.789	0.789	0.785	0.785
Hopkinton 501	115				0.789	0.789	0.785	0.785
Union Street	115				0.854	0.854	0.853	0.853
Jepson	115				0.637	0.635	0.584	0.583
Wing Lane	115				0.784	0.779	0.760	0.756
High Hill	115				0.725	0.721	0.692	0.688
Dexter W	115				0.639	0.637	0.588	0.586
Bell Rock	115				0.698	0.694	0.659	0.655
Industrial Park	115				0.744	0.741	0.716	0.712
Brook Street	115				>0.90	>0.90	0.942	0.940
Falmouth	115				>0.90	>0.90	>0.95	0.922
Hatchville	115				>0.90	>0.90	>0.95	0.932

The results show a lower number and less severe thermal overload levels on the 115 kV lines along the path between Bourne and West Barnstable than the results of the reduced OSW output applied to existing OSW projects sensitivity results. All other results are relatively unchanged when compared to the Revised SEMA/RI 2029 Needs Assessment Update results.

The addition of future OSW projects at a reduced OSW output sensitivity results in seven elements becoming needs due to N-1-1 thermal overloads.

- 107-1 line from Bourne to Otis
- 107-2 line from Otis to Falmouth Tap
- 136-1 line from Falmouth Tap to Hatchville
- 136-2 line from Hatchville to the Falmouth Tap

- 137 line from Mashpee to West Barnstable
- Low voltage at Falmouth and Hatchville

Project ID# 1725 – Build a new 115 kV line (144 line) from Bourne to West Barnstable substations identified in the Revised 2029 SEMA/RI Needs Assessment Update will also resolve additional needs observed in the Addition of Future OSW Projects at a Reduced OSW Output sensitivity.

Section 11
Appendix D: Contingency List

11.1 Appendix D1: Revised SEMA/RI 2029 Needs Assessment Update N-1 Contingencies Summary Report

Appendix D1 is included in the zip file titled "Revised_SEMARI_2029_Needs_Assessment_Update _Appendices.zip" which is posted on the ISO website under the key study area for Southeastern Massachusetts and Rhode Island.[18]

N-1 Contingencies for all analysis:

Appendix_D1_N-1.pdf

11.2 Appendix D2: Revised SEMA/RI 2029 Needs Assessment Update Initial Element Out Summary Report

Appendix D2 is included in the zip file titled "Revised_SEMARI_2029_Needs_Assessment_Update _Appendices.zip" which is posted on the ISO website under the key study area for Southeastern Massachusetts and Rhode Island.

Element Out Contingencies for all analysis:

Appendix_D2_Element_Out.pdf

11.3 Appendix A3: Revised SEMA/RI 2029 Needs Assessment Update N-1-1 Second Level Contingency List Summary Report

Appendix A3 is included in the zip file titled "Revised_SEMARI_2029_Needs_Assessment_Update _Appendices.zip" which is posted on the ISO website under the key study area for Southeastern Massachusetts and Rhode Island.

N-1-1 Second Level Contingencies for the all analysis:

Appendix_D3_N-1-1.pdf

[18] https://www.iso-ne.com/system-planning/key-study-areas/sema-ri/

11.4 Appendix A4: Revised SEMA/RI 2029 Needs Assessment Update Contingency Changes

Three contingencies were added to the contingencies listed above.

Table 11-1:
Contingency List Changes

Contingency Name	Contingency Description	Contingency Change Description	Used for Base System	Used for Non-Coincident Peak Loads on the Cape Sensitivity	Used for Reduced OSW output applied to existing OSW projects Sensitivity	Used for Addition of future OSW projects at a reduced OSW output Sensitivity
GN_RevWnd	Generator contingency to remove Revolution Wind	Addition to the contingency list	X	X	X	X
GN_MayFl	Generator contingency to remove Mayflower Wind	Addition to the contingency list				X
GN_VW2	Generator contingency to remove Vineyard Wind 2	Addition to the contingency list				X

Section 12
Appendix E: Case Summaries

The case summaries for the Revised SEMA/RI 2029 Needs Assessment Update are available in the zip file titled "Revised_SEMARI_2029_Needs_Assessment_Update _Appendices.zip" which is posted on the ISO website under the key study area for Southeastern Massachusetts and Rhode Island.[19]

Case summaries for the base system:

Appendix_E1_2029_SEMARI_base.pdf

Case summaries for the Non-Coincident Peak Loads on the Cape CCL1 Sensitivity:

Appendix_E2_2029_SEMARI_CCL1.pdf

Case summaries for the Non-Coincident Peak Loads on the Cape CCL2 Sensitivity:

Appendix_E3_2029_SEMARI_CCL2.pdf

Case summaries for Reduced OSW output applied to existing OSW projects (Vineyard Wind and Revolution Wind) Sensitivity:

Appendix_E4_2029_SEMARI_5pctRevVW.pdf

Case summaries for Addition of future OSW projects at a reduced OSW output (Vineyard Wind 2 and Mayflower Wind) Sensitivity:

Appendix_E5_2029_SEMARI_5pctOSW.pdf

Case summaries for Time-Sensitive analysis:

Appendix_E6_2029_SEMARI_TimeSens.pdf

[19] https://www.iso-ne.com/system-planning/key-study-areas/sema-ri/

Section 13
Appendix F: TARA Options and Process Used for Analysis

The TARA Options and Process Used for Analysis for the Revised SEMA/RI 2029 Needs Assessment Update are included in the zip file titled "Revised_SEMARI_2029_Needs_Assessment_Update _Appendices.zip" which is posted on the ISO website under the key study area for Southeastern Massachusetts and Rhode Island.[20]

[20] https://www.iso-ne.com/system-planning/key-study-areas/sema-ri/

Section 14
Appendix G: Generator Dispatches - SEMA/RI 2026 Needs Assessment

14.1 SEMA/RI 2026 Needs Assessment Generator Dispatches

Table 14-1:
One Unit Out of Service Dispatches

Unit OOS	Modeled Capacity (MW)	One Unit OOS Dispatch Number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Canal 2	545.1	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Edgar	688.3	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Potter	74.2	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Tiverton	244.6	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Dighton	160.3	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Cleary / Taunton	130.8	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
RISE	548.0	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Manchester / Franklin Square 11	149.0	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON
NEA Bellingham	277.6	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON
ANP Bellingham 1	236.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON
Ocean State Power C1, C2, S1	270.9	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
ANP Blackstone 1	221.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
Lake Road 1	245.8	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON
SEMass	69.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON
Dartmouth Power	83.1	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON
Milford Power	149.0	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON
Pawtucket Power	61.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF

Table 14-2:
Two Unit Out of Service Dispatches

Unit OOS	Modeled Capacity (MW)	Two Units OOS Dispatch Number															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Canal 1	549.9	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Canal 2	545.1	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Edgar	688.3	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Potter	74.2	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Tiverton	244.6	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	OFF	ON
Dighton	160.3	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Cleary/Taunton	130.8	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON
RISE	548.0	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Manchester / Franklin Square 11	149.0	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON
Manchester / Franklin Square 10	149.0	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
NEA Bellingham	277.6	ON	ON	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	OFF
ANP Bellingham 1	236.4	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON
ANP Blackstone 1	221.4	ON	ON	ON	ON	ON	ON	ON	OFF	ON	OFF	ON	ON	ON	ON	ON	ON
Ocean State Power G3, G4, S2	270.2	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON
Ocean State Power G1, G2, S1	270.9	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON
Lake Road 2	251.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
Lake Road 1	245.8	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
Dartmouth Power	83.1	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	OFF	ON	ON
Pawtucket Power	61.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON
SEMass	69.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON
Milford	149.0	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF

14.2 Revised SEMA/RI 2029 Needs Assessment Update Generator Dispatches

Table 14-3:
Revised SEMA/RI 2029 Needs Assessment Update Dispatches

Dispatch No	Stress	Generator OOS
D01	West-East	ANP Blackstone 1 and Ocean State Power G3,G4,S2
D02	West-East	Canal 1 and Canal 2
D03	West-East	Dighton and Cleary/Taunton
D04	West-East	Edgar and Potter
D05	West-East	Lake Road 1 and Lake Road 2
D06	West-East	Manchester/ Franklin square 10 and Manchester/Franklin square 11
D07	West-East	Milford Power
D08	West-East	NEA Bellingham and ANP Bellingham
D09	West-East	NEA Bellingham and ANP Blackstone 1
D10	West-East	Ocean State Power 1 and Ocean state Power 2
D11	West-East	Rise and Manchester/Franklin square 11
D12	West-East	SEMass and Dartmouth Power
D13	West-East	Tiverton and Clearly/Taunton
D14	West-East	Tiverton and Dartmouth Power
D15	West-East	Tiverton and Dighton
D16	East-West	ANP Blackstone 1 and Ocean State Power G3,G4,S2
D17	East-West	Canal 1 and Canal 2
D18	East-West	Dighton and Cleary/Taunton
D19	East-West	Edgar and Potter
D20	East-West	Lake Road 1 and Lake Road 2
D21	East-West	Manchester/ Franklin square 10 and Manchester/Franklin square 11

Dispatch No	Stress	Generator OOS
D22	East-West	Milford Power
D23	East-West	NEA Bellingham and ANP Bellingham
D24	East-West	NEA Bellingham and ANP Blackstone 1
D25	East-West	Ocean State Power 1 and Ocean state Power 2
D26	East-West	Rise and Manchester/Franklin square 11
D27	East-West	SEMass and Dartmouth Power
D28	East-West	Tiverton and Clearly/Taunton
D29	East-West	Tiverton and Dartmouth Power
D30	East-West	Tiverton and Dighton

Section 15
Appendix H: Steady-State Testing Results

The steady-state testing results for the Revised SEMA/RI 2029 Needs Assessment Update are included in the zip file titled "Revised_SEMARI_2029_Needs_Assessment_Update _Appendices.zip" which is posted on the ISO website under the key study area for Southeastern Massachusetts and Rhode Island.[21]

Appendix_H1_N-1_2029_SEMARI_Results.xlsx

Appendix_H2_N-1-1_2029_SEMARI_Results.xlsx

Appendix_H3_N-1_2029_SEMARI_Results_CCL1.xlsx

Appendix_H4_N-1-1_2029_SEMARI_Results_CCL1.xlsx

Appendix_H5_N-1_2029_SEMARI_Results_CCL2.xlsx

Appendix_H6_N-1-1_2029_SEMARI_Results_CCL2.xlsx

Appendix_H7_N-1_2029_SEMARI_Results_CCL2_5pct_Existing_OSW.xlsx

Appendix_H8_N-1-1_2029_SEMARI_Results_CCL2_5pct_Existing_OSW.xlsx

Appendix_H9_N-1_2029_SEMARI_Results_CCL2_5pct_AddFuture_OSW.xlsx

Appendix_H10_N-1-1_2029_SEMARI_Results_CCL2_5pct_AddFuture_OSW.xlsx

Appendix_H11_N-1_2029_SEMARI_Results_TimeSensitive.xlsx

Appendix_H12_N-1-1_2029_SEMARI_Results_TimeSensitive.xlsx

[21] https://www.iso-ne.com/system-planning/key-study-areas/sema-ri/

Section 16

Appendix I: Solution Components from the SEMA/RI 2026 Solutions Study that have not Started Construction

Project costs are reported as of the June 2020 RSP Project List update.

- Bell Rock area projects
  - ID# 1720 – Separate the N12/M13 DCT and reconductor the N12 and M13 between Somerset and Bell Rock substations - $39.0M
  - ID# 1721 – Reconfigure Bell Rock to breaker-and-a-half station, split the M13 line at Bell Rock substation, and terminate 114 line at Bell Rock; install a new breaker in series with N12/D21 tie breaker, upgrade D21 line switch, and install a 37.5 MVAR capacitor - $30.8M
  - ID# 1722 – Extend Line 114 – Dartmouth town line to Bell Rock - $12.3M
  - ID# 1730 – Extend Line 114 – Eversource/National Grid border to Industrial Park tap - $16.2M
  - ID# 1723 – Reconductor L14 and M13 lines from Bell Rock substation to Bates Tap – $38.7M

- West Barnstable area projects
  - ID# 1725 – Build a new 115 kV line (144 line) from Bourne to West Barnstable substations which includes associated terminal work - $59.1 M
  - ID# 1726 – Separate the 135/122 DCT from West Barnstable to Barnstable substations – $10.4M
  - ID# 1727 – Retire the Barnstable SPS - $0.2M

- Kingston area projects
  - ID# 1728 – Build a new 115 kV line from Carver to Kingston substations and add a new Carver terminal - $29.7M
  - ID# 1729 – Install a new bay position at Kingston substation to accommodate new 115 kV line - $3.4M

- Kingston area projects Capacitor installation projects
  - ID# 1719 – Install a 45.0 MVAR capacitor bank at Berry Street substation - $5.0M
  - ID# 1731 – Install a 35.3 MVAR capacitor at High Hill and Wing Lane substations - $8.0M

- Miscellaneous projects
  - ID# 1732 – Loop the 201-502 line into the Medway substation to form the 201-502N and 201-502S lines - $27.0M
  - ID# 1733 – Separate the 325/344 DCT – West Medway to West Walpole - $17.9M
  - ID# 1782 – Reconductor the J16S line - $0.7M
  - ID# 1724 – Replace Kent County 345/115 kV autotransformer - $5.9M

Section 17

Appendix J: Solution Components from the SEMA/RI 2026 Solutions Study that have started construction or are in-service

Project ID	Upgrade	Expected/ Actual In-Service
1714	Construct a new 115 kV GIS switching station (Grand Army) which includes remote terminal station work at Brayton Point and Somerset substations, and the looping in of the E-183E, F-184, X3, and W4 lines	May-20
1742	Conduct remote terminal station work at the Wampanoag and Pawtucket substations for the new Grand Army GIS switching station	Nov-20
1715	Install upgrades at Brayton Point substation which include a new 115 kV breaker, new 345/115 kV transformer, and upgrades to E183E, F184 station equipment	Jun-20
1716	Increase clearances on E-183E & F-184 lines between Brayton Point and Grand Army substations	Nov-19
1717	Separate the X3/W4 DCT and reconductor the X3 and W4 lines between Somerset and Grand Army substations; reconfigure Y2 and Z1 lines	Nov-19
1718	Add 115 kV circuit breaker at Robinson Ave substation and re-terminate the Q10 line	Dec-20
1734	Reconductor and upgrade the 112 Line from the Tremont substation to the Industrial Tap	Jun-18
1736	Reconductor the 108 line from Bourne substation to Horse Pond Tap	Oct-18
1737	Replace disconnect switches on 323 line at West Medway substation and replace 8 line structures	Dec-20
1741	Rebuild the Middleborough Gas and Electric portion of the E1 line from Bridgewater to Middleborough	Apr-19

APPENDIX 2-3 SOUTHEASTERN MASSACHUSETTS AND RHODE ISLAND AREA 2026 NEEDS ASSESSMENT

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Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment

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Transmission Planning

MAY 2016

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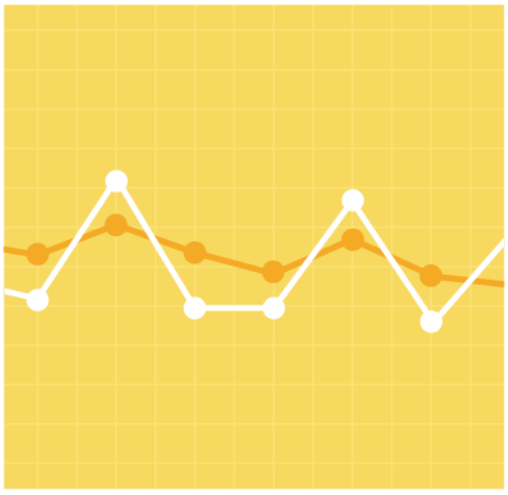

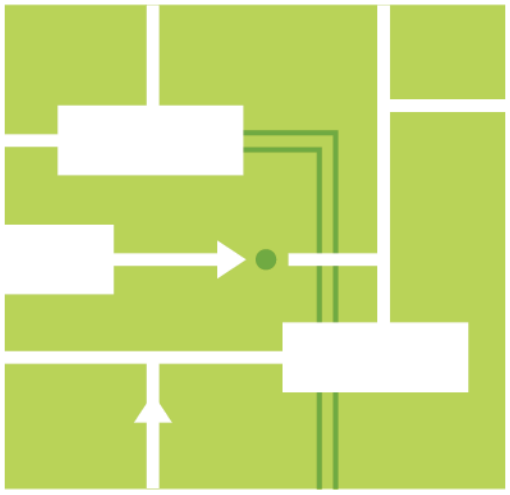



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Section 1
Executive Summary

1.1 Study Objective

The objective of Southeastern Massachusetts and Rhode Island (SEMA-RI) Needs Assessment study is to evaluate the reliability performance and identify reliability-based transmission needs in the SEMA-RI study area for the year 2026 while considering the following:

- Future load growth
- Reliability over a range of generation patterns and transfer levels
- Limited short circuit margin in the SEMA-RI area
- Coordination with plans in Boston, Northeastern Massachusetts and Eastern CT
- Existing and Forward Capacity Market-cleared supply resources
- All applicable North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Corporation (NPCC) and ISO New England (ISO-NE) transmission planning reliability standards

The Needs Assessment is the first step in the study process defined in accordance with the Regional Planning Process as outlined in Attachment K of the ISO-NE Open Access Transmission Tariff (OATT). If necessary, development of transmission solutions to address criteria violations identified in this Needs Assessment will be handled using either the Solutions Study process or Competitive Solicitation process described in Attachment K of the OATT.

This 2026 Needs Assessment has been initiated as a follow-up to the 2022 Needs Assessment for this study area. The 2022 Needs Assessment PAC presentation[1] identified a number of criteria violations in the SEMA-RI area. Pilgrim Nuclear Power Station submitted a full Non-Price Retirement Request in October 2015 with the intent to retire by June 1, 2019 and significant new resources in the study area received obligations in FCA #10. Due to these new developments, ISO-NE has completed a new Needs Assessment study for the SEMA-RI area.

1.2 Method and Criteria

The Needs Assessment was performed in accordance with NERC TPL-001-4[2] Transmission System Standards[3], Northeast Power Coordinating Council (NPCC) Regional Reliability Reference Directory # 1[4], "*Design and Operation of the Bulk Power System*", and ISO New England Planning Procedure 3[5], "Reliability Standards for the New England Area Bulk Power Supply System," as well as the criteria found in Section 4.2 of this report.

[1] https://smd.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/ceii/mtrls/2014/feb192014/a8_sema_ri_needs_ https://smd.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/ceii/mtrls/2014/jul152014/a5_sema_ri_area_needs https://smd.iso-ne.com/planning/ceii/reports/2010s/archive/sema_ri_area_needs_assessment_critical_load_level_analysis.pdf

[2] http://www.nerc.com/pa/Stand/Reliability%20Standards/TPL-001-4.pdf

[3] NERC TPL-001-4 also requires an evaluation of the power system one year, five years, and ten years out. This study only evaluated the ten years out load level and system configuration. However, a critical load level assessment was conducted that identified the year of need.

[4] https://www.npcc.org/Standards/Directories/Directory%201%20-%20Design%20and%20Operation%20of%20the%20Bulk%20Power%20System%20%20Clean%20April%2020%202012%20GJD.pdf

[5] http://www.iso-ne.com/static-assets/documents/rules_proceds/isone_plan/pp03/pp3_final.pdf

The results of the analysis provided in this report have been organized by subareas to facilitate geographic orientation of the information. A set of defined subareas was developed based on a review of the thermal and voltage violations. The set of defined subareas include the following:

1) **Farnum Subarea** – This is an area that runs along the northern section of SEMA-RI across northern Rhode Island.
2) **West Medway – West Walpole Subarea** – This is the area running across northern SEMA-RI from the Rhode Island boarder to the Walpole area.
3) **South Shore Subarea** – This is an area that runs along the northern section of SEMA-RI from the area south of Boston to the Massachusetts southern shore line.
4) **Industrial Park Subarea** – This is an area running across southern SEMA-RI from the New Bedford area through to the Cape Cod Canal.
5) **Somerset – Newport Subarea** – This is an area that runs along the lower part of SEMA-RI from lower Rhode Island through to lower southeastern Massachusetts.
6) **Cape Cod Subarea** – This area includes Cape Cod and the islands of Martha's Vineyard and Nantucket.

1.3 Study Assumptions

The regional steady-state model was developed to be representative of the 10-year projection of the 90/10 summer peak system demand levels for the 2026 model year to assess reliability performance under stressed system conditions. The assumptions included consideration of area generating unit unavailability conditions as well as variations in surrounding area regional interface transfer levels. These study assumptions are consistent with ISO-NE Planning Procedure No. 3(PP-3), "Reliability Standards for the New England Area Bulk Power Supply System." For the load levels tested, demand resources (DR) in the form of Active DR and Passive DR that cleared the Forward Capacity Market (FCM), forecasted Energy Efficiency (EE) and distributed solar generation (PV) as a part of the 2015 Capacity, Energy, Loads and Transmission (CELT) forecast were modeled as load reductions. The details for these load reductions are included in Section 3.1.6.

Section 3 of this report contains more details of all assumptions used to complete this study.

1.4 Specific Areas of Concern

1.4.1 Steady State Testing Results

The results of the analysis for all of the study work completed indicated that there were a number of design case thermal overloads and voltage violations for N-1 and N-1-1 conditions. One design case thermal overload was observed for N-0 conditions.

1.4.2 Review of N-0 Testing

N-0 (also known as "all-lines-in") conditions were reviewed for the cases modeled. The results indicate that under all tested dispatch and transfer level conditions there was one 115 kV element N-0 thermal overload observed. Additionally, there were no N-0 voltage criteria violations observed.

1.4.3 Review of N-1 Testing

N-1 testing was performed for all the system conditions described above. Overall, by 2026, N-1 contingency overloads were observed for elements within the SEMA-RI area across the 115 kV and 345 kV transmission facilities.

There were a total of one 345/115 kV element and twenty-nine 115 kV elements that were found to be overloaded under N-1 outage conditions. Additionally there were nineteen 115 kV buses that were found to have voltage violations under N-1 outage conditions.

More detailed information on the observed N-1 criteria violations is provided in Section 5.2.2.

1.4.4 **Review of N-1-1 Testing**

Initial element-out-of-service (N-1-1) testing included all 115 kV, 230 kV and 345 kV transmission lines as well as 345 kV autotransformers in the SEMA-RI and Boston areas that are considered Bulk Electric System (BES) elements. These element-out-of-service conditions were tested against the full set of contingencies used in the N-1 tests, with noted exceptions made for the treatment of no-fault contingencies as described in Section 4.3.2.

Table 1-1 provides a summary of the total number of elements by subarea that had thermal or voltage criteria violations under N-1-1 contingency conditions, as well as the critical load level range (in terms of projected net New England load) and earliest reported year of need. No N-1-1 high voltage violations were observed. The values shown include all 69 kV, 115 kV, 230 kV and 345 kV elements in the study area.

Table 1-1: Number of N-1-1 Criteria Violations

Subarea	2026 Study Year			
	LTE Overloaded Elements	Voltage Violations	Critical Load Level Range (MW)	Earliest Year of Need
Farnum	21	9	16,130 – 29,750	Prior to 2016
West Medway - West Walpole	7	5	26,501 – 29,346	Prior to 2016
South Shore	9	12	27,162 – 30,228	Prior to 2016
Industrial Park	6	5	10,063 – 28,198	Prior to 2016
Somerset - Newport	26	13	12,216 – 30,000	Prior to 2016
Cape Cod	2	4	28,108 – 30,307	Prior to 2016
Boston Area (External to Study)	13	0	21,917 – 29,346	Prior to 2016

In addition to the noted N-1-1 criteria violations, a number of non-convergent cases were observed for various contingency combinations associated with [redacted].

More detailed information on the observed N-1-1 criteria violations is provided in Section 5.2.3.

1.4.5 **Short Circuit Testing**

A short circuit assessment was also conducted for this study; the results indicated that no substations had any breakers that would be over-dutied for 2026 system model conditions. Overall results of short circuit testing indicated that there were a total of three 345 kV circuit breakers that could see fault current levels over 95% of their interrupting capability in 2026.

1.5 Statements of Need

The results of the assessment conducted of the SEMA-RI area transmission performance against transmission reliability standards for the projected 2026 system conditions in this study indicate that there are a significant number of thermal and voltage violations across all subareas within the SEMA-RI system. The SEMA-RI area transmission system fails to meet the reliability criteria standards in several geographical subareas under the design case testing performed and measures should be developed to mitigate the problems identified. A determination of the year of need was established for each element that resulted in criteria violations under contingency conditions. The specific worst case criteria violations for each element are summarized in Section 5.1. The results of the critical load level analysis can be found in Section 5.5.

1.6 NERC Compliance Statement

This report is the first part of a two part process used by ISO-NE to assess and address compliance with NERC TPL standards. This Needs Assessment report provides documentation of an evaluation of the performance of the system as contemplated under the TPL standards to determine if the system meets compliance requirements. If necessary, development of transmission solutions to address criteria violations identified in this Needs Assessment will be handled using either the Solutions Study process or Competitive Solicitation process described in Attachment K of the OATT. This Needs Assessment report and any report documentation developed as part of the solutions development process provide the necessary evaluations and determinations required under the NERC TPL standards. See Section 13 for the complete NERC compliance statement.

Section 2
Introduction and Background Information

2.1 Study Objective

The objective of this study was to identify reliability-based transmission needs in the Southeastern Massachusetts and Rhode Island (SEMA-RI) study area while considering the following:

- Future load growth
- Reliability over a range of generation patterns and transfer levels
- Limited short circuit margin in the SEMA-RI area
- Coordination with plans in Boston, Northeastern Massachusetts and Eastern CT
- Existing and Forward Capacity Market-cleared supply resources
- All applicable North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Corporation (NPCC) and ISO New England (ISO-NE) transmission planning reliability standards

The scope of the Needs Assessment study performed for the SEMA-RI area included evaluation of the reliability performance of the transmission system serving this area of New England for the year 2026 projected system conditions. The system was tested with all elements in-service i.e. N-0 and under N-1 and N-1-1 contingency conditions for a number of possible operating conditions with respect to related interface transfer levels and generating unit availability conditions.

2.2 Area(s) Studied

The study area focused on two load zones, namely, the SEMA and RI load zones as shown in Figure 2-1. This combination of load zones is collectively known as the SEMA-RI load zone and was the study area evaluated in this analysis. These load zones encompass the areas within Massachusetts located south of Boston as well as the entire state of Rhode Island.

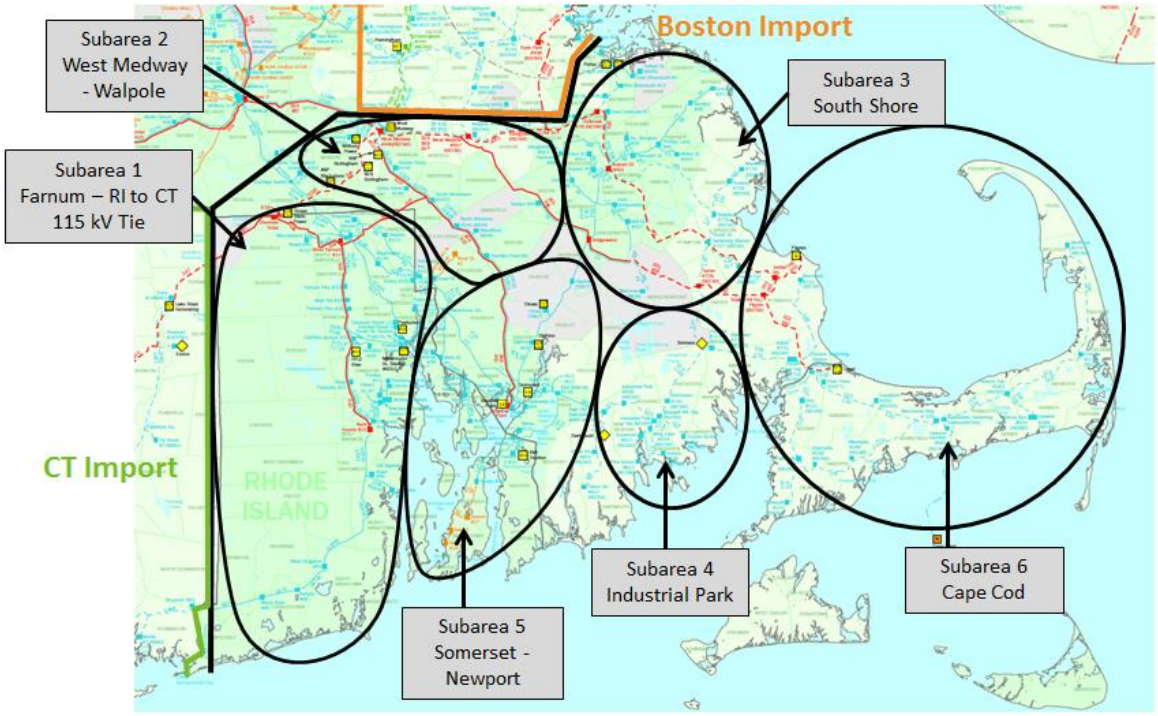

Figure 2-1: SEMA-RI Area Map

As stated in Section 1.2, the set of defined study subareas include the following:

1) **Farnum Subarea** – This is an area that runs along the northern section of SEMA-RI across northern Rhode Island.
2) **West Medway – West Walpole Subarea** – This is the area running across northern SEMA-RI from the Rhode Island boarder to the Walpole area.
3) **South Shore Subarea** – This is an area that runs along the northern section of SEMA-RI from the area south of Boston to the Massachusetts southern shore line.
4) **Industrial Park Subarea** – This is an area running across southern SEMA-RI from the New Bedford area through to the Cape Cod Canal.
5) **Somerset – Newport Subarea** – This is an area that runs along the lower part of SEMA-RI from lower Rhode Island through to lower southeastern Massachusetts.
6) **Cape Cod Subarea** – This area includes Cape Cod and the islands of Martha's Vineyard and Nantucket.

The SEMA-RI Interface borders the Boston Import Interface to the north and the Connecticut Import Interface to the West. Figure 2-2 shows the one-line diagram of the SEMA-RI subarea.

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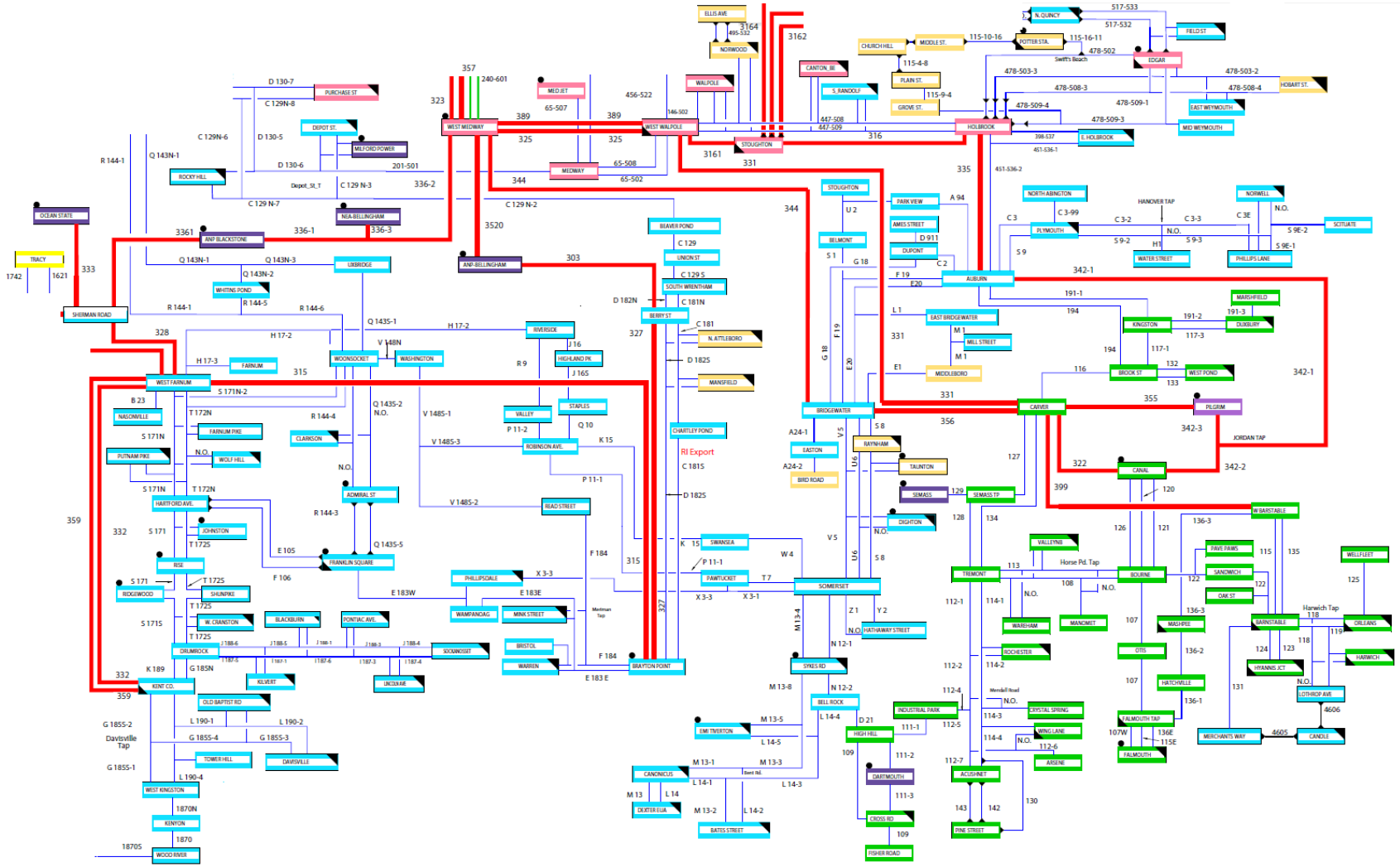

Figure 2-2: SEMA-RI Study Area One Line Diagram[6]

[6] The diagram is for illustrative purposes to show the study area. It does not show any future projects in the area.

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The SEMA-RI interface is defined by the major transmission lines listed in Table 2-1 below.

Table 2-1: List of Major Transmission Lines That Define SEMA-RI Zone

Line ID	From	To	Voltage (kV)
347	Sherman Road	Killingly	345
341	Lake Road	West Farnum	345
366	West Farnum	Millbury 3	345
1870S	Shunock	Wood River	115
C-129	Hopkinton	Millbury 2	115
D-130	Hopkinton	Millbury 2	115
Q143	Whitins Pond	Millbury 2	115
R144	Whitins Pond	Millbury 2	115
357	Millbury	West Medway	345
323	Millbury	West Medway	345
345A	West Medway 345A Autotransformer		345/115
345B	West Medway 345B Autotransformer		345/115
274-509	Medway	Sherborn	115
456-522	West Walpole	Dover	115
3162	Stoughton	K Street	345
3163	Stoughton	K Street	345
3164	Stoughton	Hyde Park	345
517-524	North Quincy	Dewar Street	115
517-525	North Quincy	Dewar Street	115

The SEMA-RI study area is characterized by multiple 345 kV loops, the most significant of which are listed below.

- West Medway Loop (West Medway - ANP Bellingham – Berry Street – Brayton Point – West Farnum – Sherman Road – ANP Blackstone – NEA Bellingham – West Medway)
- West Walpole Outer Loop (West Walpole – Stoughton – Holbrook – Auburn Street – Pilgrim – Canal – Carver - Bridgewater – West Medway – West Walpole)
- West Walpole Inner Loop (West Walpole – Stoughton – Holbrook – Auburn Street – Pilgrim – Carver – West Walpole)

In addition, there are many 345/115 kV autotransformers that feed the underlying lower kV transmission networks.

2.3 Study Horizon

A 10-year planning horizon was used for this study. This study was based on the 2026 summer peak load forecast taken from the 2015 CELT Report[7]. The 2015 CELT load forecast is given in Appendix A: Load Forecast[8].

2.4 Analysis Description

The study included the evaluation of the long term reliability of the transmission system serving the SEMA-RI study area for the projected system conditions in 2026. The system was tested under N-0 (all-facilities-in), N-1 (all-facilities-in, first contingency), and N-1-1 (first contingency after a facility out) conditions for a number of possible operating scenarios with respect to related interface transfer levels and generating unit unavailability conditions.

The following types of analysis were performed:

- **Thermal Analysis** – studies to determine the level of steady-state power flows on transmission circuits under base case conditions and following contingency events.
- **Voltage Analysis** – studies to determine steady-state voltage levels and performance under base case conditions and following contingency events.
- **Short Circuit Analysis –** Short circuit studies was conducted to determine if available fault current exceeds the capabilities of the substation equipment in the SEMA-RI study area.
- **Critical Load Level Analysis –** Studies was conducted to determine the load level at which system concerns occur under the assumed conditions.

The following analyses may be performed during the solution development process as outlined in Sections 4.2 and 4.3 in Attachment K of the ISO-NE Open Access Transmission Tariff (OATT):

- **Stability Analysis** – detailed studies to determine the dynamic performance of electric machines with respect to rotor angle displacement, system voltage stability and system frequency deviations following a fault.

[7] The 2015 CELT Report, published on May 1, 2015, is available at http://www.iso-ne.com/static-assets/documents/2015/05/2015_celt_report.pdf

[8] The 2015 CELT forecast only has projected peak demands for the years 2015-2024. To determine the 2026 peak demand forecasted load, the growth rate from years 2023-2024 was applied to the 2024 forecast twice.

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For the various elements having thermal violations and for buses with voltage violations, a critical load level assessment was performed to determine the New England load level and the year at which these violations would be eliminated.

The needs assessment was performed in accordance with all relevant North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Council, Inc. (NPCC), and ISO New England (ISO-NE) criteria as described in Section 4.2.

The thermal, voltage and critical load level analysis was performed using PowerGEM TARA version 8.50 and Siemens PTI PSS/E version 32.2.3 software. The short circuit analysis was performed using ASPEN version 11 software.

Section 3
Study Assumptions

3.1 Steady State Model Assumptions

3.1.1 Study Assumptions

The regional steady-state model was developed to be representative of the 10-year projection of the 90/10 summer peak system demand levels to assess reliability performance under stressed system conditions. The assumptions include consideration of area generation unit unavailability conditions as well as variations in surrounding area regional interface transfer levels. These study assumptions are consistent with ISO-NE Planning Procedure No. 3 (PP-3), "Reliability Standards for the New England Area Bulk Power Supply System".

3.1.2 Source of Power Flow Models

The power flow study cases used in this study were obtained from the ISO Model on Demand (MOD) system with selected upgrades to reflect the system conditions in 2026. A detailed description of the system upgrades included is described in later sections of this report.

3.1.3 Transmission Topology Changes

Transmission projects with Proposed Plan Application (PPA) approval in accordance with Section I.3.9 of the Tariff, as of the May 2015 RSP Project Listing, have been included in the study base case. In addition, any projects in the listing that were considered "Proposed" and determined to have an effect on the SEMA-RI study area were included. The Aquidneck Island Reliability Projects (RSP ID: 1669, 1670, and 1671) were also included in the base case because they are located in the SEMA-RI study area and could eliminate potential needs. A listing of the major future projects in Massachusetts, Rhode Island, and Connecticut is included below:

Massachusetts

- Greater Boston Upgrades (RSP ID: 965, 1199, 1212, 1213, 1220, 1260, 1327, 1329, 1330, 1335-1339, 1352-1357, 1363-1365, 1516, 1518-1522, 1527, 1528, 1549-1554, 1558, 1636, 1637, 1640, 1645-1647)
- Central/Western Massachusetts Upgrades (RSP ID: 937, 945, 946, 949-951, 953-955)
- NEEWS – Interstate Reliability Project (RSP ID: 190, 1094, 1293)
- Pittsfield/Greenfield Project (RSP ID: 1208-1210, 1221-1226)

Rhode Island

- NEEWS – Interstate Reliability Project (RSP ID: 794, 1233, 1252, 1298)
- Chase Hill (Crandall Street) Substation (RSP ID: 1253)
- Aquidneck Island Reliability Projects (RSP ID: 1669, 1670, 1671)
- Brayton Point Non-Price Retirement Short-Term Reliability Upgrades (RSP ID: 1623)[9]

Connecticut

[9] The West Farnum 175T and Kent County 3X 345/115 kV autotransformer rating increases also proposed as part of this set of upgrades were not listed in the RSP Project Listing. These rating increases have been included in the study base cases.

- NEEWS – Interstate Reliability Project (RSP ID: 191, 802, 1245)
- Southwestern Connecticut (SWCT) Transmission Solutions (RSP ID: 1380, 1381, 1383-1386, 1389, 1399, 1400, 1559-1579, 1620-1622)
- Greater Hartford/Central Connecticut (GHCC) Transmissions Solutions (RSP ID: 1580-1605, 1659)

3.1.4 Generation Assumptions (Additions & Retirements)

All generation projects in New England with a Forward Capacity Market (FCM) Capacity Supply Obligation (CSO) as of Forward Capacity Auction 9 (FCA #9) were included in the study base case. In addition, two generators that received CSOs in the most recent Forward Capacity Auction (FCA # 10) in the SEMA-RI area were also included. A listing of the major new future projects cleared in FCA #1 through FCA #10 and not yet in service in the SEMA-RI study area is included below:

- QP 444 – Medway Peakers (195 MW - FCA #9)
- QP 449 – Canal #3 (333 MW - FCA #10)
- QP 489 – Burrillville Energy Center (485 MW - FCA #10)

A summary of major Non-Price Retirement (NPR) requests in southern New England is provided in Table 3-1.

Table 3-1: Summary of Non-Price Retirement Requests

Resource Name	Summer Qualified Capacity (MW)	NPR Request Date	NPR Determination Date
AES Thames	182.653	9/18/2012	11/19/2012
Bridgeport Harbor 2	0.000	9/20/2013	10/16/2013
Brayton Point 1	228.205	10/6/2013	12/20/2013
Brayton Point 2	225.750	10/6/2013	12/20/2013
Brayton Point 3	610.000	10/6/2013	12/20/2013
Brayton Point 4	422.000	10/6/2013	12/20/2013
John Street 3	2.000	9/26/2013	10/16/2013
John Street 4	2.000	9/26/2013	10/16/2013
John Street 5	1.900	9/26/2013	10/16/2013
Norwalk Harbor 1	162.000	9/30/2013	12/20/2013
Norwalk Harbor 2	168.000	9/30/2013	12/20/2013
Norwalk Harbor 10	11.925	9/30/2013	12/20/2013
Pilgrim Nuclear Power Station	677.284	10/12/2015	12/18/2015

Due to the NPR request submitted for the Pilgrim Nuclear Power Station for FCA #10, the unit was modeled as OOS in all study base cases. No other significant NPR requests were submitted for FCA #10 that would have an effect on the SEMA-RI study area; therefore, these NPRs were not reflected in the study. All other NPR requests across New England through FCA #9 were modeled as OOS in the study base case. An 11.8 MW Active DR partial NPR was also submitted in SEMA-RI, but the acceptance of this NPR has a negligible effect on the study area, and was not included in the study.

Real Time Emergency Generation (RTEG) are distributed generation which have air permit restrictions that limit their operations to ISO Operating Procedure 4 (OP-4), Action 6 – an emergency action which also implements voltage reductions of five percent (5%) of normal operating voltage that require more than 10 minutes to implement. RTEG cleared in the FCM was not included in the reliability analyses because in general, long-term analyses should not be performed such that the system must be in an emergency state as required for the implementation of OP-4, Action 6.

3.1.5 **Explanation of Future Changes Not Included**

The following projects were not included in the study base cases:

- Transmission projects that have not been fully developed and were not classified as "Proposed" as of the May 2015 RSP Project Listing. These projects were not modeled in the study base case due to the uncertainty concerning their final development or lack of an impact on the SEMA-RI study area.
- With the exception of the Greater Boston projects, which are expected to receive PPA approval in the near future, transmission projects outside of the SEMA-RI area that have received PPA approval since the May 2015 RSP Project Listing was published. These projects were not modeled due to the lack of an impact on the SEMA-RI study area.
- Transmission upgrades associated with the Canal #3 and Burrillville Energy Center (BEC) generation projects were not included in the study base cases. However, the results presented reflect the presence of upgrades associated with Canal 3. Once the upgrades for BEC are established, any identified reliability concerns resolved by the BEC upgrades will be removed from the identified Needs.

3.1.6 **Forecasted Load**

A ten-year planning horizon was used for this study based on the most recently available Capacity, Energy, Loads, and Transmission (CELT) Report issued in May 2015. This study was based on the forecasted 2026 peak demand load levels for the ten-year horizon[10].

The 2026 summer peak 90/10 demand forecast for New England is 35,310 MW.

The CELT load forecast includes both system load and losses (transmission & distribution) from the power system. Since power flow modeling programs calculate losses on the system, the actual system load modeled in the case was reduced to account for system losses which are explicitly calculated in the system model.

Demand Resources (DR) are treated as capacity resources in the Forward Capacity Auctions (FCA). DR is split into two major categories, Passive and Active DR. Passive DR is largely comprised of energy efficiency and is expected to lower the system demand during designated peak hours in the summer and winter. Active DR is commonly known as Demand Side Management (DSM) and can be dispatched on a zonal basis if a forecasted or real-time capacity shortage occurs on the system. Starting in 2012, forecasting passive DR has become part of the annual load forecasting process. This forecast takes into account additional electrical efficiency (EE) savings beyond FCM results across the ten-year planning horizon. This forecast is primarily based on forecasted financial investment in state-sponsored EE programs and its correlation with historical data on reduction in

[10] The 2015 CELT forecast only has projected peak demands for the years 2015-2024. To determine the 2026 peak demand forecasted load, the growth rate from years 2023-2024 was applied to the 2024 forecast twice.

peak demand per dollar spent. This EE forecast was published in the annual CELT Report beginning in spring 2012.

Active DR are modeled in the base case at the levels of the most recent FCA #9, multiplied by a Performance Factor of 75% based on historical performance of similar resources. Passive DR are modeled at 2026 levels based on the passive DR cleared through FCA #9 (2010-2019) and the aforementioned EE forecast for the years until 2026 (2020-2026).

Since Demand Resources are modeled at the low side of the distribution bus in the power flow model, all DR values were increased by 5.5% to account for the reduction in losses on the local distribution network. Passive DR is modeled by load zone and Active DR is modeled by dispatch zone. The amounts modeled in the cases are listed in Table 3-2 and Table 3-3 and detailed reports can be seen in Section 7.

Table 3-2: 2026 Passive DR through FCA #9 and EE Forecast

Load Zone	Passive DR (FCA #1-9) DRV[11] (MW)	EE Forecast (2020-2026) DRV[11] (MW)	Total Passive DR DRV[11] (MW)
Maine	168	104	227
New Hampshire	95	64	159
Vermont	117	102	219
Northeast Massachusetts & Boston	527	363	890
Southeast Massachusetts	284	192	476
West Central Massachusetts	331	225	556
Rhode Island	189	132	321
Connecticut	425	324	749
New England Total[12]	**2,135**	**1,506**	**3,641**

[11] DRV = Demand Reduction Value = the actual amount of load reduced measured at the customer meter; these totals are forecasted values for the commitment period beginning June 1, 2025. These values exclude transmission and distribution losses.

[12] The sum of individual values may not equal the total value due to rounding.

Table 3-3: Active DR Values through FCA #9

Dispatch Zone	Active DR (FCA #1-9) DRV[11] (MW)
Bangor Hydro	27
Maine	97
Portland, ME	17
New Hampshire	13
New Hampshire Seacoast	2
Northwest Vermont	24
Vermont	5
Boston, MA	50
North Shore Massachusetts	18
Central Massachusetts	32
Springfield, MA	8
Western Massachusetts	15
Lower Southeast Massachusetts	7
Southeast Massachusetts	41
Rhode Island	56
Eastern Connecticut	8
Northern Connecticut	28
Norwalk-Stamford, Connecticut	3
Western Connecticut	32
New England Total[12]	**484**

3.1.7 Forecasted Photovoltaic (PV) Generation

In addition to the resources that cleared the FCM, the PV generation forecast was used to model PV generation in the study base cases. The 2015 CELT PV generation forecast includes the PV generation that has been installed as of the end of 2014 and provides a forecast by state of the total PV (by AC Nameplate) that is expected to be in service by the end of each forecast year for the next 10 years. As an example, the 2015 PV forecast provides data on the PV that is in service as of the end of 2014 as well as an annual forecast for the PV that will be in service for end of 2015, end of 2016 and so on until the end of 2024. For years beyond 2024, the rate of PV generation growth from 2023-2024 was used to extrapolate the PV generation forecast.

An availability factor of 26% was applied to the values from the PV generation forecast. Table 3-4 summarizes the PV generation modeled for the initial study files for New England.

Table 3-4: Forecasted PV Generation Modeled in New England Modeled in Study Base Cases

Load Zone		2026 Peak
New England	A - PV generation (nameplate) in New England	1,937
	B - 5.5% Reduction in Distribution Losses	107
	C - Unavailable PV generation (A+B)*(1-26%)	1,512
	PV Generation Modeled in Case as Negative Load (A+B)-C	**531**

3.1.8 Load Levels Studied

Consistent with ISO planning practices, transmission planning studies utilize the ISO extreme weather 90/10 forecast assumptions for modeling summer peak load profiles in New England. A breakdown of the load modeled in the 2026 cases, taking into account transmission and distribution losses, is shown in Table 3-5. A more detailed report of the loads modeled and how the numbers were derived from the CELT values can be seen in Section 7.

Table 3-5: Load Levels Studied

State	2026 CELT 90/10 Load[13] (MW)
Maine[14]	2,525
New Hampshire	3,350
Vermont	1,265
Massachusetts	16,545
Rhode Island	2,550
Connecticut	9,075
New England Total	**35,310**

After taking into account the aforementioned transmission losses, the contributions of demand resources and forecasted EE, and the addition of non-CELT and station service loads, the actual load level modeled in the base cases for this study is approximately 31,103 MW.

3.1.9 Load Power Factor Assumptions

Load power factors consistent with the local transmission owner's planning practices were applied uniformly at each substation. Eversource Energy's load power factor was modeled as 0.983 in SEMA. National Grid's load power factor was modeled as 0.995 in SEMA and 0.996 in RI. Demand resource power factors were set to match the power factor of the load at that bus in the model. A list of overall power factors by company territory can be found in the detailed load report in Appendix A: Load Forecast.

3.1.10 Transfer Levels

In accordance with the reliability criteria of the NERC, NPCC and the ISO, the regional transmission power grid must be designed for reliable operation during stressed system conditions. A detailed list of all transfer levels can be found in the study base summaries in Section 9. The following external transfers were utilized for the study.

Table 3-6: Interface Levels Tested

Case	Interface Level Condition	North-South Transfers	East-West Transfers	West to East Transfers	Boston Import	CT Import
A	High East to West with High North-South	High	High	Low	Low	High

[13] These values exclude transmission and distribution losses.

[14] The value does not include 365 MW of paper mill load where the mills have on site generation located behind their meter.

B	High West to East with Low North-South	Medium	Low	High	Low	Low
C	High West-East with Medium North-South	Medium	Low	High	Medium	Low

Case A: This case represents a scenario with high East-West flows. In this case, the stress is from East-to-West with SEMA-RI transfer levels being dictated by the load in the area and unit unavailability. All units in the Boston area were assumed in-service for this scenario. Imports from Hydro-Quebec over the HVDC circuits and on the New-Brunswick to New England (NB-NE) ties were adjusted accordingly to achieve a high East-to-West bias. Flows over the New-York tie lines were allowed to adjust within acceptable limits to meet New England load.

Case B: This case represents a scenario with high West-East flows. In this case, the North-South interface was held at a low value with SEMA-RI zone being stressed from the West. In this scenario, all units in the Boston area were assumed in service. The flows on the HVDC tie from Quebec and NB-NE were adjusted as needed to maintain a high West-to-East interface flow. Flows over the New-York tie lines were allowed to adjust within acceptable limits to meet New England load.

Case C: This case represents a scenario with high West-East flows. In this scenario, one unit in the Boston area was assumed out-of-service. Imports from Hydro-Quebec over the HVDC circuits and on the New-Brunswick to New England (NB-NE) ties were adjusted accordingly to achieve a high West-East interface flow. Imports/Exports over New-York tie lines were allowed to adjust within acceptable limits to meet New England load.

3.1.11 Generation Dispatch Scenarios

Table 3-7 shows a list of the generating units in the study area and their modeled generation capacities.

Table 3-7: Modeled Generating Capacities of Study Area Units

Generating Unit	Modeled Capacity (MW)	Fast-Start Unit[15]
NEA Bellingham	277.621	No
Edgar / Fore River	700.000	No
ANP Blackstone 1	239.634	No
ANP Blackstone 2	245.314	No
SEMASS 1	46.955	No
SEMASS 2	22.174	No
Canal 1	547.059	No
Canal 2	545.125	No
Canal 3 (FCA #10)	333.000	No[16]

[15] "Fast-start" generators are those units that can go from being off-line to their full Seasonal Claimed Capability in 10 minutes. These units do not need to participate in the 10-minute reserve market to be considered a fast-start unit in planning studies.

[16] Since this unit's ramping capability has not yet been tested and verified, this study has assumed that it is not a fast-start unit.

Generating Unit	Modeled Capacity (MW)	Fast-Start Unit[15]
Dartmouth Power	62.156	No
Potter	73.927	No
Milford Power	149.000	No
ANP Bellingham 1	237.102	No
ANP Bellingham 2	243.587	No
Cleary 8	24.825	No
Cleary 9/9A	104.931	No
Dighton Power	160.539	No
Ocean State Power G1/G2/S1	270.901	No
Ocean State Power G3/G4/S2	270.180	No
Manchester / Franklin Square 9/9A	149.000	No
Manchester / Franklin Square 10/10A	149.000	No
Manchester / Franklin Square 11/11A	149.000	No
Pawtucket Power	59.810	No
Tiverton Power	244.086	No
RISE	543.455	No
Ridgewood Landfill	26.000	No
Burrillville Energy Center (FCA #10)	485.000	No[16]
Lake Road 1[17]	245.792	No
Lake Road 2[17]	251.213	No
Lake Road 3[17]	255.000	No
West Medway Jet 1[17]	42.000	Yes
West Medway Jet 2[17]	40.835	Yes
West Medway Jet 3[17]	35.441	Yes
West Tisbury	5.568	Yes
Oak Bluffs	8.120	Yes
Thomas A. Watson	105.200	Yes

At all locations in the study area where a single fast-start unit is available, that unit was assumed OOS for each dispatch. For subareas where there are multiple fast-start units, one of the fast-start units was taken out of service and the rest were assumed online and available in that subarea.

Of all the fast-start units available in SEMA-RI study area, approximately 20% of them were considered out of service (OOS) for each dispatch. The rest of the fast-start units were assumed available for dispatch. For all cases except Edgar or Edgar and Potter out-of-service, West Medway Jet 2 and Oak Bluffs are considered the best helpers[18], and were assumed OOS. For Edgar or Edgar

[17] While these units are located outside of the SEMA-RI area, they do have a significant influence on the performance of the study area and are therefore listed.

[18] In this case, a "helper" unit is the fast-start unit that would be most beneficial, for the given situation, to turn on in order to help offset the loss of a certain base generation unit.

and Potter OOS, Thomas A. Watson 1 is considered the best helper, and was assumed OOS. In all cases, approximately 80% of the fast-starts were assumed in-service.

Generating units in the rest of the New England system outside of the SEMA-RI study area were dispatched to create the stress conditions shown in Table 3-6: Interface Levels Tested.

The most up-to-date voltage schedules obtained from ISO-NE Operating Procedure 12 (OP-12) were utilized in this study. The fast-start dispatch assumptions detailed above were turned on in the base case and no adjustments were made to these fast-start units post-first contingency. Canal 3 and Burrillville Energy Center are in service in all cases.

REDACTED

Table 3-8 and Table 3-9 show the dispatch scenarios and the list of units that were assumed unavailable in each of the base cases. These scenarios have been set up to stress different parts of SEMA-RI study area.

New one-unit-out and two-units-out generation dispatches were not required for the Canal 3 and Burrillville Energy Center due to their interconnection points which are shared with other units or are within the same proximity. Canal 3 will be connected with the other Canal units at the Canal substation and the Burrillville Energy Center will be connected into the Sherman Road 345 kV substation, similar to the Ocean State Power generation units. The existing two-units-out generation dispatches serve as the worst case scenario. Canal 3 and Burrillville Energy Center are in service in all cases.

REDACTED

Table 3-8: One-Unit-Out Generation Dispatches

Unit OOS	Modeled Capacity (MW)	One Unit OOS Dispatch Number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Canal 2	545.1	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Edgar	688.3	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Potter	74.2	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Tiverton	244.6	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Dighton	160.3	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Cleary / Taunton	130.8	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
RISE	548	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Manchester/ Franklin Square 11	149	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON
NEA Bellingham	277.6	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON
ANP Bellingham 1	236.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON
Ocean State Power C1, C2, S1	270.9	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
ANP Blackstone 1	221.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
Lake Road 1	245.8	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON
SEMASS	69.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON
Dartmouth Power	83.1	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON
Milford Power	149	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON
Pawtucket Power	61.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF

REDACTED

Table 3-9: Two-Units-Out Generation Dispatches

Unit OOS	Modeled Capacity (MW)	Two Units OOS Dispatch Number														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Canal 1	549.9	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Canal 2	545.1	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Edgar	688.3	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Potter	74.2	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Tiverton	244.6	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	OFF
Dighton	160.3	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Cleary/Taunton	130.8	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF
RISE	548	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Manchester / Franklin Square 11	149	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	OFF	ON	ON
Manchester / Franklin Square 10	149	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON
NEA Bellingham	277.6	ON	ON	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	ON	ON
ANP Bellingham 1	236.4	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON
ANP Blackstone 1	221.4	ON	ON	ON	ON	ON	ON	ON	OFF	ON	OFF	ON	ON	ON	ON	ON
Ocean State Power G3, G4, S2	270.2	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON
Ocean State Power G1, G2, S1	270.9	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Lake Road 2	251.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON
Lake Road 1	245.8	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON
Dartmouth Power	83.1	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	OFF	ON
Pawtucket Power	61.4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON
SEMASS	69.2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	ON

3.1.12 Reactive Resource and Dispatch Assumptions

All area shunt reactive resources were assumed available and dispatched when required. Reactive output of generating units was modeled to reflect defined limits. A summary of the reactive output of units and shunt devices connected to the transmission system that played a significant role in the study area can be found in the power flow case summaries included in Section 9.

3.1.13 Demand Resources

As stated in Section 3.1.6, Passive DR as forecasted for the year 2026 and Active DR that cleared as of FCA #9 in 2015 were modeled for this study. Passive DR were assumed to perform to 100% of their qualified amount. The passive DR included the forecasted EE which were assumed to perform to 100% of the forecasted amount. Active DR were assumed to perform to 75% of their qualified amount. A summary of assumed DR performance is shown in Table 3-10. Real Time Emergency Generation (RTEG) were not modeled, consistent with all needs and solutions planning analyses.

Table 3-10: New England Demand Resource Performance Assumptions

Region	Passive DR	Active DR	Forecasted EE	RTEGs
New England	100%	75%	100%	0%

3.1.14 Protection and Control System Devices Included in the Study Area

There are five Special Protection Systems that are in operation in the SEMA-RI study area:

1. Barnstable SPS – NPCC Type III
2. ANP Bellingham SPS – NPCC Type III
3. Edgar Station SPS – NPCC Type III
4. Tiverton SPS – NPCC Type III
5. Stoughton Station SPS – NPCC Type III

The Barnstable SPS is a flow-based SPS which will initiate load shedding on the Cape based on [redacted].

The ANP Bellingham SPS will trip the Bellingham Unit #2 generator breaker following [redacted].

The Edgar SPS trips specific Edgar station generation (EDG1, EDST) if [redacted]

[redacted].

The Tiverton SPS is a flow-based SPS that reduces the output of [redacted].

The Stoughton SPS trips certain lines in the Boston area for N-1-1 conditions. The operation of this SPS is needed to avoid [redacted].

Contingencies affected by the operation of these SPSs were tested both with the SPS operating and out-of-service.

3.1.15 Explanation of Operating Procedures and Other Modeling Assumptions

The SEMA-RI area transmission power flows are managed on a daily basis through the use of generation dispatch. For the purposes of the contingency testing conducted as part of this study generation adjustments were modeled in the analysis to reflect system adjustments that could occur between outages under N-1-1 contingency conditions. These adjustments were primarily limited to unit back-downs in the SEMA-RI study area and HVDC terminal adjustments. The reductions in resource output were limited to a total of 1,200 MW across the New England system to reflect consistency with operating reserve constraints.

Additionally, the SEMA-RI area has two operating guides. The first is associated with the operation of the Canal 1 and 2 generating units when certain facilities are out of service or following the loss of certain facilities. These procedures serve to limit the output of the Canal units to avoid potential loss of generation due to instability following specific contingency events. Modeling of these operating procedures was captured through base case dispatch conditions and/or through system adjustments performed between contingency events.

The second operating guide is associated with the Tremont – East Area. This guide specifies facility-out stability limits for the Pilgrim and Canal units for line out and breaker out conditions should a "normally open" 345 kV breaker 863 at Carver have to be closed. Modeling of these operating procedures was captured through base case dispatch conditions and/or through system adjustments performed between contingency events. With the retirement of Pilgrim the operating guide will be re-evaluated to determine its applicability.

3.2 Stability Modeling Assumptions

Not applicable for this study.

3.3 Short Circuit Model Assumptions

3.3.1 Study Assumptions

The short circuit study evaluated the projected 2026 available fault current levels around the SEMA-RI area. It also included the effects of area reliability project upgrades as well as proposed generation interconnection projects as outlined in Sections 3.1.3 and 3.1.4.

3.3.2 Short Circuit Model

The ASPEN Circuit Breaker Rating Module software was used to calculate all circuit breaker duties. The case for the short circuit study was obtained from the 2015 short circuit base case library and all "Proposed", "Planned", and "Under Construction" projects from the May 2015 RSP Project Listing, as discussed in Section 3.1.3 of this scope document, were added to that model. In addition, the Aquidneck Island Reliability Projects (RSP ID: 1669, 1670, and 1671) were also included in the case.

3.3.3 Contributing Generation Assumptions (Additions & Retirements)

The model included proposed generation interconnection projects that have PPA approval as well as those generator projects that have FCA Capacity Supply Obligations (CSOs).

The following relevant proposed generation projects were modeled for this study:

- QP 444 – Medway Peakers (195 MW - FCA #9)
- QP 449 – Canal #3 (333 MW - FCA #10)
- QP 489 – Burrillville Energy Center (485 MW - FCA #10)

The Non-Price Retirements listed in Table 3-1 were also reflected in the short circuit base cases.

3.3.4 Generation and Transmission System Configurations

NPCC Regional Reliability Reference Directory #1, "Design and Operation of the Bulk Power System" and PP-3 required short circuit testing to be conducted with all transmission and generation facilities in-service for all potential operating conditions.

3.3.5 Boundaries

This study included testing of all 115 kV and 345 kV substations and breakers in the SEMA-RI study area as well as select substations and breakers in neighboring portions of the Greater Boston and Eastern Connecticut study areas.

3.3.6 Other Relevant Modeling Assumptions

Not applicable for this study.

Section 4
Analysis Methodology

4.1 Planning Standards and Criteria

The applicable NERC, NPCC and ISO-NE standards and criteria were tested as part of this evaluation. Descriptions of each of the NERC, NPCC and ISO-NE standard tests that were used to assess system performance are discussed later in this section.

4.2 Performance Criteria

4.2.1 **Steady State Criteria**

The Needs Assessment was performed in accordance with NERC TPL-001-4 Transmission Planning System Standards, NPCC "Regional Reliability Reference Directory #1, Design and Operation of the Bulk Power System", dated 09/30/15, and ISO Planning Procedure No. 3, "Reliability Standards for the New England Area Bulk Power Supply System", dated 03/01/13. The contingency analysis steady-state voltage and loading criteria, solution parameters and contingency specifications that were used in this analysis are consistent with these documents.

As a part of this needs analysis the robustness of the system with respect to limited extreme contingency events was evaluated.

In this study report, only criteria violations on PTF transmission elements and substations were reported. Information on non-PTF violations can be found in Section 11, but will not be considered in transmission solution development.

4.2.1.1 *Steady State Thermal and Voltage Limits*

Loadings were monitored on all transmission facilities rated at 115 kV and above in the study area and in the Greater Boston and Eastern Connecticut study area which is in close proximity to the SEMA-RI study area. The thermal violation screening criteria defined in Table 4-1 was applied.

Table 4-1: Steady State Thermal Criteria

System Condition	Maximum Allowable Facility Loading
Pre-Contingency (All Lines In)	Normal Rating
Post-Contingency	Long Time Emergency (LTE) Rating

Voltages were monitored at all buses with voltages 115 kV and above in the study area and in the Greater Boston and Eastern Connecticut study area which is in close proximity to the SEMA-RI study area. System bus voltages outside of limits identified in Table 4-2 were identified for all normal (pre-contingency) and post-contingency conditions.

Table 4-2: Steady State Voltage Criteria

Transmission Owner	Voltage Level	Bus Voltage Limits (Per-Unit)	
		Normal Conditions (Pre-Contingency)	Emergency Conditions (Post-Contingency)
National Grid	230 kV and above	0.98 to 1.05	0.95 to 1.05
	115 kV and below	0.95 to 1.05	0.90[19] to 1.05
Eversource Energy	69 kV & above	0.95 to 1.05	0.95 to 1.05
Eversource Energy (NSTAR)	230 kV and above	0.95 to 1.05	0.95 to 1.05
	115 kV and below	0.95 to 1.05	0.95 to 1.05
Millstone / Seabrook[20]	345 kV	1.00 to 1.05	1.00 to 1.05
Pilgrim[20]	345 kV	0.995 to 1.05	0.99 to 1.05
Vermont Yankee[20]	115 kV	1.00 to 1.05	1.00 to 1.05

4.2.1.2 *Steady State Solution Parameters*

The steady-state analysis was performed with pre-contingency solution parameters that allowed for adjustment of load tap-changing transformers (LTCs), static VAR devices (SVDs, including automatically-switched capacitors), and phase angle regulators (PARs). Table 4-3 summarizes the solution parameters used in the study.

Table 4-3: Study Solution Parameters

Case	Area Interchange Control	Tap Adjustments	Adjust Phase Shift	Switched Shunt Adjustments
Base	Tie Lines and Loads Enabled	Stepping	Enabled	Enabled
Contingency	Disabled	Stepping	Disabled[21]	Disabled

[19] This minimum voltage criterion only applies to non-Bulk Power System (BPS) designated substations. BPS stations must be >0.95 post contingency.

[20] This is in compliance with NUC-001-2, *"Nuclear Plant Interface Coordination Reliability Standard,"* adopted August 5, 2009.

[21] Results with NNC PARs 'Disabled' will be reported in the Needs Assessment report. To accurately model the operation of the NNC PARs as described in Section 3.1.15, the analysis will be completed with the Adjust Phase Shift setting set to both 'Enabled' and 'Disabled' for post-contingency conditions in order to compare results.

4.2.2 **Stability Performance Criteria**

Not applicable for this study.

4.2.3 **Short Circuit Performance Criteria**

This study was performed in accordance with appropriate IEEE C37 standards and specific design parameters of the circuit breakers. This includes specific considerations for total-current rated and symmetrical-current rated breakers as appropriate.

The circuit breakers were evaluated for short circuit adequacy based on the following criteria:

- *Acceptable-duty*: Circuit breaker fault interrupting duty less than 100% of the available fault current. No action required.
- *Over-duty Condition*: Circuit Breaker Fault Interrupting Duty greater than 100%. This is considered an unacceptable operating condition requiring a solution to be developed to eliminate the over-duty condition.

4.2.4 **Other Performance Criteria**

Not applicable for this study.

4.3 System Testing

4.3.1 **System Conditions (Sensitivities) Tested**

Testing of system conditions included the evaluation of system performance under a number of resource outage scenarios, variation of related transfer levels, and an extensive number of transmission equipment contingency events.

4.3.2 **Steady State Contingencies / Faults Tested**

Each base case was subjected to single element contingencies such as the loss of a transmission circuit or an autotransformer. In addition, single contingencies which may cause the loss of multiple transmission circuit facilities, such as those on a common set of tower line structures were simulated. The steady-state contingency events in this study also included circuit breaker failures and substation bus fault conditions that could result in removing multiple transmission elements from service. A comprehensive set of contingency events, listed in Appendix D: Contingency List were tested to monitor thermal and voltage performance of the Southwest Connecticut study area transmission network. A listing of all contingency events that were tested is included in Table 4-4.

Additional analyses evaluated N-1-1 conditions with an initial outage of a NERC Bulk Electric System (BES) transmission element followed by another contingency event. The N-1-1 analyses examined the summer peak load case with stressed conditions. For these N-1-1 cases, regional reliability standards, including ISO Planning Procedure 3, allowed specific manual system adjustments, such as fast-start generation re-dispatch, phase-angle regulator adjustment or HVDC adjustments prior to the next single contingency event.

A class of contingencies is the loss of elements without a fault. A distinction was made in this assessment based on the nature of a no-fault contingency as follows:

- Type 1: No-fault contingencies involving the opening of a terminal of a line independent of the design of the terminating facility

- Type 2: A subset of the above contingencies that involves the opening of a single breaker

For N-1 testing, all Type 1 contingencies above were simulated. However, for N-1-1 testing only the Type 2 contingencies were simulated as second contingencies.

A listing of all contingency types that were tested is included in Table 4-4 and a summary of Element-Out scenarios is provided in Table 4-5. A complete listing of the element-out scenarios can be seen in Appendix D: Contingency List.

Contingency events were also applied in the eastern Connecticut area to evaluate the system performance along the Connecticut to Rhode Island 115 kV tie (the path from Buddington station in CT to West Kingston station in RI).

Table 4-4: Summary of NERC, NPCC and/or ISO-NE Category Contingencies to be Included

Standard	Event Categories
NERC TPL-001-4[22]	P0, P1, P2, P3, P4, P6, P7, Extreme (Limited)
NPCC Directory 1[23]	Performance Requirement iii, I.1, I.2, I.3, I.4[24], I.6, I.8[25], II, Extreme (Limited)
ISO PP-3[26]	3.2.a-c, 3.2.e, 3.2.h, 5.a-c (Limited)

Table 4-5: Summary of N-1-1 First Element-Out Scenarios

Contingency Type	Number of Element-Out Scenarios	Number of Contingencies Tested For N-1/N-1-1 Analysis
Transmission Circuit	165	476
Transformer	69	208
Generator	36	122
Reactive Devices	19	81
Breaker Failure	N/A	1067
Loss of Element w/o Fault	N/A	504
Double Circuit Tower	N/A	163
Multi Circuit Tower	N/A	1
Bus Section	N/A	59
Special Protection System	N/A	59
Loss of Right-of-Way	N/A	125
Loss of Substation	N/A	126
Loss of Generation Station	N/A	10
Total Number of Scenarios	**289**	**3001**

[22] NERC Category P5 events are not included since delayed clearing cannot be reflected in steady state analysis.

[23] NERC Category I.7 events are not included in this study since no bipolar HVDC facilities are connected in or near the SEMA-RI study area. This also applies to ISO PP-3 3.2.f events.

[24] For the purposes of this study, NPCC Category I.5 events will be covered by testing Category I.4 events; in steady state, these two types of events are modeled similarly.

[25] For the purposes of this study, NPCC Category I.9 events will be covered by testing Category I.8 events; in steady state, these two types of events are modeled similarly.

[26] ISO PP-3 3.2.g events will not be tested since modeling SPS inaction is generally the same as not modeling the operation of the SPS at all; these will be covered as part of testing of other PP-3 events.

4.3.3 **Generation Re-Dispatch Testing**

As outlined in ISO Planning Procedure #3 (PP-3), allowable actions after the first contingency event and prior to the second contingency event include re-dispatch of generation. To simulate these actions in power flow analysis, the Security Constrained Re-Dispatch (SCRD) tool in the TARA software package was used.

During the analysis, all available generation within the study area was allowed to be reduced up to a maximum of 1200 MW in total or turned off to mitigate a thermal violation.

4.3.4 **Critical Load Level (CLL) Analysis**

For all violations that could not be resolved by the re-dispatch analysis, a critical load level analysis was performed to determine at what system load level the violation would first occur. This was then used to determine the year each violation could occur on the system.

For each criteria violation, the worst base case stress and contingency event pair was used to determine the CLL. Due to the retirement of Pilgrim Nuclear Power Station by May 31, 2019, the CLL analysis was conducted in two periods over the ten year study horizon. One period is the present year (2016) to 2019 which, represents a system with the Pilgrim Nuclear Power Station in service. The other period is from 2019 to 2026, which represents a system with the Pilgrim Nuclear Power Station OOS. SEMA-RI load was scaled down to 2019 peak load conditions with Pilgrim in service and OOS and down to 2018 peak load[27] conditions with Pilgrim in-service. Meanwhile, generation far away from the study area in Maine, New Hampshire, Vermont, western Massachusetts and western Connecticut was scaled down to maintain a balanced system.

Using the linear extrapolation method described in Section 23 of the ISO-NE Planning Technical Guide, Critical Load Levels were determined and compared to previously-established net load levels for the years 2016-2019 with Pilgrim Nuclear Power Station in-service and 2019-2026 with the Pilgrim Nuclear Power Station OOS to determine a Year of Need.

Table 4-6 shows the net New England load levels by study year used as part of this analysis. Criteria violations with a reported critical load level in-between two respective study years' net peak loads will be reported with the year of need of the higher load level.

Table 4-6: Net New England Load Levels Used for CLL Analysis

Study Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Net NE Load (MW)	27,716	28,198	28,689	29,189	29,346	29,467	29,583	29,729	29,892	30,068	30,238	30,407

[27] The year 2018 was selected for two reasons. First, the year establishes a second point in the period where the Pilgrim Nuclear Power Station is in-service. Secondly, the 2018 peak load point establishes which needs are time-sensitive as described in Section 4.1(j) of Attachment K of the OATT. Time-sensitive needs are those that occur within three years of the completion of the Needs Assessment report. This Needs Assessment report is expected to be posted in April or May 2016. The three year period begins in May 2016 and ends in May 2019. The latest peak load case in this three year period is the 2018 peak load case. The needs assessment analysis was conducted using the 2018 peak load case. Those needs identified in both the 2026 and 2018 needs assessment analysis were deemed time-sensitive. Those needs identified in the 2026 needs assessment analysis but not in the 2018 needs assessment analysis will be deemed as not time sensitive.

REDACTED

4.3.5 **Stability Contingencies / Faults Tested**

Not applicable for this study.

4.3.6 **Short Circuit Faults Tested**

The ASPEN circuit breaker rating module software was used to calculate all circuit breaker duties. The pre-fault operating voltage for all the SEMA-RI study area buses was 1.04 per unit (p.u.). Figure 4-1 shows the ASPEN options used in this study.

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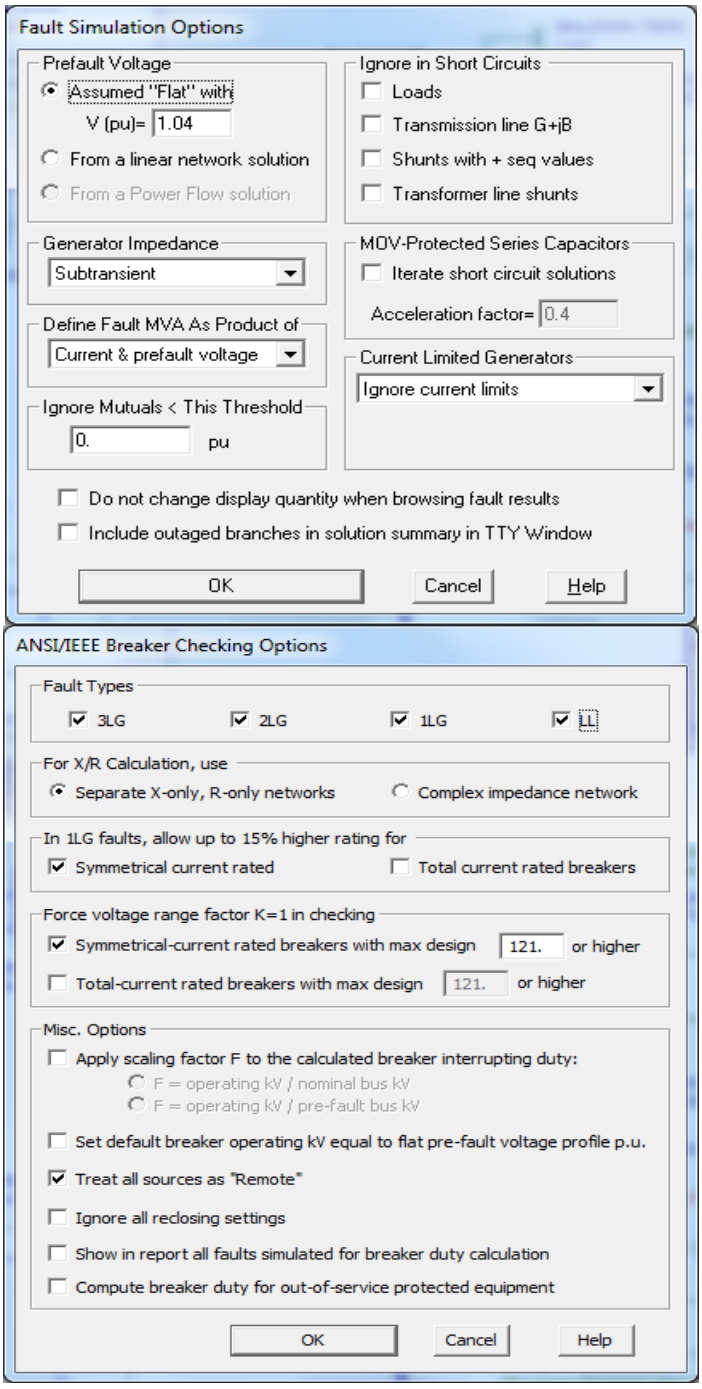

Figure 4-1: ASPEN Fault Simulation Options

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Section 5
Results of Analysis

5.1 Overview of Results

The results of steady-state analysis for the SEMA-RI study area indicated that there was one N-0 thermal overload and no N-0 unacceptable voltage conditions. There were a number of N-1 and N-1-1 thermal overloads and unacceptable voltage conditions for each of the subareas within the SEMA-RI study area.

The summary of results presented in Sections 5.2.1 through 5.2.3 includes thermal overload results and unacceptable voltage results organized by subarea. The subareas were selected based on the transmission topology as well as geographic orientation of facilities. The list of SEMA-RI subareas by which the results have been organized is as follows:

1) **Farnum Subarea** – This is an area that runs along the northern section of SEMA-RI across northern Rhode Island.
2) **West Medway – West Walpole Subarea** – This is the area running across northern SEMA-RI from the Rhode Island boarder to the Walpole area.
3) **South Shore Subarea** – This is an area that runs along the northern section of SEMA-RI from the area south of Boston to the Massachusetts southern shore line.
4) **Industrial Park Subarea** – This is an area running across southern SEMA-RI from the New Bedford area through to the Cape Cod Canal.
5) **Somerset – Newport Subarea** – This is an area that runs along the lower part of SEMA-RI from lower Rhode Island through to lower southeastern Massachusetts.
6) **Cape Cod Subarea** – This area includes Cape Cod and the islands of Martha's Vineyard and Nantucket.

The geographic locations of the defined subareas listed above are shown in Figure 5-1**.**

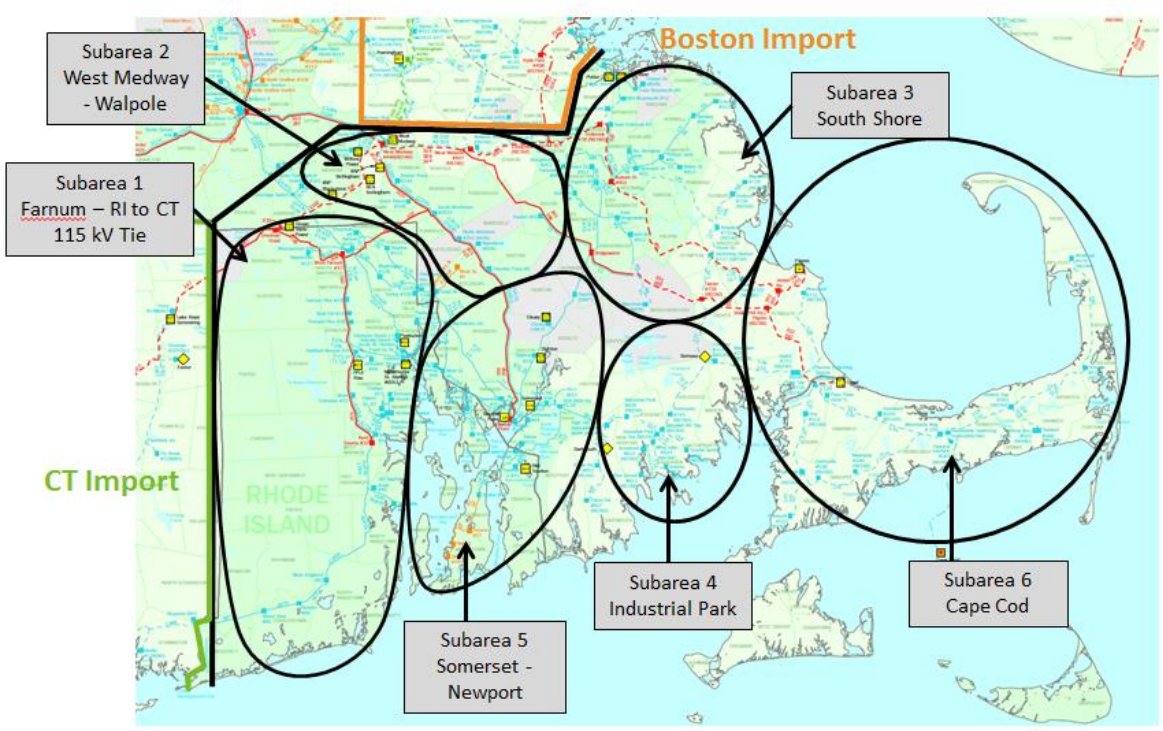

Figure 5-1: SEMA-RI Needs Assessment Study Subareas

5.2 Steady State Performance Criteria Compliance

Steady state test results varied as a function of the generation dispatch and transfer level conditions modeled. One base case thermal overload was observed. A number of post-contingency overloads and voltage violations were observed in all of the various base cases modeled. There were also a number of post-contingency overloads and voltage violations that were only associated with specific system conditions.

5.2.1 N-0 Thermal and Voltage Violation Summary

Under N-0 base case modeled conditions, there was one overload observed in the Farnum subarea on the [redacted]. There were no N-0 base case thermal overloads in any other subarea. There were no observed N-0 base case voltage violations in any study subarea.

Table 5-1: [redacted] Thermal Overload

Element ID	Element Description	Normal Rating (MW)	Dispatch	Worst-Case Thermal Loading (% LTE)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]				

[redacted]



5.2.2 **N-1 Thermal and Voltage Violation Summary**

N-1 testing was performed for all of the system conditions described in Section 3.1. An overview of the results that showed thermal overloads and unacceptable voltage performance is listed below. Every subarea with the exception of Cape Cod had single contingency overload or voltage violation events. The complete set of results of overloaded elements and unacceptable voltage performance can be found in Section 11.

5.2.2.1 *Farnum Subarea N-1 Thermal Overloads and Voltage Violations Results*

The elements listed in the following tables and shown on the one-line diagrams following the tables were overloaded for the contingency and generation dispatch conditions noted in the results tables for the Farnum subarea.

The results for this subarea indicate that, absent generation at [redacted], N-1 overloads occur on lines supplying the load pocket encompassed by the Woonsocket, Washington, Robinson Ave, Valley and Riverside substations.

No N-1 voltage violations were observed in this subarea.

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Table 5-2: V148S, R9, and J16S N-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MW)	Contingency	Worst-Case Thermal Loading (% LTE)
V148S-1	V148 Tap to Washington RI 115 kV Line Section	218	[redacted]	114.39
R9	Riverside to Valley 115 kV Line	110	[redacted]	173.15
J16S	Staples to Highland Park 115 kV Line	115	[redacted]	112.56
Worst case overloads occur [redacted]. With much of the major generation [redacted], additional stress is placed on the 115 kV paths leading into and out of the area.				

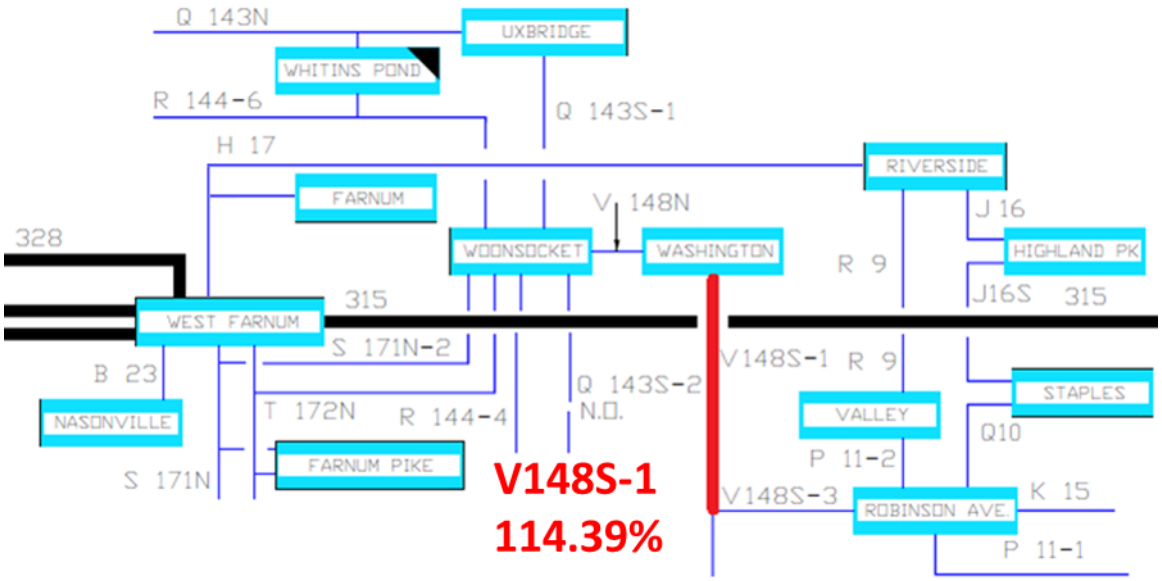

Figure 5-3: V148S-1 N-1 Thermal Overload

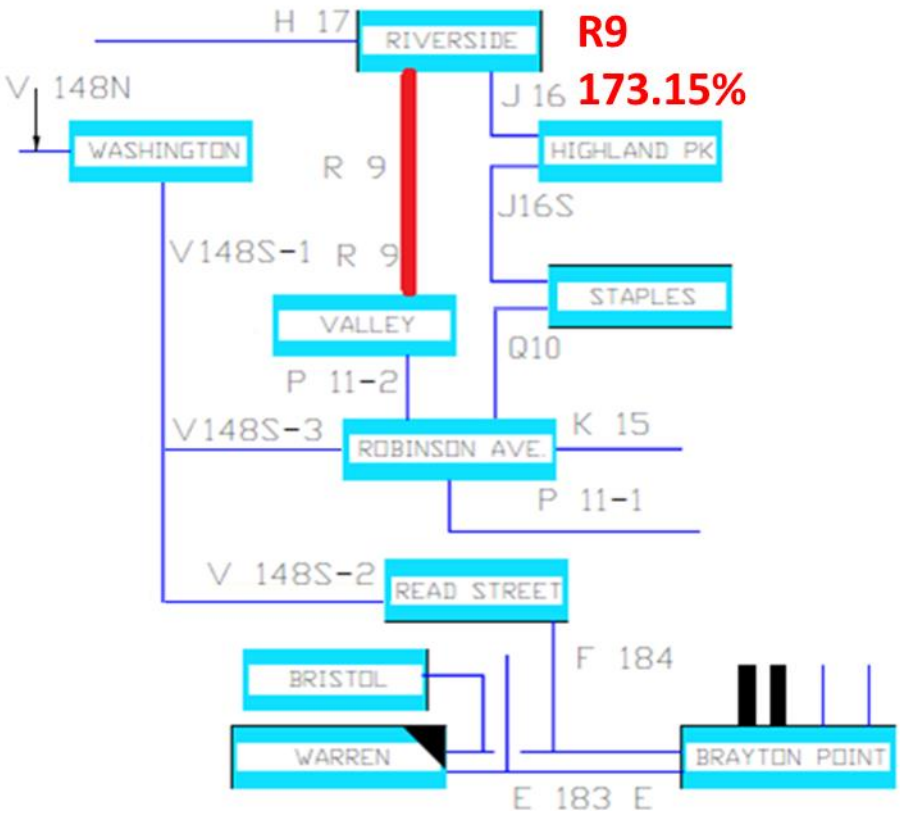

Figure 5-4: R9 N-1 Thermal Overload

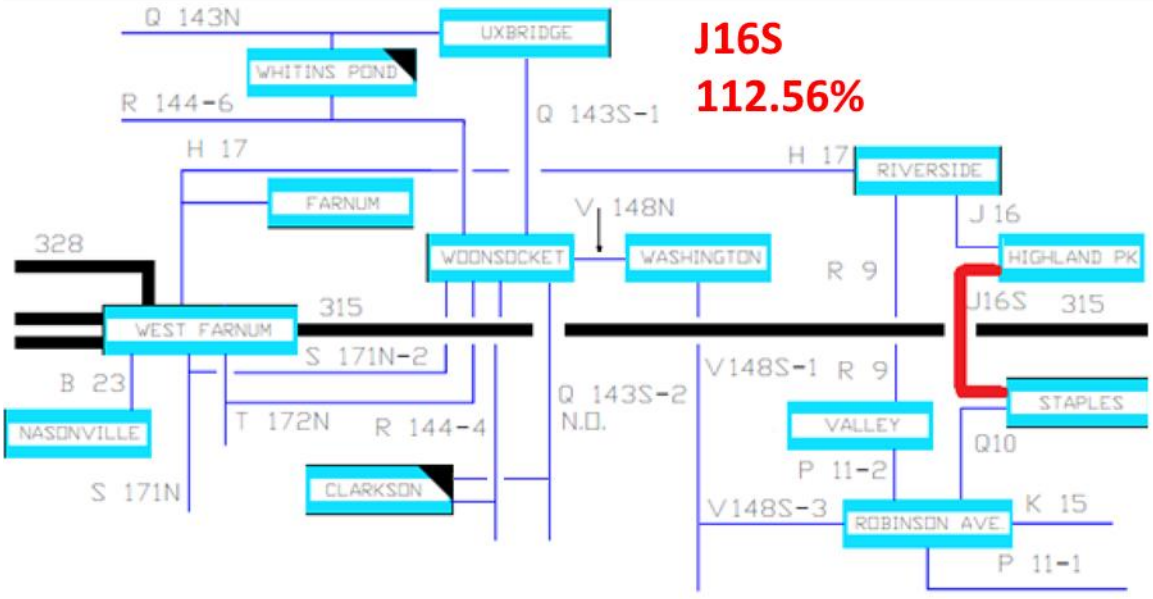

Figure 5-5: J16S N-1 Thermal Overload

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Table 5-3: P11 Line Section N-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MW)	Contingency	Worst-Case Thermal Loading (% LTE)
P11-1	Pawtucket kV to P11 Tap 115 kV Line Section	172	[redacted]	119.40
P11-2	Valley to P11 Tap 115 kV Line Section	127	[redacted]	110.09
P11-3	Robinson Ave to P11 Tap 115 kV Line Section	193	[redacted]	104.40
Worst case overloads occur [redacted]. With much of the major generation in the [redacted], additional stress is placed on the 115 kV paths leading into and out of the area.				

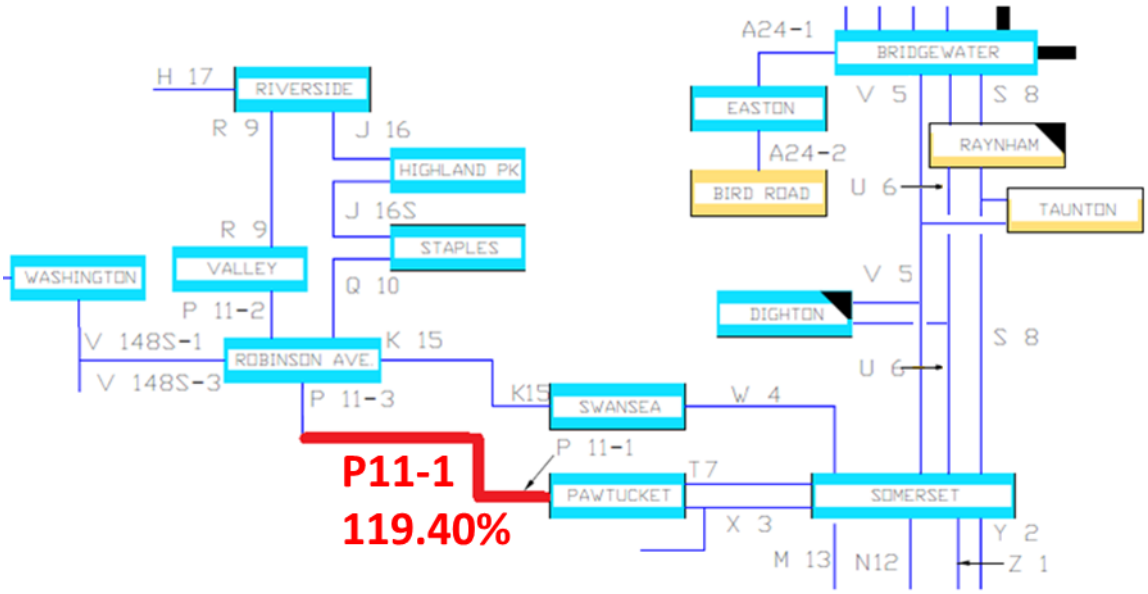

Figure 5-6: P11-1 N-1 Thermal Overload

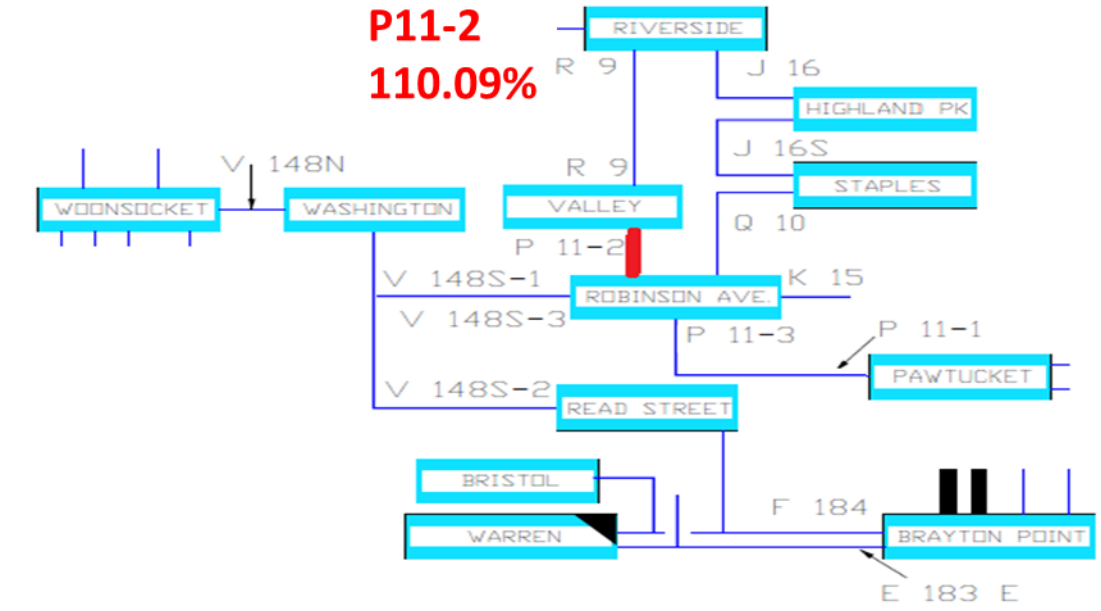

Figure 5-7: P11-2 N-1 Thermal Overload

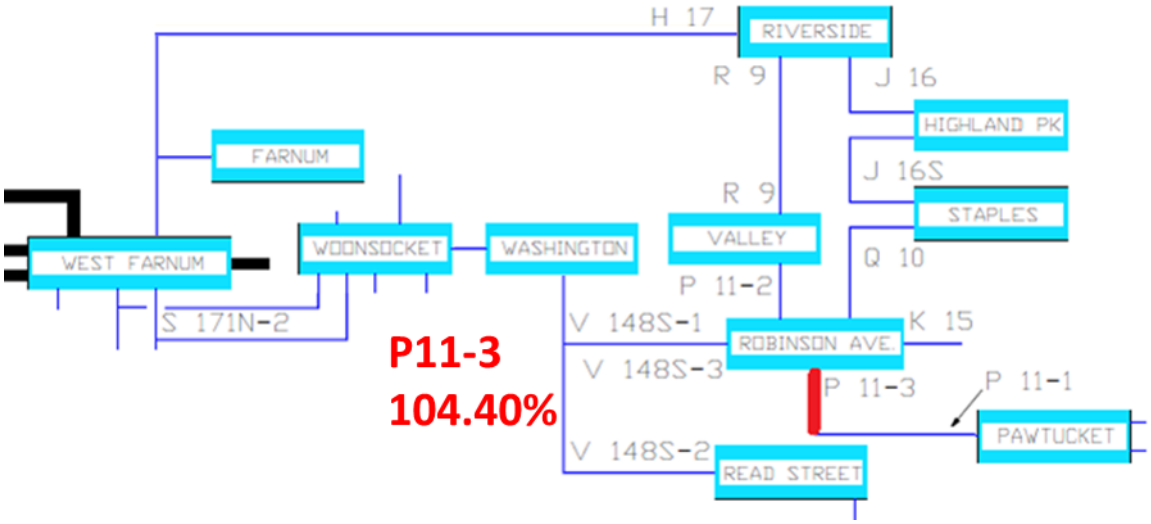

Figure 5-8: P11-3 N-1 Thermal Overload

Table 5-4: Valley P11/R9 Bus Tie **and H17 Line Sections N-1 Thermal Overloads**

Element ID	Element Description	LTE Rating (MW)	Contingency	Worst-Case Thermal Loading (% LTE)
Valley P11/R9 Bus Tie	Valley 205 115 kV Bus Equipment	128	[redacted]	129.20
H17-1	West Farnum to Farnum Tap 115 kV Line Section	284	[redacted]	112.03
H17-2	Riverside to Farnum Tap 115 kV Line Section	245	[redacted]	129.28
Worst case overloads occur with [redacted].				

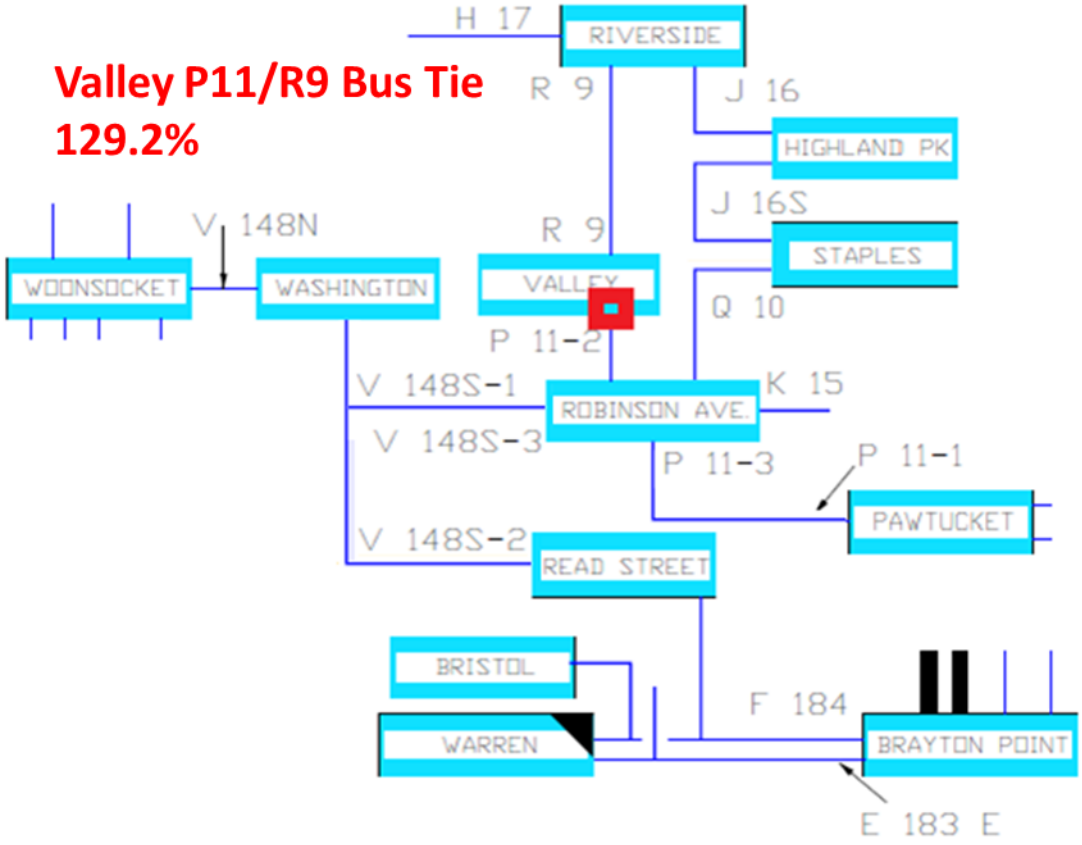

Figure 5-9: Valley P11/R9 Bus Tie**N-1 Thermal Overload**

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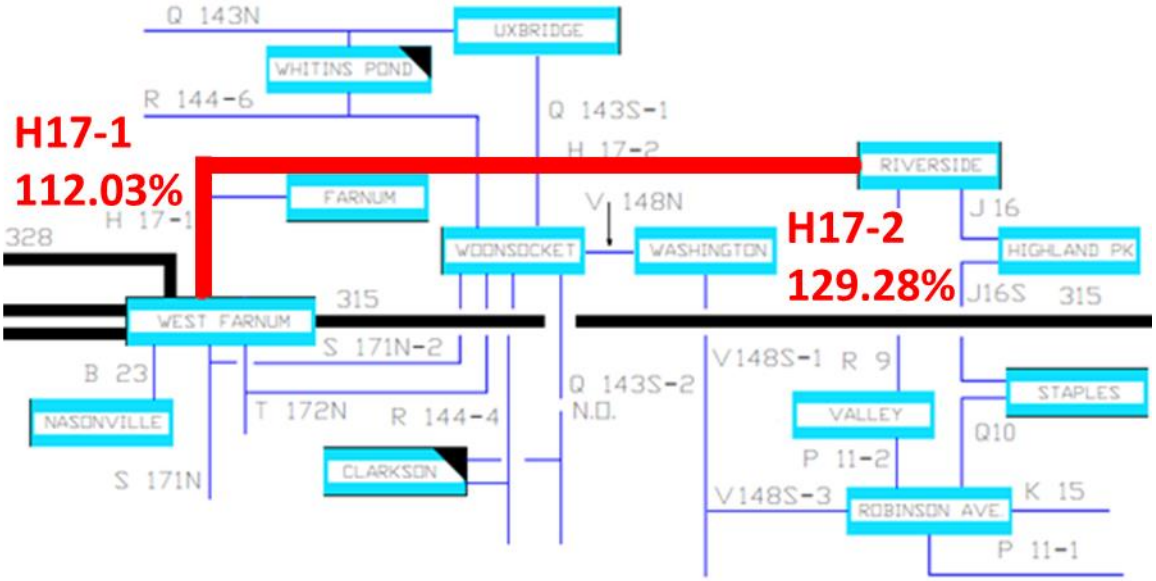

Figure 5-10: H17-1 N-1 Thermal Overload

Table 5-5: West Farnum 175T N-1 Thermal Overload

Element ID	Element Description	LTE Rating (MW)	Contingency	Worst-Case Thermal Loading (% LTE)
West Farnum 175T	West Farnum 345/115 kV Autotransformer	389	[redacted]	100.56
Worst case overload occurs with [redacted]. Loss of major generation in the Farnum area causes much of this subarea to be served [redacted].				

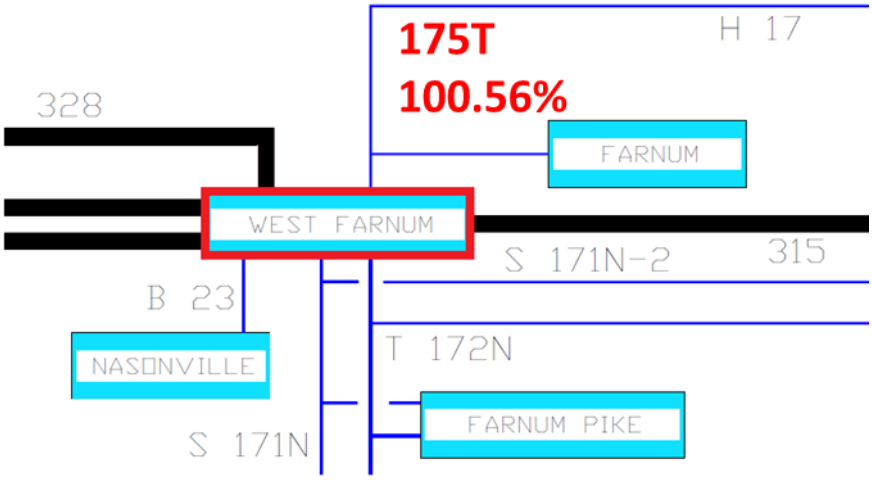

Figure 5-11: West Farnum 175T N-1 Thermal Overload

5.2.2.2 *West Medway – West Walpole Subarea N-1 Thermal Overloads and Voltage Violations Results*

No N-1 voltage violations or thermal overloads were observed for the West Medway – West Walpole subarea.

5.2.2.3 *South Shore Subarea N-1 Thermal Overloads and Voltage Violations Results*

The elements listed in the following table and shown on the one-line diagrams following the table were overloaded for the contingency and generation dispatch conditions noted in the results tables for the South Shore subarea.

No N-1 voltage violations were observed in this subarea.

Table 5-6: South Shore Subarea N-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MW)	Contingency	Worst-Case Thermal Loading (% LTE)
L1[28]	East Bridgewater to East Bridgewater Tap 115 kV Line	166	[redacted]	120.47
E1-2	Middleboro to Bridgewater 115 kV Line Section	197	[redacted]	109.49[29]
Worst case overloads occur for loss of some combination of the [redacted].				

[28] Planned National Grid upgrades to this line (with an in-service date of 2017) may alleviate or eliminate this overload, but final updated ratings were not available as of the time of completion of this Needs Assessment.

[29] This overload only occurs on the portion of the line owned by Middleboro Gas and Electric.

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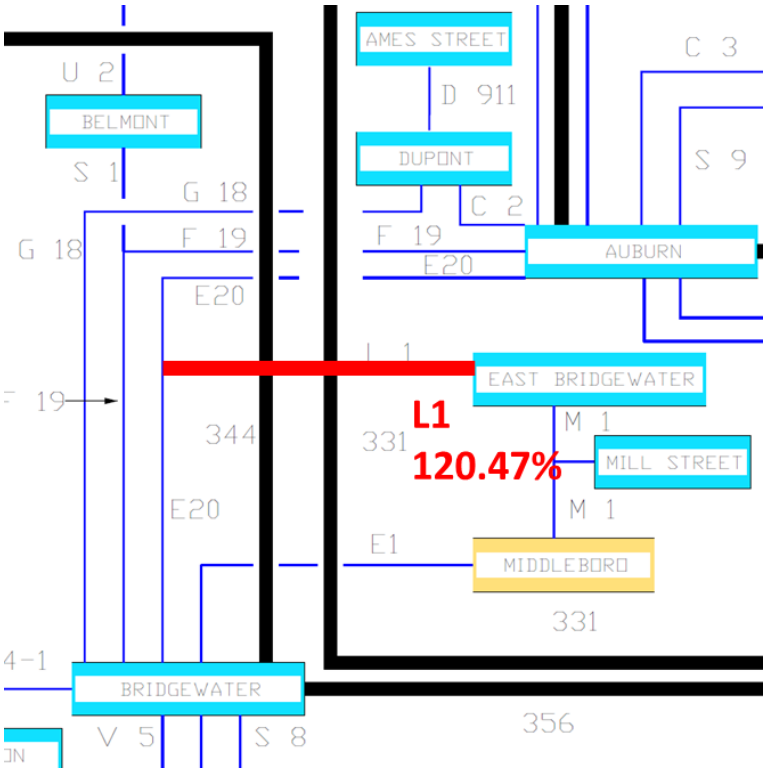

Figure 5-12: L1 N-1 Thermal Overload

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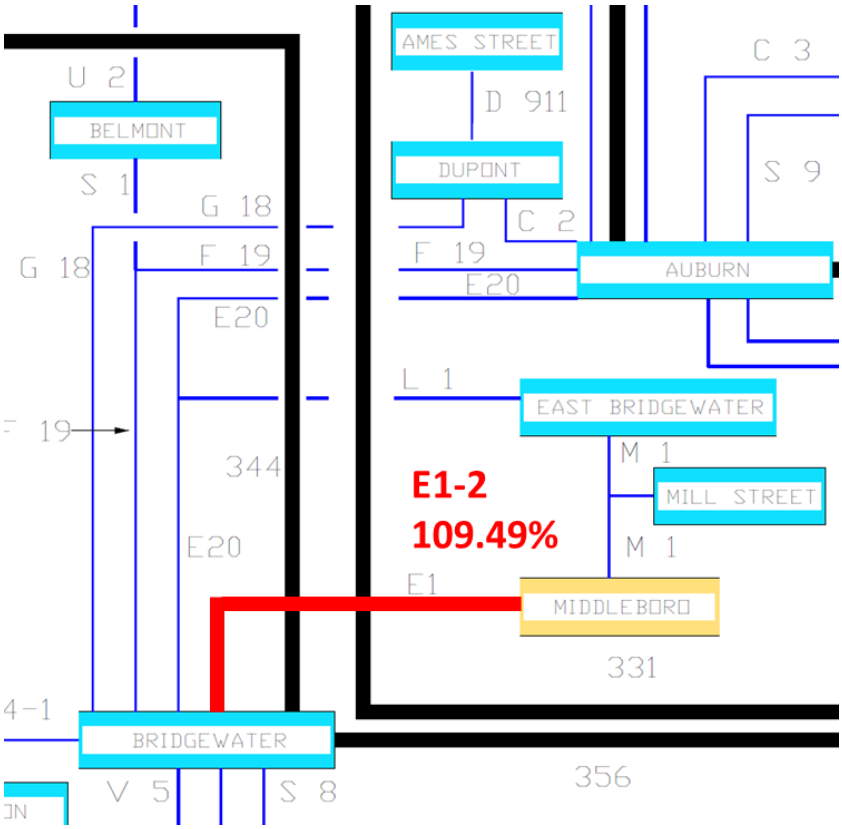

Figure 5-13: E1-2 N-1 Thermal Overload

5.2.2.4 *Industrial Park Subarea N-1 Thermal Overloads and Voltage Violations Results*

The elements listed in the following table and shown on the one-line diagrams following the table were overloaded for the contingency and generation dispatch conditions noted in the results tables for the Industrial Park subarea.

Table 5-7: 111 and 122 Line Section Overloads N-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Contingency	Worst-Case Thermal Loading (% LTE)
112-1[30]	Tremont to Rochester 115 kV Line Section	286	[redacted]	119.18
112-2[30]	Rochester to Crystal Spring Tap 115 kV Line Section	281	[redacted]	119.73
112-3[30]	Industrial Park Tap to Crystal Spring Tap 115 kV Line Section	280	[redacted]	120.16
112-4	Industrial Park to Industrial Park Tap 115 kV Line Section	246	[redacted]	184.17
111-1	High Hill to Industrial Park 115 kV Line Section	246	[redacted]	163.71
Loss of the [redacted] leaves a large portion of eastern Rhode Island and southeastern Massachusetts fed radially off of the 112 and 114 lines out of the Tremont substation. Absent generation [redacted], the thermal overloads are exacerbated and low voltages are observed in the pocket.				

[30] The reported worst case thermal overloads on these line sections reflect the inclusion of the FCM-certified transmission upgrades proposed for these line sections associated with [redacted].

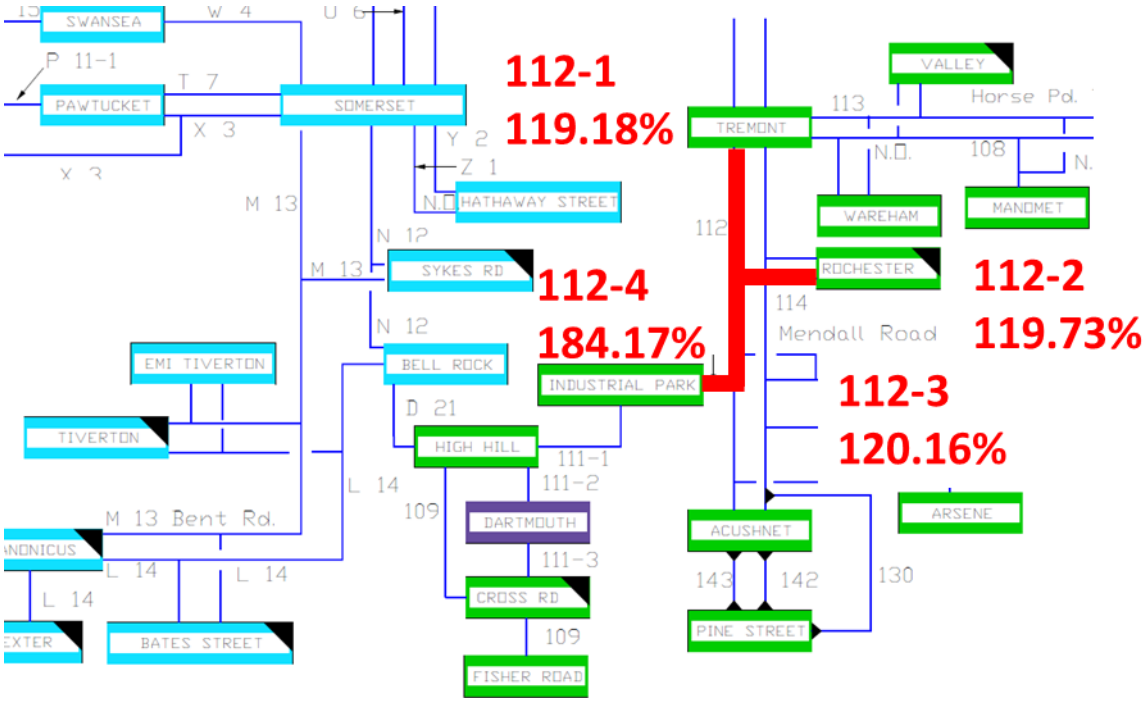

Figure 5-14: 112 Line Sections N-1 Thermal Overloads

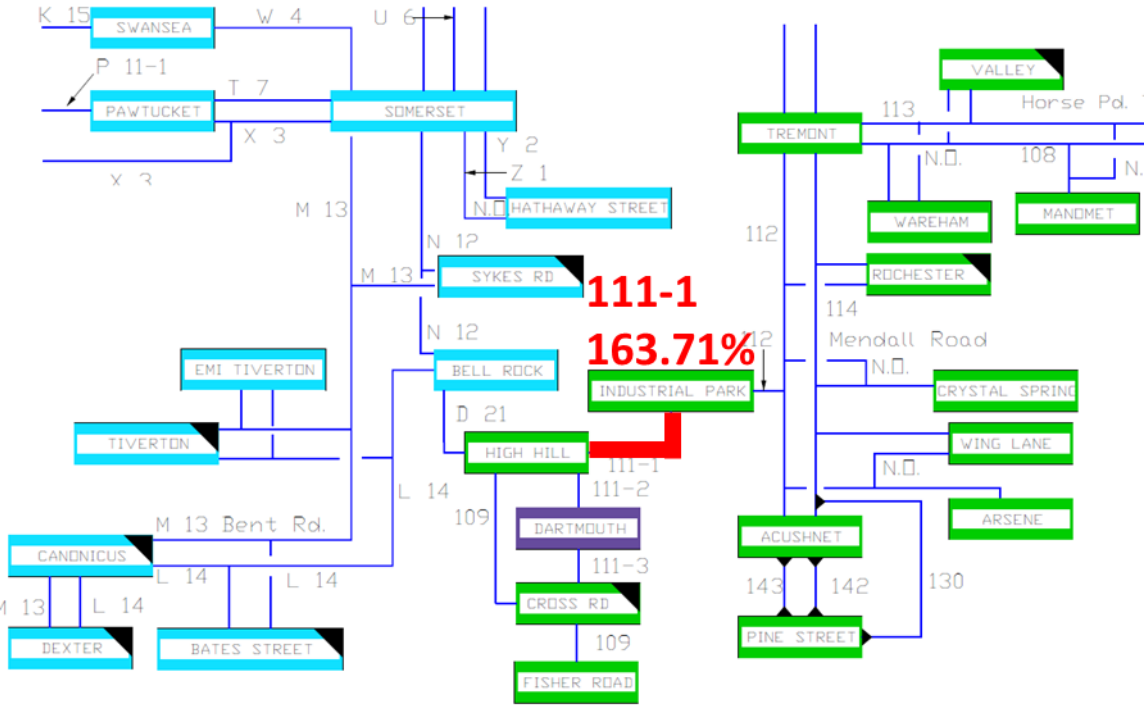

Figure 5-15: 111-1 Thermal N-1 Overload

The buses listed in the following table and shown on the one-line diagrams following the table showed N-1 voltage violations for the contingency and generation dispatch conditions noted in the results tables for the Industrial Park subarea.

Table 5-8: Industrial Park Subarea N-1 Voltage Violations

Bus Name	Base kV	Contingency	Worst-Case Voltage (p.u.)	Comments
Acushnet	115	[redacted]	0.8405	[redacted]
High Hill	115	[redacted]	0.7164	[redacted]
Industrial Park	115	[redacted]	0.7508	[redacted]
Tremont	115	[redacted]	0.9437	[redacted]

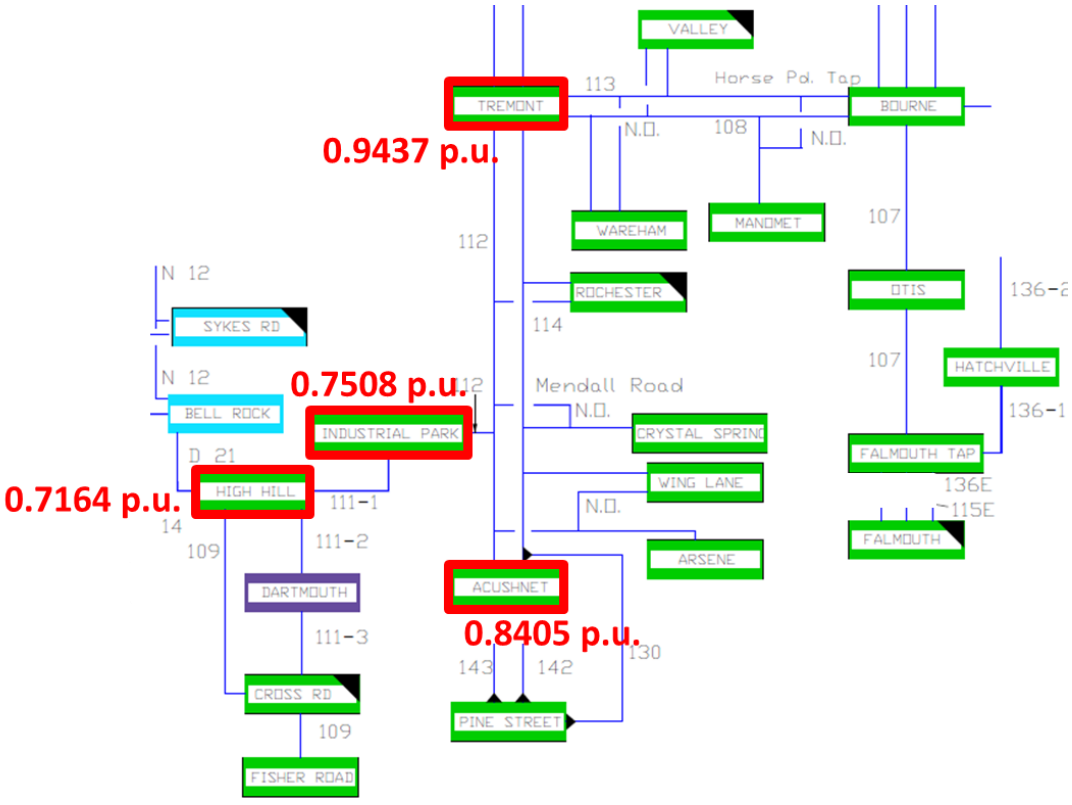

Figure 5-16: Industrial Park Subarea N-1 Voltage Violations

5.2.2.5 *Somerset – Newport Subarea N-1 Thermal Overloads and Voltage Violations Results*

The elements listed in the following tables and shown on the one-line diagrams following the tables were overloaded for the generation dispatch conditions noted under in the results tables for the Somerset-Newport subarea.

The results for this subarea indicate that, absent generation [redacted], N-1 overloads occur on [redacted] the load pocket encompassed by the Woonsocket, Washington, Robinson Ave, Valley, and Riverside substations.

Table 5-9: L14 Line Sections N-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Contingency	Worst-Case Thermal Loading (% LTE)
L14-3	Bent Rd to Tiverton Tap 115 kV Line Section	210	[redacted]	135.25
L14-4	Bell Rock to Tiverton Tap 115 kV Line Section	250	[redacted]	129.16
L14-6	Tiverton to Tiverton Tap 115 kV Line Section	180	[redacted]	103.17
L14-7	Canonicus to Dexter 115 kV Line Section	165	[redacted]	111.50
These overloads occur for various contingencies that take out some or all portions of the [redacted].				

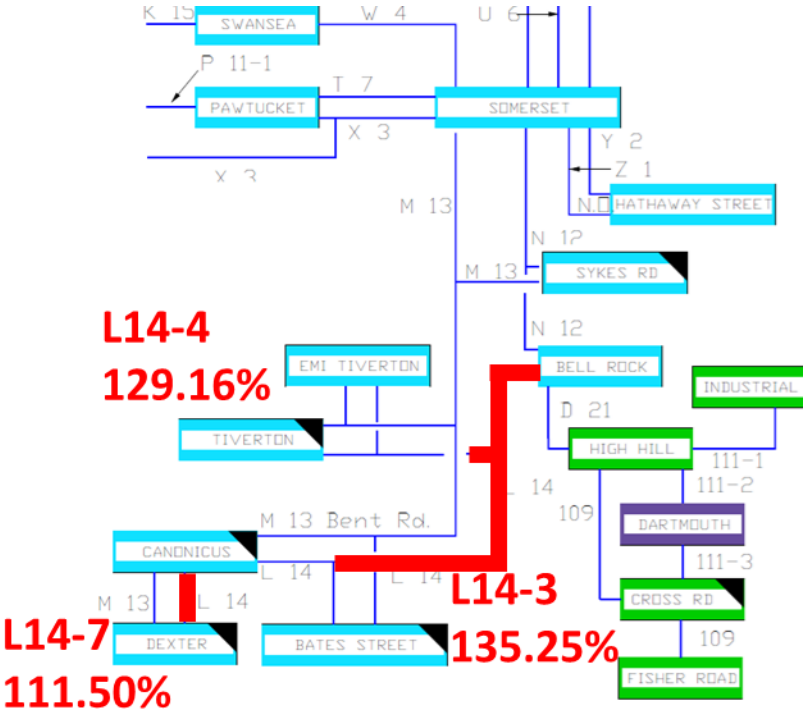

Figure 5-17: L14 Line Sections Thermal Overloads

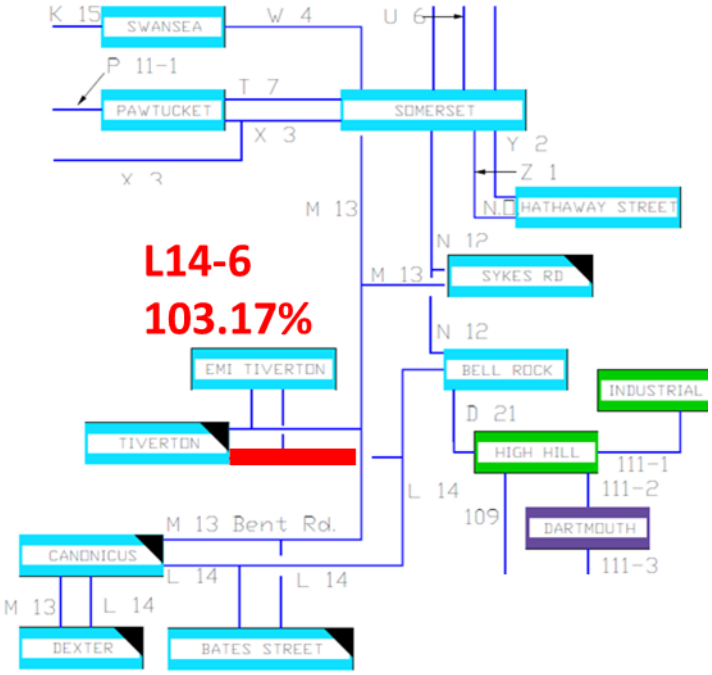

Figure 5-18: L14-6 N-1 Thermal Overload

REDACTED

Table 5-10: D21, N12 and M13 Line Sections N-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Contingency	Worst-Case Thermal Loading (% LTE)
D21	Bell Rock to High Hill 115 kV Line	330	[redacted]	102.42
N12-1	Somerset to Sykes Rd 115 kV Line Section	284	[redacted]	110.26
N12-2	Sykes Rd to Bell Rock 115 kV Line Section	284	[redacted]	100.05
M13-4	Somerset to Sykes Rd 115 kV Line Section	284	[redacted]	109.38
M13-8	Tiverton Tap to Sykes Rd 115 kV Line Section	250	[redacted]	117.28
With generation at [redacted], loss of [redacted] this load pocket causes overloads on the lines remaining in service.				

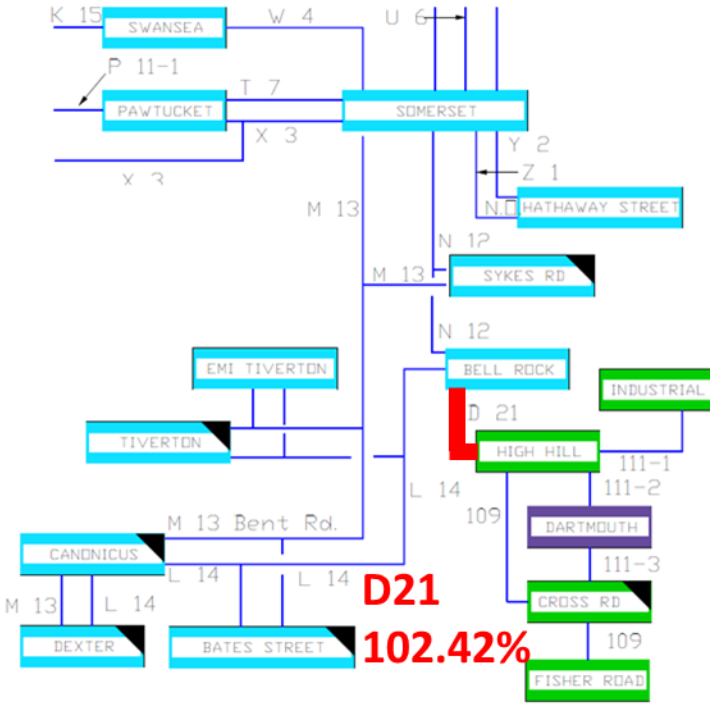

Figure 5-19: D21 N-1 Overload

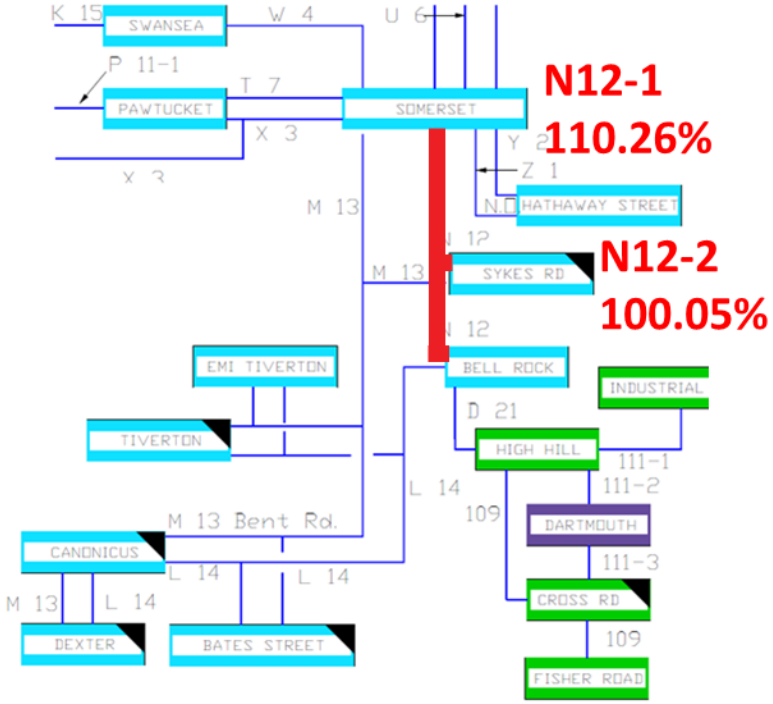

Figure 5-20: N12 Line Sections N-1 Thermal Overloads

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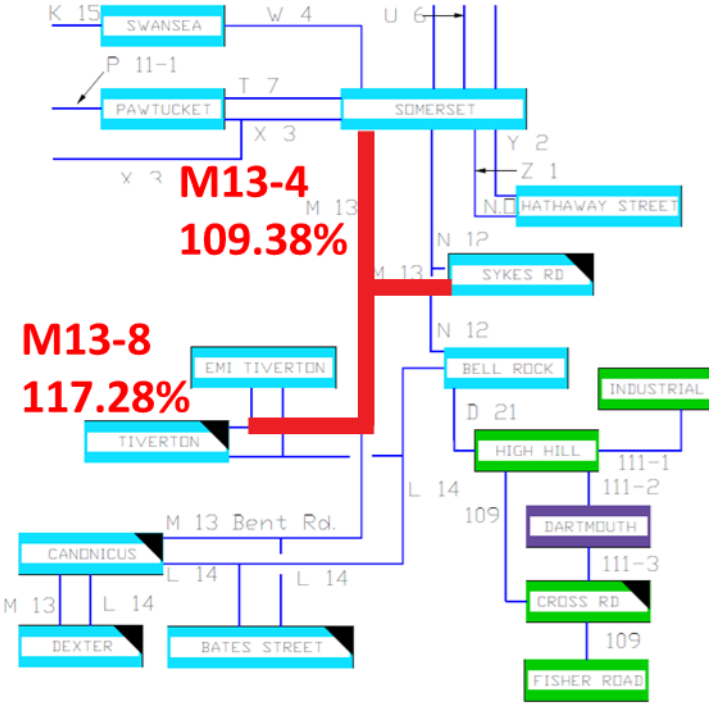

Figure 5-21: M13 Line Sections N-1 Thermal Overloads

REDACTED

Table 5-11: V5, U6 and S8 Line Sections N-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Contingency	Worst-Case Thermal Loading (% LTE)
U6-1	Somerset to Dighton 115 kV Line Section	206	[redacted]	117.38
U6-3	Dighton to Dighton Tap Line Section	206	[redacted]	117.33
V5-3	Bridgewater to V5 Tap 115 kV Line Section	244	[redacted]	100.36
S8-4	Bridgewater to Raynham 115 kV Line Section	244	[redacted]	113.92
Overloads occur [redacted] generation with contingencies involving [redacted].				

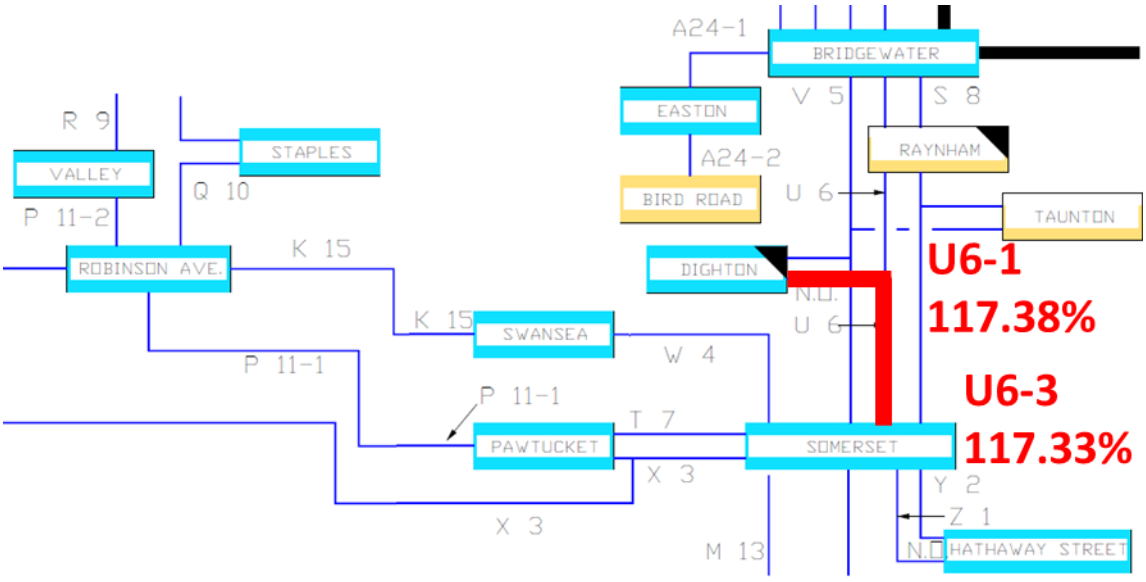

Figure 5-22: U6-1, 3 N-1 Overloads

REDACTED

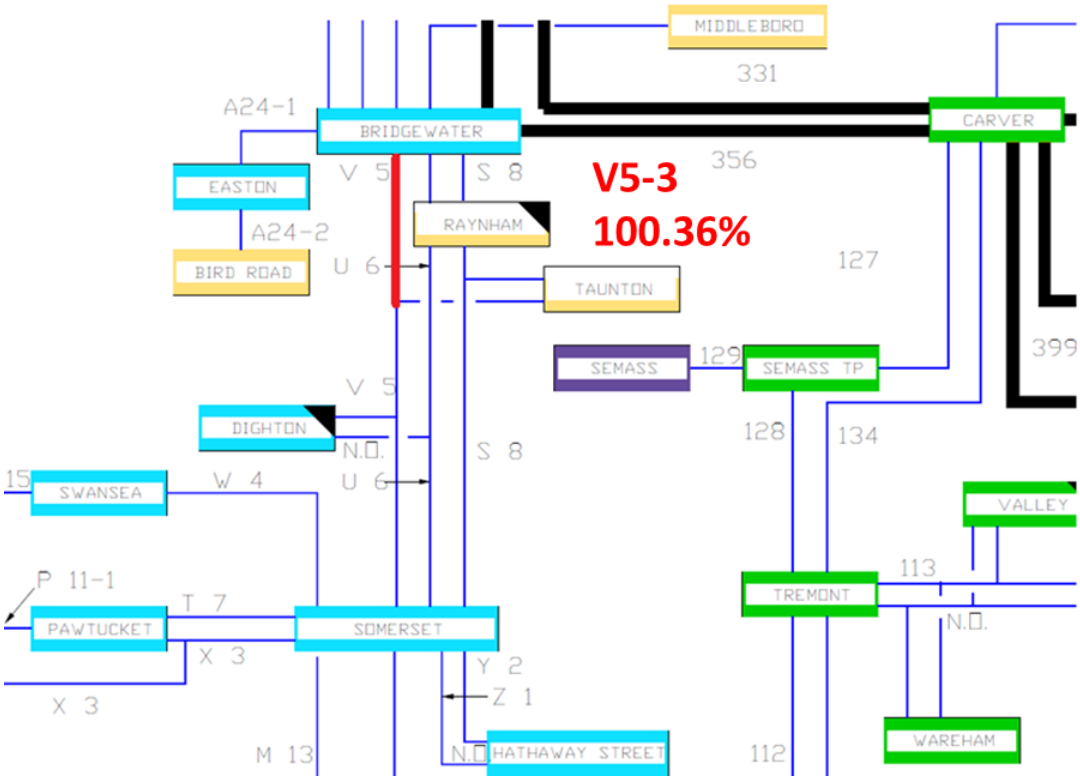

Figure 5-23: V5-3 N-1 Thermal Overload

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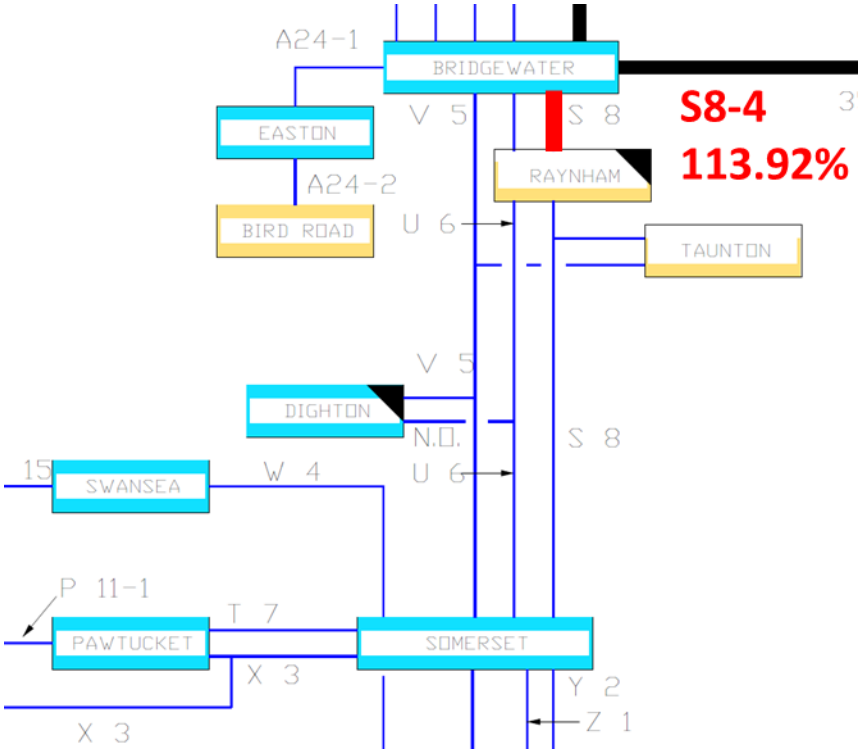

Figure 5-24: S8-4 N-1 Thermal Overload

The buses listed in the following table and shown on the one-line diagram following the table showed N-1 voltage violations for the contingency and generation dispatch conditions noted in the results tables for the Somerset – Newport subarea.

Table 5-12: Somerset – Newport Subarea N-1 Voltage Violations

Bus Name	Base kV	Contingency	Worst-Case Voltage (p.u.)	Comments
Bell Rock	115	[redacted]	0.6702	[redacted]
Canonicus	115	[redacted]	0.5998	[redacted]
Dexter	115	[redacted]	0.5802	[redacted]
Jepson	115	[redacted]	0.5757	[redacted]
Tiverton	115	[redacted]	0.6025	[redacted]

REDACTED

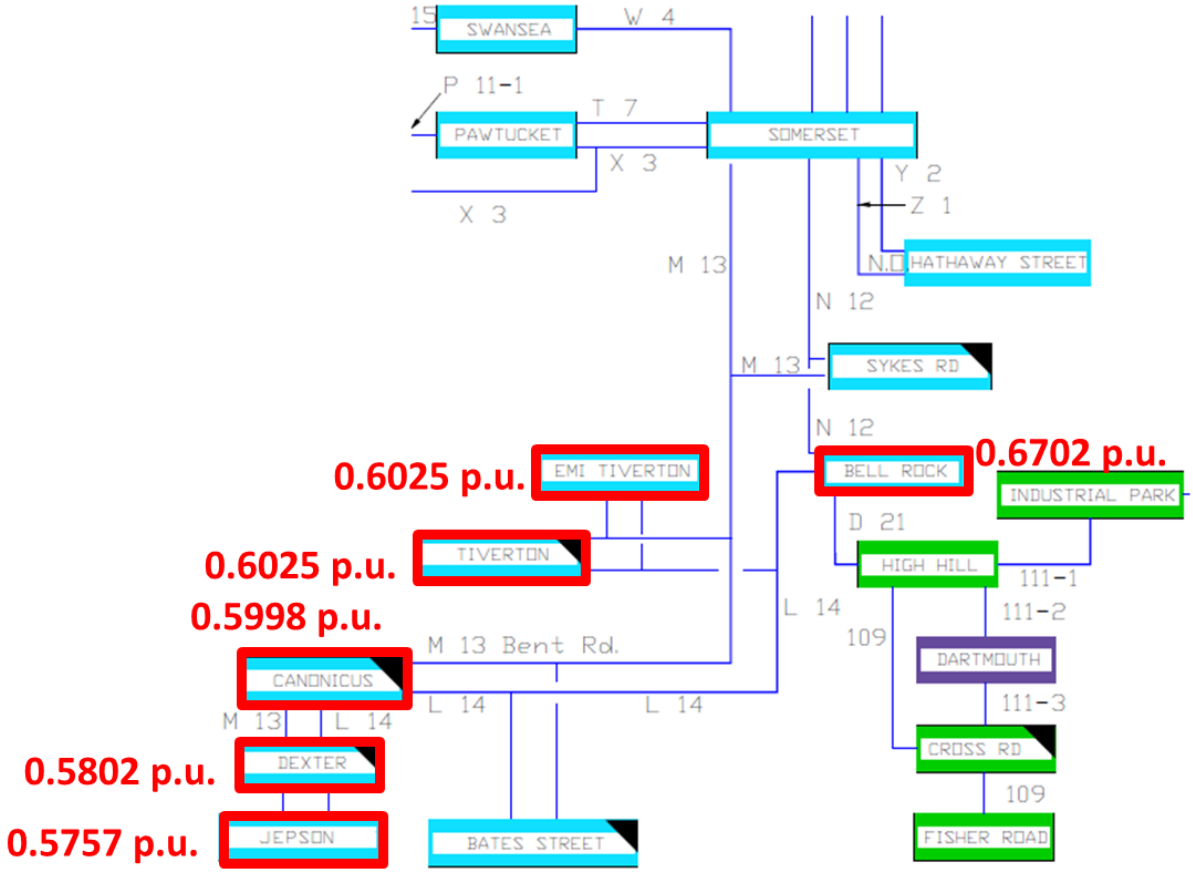

Figure 5-25: N-1 Voltage Violations Somerset - Newport Subarea

5.2.2.6 *Cape Cod Subarea N-1 Thermal Overloads and Voltage Violations Results*

No N-1 voltage violations or thermal overloads were observed for the Cape Cod subarea.

5.2.3 **N-1-1 Thermal and Voltage Violation Summary**

Element-out-of-service (N-1-1) testing included all 115 kV, 230 kV and 345 kV transmission lines as well as 345 kV autotransformers as initial out of service elements in the SEMA-RI area that are considered NERC Bulk Electric System (BES) elements. These element-out-of-service conditions were tested against the full set of contingencies used in the N-1 tests, with noted exceptions made for the treatment of no-fault contingencies as described in Section 4.3.2. Testing of the system included use of an analytical tool that used a re-dispatch of New England generation outside the SEMA-RI area and back-down of SEMA-RI area generation in an attempt to avoid overloads.

The N-1-1 overloaded elements and voltage violations for each subarea listed in Section 5.1 above are shown in this section and are organized by the six subareas. These results shown below include the worst-case result for each element or bus. The dispatch conditions for the overloaded element results have been noted in the comments at the bottom of each table. The full set of results for all contingencies tested can be found in Section 11.

5.2.3.1 *Farnum Subarea N-1-1 Thermal Overloads and Voltage Violation Results*

The tables in this section and the figures following them show the worst case N-1-1 element overloads and unacceptable voltage performance results for the Farnum subarea. Dispatch conditions for each of the overloads and voltage violations are noted in the comments at the bottom of each table.

Table 5-13: Kent County 3X N-1-1 Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
Kent County 3X	Kent County 3X 345/115 kV Autotransformer	587	[redacted]	[redacted]	102.97
Worst case overloads occur with [redacted]. [redacted] leaves the 3X autotransformer (which has the lowest LTE rating of the three) as the only 345 kV source into the area.					

REDACTED

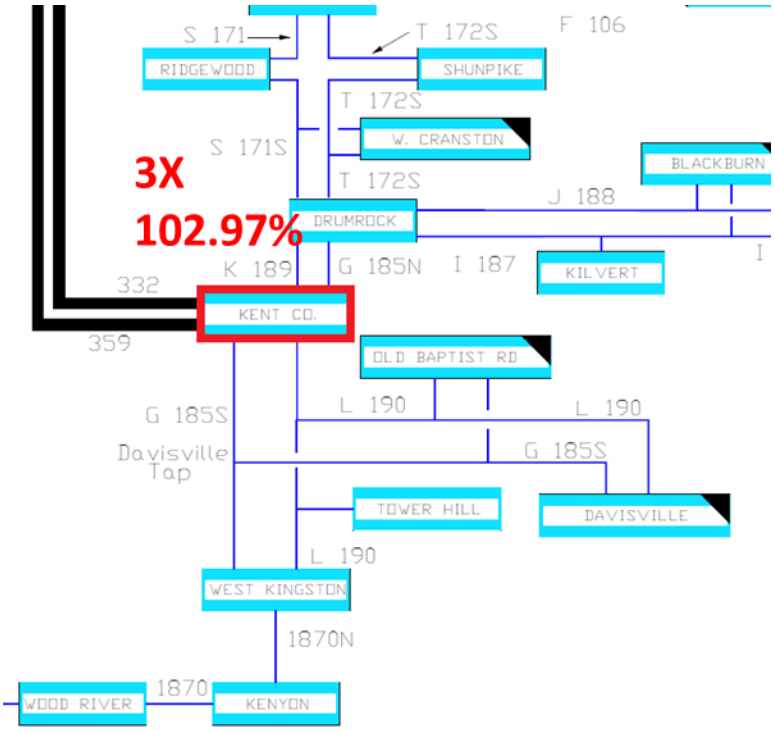

Figure 5-26: Kent County 3X N-1-1 Overload

Table 5-14: L190 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
L190-4	Tower Hill to West Kingston 115 kV Line	251	[redacted]	[redacted]	118.19
L190-5	Tower Hill to Davisville Tap 115 kV Line	251	[redacted]	[redacted]	131.18
Worst-case overloads occurred [redacted]. [redacted], the L190 becomes the sole transmission source into this pocket and also must serve several substations west of the CT-RI border.					

REDACTED

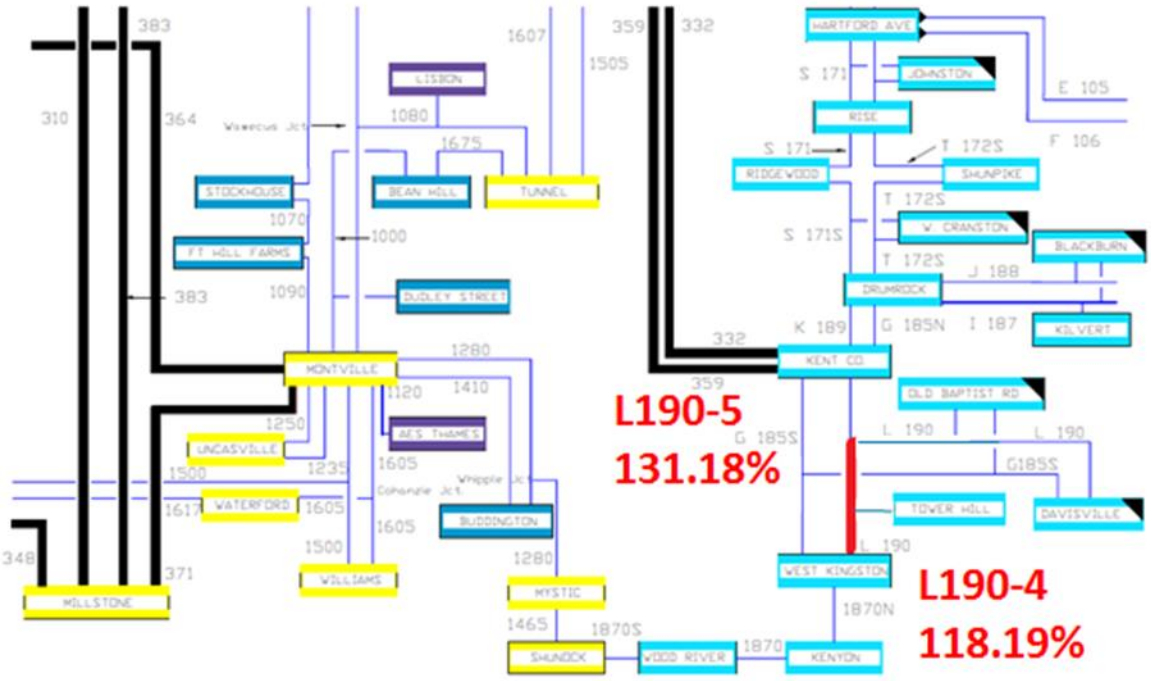

Figure 5-27: L190-4, 5 N-1-1 Overloads

Table 5-15: V148N/S Line Section and H17 Line Section N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
V148S-1	V148 Tap to Washington RI 115 kV Line	218	[redacted]	[redacted]	144.34
V148S-3	Robinson Ave to V148 Tap 115 kV Line	410	[redacted]	[redacted]	104.66
V148N	Washington to Woonsocket 115 kV Line	348	[redacted]	[redacted]	106.84
H17-1	West Farnum to Farnum Tap 115 kV Line	284	[redacted]	[redacted]	144.64
H17-2	Riverside to Farnum Tap 115 kV Line	245	[redacted]	[redacted]	167.18
All of the overloads in this table occur for loss [redacted] and leaves the area with limited support [redacted]. In all cases, the worst violations occurred [redacted].					

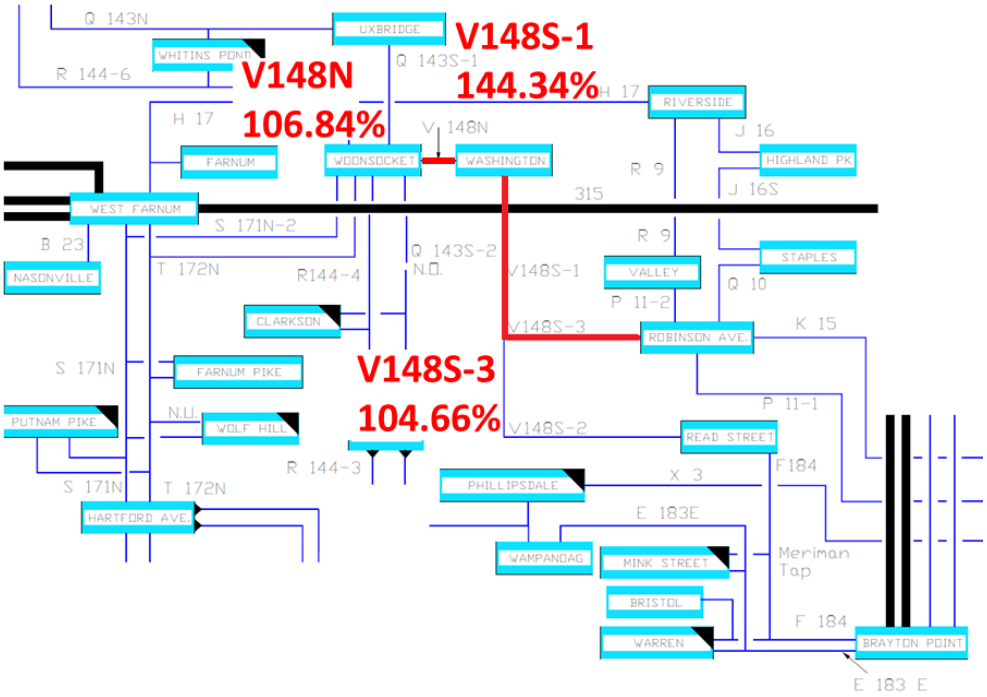

Figure 5-28: V148N and V148S Line Sections N-1-1 Thermal Overloads

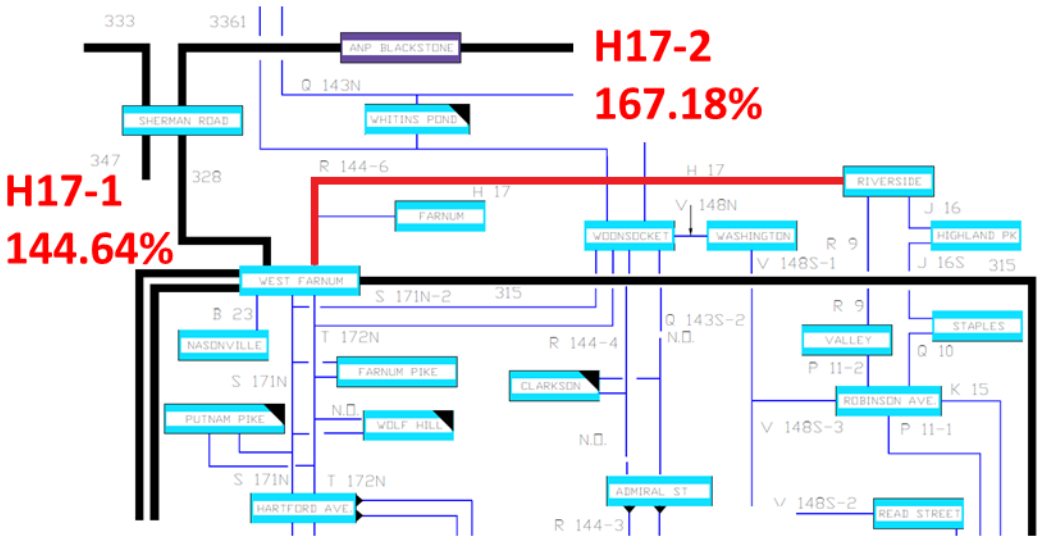

Figure 5-29: H17 Line Sections N-1-1 Overloads

REDACTED

Table 5-16: R9, Valley P11/R9 Bus Tie **and J16 Line Section N-1-1 Thermal Overloads**

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
R9	Riverside to Valley 115 kV Line	110	[redacted]	[redacted]	210.61
Valley P11/R9 Bus Tie	Valley 205 115 kV Bus Equipment	128	[redacted]	[redacted]	160.39
J16S	Staples to Highland Drive 115 kV Line	115	[redacted]	[redacted]	169.36
All of the overloads in this table occur for loss [redacted]. In all cases, the worst violations occurred with [redacted].					

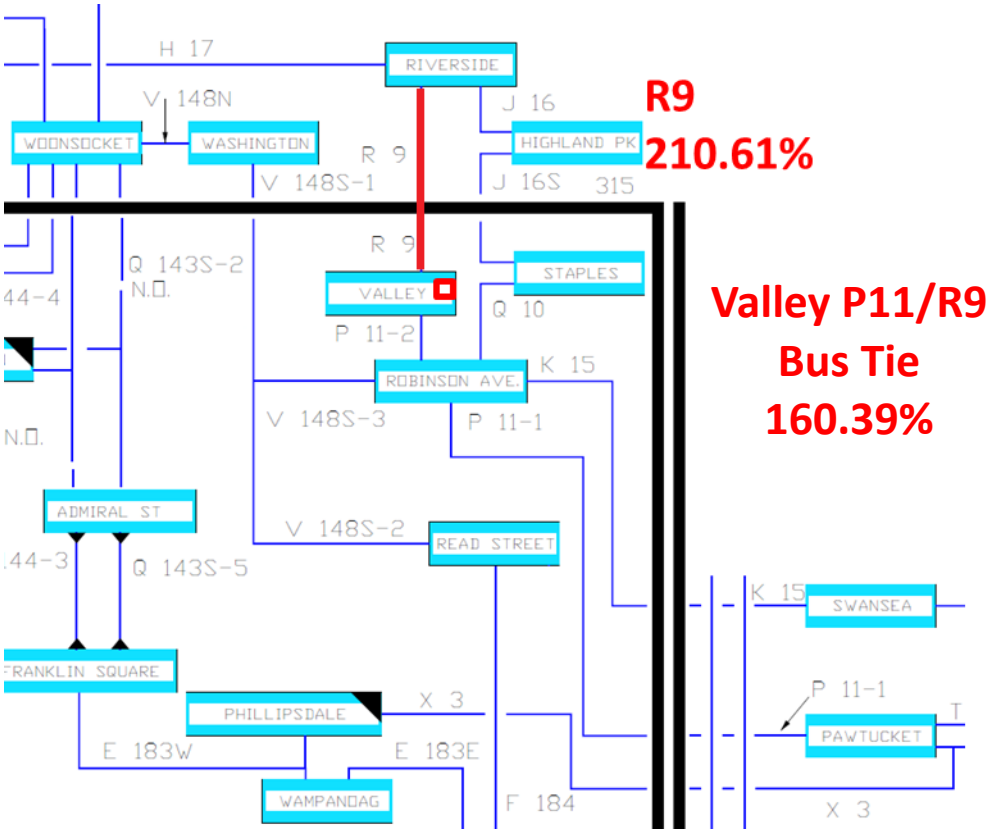

Figure 5-30: R9, Valley P11/R9 Bus Tie **N-1-1 Thermal Overloads**

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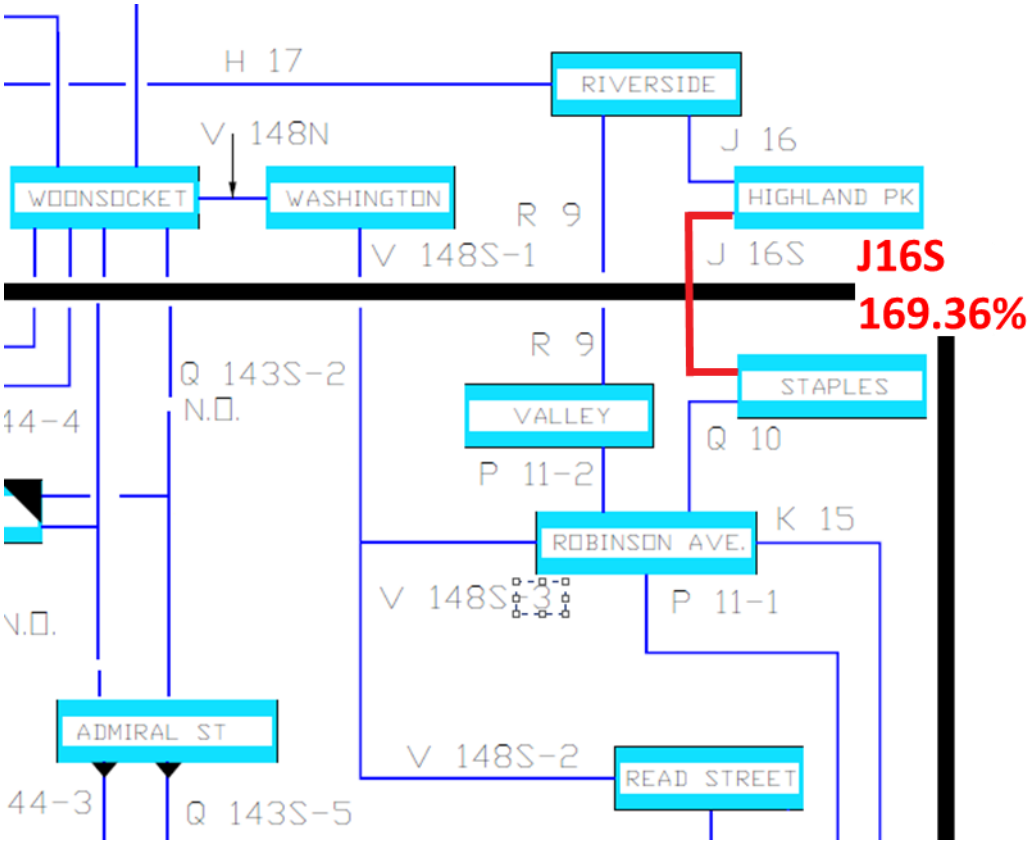

Figure 5-31: J16S N-1-1 Thermal Overloads

REDACTED

Table 5-17: P11 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
P11-1	Pawtucket to P11 Tap 115 kV Line	172	[redacted]	[redacted]	188.96
P11-2	Valley to P11 Tap 115 kV Line	127	[redacted]	[redacted]	140.36
P11-3	Robinson Ave to P11 Tap 115 kV Line	193	[redacted]	[redacted]	136.94
Worst case overloads occur [redacted]. These overloads are primarily driven by loss of [redacted], placing additional stress on the 115 kV network [redacted].					

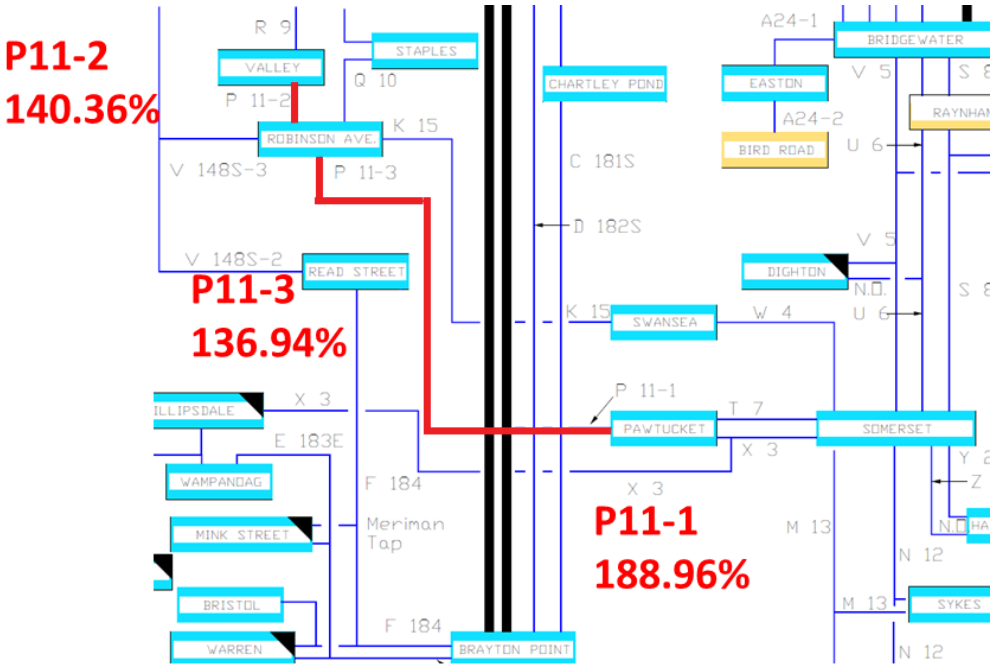

Figure 5-32: P11 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-18: Q10 N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
Q10	Robinson Ave to Staples 115 kV Line	156	[redacted]	[redacted]	119.81
Worst case overloads occur with [redacted]. This combination of contingencies leaves the K15/Q10 path [redacted].					

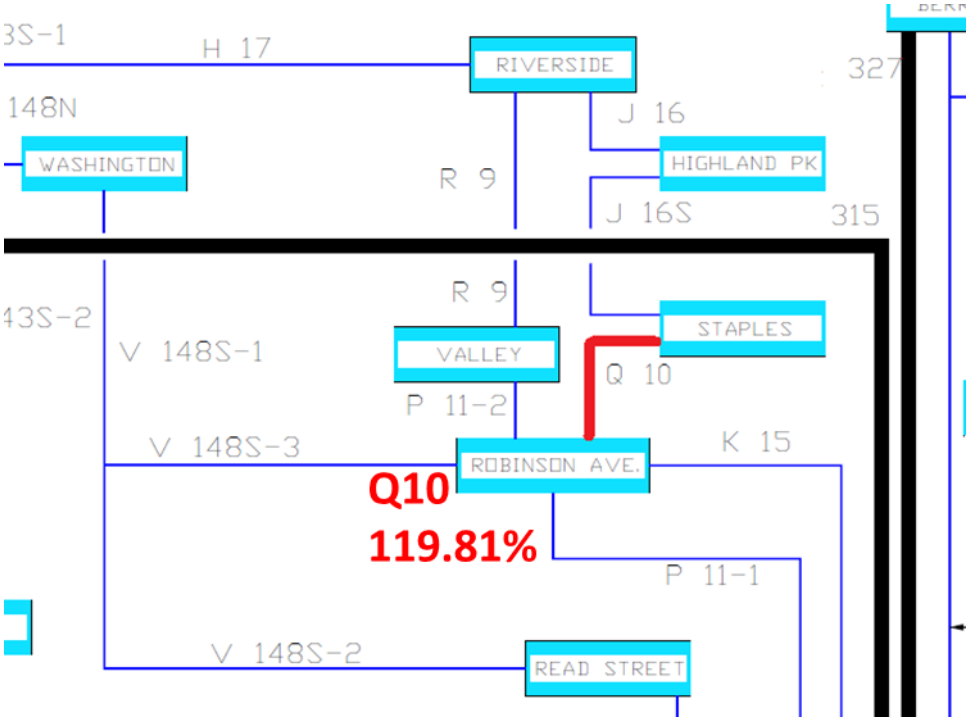

Figure 5-33: Q10 N-1-1 Thermal Overload

REDACTED

Table 5-19: West Farnum 175T and S171 Line Section N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
West Farnum 175T[31]	West Farnum 345/115 kV Autotransformer	389	[redacted]	[redacted]	118.28
Worst case overloads occur [redacted]. Loss of [redacted] makes the remaining autotransformer the main source of 345 kV support into the region between these two 345 kV substations.					

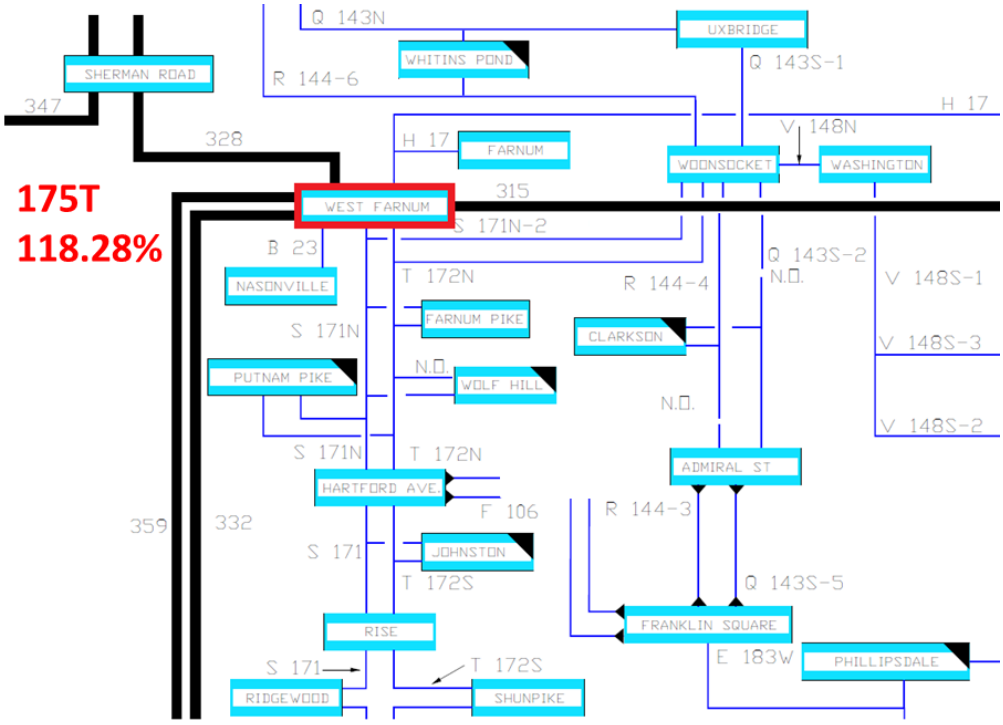

Figure 5-34: West Farnum 175T N-1-1 Thermal Overload

[31] The West Farnum 175T autotransformer has rating of 389 MVA; the parallel 174T transformer has a higher rating of 592 MVA.

REDACTED

Table 5-20: 1870, 1870S N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
1870[32]	Kenyon to Wood River 115 kV Line	290	[redacted]	[redacted]	114.25
1870S[32]	Wood River to Chase Hill 115 kV Line	218	[redacted]	[redacted]	124.02
1870S-1[32]	Chase Hill to Shunock 115 kV Line	218	[redacted]	[redacted]	111.66
With loss of [redacted], Kent County becomes the nearest source of 345 kV support for a large portion of eastern Connecticut, placing stress on the single 115 kV corridor between Connecticut and Rhode Island.					

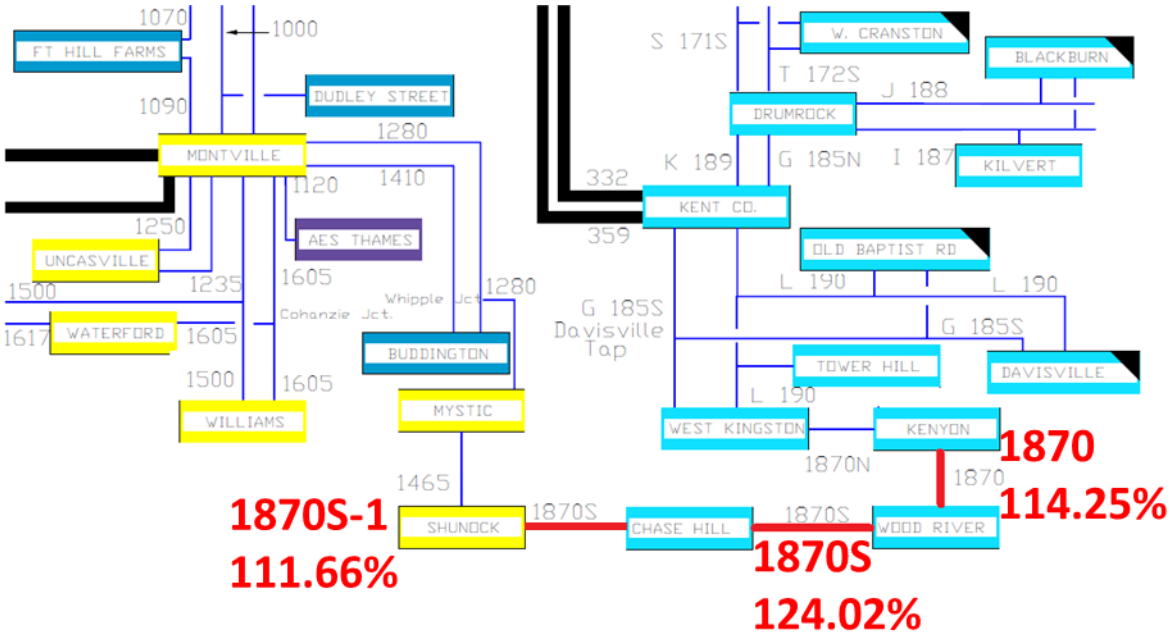

Figure 5-35: 1870N, 1870, 1870S N-1-1 Thermal Overloads

[32] These overloads occur due to contingencies in the eastern portion of Connecticut. Transmission solutions to address these needs will be developed in cooperation with the ongoing Eastern Connecticut study group.

Table 5-21: Drumrock G185N, K189 N-1-1 Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
G185N Line	Drumrock to Kent County 115 kV Line	446	[redacted]	[redacted]	100.97
K189 Line	Drumrock to Kent County 115 kV Line	449	[redacted]	[redacted]	100.78
This combination of contingencies leaves the transmission corridor between West Farnum and Kent County served by only two 115 kV lines. Worst-case overloads occurred [redacted]					

REDACTED

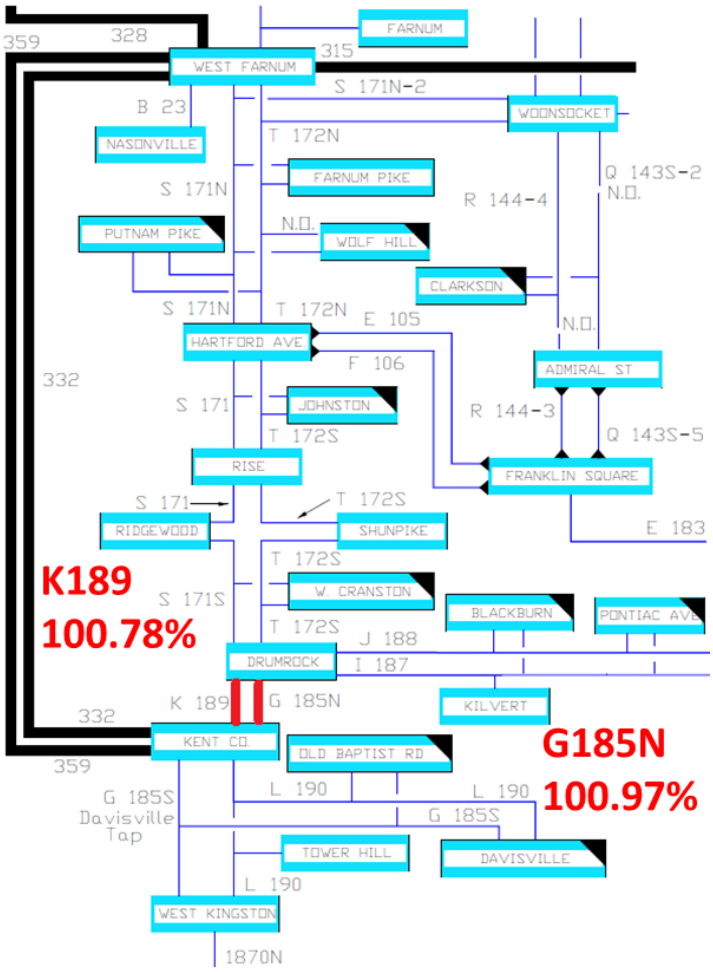

Figure 5-36: G185N, K189 N-1-1 Thermal Overloads

REDACTED

Table 5-22: Farnum Subarea N-1-1 Voltage Violations

Bus Name	Base kV	Element OOS	Contingency	Worst-Case Voltage (p.u.)	Comments
Highland Drive	115	[redacted]	[redacted]	0.7221	[redacted]
Riverside	115	[redacted]	[redacted]	0.7150	[redacted]
Robinson Avenue	115	[redacted]	[redacted]	0.7603	[redacted]
Staples	115	[redacted]	[redacted]	0.7291	[redacted]
Valley	115	[redacted]	[redacted]	0.6917	[redacted]
Drumrock	115	[redacted]	[redacted]	0.9355	[redacted]
Kenyon[33]	115	[redacted]	[redacted]	0.8494	[redacted]
Wood River[33]	115	[redacted]	[redacted]	0.8175	[redacted]
West Kingston[33]	115	[redacted]	[redacted]	0.8897	[redacted]

[33] These voltage violations occur due to contingencies in the eastern portion of Connecticut. Transmission solutions to address these needs will be developed in cooperation with the ongoing Eastern Connecticut study group.

REDACTED

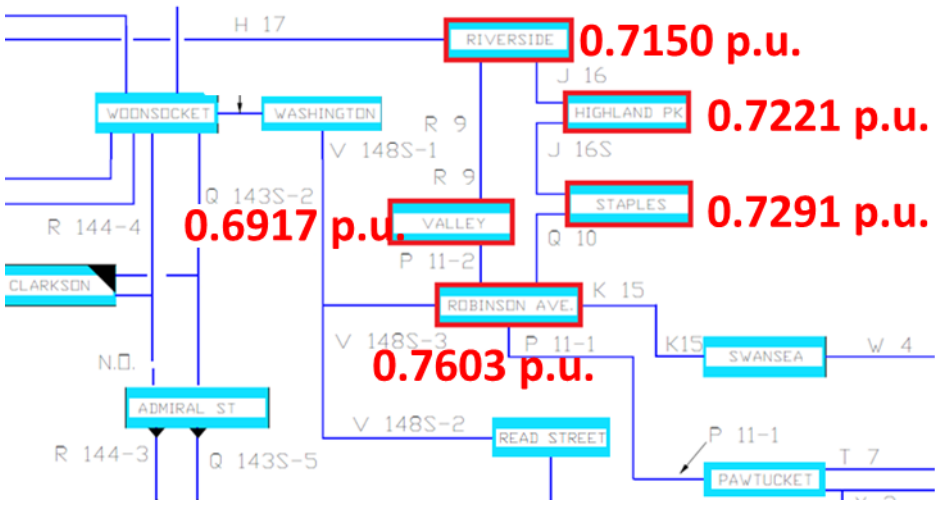

Figure 5-37: Farnum Subarea N-1-1 Voltage Violations

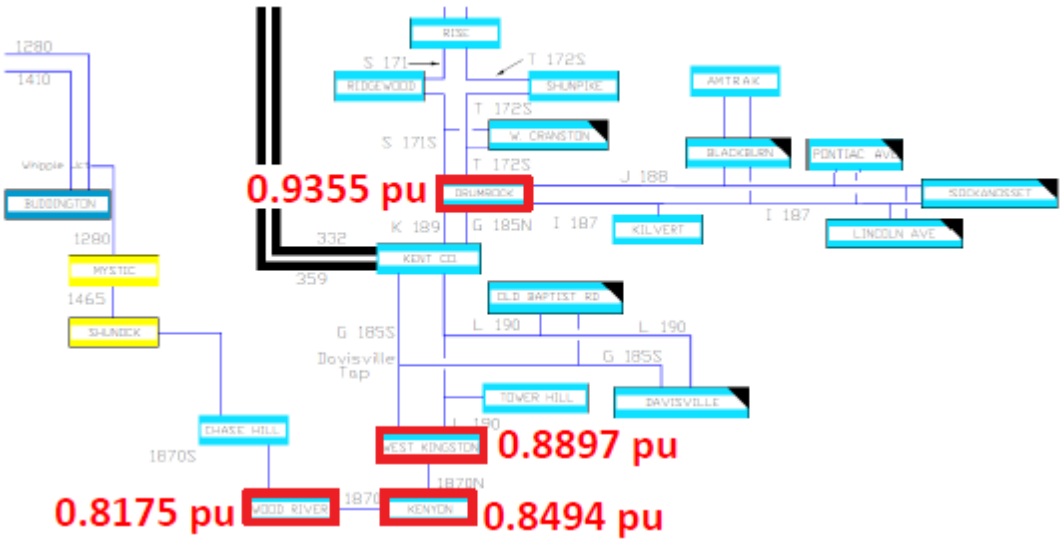

Figure 5-38: Farnum Subarea N-1-1 Voltage Violations

5.2.3.2 *West Medway – West Walpole Subarea N-1-1 Thermal Overloads and Voltage Violation Results*

The tables in this section and the figures following them show the worst case N-1-1 element overloads and unacceptable voltage performance results for the West Medway – West Walpole subarea. Dispatch conditions for each of the overloads and voltage violations are noted in the comments at the bottom of each table.

Table 5-23: West Medway 345 kV Lines N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	2026 Loading % LTE
323 (Eversource)	West Medway to Millbury 345 kV Line	1319	[redacted]	[redacted]	126.40
323 (National Grid)	West Medway to Millbury 345 kV Line	1416	[redacted]	[redacted]	117.77
325	West Medway to West Walpole 345 kV Line	1520	[redacted]	[redacted]	113.67
357 (Eversource)	West Medway to Millbury 345 kV Line	1319	[redacted]	[redacted]	110.67
389	West Medway to West Walpole 345 kV Line	1972	[redacted]	[redacted]	110.51
Worst case overloads for all of these noted violations occur with [redacted], [redacted] [redacted].					

REDACTED

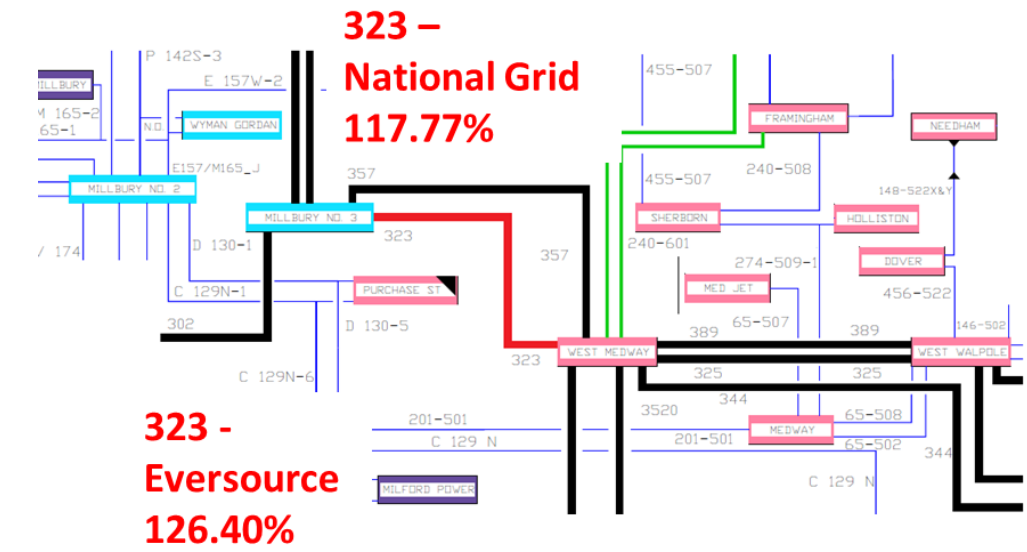

Figure 5-39: 323 N-1-1 Thermal Overload

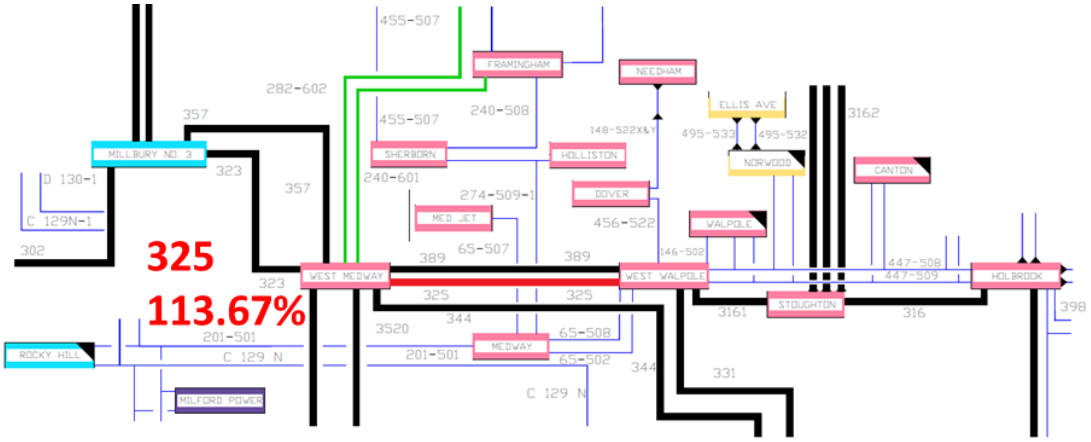

Figure 5-40: 325 N-1-1 Thermal Overload

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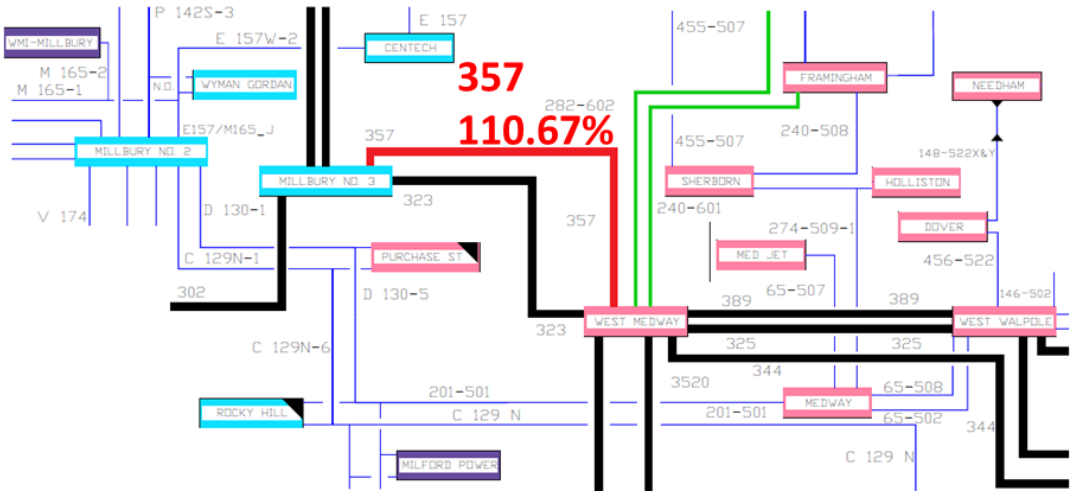

Figure 5-41: 357 N-1-1 Thermal Overload

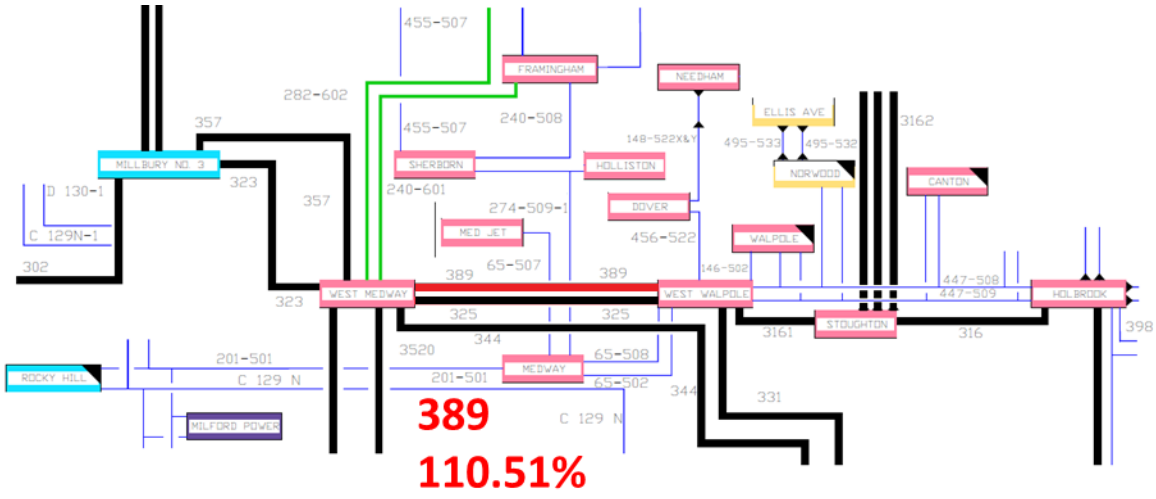

Figure 5-42: 389 N-1-1 Thermal Overload

REDACTED

Table 5-24: 331 N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	2026 Loading % LTE
331[34]	West Walpole to Carver 345 kV Line	1156	[redacted]	[redacted]	113.16
Worst case overloads for this violation occur with [redacted]. Loss of [redacted] the South Shore/Cape Cod areas causes the remaining 345 kV line to become overloaded.					

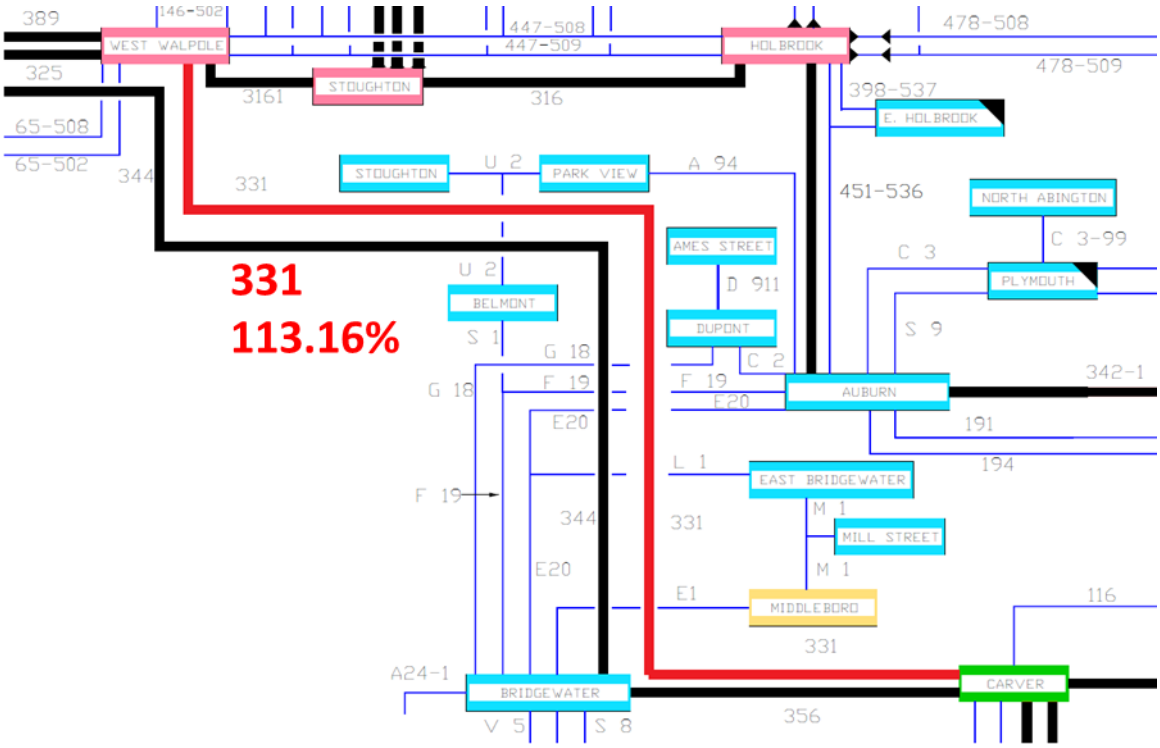

Figure 5-43: 331 N-1-1 Thermal Overload

[34] Both ends of the 331 line are owned by Eversource, but the middle portion of the line is owned by National Grid and has a higher rating (1466 MVA); thus, this overload only occurs on the Eversource portions of the line.

Table 5-25: C-129 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	2026 Loading % LTE
C-129N-1	Millbury to Purchase Tap 115 kV Line Section	218	[redacted]	[redacted]	136.36
C-129N-6	Rocky Hill to Purchase Tap 115 kV Line Section	218	[redacted]	[redacted]	112.90
Worst case overloads for all of these noted violations occur with [redacted]. Loss [redacted] leaves several substations (Purchase Street down to Union Street) served radially from the C-129N out of Millbury.					

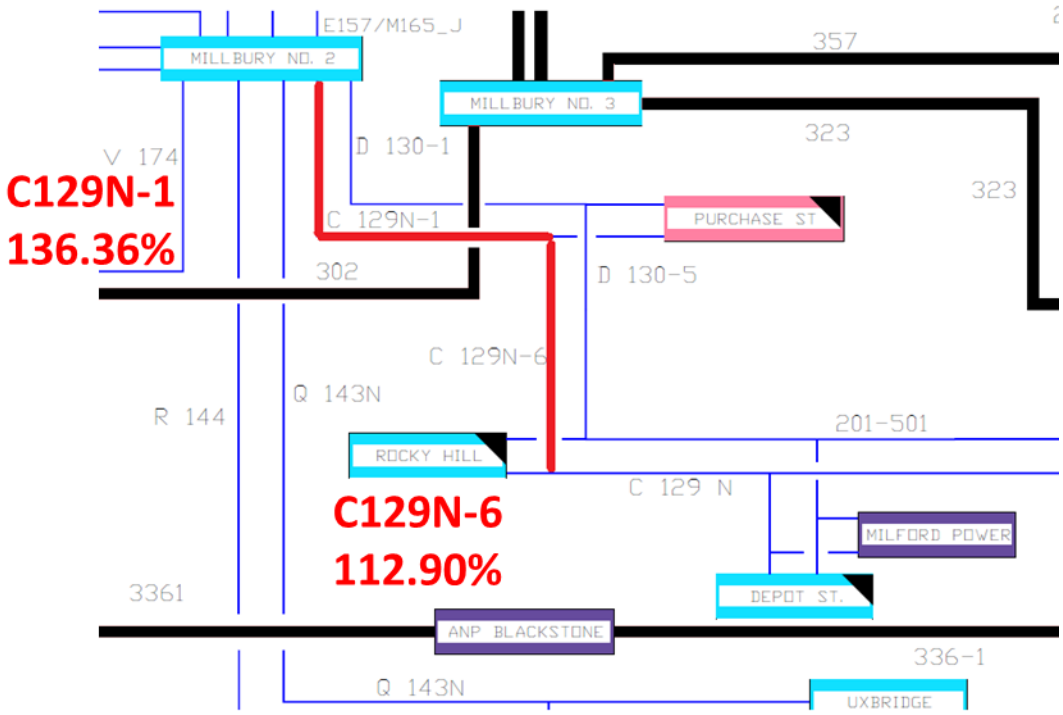

Figure 5-44: C-129N Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-26: West Medway – West Walpole Subarea N-1-1 Voltage Violations

Bus Name	Base kV	Element OOS	Contingency	Worst-Case Voltage (p.u.)	Comments
Beaver Pond	115	[redacted]	[redacted]	0.8219	[redacted]
Depot Street	115	[redacted]	[redacted]	0.8320	[redacted]
Purchase Street	115	[redacted]	[redacted]	0.8589	[redacted]
Rocky Hill	115	[redacted]	[redacted]	0.8427	[redacted]
Union Street	115	[redacted]	[redacted]	0.8200	[redacted]

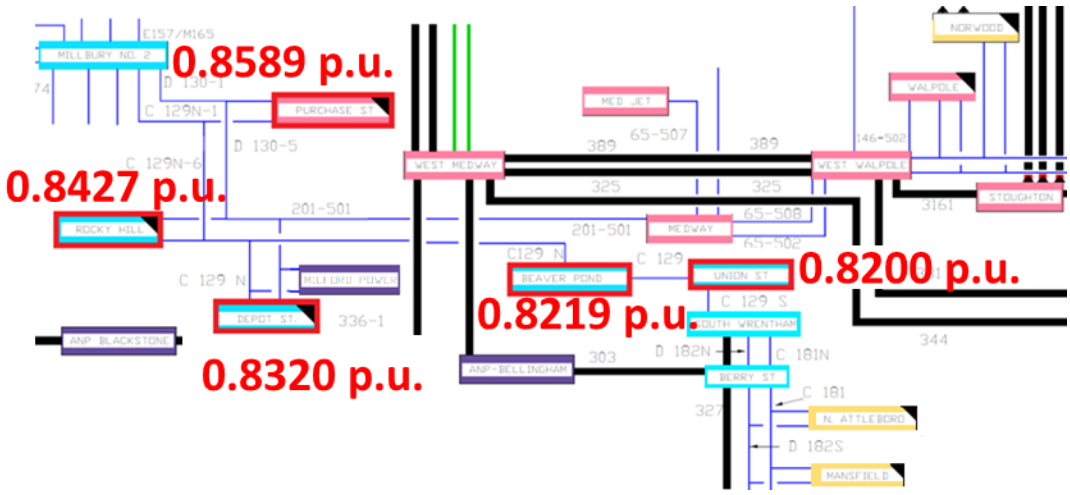

Figure 5-45: West Medway - West Walpole Subarea N-1-1 Voltage Violations

5.2.3.3 *South Shore Subarea N-1-1 Thermal Overloads and Voltage Violation Results*

The tables in this section and the figures following them show the worst case N-1-1 element overloads and unacceptable voltage performance results for the South Shore subarea. Dispatch conditions for each of the overloads and voltage violations are noted in the comments at the bottom of each table.

Table 5-27: 451-536 N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
451-536	Holbrook to East Holbrook Tap 115 kV Line	548	[redacted]	[redacted]	104.01
Worst case overloads for this violation occur with [redacted]. With the loss [redacted], the 451-536 line (which runs parallel to the 335 line) becomes a primary feed into the 115 kV network served off of the Auburn and Bridgewater substations.					

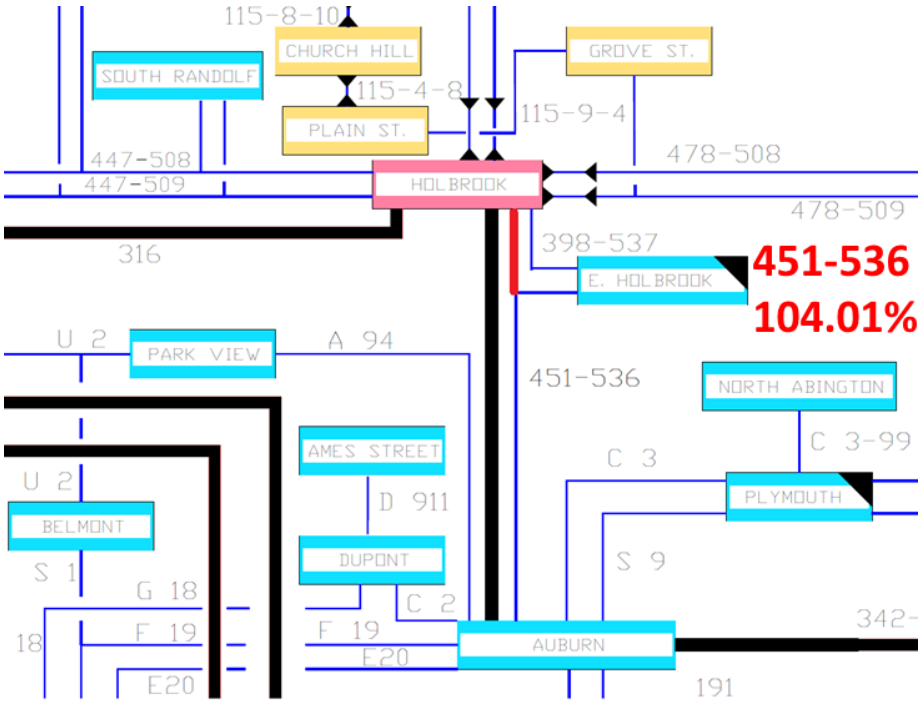

Figure 5-46: 451-536 N-1-1 Thermal Overload

REDACTED

Table 5-28: Bridgewater 162X N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
Bridgewater 162X	Bridgewater 345/115 kV Autotransformer	472	[redacted]	[redacted]	101.12
Worst case overloads for this violation occur [redacted].					

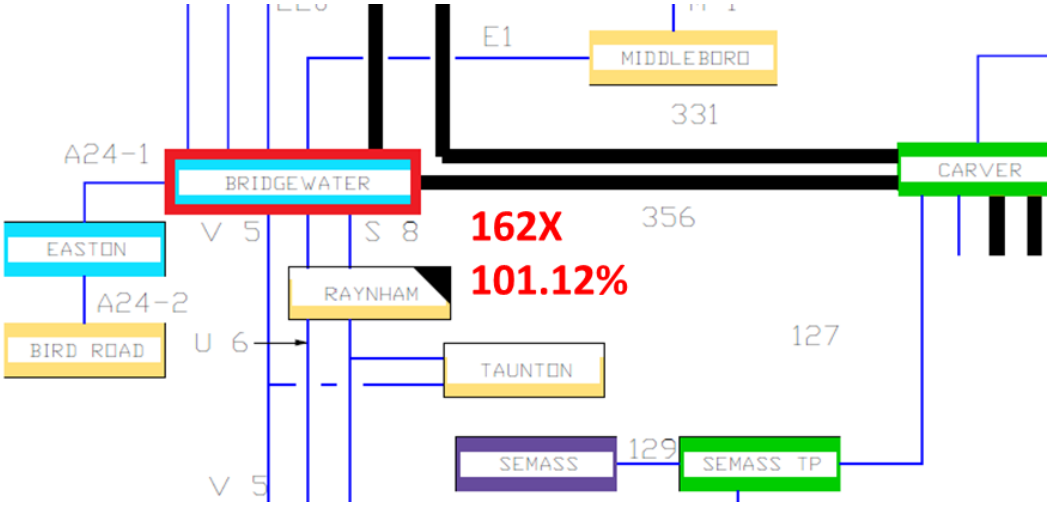

Figure 5-47: Bridgewater 162X N-1-1 Overload

REDACTED

Table 5-29: 191 and 117 Lines N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
191	Kingston to Auburn 115 kV Line	165	[redacted]	[redacted]	121.66
117	Kingston to Brook St 115 kV Line	142	[redacted]	[redacted]	122.86
Worst case overloads occur [redacted]. Loss of [redacted] causes overloads on the 115 kV path between the Auburn and Carver substations, [redacted].					

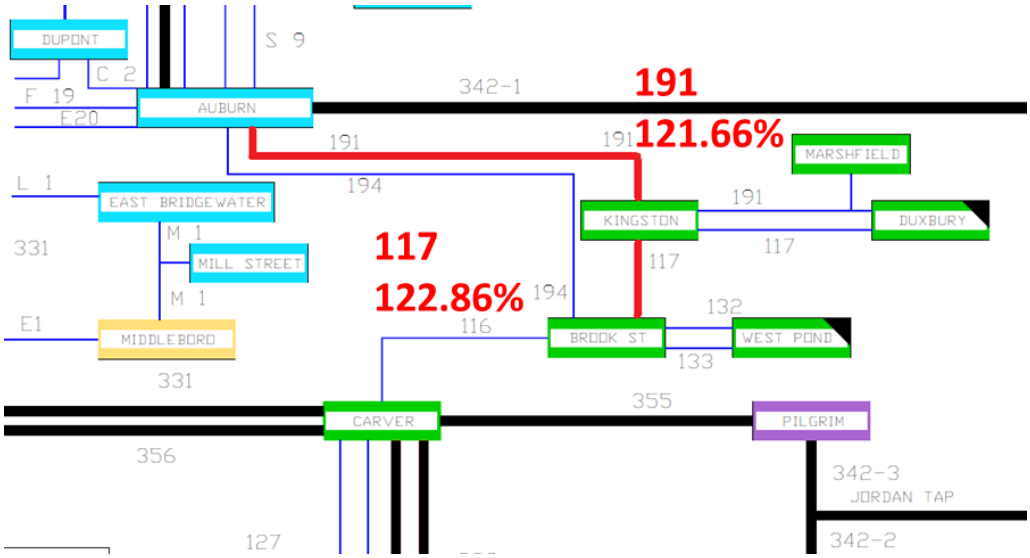

Figure 5-48: 191 and 117 Lines N-1-1 Overloads

REDACTED

Table 5-30: F19, E1, C2, and E20 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
F19-2	Auburn St to Belmont Tap 115 kV Line Section	206	[redacted]	[redacted]	114.63
E1[35]	Bridgewater to Middleboro 115 kV Line	197	[redacted]	[redacted]	118.46
C2	Dupont to Auburn St 115 kV Line	232	[redacted]	[redacted]	117.14
L1[36]	East Bridgewater to East Bridgewater Tap 115 kV Line Section	166	[redacted]	[redacted]	122.57
E20-2	Auburn St to East Bridgewater Tap 115 kV Line Section	244	[redacted]	[redacted]	103.33
Worst case overloads occur [redacted]. [redacted] causes overloads on the remaining 115 kV lines serving the pocket.					

[35] This overload only occurs on the portion of the line owned by Middleboro Gas and Electric.

[36] Planned National Grid upgrades to this line (with an in-service date of 2017) may alleviate or eliminate this overload, but final updated ratings were not available as of the time of completion of this Needs Assessment.

REDACTED

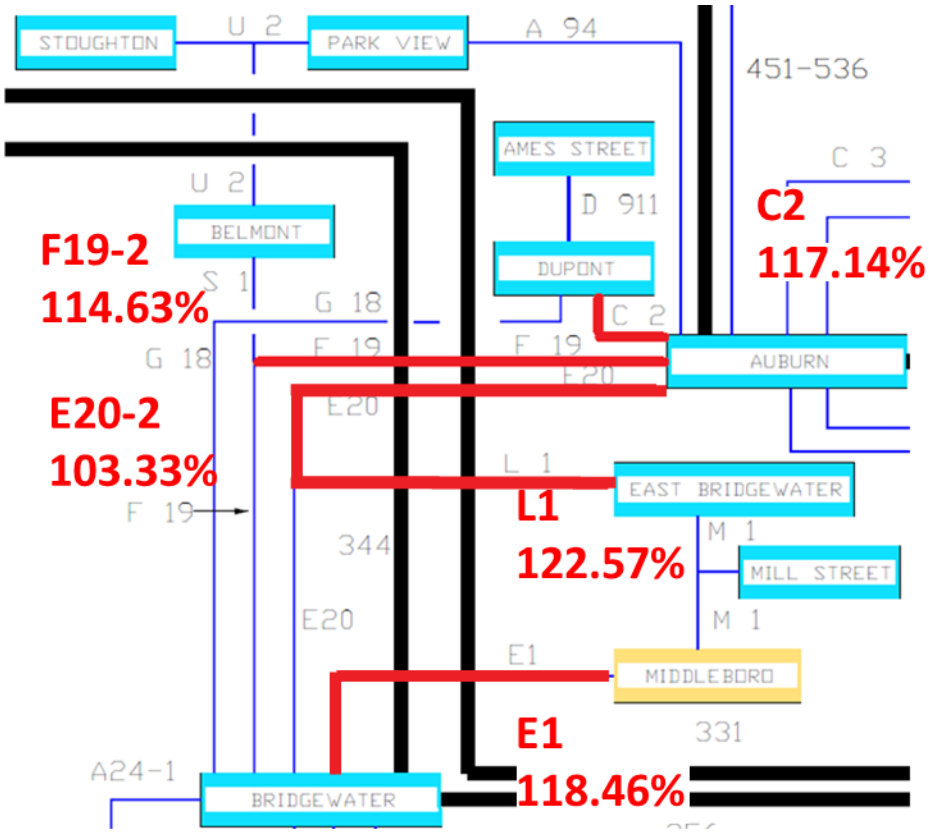

Figure 5-49: F19, E1, C2, L1 and E20 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-31: South Shore Subarea N-1-1 Voltage Violations

Bus Name	Base kV	Element OOS	Contingency	Worst-Case Voltage (p.u.)	Comments
Brook Street	115	[redacted]	[redacted]	0.8931	[redacted]
Kingston	115	[redacted]	[redacted]	0.9023	[redacted]
Middleboro	115	[redacted]	[redacted]	0.8952	[redacted]
East Bridgewater	115	[redacted]	[redacted]	0.8539	[redacted]
Mill Street	115	[redacted]	[redacted]	0.8620	[redacted]
Church Hill	115	[redacted]	[redacted]	0.9140	[redacted]
Edgar	115	[redacted]	[redacted]	0.9095	[redacted]
Grove Street	115	[redacted]	[redacted]	0.9170	[redacted]
Holbrook	115	[redacted]	[redacted]	0.9225	[redacted]
Middle Street	115	[redacted]	[redacted]	0.9135	[redacted]
Potter	115	[redacted]	[redacted]	0.9138	[redacted]
Plain Street	115	[redacted]	[redacted]	0.9157	[redacted]

REDACTED

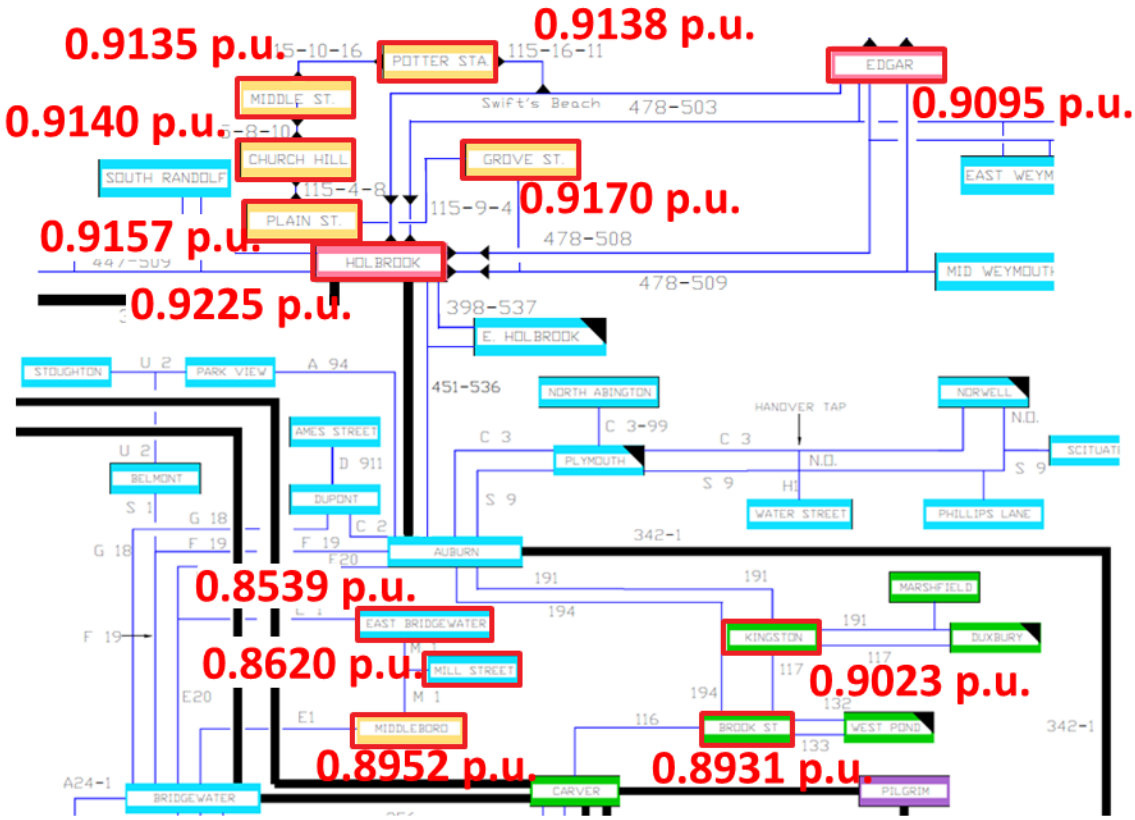

Figure 5-50: South Shore Subarea N-1-1 Voltage Violations

5.2.3.4 *Industrial Park Subarea N-1-1 Thermal Overload and Voltage Violation Results*

The tables in this section and the figures following them show the worst case N-1-1 element overloads and unacceptable voltage performance results for the Industrial Park subarea. Dispatch conditions for each of the overloads and voltage violations are noted in the comments at the bottom of each table.

Table 5-32: 111 Line Section N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
111-1	High Hill to Industrial Park 115 kV Line Section	246	[redacted]	[redacted]	164.10
Worst case overloads occur [redacted]. Loss of [redacted] leaves the 115 kV path out of Tremont as the sole transmission or generation source into this pocket and into stations normally served by Somerset.					

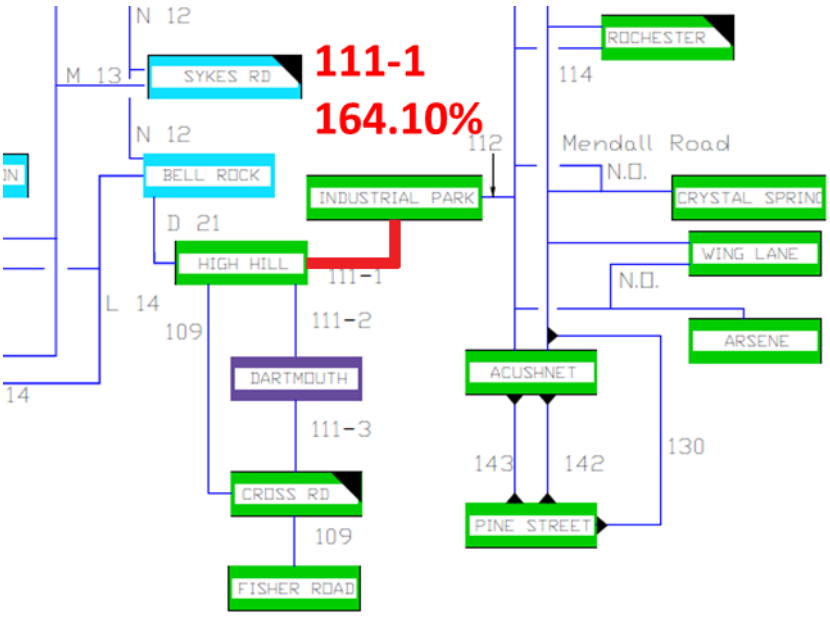

Figure 5-51: 111 Line Section N-1-1 Thermal Overload

Table 5-33: 112 and 114 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
112-1	Tremont to Rochester 115 kV Line Section	229	[redacted]	[redacted]	194.17
112-2	Rochester to Crystal Spring Tap 115 kV Line Section	246	[redacted]	[redacted]	196.00
112-3	Industrial Park to Crystal Spring Tap 115 kV Line Section	246	[redacted]	[redacted]	196.70
112-4	Industrial Park to Industrial Park Tap 115 kV Line Section	246	[redacted]	[redacted]	184.61
114-1	Tremont to Rochester 115 kV Line Section	289	[redacted]	[redacted]	105.93
Worst case overloads occur [redacted]. [redacted] leaves the 115 kV path out of Tremont as the sole transmission or generation source into this pocket and into stations normally served by Somerset.					

REDACTED

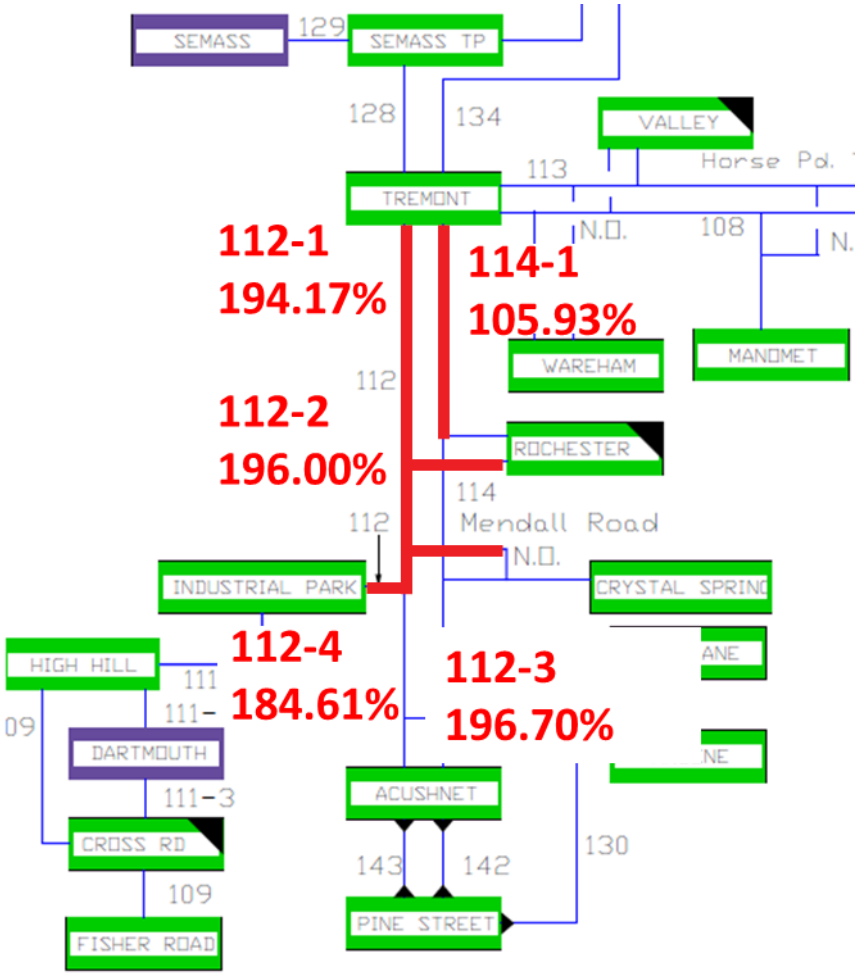

Figure 5-52: 112 and 114 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-34: Southeastern MA – Industrial Park Subarea N-1-1 Voltage Violations

Bus Name	Base kV	Element OOS	Contingency	Worst-Case Voltage (p.u.)	Comments
High Hill	115	[redacted]	[redacted]	0.6174	[redacted]
Industrial Park	115	[redacted]	[redacted]	0.6139	[redacted]
Tremont	115	[redacted]	[redacted]	0.8864	[redacted]
Acushnet	115	[redacted]	[redacted]	0.7072	[redacted]
SEMASS	115	[redacted]	[redacted]	0.8951	[redacted]

REDACTED

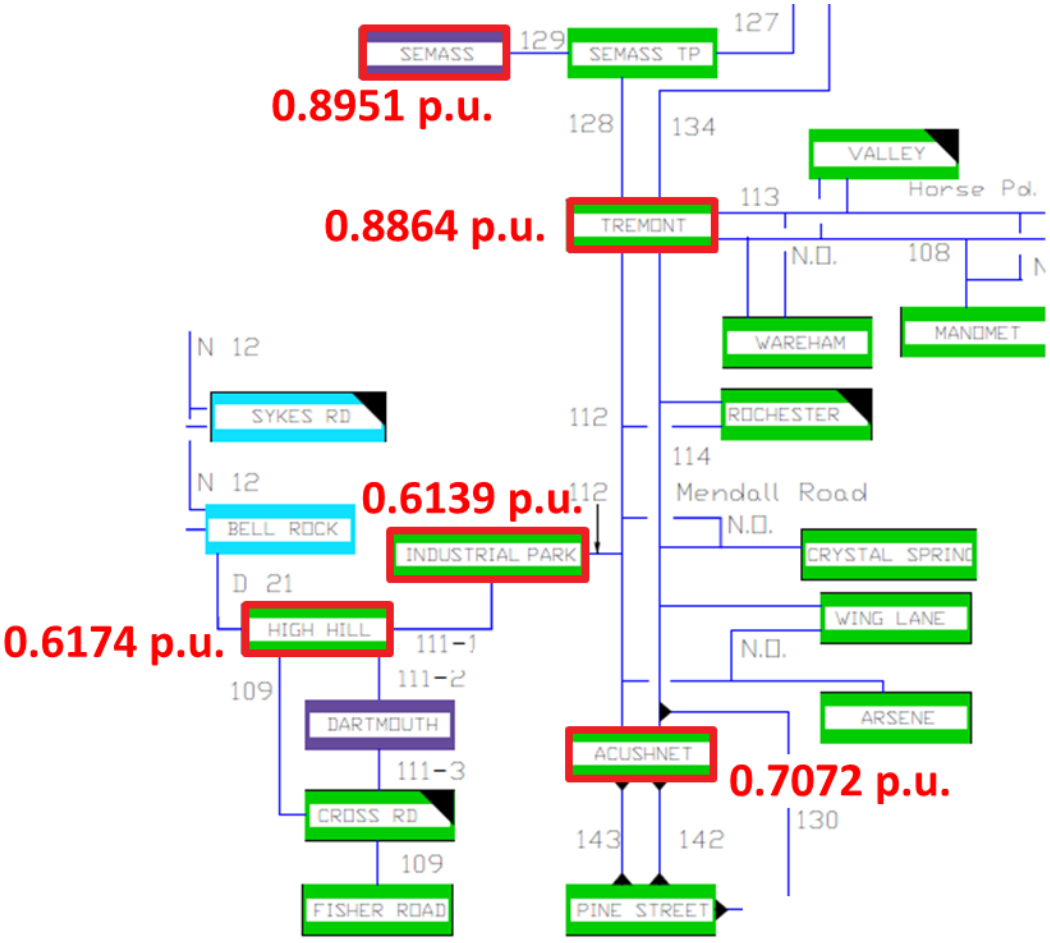

Figure 5-53: Southeastern MA – Industrial Park Subarea N-1-1 Voltage Violations

5.2.3.5 *Somerset – Newport Subarea N-1-1 Thermal Overload and Voltage Violation Results*

The tables in this section and the figures following them show the worst case N-1-1 element overloads and unacceptable voltage performance results for the Somerset-Newport subarea. Dispatch conditions for each of the overloads and voltage violations are noted in the comments at the bottom of each table.

Table 5-35: W4 N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
W4	Somerset to Swansea 115 kV Line	165	[redacted]	[redacted]	147.11
Worst case overloads occur [redacted]. Loss of the [redacted] leaves the W4/K15 path out of Somerset as the sole transmission source into the load pocket consisting of the Robinson Avenue, Riverside, Valley, Staples and Highland Park substations.					

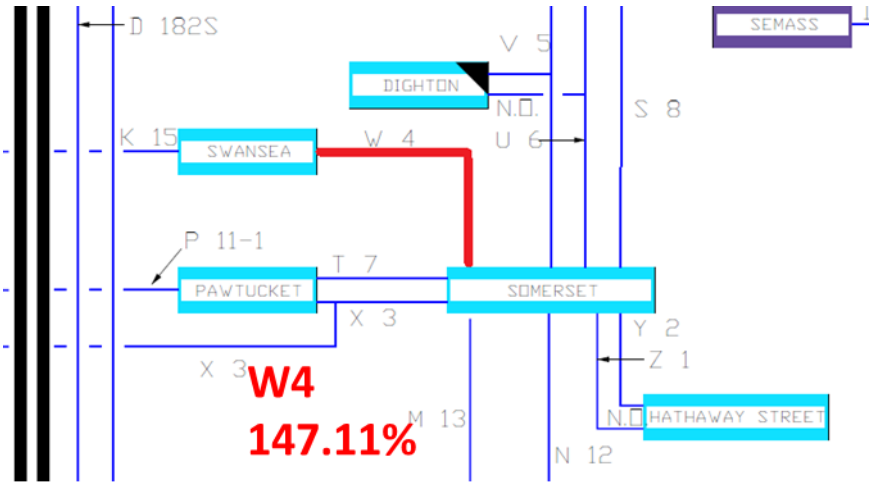

Figure 5-54: W4 N-1-1 Overload

REDACTED

Table 5-36: S8 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
S8-1	Somerset to S8 Tap 115 kV Line Section	244	[redacted]	[redacted]	133.82
S8-2	Raynham to S8 Tap 115 kV Line Section	244	[redacted]	[redacted]	154.64
S8-4	Bridgewater to Raynham 115 kV Line Section	244	[redacted]	[redacted]	171.23
Worst case overloads occur for these violations occur with [redacted]. Loss of [redacted] causes overloads on the only remaining line.					

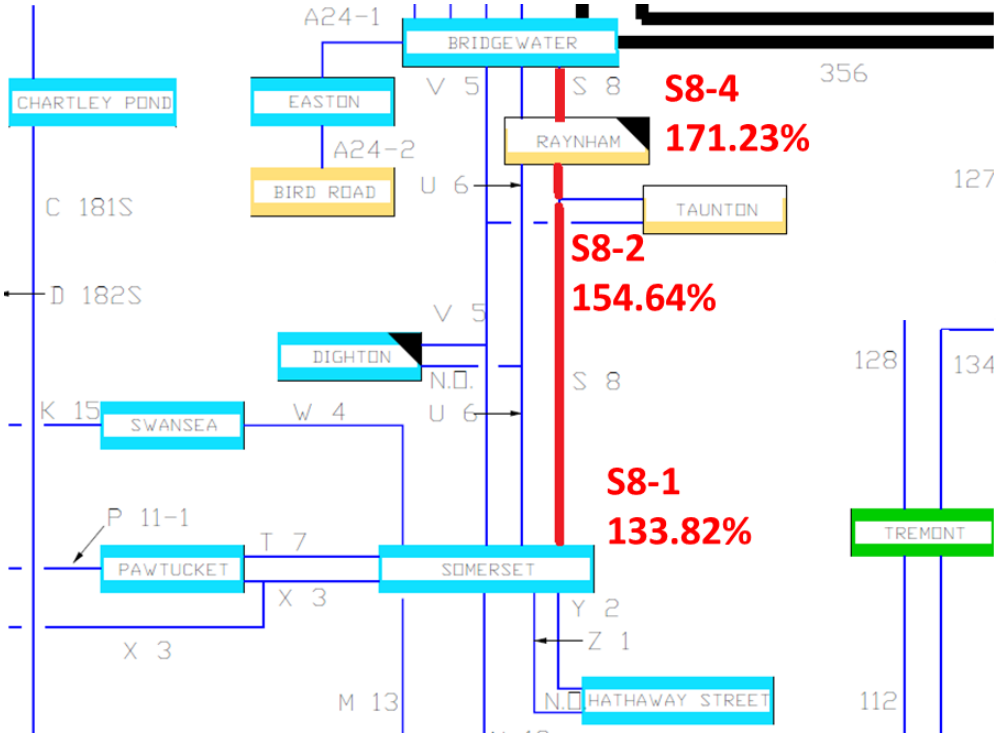

Figure 5-55: S8 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-37: V5 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
V5-1	Somerset to Dighton 115 kV Line Section	206	[redacted]	[redacted]	115.35
V5-2	Dighton to V5 Tap 115 kV Line Section	206	[redacted]	[redacted]	129.71
V5-3	Bridgewater to V5 Tap 115 kV Line Section	206	[redacted]	[redacted]	146.54
Worst case overloads occur with [redacted]. Loss of [redacted] places additional stress on the remaining 115 kV lines serving the pocket.					

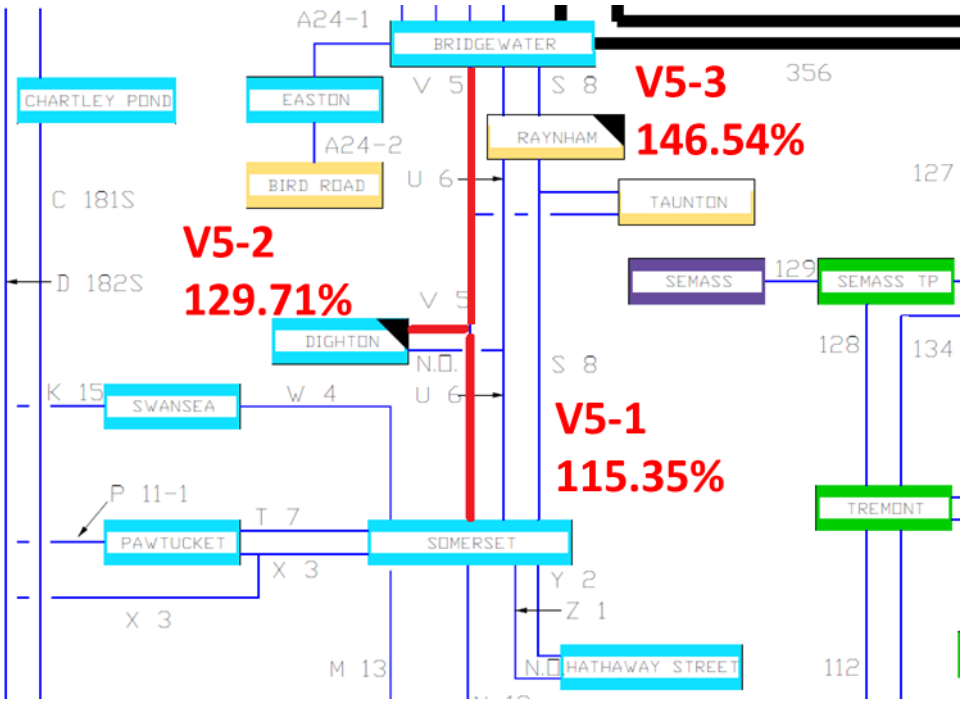

Figure 5-56: V5 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-38: N12, D12 and U6 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
N12-1	Somerset to Sykes Rd 115 kV Line Section	284	[redacted]	[redacted]	192.33
N12-2	Sykes Rd to Bell Rock 115 kV Line Section	284	[redacted]	[redacted]	181.30
D21	Bell Rock to High Hill 115 kV Line	330	[redacted]	[redacted]	102.73
U6-1	Somerset to Dighton 115 kV Line Section	206	[redacted]	[redacted]	166.14
U6-3	Dighton to Dighton Tap 115 kV Line Section	206	[redacted]	[redacted]	166.08
Worst case overloads occur with [redacted]. Observed N-1 overloads in this area [redacted] are exacerbated with additional loss of [redacted]					

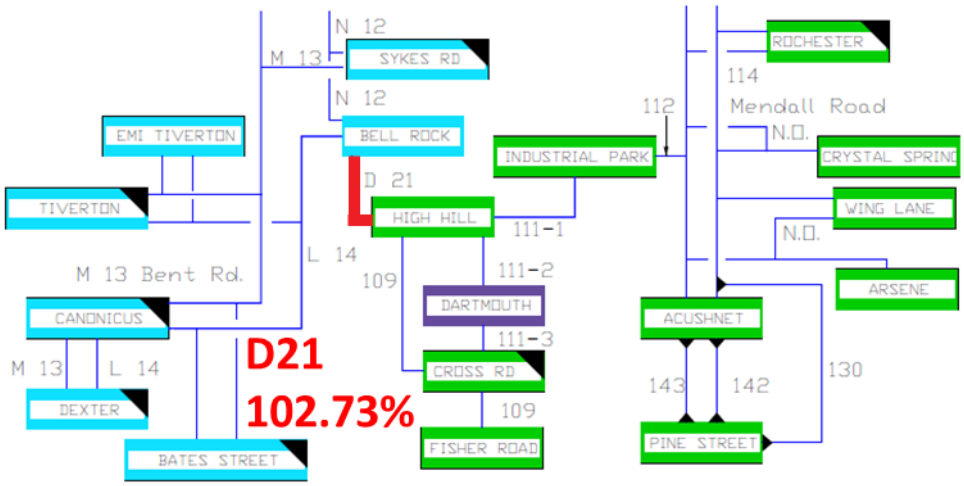

Figure 5-57: D21 N-1-1 Thermal Overload

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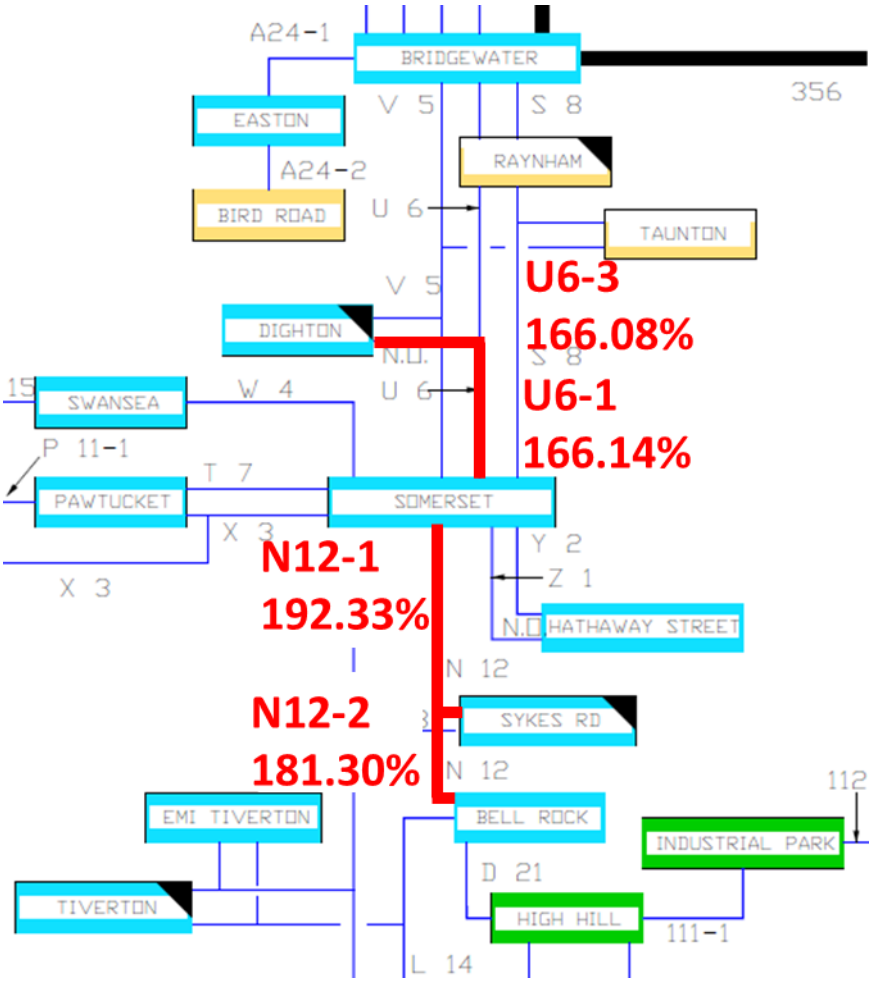

Figure 5-58: N12 and U6 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-39: K15 N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
K15	Swansea to Robinson Ave 115 kV Line	165	[redacted]	[redacted]	142.44
Worst case overloads occur with [redacted]. Loss of [redacted] places additional stress on the remaining 115 kV path between Robinson Avenue and Somerset.					

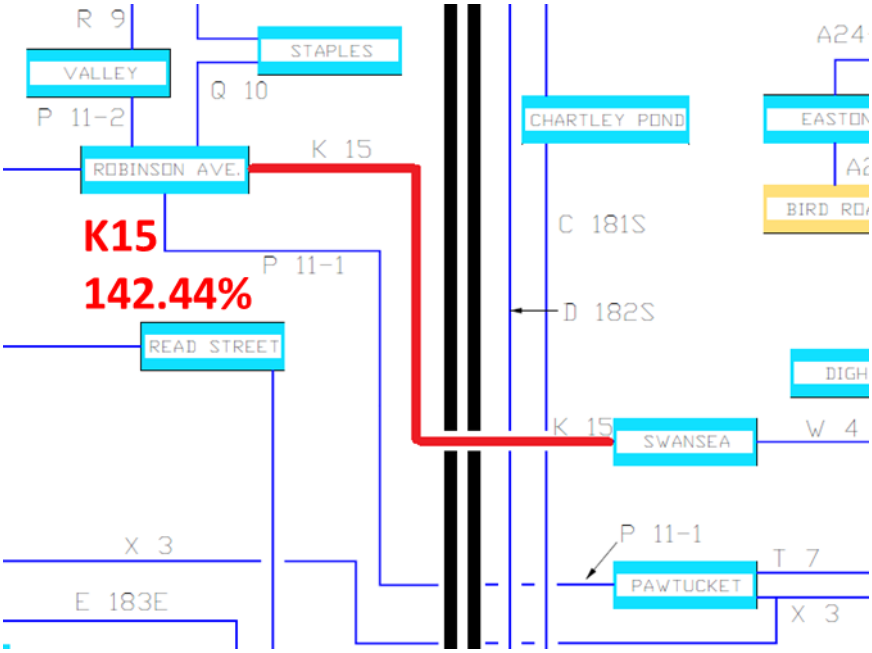

Figure 5-59: K15 N-1-1 Thermal Overload

REDACTED

Table 5-40: M13 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
M13-3	Bent Rd to Tiverton Tap 115 kV Line Section	244	[redacted]	[redacted]	115.36
M13-4	Somerset to Sykes Rd 115 kV Line Section	284	[redacted]	[redacted]	181.74
M13-5	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	180	[redacted]	[redacted]	157.65
M13-6	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	180	[redacted]	[redacted]	146.59
M13-7	Canonicus to Dexter 115 kV Line Section	165	[redacted]	[redacted]	109.65
M13-8	Sykes Rd to Tiverton Tap 115 kV Line Section	250	[redacted]	[redacted]	193.58
Worst case overloads occur with [redacted]. Loss of [redacted] places additional stress on the remaining transmission lines serving the load pocket.					

REDACTED

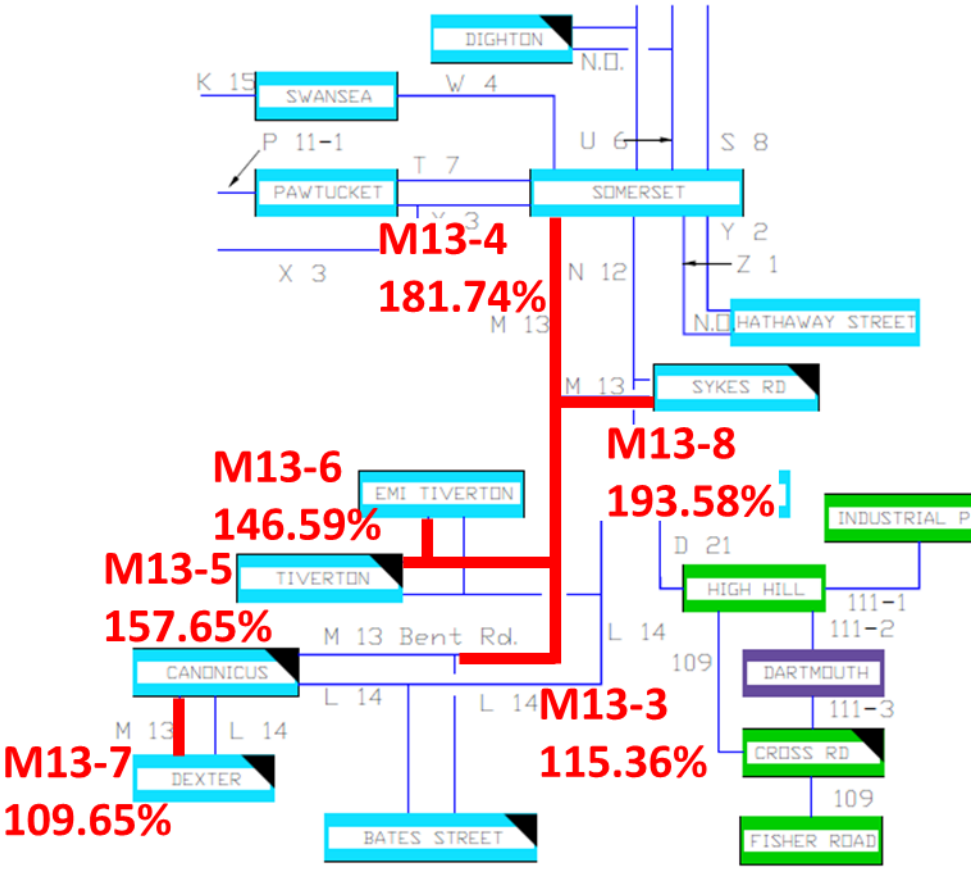

Figure 5-60: M13 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-41: L14 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
L14-1	Bent Rd to Canonicus 115 kV Line Section	210	[redacted]	[redacted]	102.68
L14-3	Bent Rd to Tiverton Tap 115 kV Line Section	210	[redacted]	[redacted]	151.00
L14-4	Bell Rock to Tiverton Tap 115 kV Line Section	250	[redacted]	[redacted]	144.83
L14-5	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	180	[redacted]	[redacted]	133.08
L14-6	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	180	[redacted]	[redacted]	142.26
L14-7	Canonicus to Dexter 115 kV Line Section	165	[redacted]	[redacted]	130.67
Worst case overloads occur [redacted]. Loss of [redacted] places additional stress on the remaining transmission lines serving the load pocket.					

REDACTED

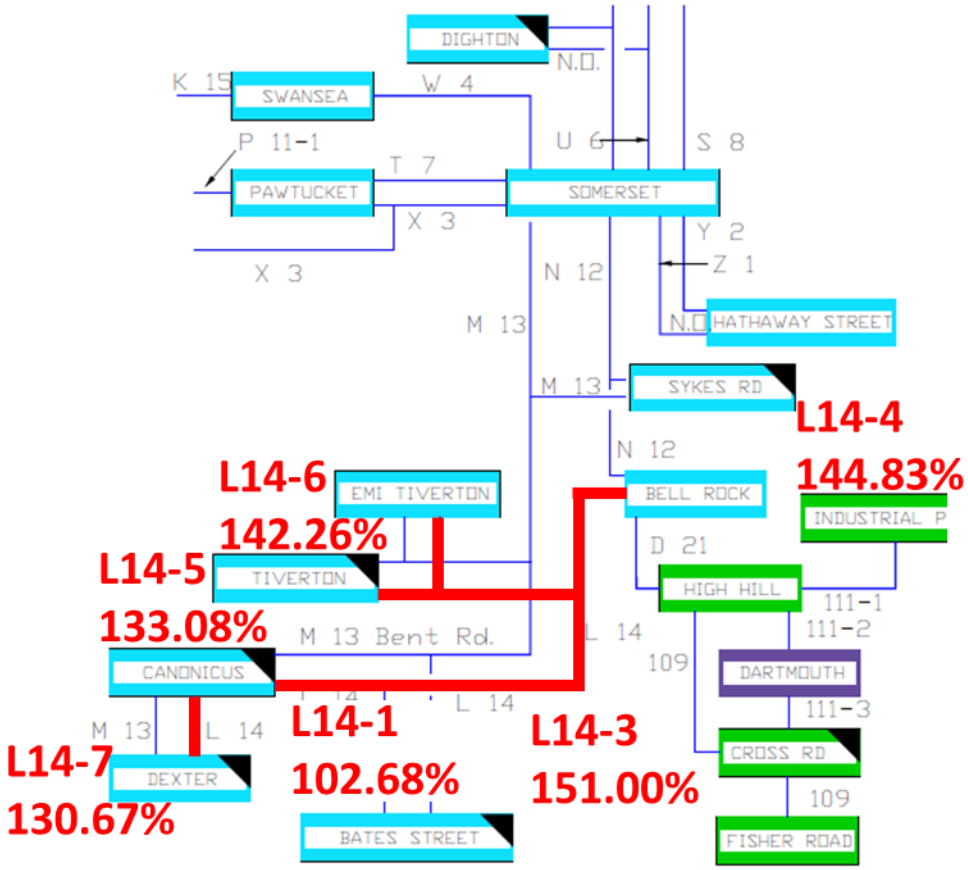

Figure 5-61: L14 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-42: Somerset – Newport Subarea Worst Case N-1-1 Voltage Violations

Bus Name	Base kV	Element OOS	Contingency	Worst-Case Voltage (p.u.)	Comments
Bell Rock	115	[redacted]	[redacted]	0.5823	[redacted]
Canonicus	115	[redacted]	[redacted]	0.5212	[redacted]
Dexter	115	[redacted]	[redacted]	0.5042	[redacted]
Jepson	115	[redacted]	[redacted]	0.5003	[redacted]
Tiverton	115	[redacted]	[redacted]	0.5235	[redacted]
Mink Street	115	[redacted]	[redacted]	0.8682	[redacted]
Dighton	115	[redacted]	[redacted]	0.8692	[redacted]
Somerset	115	[redacted]	[redacted]	0.7880	[redacted]
Sykes Road	115	[redacted]	[redacted]	0.7725	[redacted]
Swansea	115	[redacted]	[redacted]	0.8071	[redacted]
Pawtucket	115	[redacted]	[redacted]	0.7926	[redacted]
Phillipdale	115	[redacted]	[redacted]	0.7935	[redacted]
Wampanoag	115	[redacted]	[redacted]	0.8663	[redacted]

REDACTED

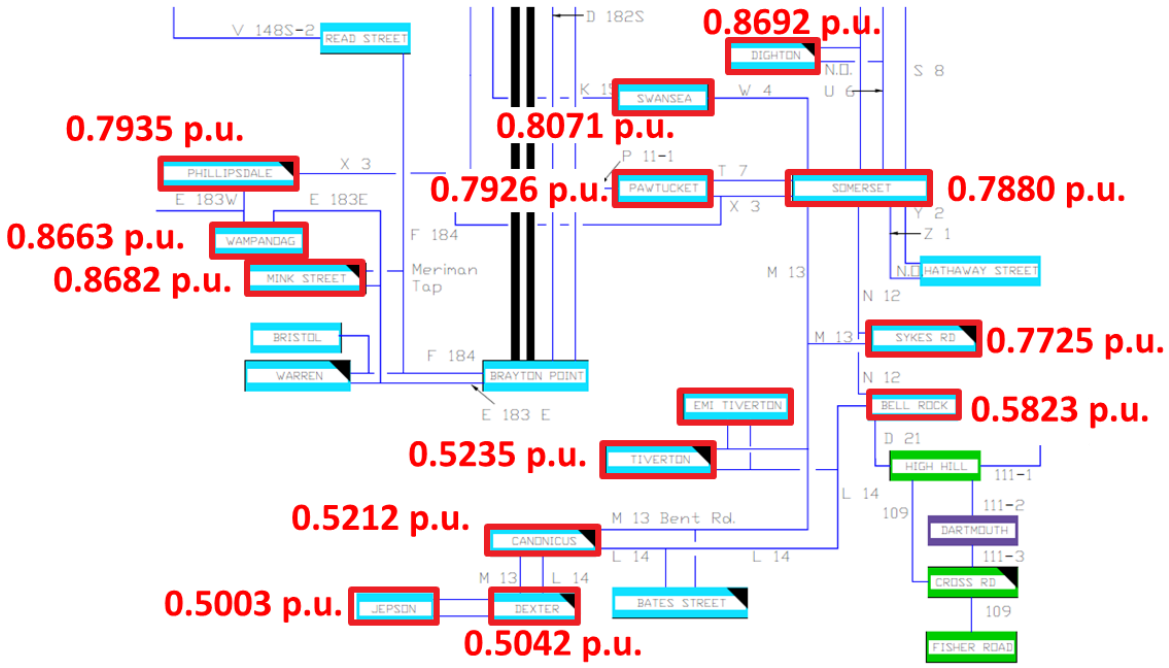

Figure 5-62: Somerset - Newport Subarea N-1-1 Voltage Violations.

REDACTED

Subarea 6: Cape Cod N-1-1 Thermal Overloads and Voltage Violation Results

The tables below and the figures following them show the worst case N-1-1 element overloads and unacceptable voltage performance results for the Cape Cod subarea. Dispatch conditions for each of the overloads and voltage violations are noted in the comments at the bottom of each table.

Table 5-43: 108 Line Sections N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
108-4	Bourne to Horse Pond Tap 115 kV Line	246	[redacted]	[redacted]	111.68
Worst case overloads occur [redacted]. [redacted], causes overloads on portions of the remaining path between Tremont and Bourne.					

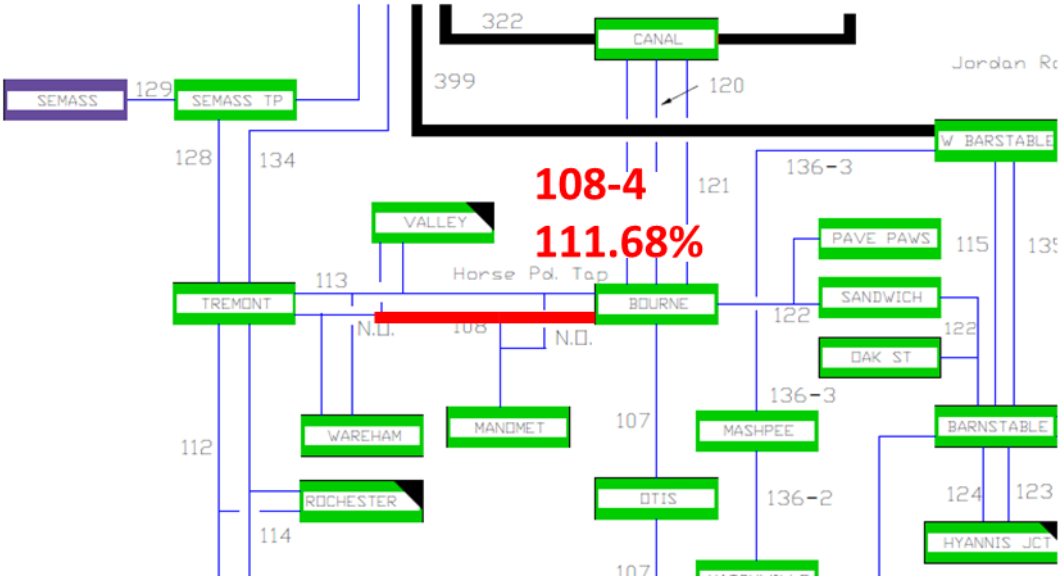

Figure 5-63: 108 Line Sections N-1-1 Thermal Overloads

REDACTED

Table 5-44: 120W N-1-1 Thermal Overload

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
120W	Bourne to Canal 115 kV Line	467	[redacted]	[redacted]	100.97
Worst case overloads occur [redacted], leaves Canal as the strongest 345 kV source of power into the Cape area.					

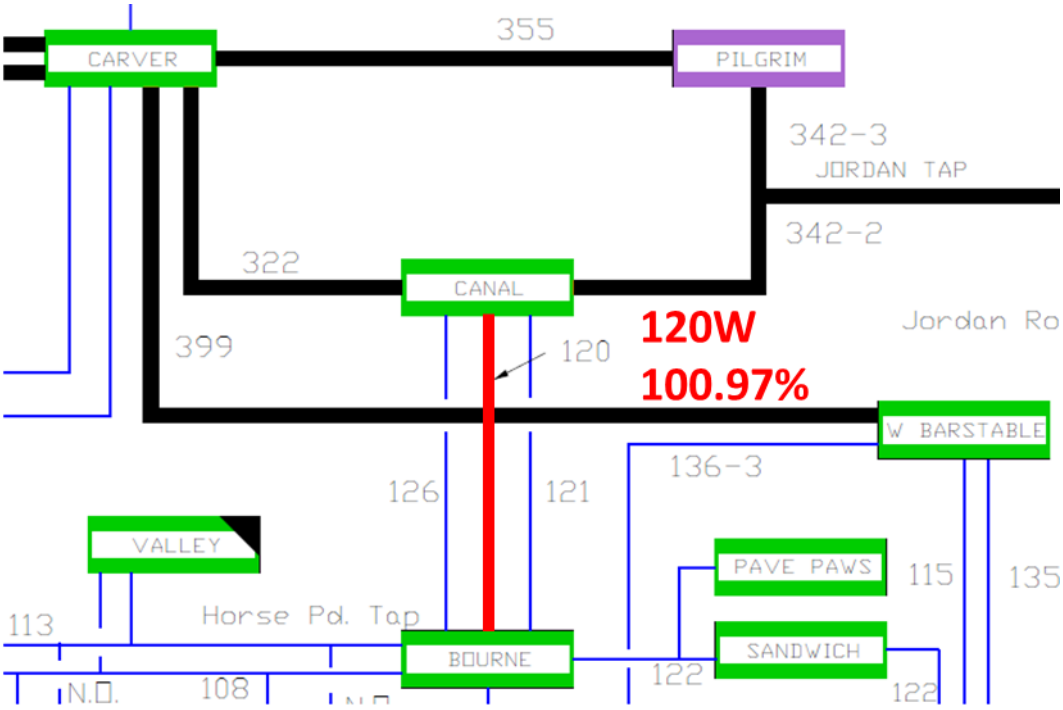

Figure 5-64: 120W N-1-1 Thermal Overload

REDACTED

Table 5-45: Cape Cod Subarea N-1-1 Voltage Violations

Substation Name	Base kV	Element OOS	Contingency	Worst-Case Voltage (p.u.)	Comments
Bourne	115	[redacted]	[redacted]	0.9222	[redacted]
Canal	345	[redacted]	[redacted]	0.9337	[redacted]
Valley_NB	115	[redacted]	[redacted]	0.9143	[redacted]
Wareham	115	[redacted]	[redacted]	0.8972	[redacted]

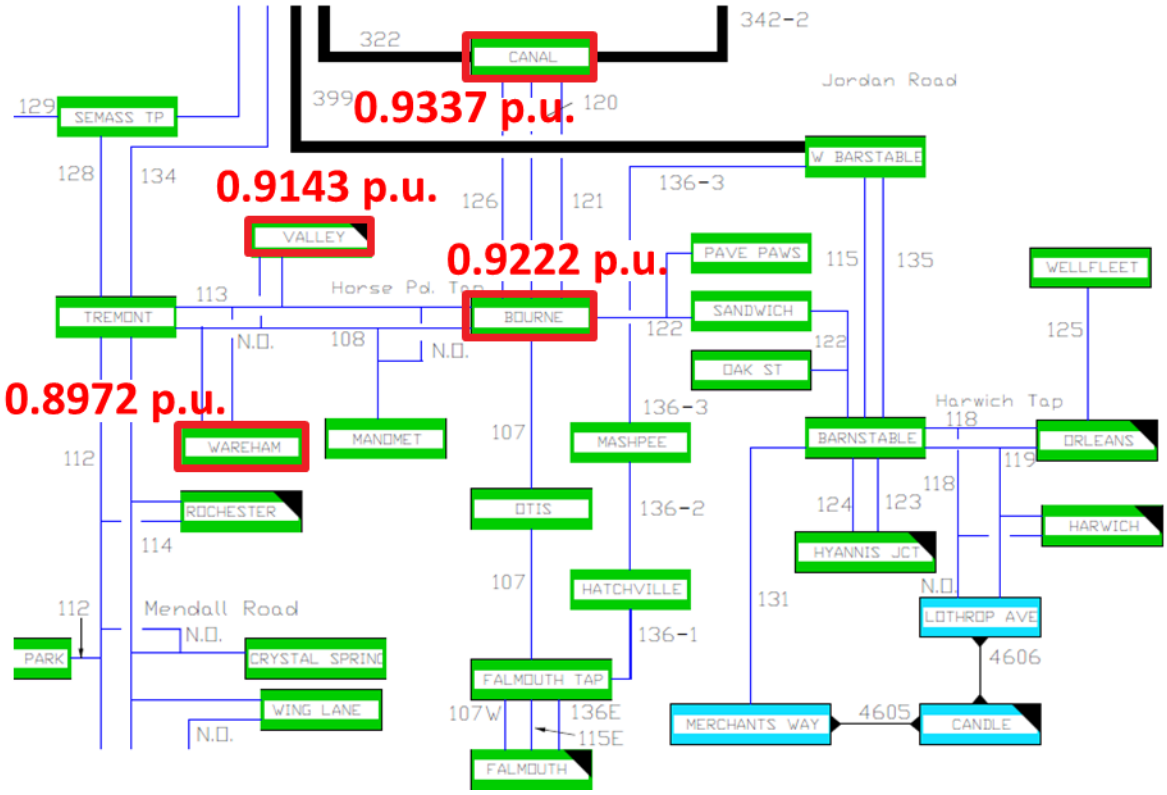

Figure 5-65: Worst Case N-1-1 Voltage Violations Cape Cod Subarea

5.2.3.6 *External Area: Boston N-1-1 Thermal Overload Results*

In addition to the noted thermal overloads and voltage violations in the SEMA-RI study area, several thermal overloads were also observed in the Boston area due to dispatch conditions and contingency scenarios tested in this study.

Table 5-46: Boston Area N-1-1 Thermal Overloads and the figures following it detail the worst case N-1-1 element overloads observed in the Boston area for contingencies modeled in the SEMA-RI study area.

Table 5-46: Boston Area N-1-1 Thermal Overloads

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
324	Mystic to Kingston 345 kV Line	650	[redacted]	[redacted]	108.77
372	Mystic to Kingston 345 kV Line	674	[redacted]	[redacted]	109.56
Kingston 345A	Kingston 345A 345/115 kV Autotransformer	540	[redacted]	[redacted]	135.32
Kingston 345B	Kingston 345B 345/115 kV Autotransformer	540	[redacted]	[redacted]	141.52
329-530	Brighton to Blair Pond 115 kV Line	231	[redacted]	[redacted]	105.73
329-531	Brighton to North Cambridge 115 kV Line	231	[redacted]	[redacted]	145.93
509-530	North Cambridge to Blair Pond 115 kV Line	231	[redacted]	[redacted]	118.84
385-512	Kingston St to K Street 1 115 kV Line	190	[redacted]	[redacted]	166.57
385-513	Kingston St to K Street 1 115 kV Line	190	[redacted]	[redacted]	166.57
385-510-1	High St to K Street 1 115 kV Line Section	190	[redacted]	[redacted]	158.73
385-510-2	Kingston St to High St 115 kV Line Section	190	[redacted]	[redacted]	183.73

REDACTED

Element ID	Element Description	LTE Rating (MVA)	Element OOS	Contingency	Worst-Case Thermal Loading (% LTE)
385-511-1	High St to K Street 2 115 kV Line Section	190	[redacted]	[redacted]	158.73
385-511-2	Kingston St to High St 115 kV Line Section	190	[redacted]	[redacted]	183.73

[redacted] causes flows in the Boston area to re-direct primarily through the low impedance underground cable network in the downtown Boston area. In addition, the area is receiving limited generation support from the SEMA area (worst case overloads occur with two Canal units OOS). These issues were also identified as part of the study work in support of the Greater Boston transmission upgrades but since the facility outages modeled occur in SEMA-RI, it was decided that this study would address them.

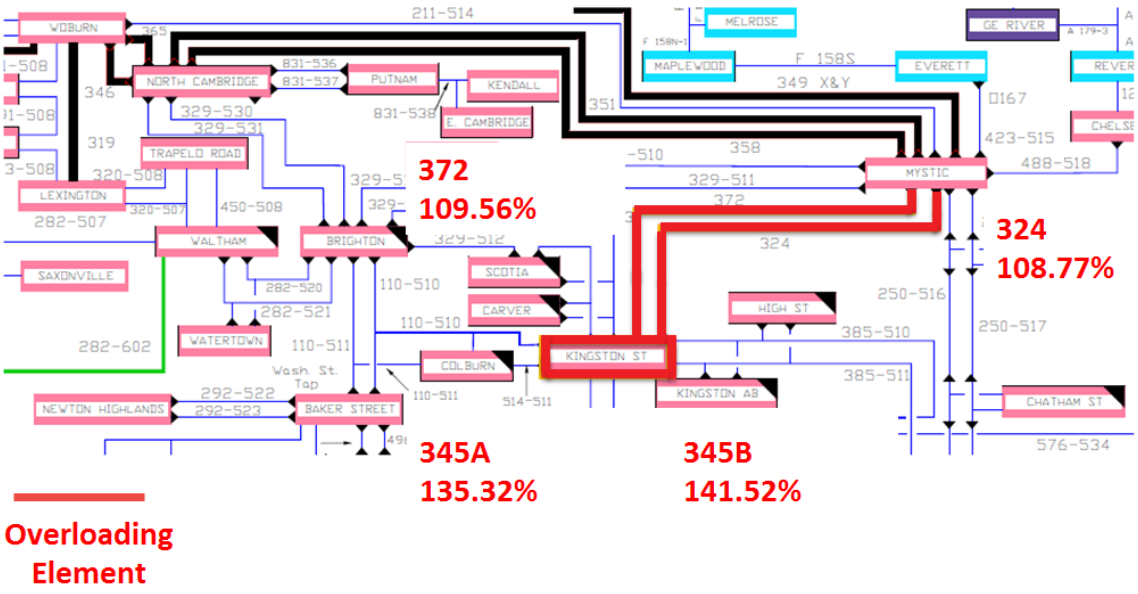

Figure 5-66: Boston Area 345 kV N-1-1 Thermal Overloads

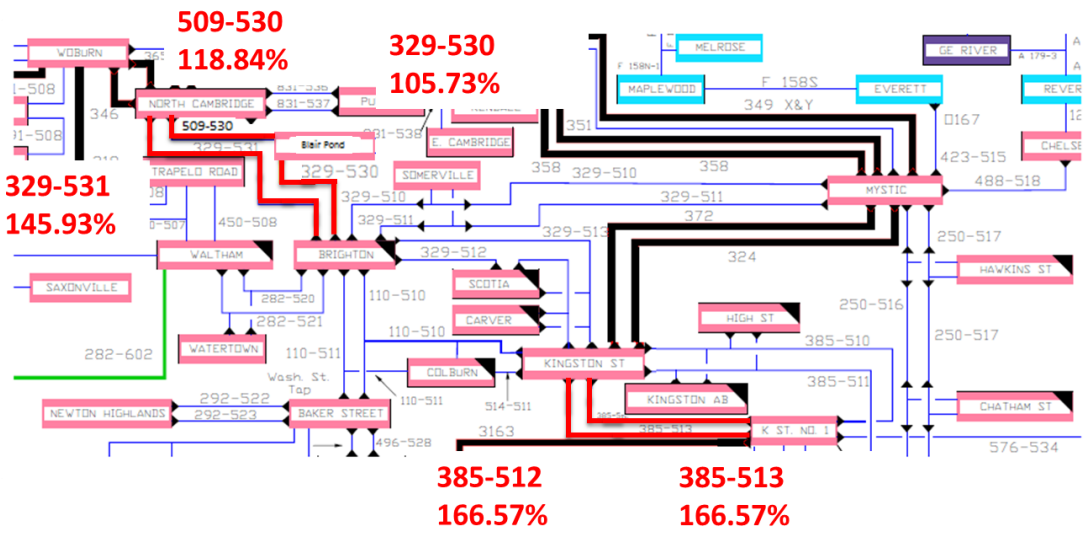

Figure 5-67: Boston Area 115 kV N-1-1 Thermal Overloads

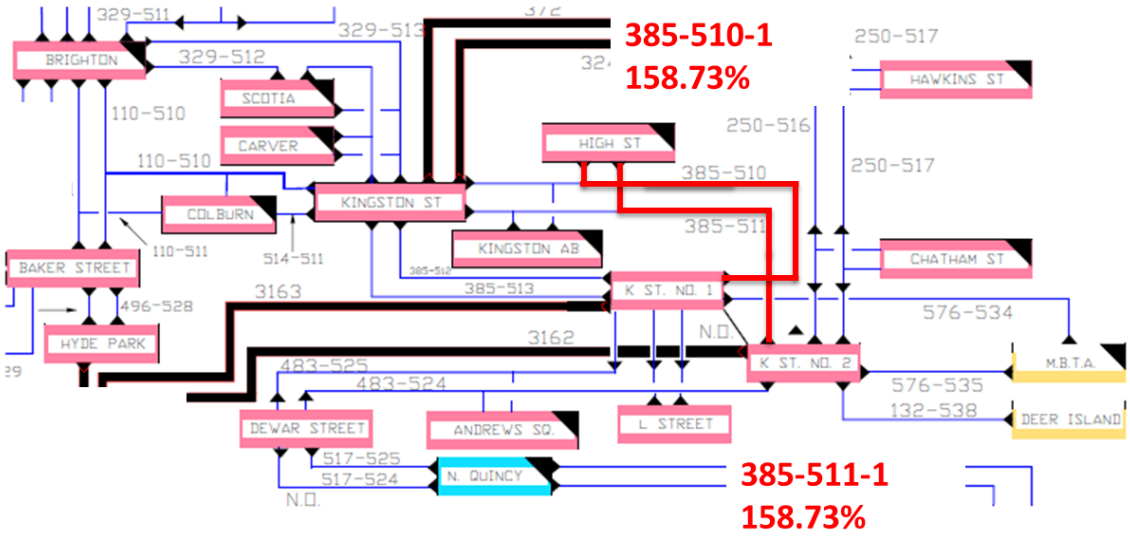

Figure 5-68: Boston Area 115 kV N-1-1 Thermal Overloads

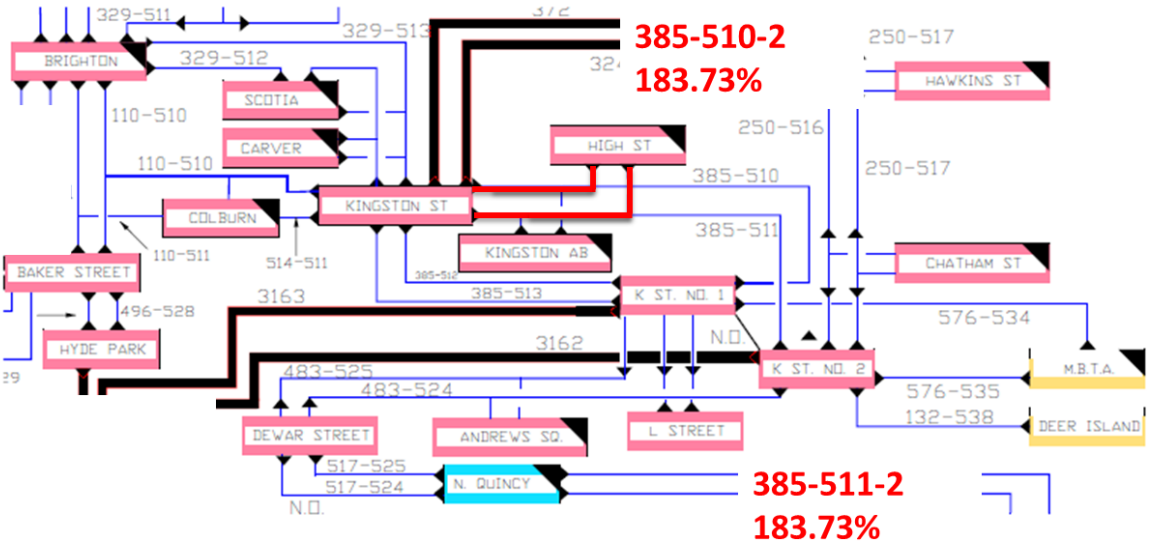

Figure 5-69: Boston Area 115 kV N-1-1 Thermal Overloads

5.2.3.7 *N-1-1 Non-Convergent Contingency Scenario Results*

Non-convergent cases occurred for a number of contingencies associated with [redacted] into the Cape area along [redacted]. [redacted].

Table 5-47 provides details on the contingency pairs that resulted in non-convergent cases and the associated counts for the number of cases where each contingency pair resulted in non-convergence. A contingency pair with a count of 99 indicates that the particular contingency pair did not converge in any case.

Table 5-47: Cape Cod Subarea N-1-1 Non-Convergent Contingency Cases

Element Out of Service	Contingency	Count of Non-Convergent Cases
122-1-2	[redacted]	99
	[redacted]	99
122-3-4	[redacted]	11
	[redacted]	7
399	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	64
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	99

REDACTED

Element Out of Service	Contingency	Count of Non-Convergent Cases
	[redacted]	
	[redacted]	99
	[redacted]	66
	[redacted]	67
345A West Barnstable 345/115 kV	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	53
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	99
	[redacted]	59

5.3 Stability Performance Criteria Compliance

Not applicable for this study.

5.4 Short Circuit Performance Criteria Compliance

Overall results of short circuit testing with respect to over-dutied circuit breakers indicated that there were a total of three 345 kV circuit breakers that could see fault current levels over 95% of their interrupting capability in 2026.

5.4.1 Short Circuit Test Results

Short circuit testing for the SEMA-RI study area was performed for all 345 kV, 115 kV and 69 kV buses within the study area and included assessment of all fault type conditions. The analysis assessed breaker duties for worst-case fault conditions and the results of this analysis are summarized in Table 5-48.

Table 5-48 SEMA-RI Short Circuit Analysis Results

Study Subarea	Substation	Base kV	Number of Circuit Breakers (Breaker Ratings)	
			Over Duty (Above 100%)	High Duty (95% to 100%)
West Medway – West Walpole	West Medway	345	-	3 (50 kA)

5.5 Critical Load Level and Year of Need Assessment Testing Results

An assessment was performed for all thermal overloads, voltage violations under 2026 model year conditions to determine the net New England load level and approximate study year in which these criteria violations would first be seen. This assessment was carried out using the method described in Section 4.3.4 of this report. Only the worst case contingency scenario and dispatch were tested for each transmission element and substation with a criteria violation. Violations with a reported critical load level in-between two respective study years' net peak loads will be reported with the year of need of the higher load level. For all CLLs below 28,198 MW (net New England peak load for the 2016 study year from

Table 4-6), the year of need is reported as "Prior to 2016".

Table 5-49: Farnum Subarea Thermal Critical Load Level Analysis Results

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
Kent County 3X	Kent County 3X 345/115 kV Autotransformer	[redacted]	[redacted]	26,158	Prior to 2016
L190-4	Tower Hill to West Kingston 115 kV Line	[redacted]	[redacted]	27,280	Prior to 2016
L190-5	Tower Hill to Davisville Tap 115 kV Line	[redacted]	[redacted]	25,537	Prior to 2016
V148S-1	V148 Tap to Washington RI 115 kV Line	[redacted]	[redacted]	16,388	Prior to 2016
V148S-3	Robinson Ave to V148 Tap 115 kV Line	[redacted]	[redacted]	29,568	2021
V148N	Washington to Woonsocket 115 kV Line	[redacted]	[redacted]	29,346	2019
H17-1	West Farnum to Farnum Tap 115 kV Line	[redacted]	[redacted]	24,960	Prior to 2016
H17-2	Riverside to Farnum Tap 115 kV Line	[redacted]	[redacted]	23,141	Prior to 2016
R9	Riverside to Valley 115 kV Line	[redacted]	[redacted]	16,130	Prior to 2016
Valley P11/R9 Bus Tie	Valley 205 115 kV Bus Equipment	[redacted]	[redacted]	19,682	Prior to 2016
J16S	Staples to Highland Drive 115 kV Line	[redacted]	[redacted]	23,792	Prior to 2016

REDACTED

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
P11-1	Pawtucket to P11 Tap 115 kV Line	[redacted]	[redacted]	24,791	Prior to 2016
P11-2	Valley to P11 Tap 115 kV Line	[redacted]	[redacted]	19,527	Prior to 2016
P11-3	Robinson Ave to P11 Tap 115 kV Line	[redacted]	[redacted]	23,922	Prior to 2016
Q10	Robinson Ave to Staples 115 kV Line	[redacted]	[redacted]	27,990	2016
West Farnum 175T	West Farnum 345/115 kV Transformer	[redacted]	[redacted]	28,083	2016
1870	Kenyon to Wood River 115 kV Line	[redacted]	[redacted]	20,993	Prior to 2016
1870S	Wood River to Chase Hill 115 kV Line	[redacted]	[redacted]	24,871	Prior to 2016
1870S-1	Chase Hill to Shunock 115 kV Line	[redacted]	[redacted]	28,740	2018
G185N Line	Drumrock to Kent County 115 kV Line	[redacted]	[redacted]	29,750	2023
K189 Line	Drumrock to Kent County 115 kV Line	[redacted]	[redacted]	29,723	2022

REDACTED

Table 5-50: Farnum Subarea Voltage Critical Load Level Analysis Results

Bus Name	Base kV	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
Highland Drive	115	[redacted]	[redacted]	27,243	Prior to 2016
Riverside	115	[redacted]	[redacted]	27,192	Prior to 2016
Robinson Avenue	115	[redacted]	[redacted]	27,628	Prior to 2016
Staples	115	[redacted]	[redacted]	27,327	Prior to 2016
Valley	115	[redacted]	[redacted]	27,033	Prior to 2016
Drumrock	115	[redacted]	[redacted]	28,647	2017
Kenyon	115	[redacted]	[redacted]	25,264	Prior to 2016
Wood River	115	[redacted]	[redacted]	22,901	Prior to 2016
West Kingston	115	[redacted]	[redacted]	28,539	2017

REDACTED

Table 5-51: West Medway – West Walpole Subarea Thermal Critical Load Level Results

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
323 (Eversource)	West Medway to Millbury 345 kV Line	[redacted]	[redacted]	28,929	2018
323 (National Grid)	West Medway to Millbury 345 kV Line	[redacted]	[redacted]	29,346	2019
325	West Medway to West Walpole 345 kV Line	[redacted]	[redacted]	29,346	2019
357 (Eversource)	West Medway to Millbury 345 kV Line	[redacted]	[redacted]	29,346	2019
389	West Medway to West Walpole 345 kV Line	[redacted]	[redacted]	29,346	2019
331 (Eversource)	West Walpole to Carver 345 kV Line	[redacted]	[redacted]	29,346	2019
C-129N-1	Millbury to Purchase Tap 115 kV Line Section	[redacted]	[redacted]	26,501	Prior to 2016
C-129N-6	Rocky Hill to Purchase Tap 115 kV Line Section	[redacted]	[redacted]	28,669	2017

Table 5-52: West Medway – West Walpole Subarea Voltage Critical Load Level Analysis Results

Bus Name	Base kV	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
Beaver Pond	115	[redacted]	[redacted]	27,947	2016
Depot Street	115	[redacted]	[redacted]	28,047	2016
Purchase Street	115	[redacted]	[redacted]	28,483	2017
Rocky Hill	115	[redacted]	[redacted]	28,199	2017
Union Street	115	[redacted]	[redacted]	27,913	2016

REDACTED

Table 5-53: South Shore Subarea Thermal Critical Load Level Results

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
451-536	Holbrook to East Holbrook Tap 115 kV Line	[redacted]	[redacted]	29,729	2022
Bridgewater 162X	Bridgewater 345/115 kV Autotransformer	[redacted]	[redacted]	30,021	2024
191	Kingston to Auburn 115 kV Line	[redacted]	[redacted]	27,720	2016
117	Kingston to Brook St 115 kV Line	[redacted]	[redacted]	28,444	2017
F19-2	Auburn St to Belmont Tap 115 kV Line Section	[redacted]	[redacted]	27,913	2016
E1-2	Bridgewater to Middleboro 115 kV Line	[redacted]	[redacted]	28,646	2017
C2	Dupont to Auburn St 115 kV Line	[redacted]	[redacted]	27,433	Prior to 2016
L1	East Bridgewater to East Bridgewater Tap 115 kV Line Section	[redacted]	[redacted]	27,162	Prior to 2016
E20-2	Auburn St to East Bridgewater Tap 115 kV Line Section	[redacted]	[redacted]	29,897	2024

REDACTED

Table 5-54: South Shore Subarea Voltage Critical Load Level Analysis Results

Bus Name	Base kV	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
Brook Street	115	[redacted]	[redacted]	27,546	Prior to 2016
Kingston	115	[redacted]	[redacted]	27,950	2016
Middleboro	115	[redacted]	[redacted]	30,228	2025
East Bridgewater	115	[redacted]	[redacted]	29,215	2019
Mill Street	115	[redacted]	[redacted]	29,346	2019
Church Hill	115	[redacted]	[redacted]	29,346	2019
Edgar	115	[redacted]	[redacted]	29,335	2019
Grove Street	115	[redacted]	[redacted]	29,346	2019
Holbrook	115	[redacted]	[redacted]	29,346	2019
Middle Street	115	[redacted]	[redacted]	29,346	2019
Potter	115	[redacted]	[redacted]	29,346	2019
Plain Street	115	[redacted]	[redacted]	29,346	2019

REDACTED

Table 5-55: Industrial Park Subarea Thermal Critical Load Level Results

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
111-1	High Hill to Industrial Park 115 kV Line Section	[redacted]	[redacted]	17,961	Prior to 2016
112-1	Tremont to Rochester 115 kV Line Section	[redacted]	[redacted]	14,976	Prior to 2016
112-2	Rochester to Crystal Spring Tap 115 kV Line Section	[redacted]	[redacted]	10,063	Prior to 2016
112-3	Industrial Park to Crystal Spring Tap 115 kV Line Section	[redacted]	[redacted]	10,270	Prior to 2016
112-4	Industrial Park to Industrial Park Tap 115 kV Line Section	[redacted]	[redacted]	17,025	Prior to 2016
114-1	Tremont to Rochester 115 kV Line Section	[redacted]	[redacted]	26,310	Prior to 2016

Table 5-56: Industrial Park Subarea Voltage Critical Load Level Analysis Results

Bus Name	Base kV	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
High Hill	115	[redacted]	[redacted]	28,198	2016
Industrial Park	115	[redacted]	[redacted]	15,279	Prior to 2016
Tremont	115	[redacted]	[redacted]	27,624	Prior to 2016
Acushnet	115	[redacted]	[redacted]	15,415	Prior to 2016
SEMASS	115	[redacted]	[redacted]	27,974	2016

REDACTED

Table 5-57: Somerset - Newport Subarea Thermal Critical Load Level Results

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
W4	Somerset to Swansea 115 kV Line	[redacted]	[redacted]	25,773	Prior to 2016
S8-1	Somerset to S8 Tap 115 kV Line Section	[redacted]	[redacted]	24,471	Prior to 2016
S8-2	Raynham to S8 Tap 115 kV Line Section	[redacted]	[redacted]	23,572	Prior to 2016
S8-4	Bridgewater to Raynham 115 kV Line Section	[redacted]	[redacted]	22,645	Prior to 2016
V5-1	Somerset to Dighton 115 kV Line Section	[redacted]	[redacted]	29,124	2018
V5-2	Dighton to V5 Tap 115 kV Line Section	[redacted]	[redacted]	27,802	2016
V5-3	Bridgewater to V5 Tap 115 kV Line Section	[redacted]	[redacted]	25,909	Prior to 2016
N12-1	Somerset to Sykes Rd 115 kV Line Section	[redacted]	[redacted]	25,159	Prior to 2016
N12-2	Sykes Rd to Bell Rock 115 kV Line Section	[redacted]	[redacted]	25,524	Prior to 2016
D21	Bell Rock to High Hill 115 kV Line	[redacted]	[redacted]	28,656	2017
U6-1	Somerset to Dighton 115 kV Line Section	[redacted]	[redacted]	23,207	Prior to 2016
U6-3	Dighton to Dighton Tap 115 kV Line Section	[redacted]	[redacted]	23,214	Prior to 2016
K15	Swansea to Robinson Ave 115 kV Line	[redacted]	[redacted]	27,888	2016
M13-3	Bent Rd to Tiverton Tap 115 kV Line Section	[redacted]	[redacted]	25,864	Prior to 2016
M13-4	Somerset to Sykes Rd 115 kV Line Section	[redacted]	[redacted]	15,095	Prior to 2016
M13-5	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	[redacted]	[redacted]	19,699	Prior to 2016
M13-6	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	[redacted]	[redacted]	17,812	Prior to 2016

REDACTED

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
M13-7	Canonicus to Dexter 115 kV Line Section	[redacted]	[redacted]	27,059	Prior to 2016
M13-8	Sykes Rd to Tiverton Tap 115 kV Line Section	[redacted]	[redacted]	16,457	Prior to 2016
L14-1	Bent Rd to Canonicus 115 kV Line Section	[redacted]	[redacted]	30,000	2024
L14-3	Bent Rd to Tiverton Tap 115 kV Line Section	[redacted]	[redacted]	22,277	Prior to 2016
L14-4	Bell Rock to Tiverton Tap 115 kV Line Section	[redacted]	[redacted]	21,799	Prior to 2016
L14-5	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	[redacted]	[redacted]	15,373	Prior to 2016
L14-6	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	[redacted]	[redacted]	12,216	Prior to 2016
L14-7	Canonicus to Dexter 115 kV Line Section	[redacted]	[redacted]	19,303	Prior to 2016

Table 5-58: Somerset - Newport Subarea Voltage Critical Load Level Analysis Results

Bus Name	Base kV	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
Bell Rock	115	[redacted]	[redacted]	16,827	Prior to 2016
Canonicus	115	[redacted]	[redacted]	16,713	Prior to 2016
Dexter	115	[redacted]	[redacted]	16,719	Prior to 2016
Jepson	115	[redacted]	[redacted]	17,126	Prior to 2016
Tiverton	115	[redacted]	[redacted]	16,205	Prior to 2016
Mink Street	115	[redacted]	[redacted]	27,637	Prior to 2016
Dighton	115	[redacted]	[redacted]	28,604	2017
Somerset	115	[redacted]	[redacted]	27,579	Prior to 2016
Sykes Road	115	[redacted]	[redacted]	27,380	Prior to 2016

Swansea	115	[redacted]	[redacted]	26,368	Prior to 2016
Pawtucket	115	[redacted]	[redacted]	25,865	Prior to 2016
Phillipdale	115	[redacted]	[redacted]	25,988	Prior to 2016
Wampanoag	115	[redacted]	[redacted]	27,462	Prior to 2016

Table 5-59: Cape Cod Subarea Thermal Critical Load Level Results

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
108-4	Bourne to Horse Pond Tap 115 kV Line	[redacted]	[redacted]	28,108	2016
120W	Bourne to Canal 115 kV Line	[redacted]	[redacted]	30,307	2026

Table 5-60: Cape Cod Subarea Voltage Critical Load Level Analysis Results

Bus Name	Base kV	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
Bourne	115	[redacted]	[redacted]	29,539	2021
Canal	345	[redacted]	[redacted]	29,829	2023
Valley_NB	115	[redacted]	[redacted]	29,093	2018
Wareham	115	[redacted]	[redacted]	28,261	2017

REDACTED

Table 5-61: Boston Area Thermal Critical Load Level Results

Element ID	Element Description	Initial Element OOS	Worst Case Contingency	Critical Load Level (MW)	Year of Need
324	Mystic to Kingston 345 kV Line	[redacted]	[redacted]	29,346	2019
372	Mystic to Kingston 345 kV Line	[redacted]	[redacted]	29,346	2019
Kingston 345A	Kingston 345A 345/115 kV Autotransformer	[redacted]	[redacted]	25,464	Prior to 2016
Kingston 345B	Kingston 345B 345/115 kV Autotransformer	[redacted]	[redacted]	24,748	Prior to 2016
329-530	Brighton to Blair Pond 115 kV Line	[redacted]	[redacted]	29,346	2019
329-531	Brighton to North Cambridge 115 kV Line	[redacted]	[redacted]	28,392	2016
509-530	North Cambridge to Blair Pond 115 kV Line	[redacted]	[redacted]	29,346	2019
385-512	Kingston St to K Street 1 115 kV Line	[redacted]	[redacted]	23,292	Prior to 2016
385-513	Kingston St to K Street 1 115 kV Line	[redacted]	[redacted]	23,292	Prior to 2016
385-510-1	High St to K Street 1 115 kV Line Section	[redacted]	[redacted]	24,019	Prior to 2015
385-510-2	Kingston St to High St 115 kV Line Section	[redacted]	[redacted]	21,917	Prior to 2016
385-511-1	High St to K Street 2 115 kV Line Section	[redacted]	[redacted]	24,019	Prior to 2016
385-511-2	Kingston St to High St 115 kV Line Section	[redacted]	[redacted]	21,946	Prior to 2016

Table 5-62 lists the critical load level (CLL) and year of need associated with the non-converged contingency scenarios observed in the Cape Cod subarea. These contingency scenarios were non-convergent in at least one study case for projected 2018 system conditions; as such, their CLL and Year of Need were set to coincide with that study year and respective projected New England net load. Since non-converged solutions are an indication of severe system performance concerns, the actual year of need is likely before 2018.

Table 5-62: Cape Cod Area Non-Convergence Critical Load Level Results

Element OOS	Contingency	Critical Load Level (MW)	Year of Need
122-1-2	[redacted]	29,189	2018
	[redacted]	29,189	2018
122-3-4	[redacted]	29,189	2018
	[redacted]	29,189	2018
399	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
345A West Barnstable 345/115 kV	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018

REDACTED

Element OOS	Contingency	Critical Load Level (MW)	Year of Need
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018
	[redacted]	29,189	2018

Section 6
Conclusions on Needs Analysis

The results of the assessment conducted of the Southeastern Massachusetts and Rhode Island area transmission performance against transmission reliability standards for the projected 2026 system conditions in this study indicate that there are a significant number of thermal and voltage violations across a number of subareas within the Southeastern Massachusetts and Rhode Island system. The Southeastern Massachusetts and Rhode Island area transmission system fails to meet established reliability criteria standards, and measures should be developed to mitigate the problems identified. The study has determined the specific year in which violations first emerge and based on this information system upgrades necessary to mitigate these violations in criteria should be implemented as soon as practical.

The specific set of criteria and standards that the transmission system serving SEMA-RI fails to meet includes the following:

- NERC Reliability Standards TPL-001-4 Category P0, P1, P2, P3, P4, P6 and P7 performance requirements.
- NPCC Regional Reliability Reference Directory # 1 Design and Operation of the Bulk Power System Transmission Design Criteria requirements.
- ISO New England Planning Procedure No. 3 Reliability Standards For The New England Area Bulk Power Supply System Section 3.0 Area Transmission requirements.

6.1 Reliability Determination of Time-Sensitive Needs

Transmission needs identified in this study have been deemed time-sensitive if they have a year of need within three years of the completion of this Needs Assessment. Since the publishing date of this assessment occurs before June 1, 2016, the threshold for determining time-sensitive needs has been determined to be any issues that occur before the 2019 summer peak.

Table 6-1, Table 6-2, and Table 6-3 list the needs in the SEMA-RI study area that have been determined to be time-sensitive as part of this Needs Assessment. To address these needs, ISO-NE proposes to use the Solutions Study process described in Section 4.2 of Attachment K and develop solutions to address them in cooperation with Eversource Energy and National Grid, the two participating Transmission Owners in the study area.

REDACTED

Table 6-1: SEMA-RI Time-Sensitive Thermal Needs

Study Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
Farnum	**Kent County 3X**	Kent County 3X 345/115 kV Autotransformer	26,158	Prior to 2016
Farnum	**L190-4**	Tower Hill to West Kingston 115 kV Line	27,280	Prior to 2016
Farnum	**L190-5**	Tower Hill to Davisville Tap 115 kV Line	25,537	Prior to 2016
Farnum	**V148S-1**	V148 Tap to Washington RI 115 kV Line	16,388	Prior to 2016
Farnum	**H17-1**	West Farnum to Farnum Tap 115 kV Line	24,960	Prior to 2016
Farnum	**H17-2**	Riverside to Farnum Tap 115 kV Line	23,141	Prior to 2016
Farnum	**R9**	Riverside to Valley 115 kV Line	16,130	Prior to 2016
Farnum	**Valley P11/R9 Bus Tie**	Valley 205 115 kV Bus Equipment	19,682	Prior to 2016
Farnum	**J16S**	Staples to Highland Drive 115 kV Line	23,792	Prior to 2016
Farnum	**P11-1**	Pawtucket to P11 Tap 115 kV Line	24,791	Prior to 2016
Farnum	**P11-2**	Valley to P11 Tap 115 kV Line	19,527	Prior to 2016
Farnum	**P11-3**	Robinson Ave to P11 Tap 115 kV Line	23,922	Prior to 2016
Farnum	**Q10**	Robinson Ave to Staples 115 kV Line	27,990	2016
Farnum	**West Farnum 175T**	West Farnum 345/115 kV Transformer	28,083	2016
Farnum	**1870**	Kenyon to Wood River 115 kV Line	20,993	Prior to 2016
Farnum	**1870S**	Wood River to Chase Hill 115 kV Line	24,871	Prior to 2016
Farnum	**1870S-1**	Chase Hill to Shunock 115 kV Line	28,740	2018
West Medway - West Walpole	**323 (Eversource)**	West Medway to Millbury 345 kV Line	28,929	2018

REDACTED

Study Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
West Medway - West Walpole	**C-129N-1**	Millbury to Purchase Tap 115 kV Line Section	26,501	Prior to 2016
West Medway - West Walpole	**C-129N-6**	Rocky Hill to Purchase Tap 115 kV Line Section	28,669	2017
South Shore	**191**	Kingston to Auburn 115 kV Line	27,720	2016
South Shore	**117**	Kingston to Brook St 115 kV Line	28,444	2017
South Shore	**F19-2**	Auburn St to Belmont Tap 115 kV Line Section	27,913	2016
South Shore	**E1**	Bridgewater to Middleboro 115 kV Line	28,646	2017
South Shore	**C2**	Dupont to Auburn St 115 kV Line	27,433	Prior to 2016
South Shore	**L1**	East Bridgewater to East Bridgewater Tap 115 kV Line Section	27,162	Prior to 2016
Industrial Park	**111-1**	High Hill to Industrial Park 115 kV Line Section	17,961	Prior to 2016
Industrial Park	**112-1**	Tremont to Rochester 115 kV Line Section	14,976	Prior to 2016
Industrial Park	**112-2**	Rochester to Crystal Spring Tap 115 kV Line Section	10,063	Prior to 2016
Industrial Park	**112-3**	Industrial Park to Crystal Spring Tap 115 kV Line Section	10,270	Prior to 2016
Industrial Park	**112-4**	Industrial Park to Industrial Park Tap 115 kV Line Section	17,025	Prior to 2016
Industrial Park	**114-1**	Tremont to Rochester 115 kV Line Section	26,310	Prior to 2016
Somerset - Newport	**F184-3**	Mink St to Read St 115 kV Line Section	19,181	Prior to 2016
Somerset – Newport	**S8-1**	Somerset to S8 Tap 115 kV Line Section	24,471	Prior to 2016
Somerset - Newport	**S8-2**	Raynham to S8 Tap 115 kV Line Section	23,572	Prior to 2016
Somerset - Newport	**S8-4**	Bridgewater to Raynham 115 kV Line	22,645	Prior to 2016

REDACTED

Study Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
		Section		
Somerset - Newport	**V5-1**	Somerset to Dighton 115 kV Line Section	29,124	2018
Somerset - Newport	**V5-2**	Dighton to V5 Tap 115 kV Line Section	27,802	2016
Somerset - Newport	**V5-3**	Bridgewater to V5 Tap 115 kV Line Section	25,909	Prior to 2016
Somerset - Newport	**N12-1**	Somerset to Sykes Rd 115 kV Line Section	25,159	Prior to 2016
Somerset - Newport	**N12-2**	Sykes Rd to Bell Rock 115 kV Line Section	25,524	Prior to 2016
Somerset - Newport	**D21**	Bell Rock to High Hill 115 kV Line	28,656	2017
Somerset - Newport	**U6-1**	Somerset to Dighton 115 kV Line Section	23,207	Prior to 2016
Somerset - Newport	**U6-3**	Dighton to Dighton Tap 115 kV Line Section	23,214	Prior to 2016
Somerset - Newport	**K15**	Swansea to Robinson Ave 115 kV Line	27,888	2016
Somerset - Newport	**M13-3**	Bent Rd to Tiverton Tap 115 kV Line Section	25,864	Prior to 2016
Somerset - Newport	**M13-4**	Somerset to Sykes Rd 115 kV Line Section	15,095	Prior to 2016
Somerset - Newport	**M13-5**	Tiverton Tap to EMI Tiverton Tap 115 kV Line Section	19,699	Prior to 2016
Somerset - Newport	**M13-6**	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	17,812	Prior to 2016
Somerset - Newport	**M13-7**	Canonicus to Dexter 115 kV Line Section	27,059	Prior to 2016
Somerset - Newport	**M13-8**	Sykes Rd to Tiverton Tap 115 kV Line Section	16,457	Prior to 2016
Somerset - Newport	**L14-3**	Bent Rd to Tiverton Tap 115 kV Line Section	22,277	Prior to 2016
Somerset - Newport	**L14-4**	Bell Rock to Tiverton Tap 115 kV Line Section	21,799	Prior to 2016
Somerset - Newport	**L14-5**	Tiverton Tap to EMI Tiverton Tap 115 kV	15,373	Prior to 2016

REDACTED

Study Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
		Line Section		
Somerset - Newport	**L14-6**	EMI Tiverton Tap to EMI Tiverton 115 kV Line Section	12,216	Prior to 2016
Somerset - Newport	**L14-7**	Canonicus to Dexter 115 kV Line Section	19,303	Prior to 2016
Cape Cod	**108-4**	Bourne to Horse Pond Tap 115 kV Line	28,108	2016
Boston (External)	**Kingston 345A**	Kingston 345A 345/115 kV Autotransformer	25,464	Prior to 2016
Boston (External)	**Kingston 345B**	Kingston 345B 345/115 kV Autotransformer	24,748	Prior to 2016
Boston (External)	**329-531**	Brighton to North Cambridge 115 kV Line	28,392	2016
Boston (External)	**385-512**	Kingston St to K Street 1 115 kV Line	23,292	Prior to 2016
Boston (External)	**385-513**	Kingston St to K Street 1 115 kV Line	23,292	Prior to 2016
Boston (External)	**385-510-1**	High St to K Street 1 115 kV Line Section	24,019	Prior to 2016
Boston (External)	**385-510-2**	Kingston St to High St 115 kV Line Section	21,917	Prior to 2016
Boston (External)	**385-511-1**	High St to K Street 2 115 kV Line Section	24,019	Prior to 2016
Boston (External)	**385-511-2**	Kingston St to High St 115 kV Line Section	21,946	Prior to 2016

Table 6-2: SEMA-RI Time-Sensitive Voltage Needs

Study Subarea	Bus Name	Base kV	Critical Load Level (MW)	Year of Need
Farnum	**Highland Drive**	115	27,243	Prior to 2016
Farnum	**Riverside**	115	27,192	Prior to 2016
Farnum	**Robinson Avenue**	115	27,628	Prior to 2016
Farnum	**Staples**	115	27,327	Prior to

REDACTED

Study Subarea	Bus Name	Base kV	Critical Load Level (MW)	Year of Need
				2016
Farnum	**Valley**	115	27,033	Prior to 2016
Farnum	**Drumrock**	115	28,647	2017
Farnum	**Kenyon**	115	25,264	Prior to 2016
Farnum	**Wood River**	115	22,901	Prior to 2016
Farnum	**West Kingston**	115	28,539	2017
West Medway – West Walpole	**Beaver Pond**	115	27,947	2016
West Medway – West Walpole	**Depot Street**	115	28,047	2016
West Medway – West Walpole	**Purchase Street**	115	28,483	2017
West Medway – West Walpole	**Rocky Hill**	115	28,199	2017
West Medway – West Walpole	**Union Street**	115	27,913	2016
South Shore	**Brook Street**	115	27,546	Prior to 2016
South Shore	**Kingston**	115	27,950	2016
Industrial Park	**High Hill**	115	28,198	2016
Industrial Park	**Industrial Park**	115	15,279	Prior to 2016
Industrial Park	**Tremont**	115	27,624	Prior to 2016
Industrial Park	**Acushnet**	115	15,415	Prior to 2016
Industrial Park	**SEMASS**	115	27,974	2016
Somerset - Newport	**Bell Rock**	115	16,827	Prior to 2016
Somerset – Newport	**Canonicus**	115	16,713	Prior to 2016
Somerset – Newport	**Dexter**	115	16,719	Prior to 2016
Somerset – Newport	**Jepson**	115	17,126	Prior to 2016
Somerset – Newport	**Tiverton**	115	16,205	Prior to 2016
Somerset – Newport	**Mink Street**	115	27,637	Prior to 2016

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Study Subarea	Bus Name	Base kV	Critical Load Level (MW)	Year of Need
Somerset – Newport	**Dighton**	115	28,604	2017
Somerset – Newport	**Somerset**	115	27,579	Prior to 2016
Somerset – Newport	**Sykes Road**	115	27,380	Prior to 2016
Somerset – Newport	**Swansea**	115	26,368	Prior to 2016
Somerset – Newport	**Pawtucket**	115	25,865	Prior to 2016
Somerset – Newport	**Phillipdale**	115	25,988	Prior to 2016
Somerset - Newport	**Wampanoag**	115	27,462	Prior to 2016
Cape Cod	**Valley_NB**	115	29,093	2018
Cape Cod	**Wareham**	115	28,261	2017

Table 6-3: SEMA-RI Time-Sensitive Non-Convergence Needs

Element OOS	Contingency	Critical Load Level (MW)	Year of Need
[redacted]		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018

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Element OOS	Contingency	Critical Load Level (MW)	Year of Need
[redacted]		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018
		29,189	2018

Table 6-4 and Table 6-5 list the needs in the SEMA-RI study area that have been determined to be not time-sensitive as part of this Needs Assessment. These needs occur only for projected system conditions in the 2019 study year and beyond. During the Solutions Study phase, specific transmission solutions will not be developed to address these needs. However, due to the nature of transmission solutions, it is quite likely that many of the needs determined to be non-time sensitive will be resolved. Once the solution to address the time-sensitive needs in the SEMA-RI study area has been fully developed, any of these needs that remain will be re-evaluated pursuant to the requirements of Attachment K, Section 4.1(j).

Table 6-4: SEMA-RI Thermal Needs Determined to be Not Time-Sensitive

Study Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
Farnum	**V148S-3**	V148 Tap to Washington RI 115 kV Line Section	29,568	2021
Farnum	**V148N**	Washington to Woonsocket 115 kV Line	29,346	2019
Farnum	**G185N**	Drumrock to Kent County 115 kV Line	29,750	2023
Farnum	**K189**	Drumrock to Kent County 115 kV Line	29,723	2022
West Medway – West Walpole	**323 (NGrid)**	Millbury to West Medway 345 Line kV	29,346	2019
West Medway – West Walpole	**325**	West Medway to West Walpole 345 kV Line	29,346	2019
West Medway – West Walpole	**357 (Eversource)**	West Medway to Millbury 345 kV Line	29,349	2019
West Medway – West Walpole	**389**	West Medway to West Walpole 345 kV Line	29,346	2019
West Medway – West Walpole	**331 (Eversource)**	West Walpole to Carver 345 kV Line	29,346	2019
South Shore	**451-536**	Holbrook to East Holbrook Tap 115 kV Line	29,729	2022
South Shore	**Bridgewater 162X**	Bridgewater 345/115 kV Autotransformer	30,021	2024
South Shore	**E20-2**	Auburn St to East Bridgewater Tap 115 kV Line Section	29,897	2024
Somerset – Newport	**L14-1**	Bent Rd to Canonicus 115 kV Line Section	30,000	2024

REDACTED

Study Subarea	Element ID	Element Description	Critical Load Level (MW)	Year of Need
Cape Cod	**120W**	Bourne to Canal 115 kV Line	30,307	2026
Boston (External)	**324**	Mystic to Kingston 345 kV Line	29,346	2019
Boston (External)	**372**	Mystic to Kingston 345 kV Line	29,346	2019
Boston (External)	**329-530**	Brighton to Blair Pond 115 kV Line	29,346	2019
Boston (External)	**509-530**	North Cambridge to Blair Pond 115 kV Line	29,346	2019

Table 6-5: SEMA-RI Voltage Needs Determined to be Not Time-Sensitive

Study Subarea	Bus Name	Base kV	Critical Load Level (MW)	Year of Need
South Shore	**Middleboro**	115	30,228	2025
South Shore	**East Bridgewater**	115	29,215	2019
South Shore	**Mill Street**	115	29,346	2019
South Shore	**Church Hill**	115	29,346	2019
South Shore	**Edgar**	115	29,335	2019
South Shore	**Grove Street**	115	29,346	2019
South Shore	**Holbrook**	115	29,346	2019
South Shore	**Middle Street**	115	29,346	2019
South Shore	**Potter**	115	29,346	2019
South Shore	**Plain Street**	115	29,346	2019
Cape Cod	**Bourne**	115	29,539	2021
Cape Cod	**Canal**	115	29,829	2023

REDACTED

Section 7
Appendix A: Load Forecast

Table 7-1: 2015 CELT Seasonal Peak Load Forecast Distributions

		Peak Load Forecast at Milder Than Expected Weather				Reference Forecast at Expected Weather	Peak Load Forecast at More Extreme Than Expected Weather				
Summer (MW)	2015	27145	27395	27440	27825	28251	28700	29165	29825	30600	31270
	2016	27548	27803	27848	28238	28673	29133	29603	30278	31053	31733
	2017	27921	28181	28226	28626	29066	29531	30011	30696	31481	32171
	2018	28323	28583	28633	29033	29483	29958	30443	31138	31933	32628
	2019	28686	28951	28996	29406	29861	30341	30831	31541	32341	33051
	2020	28992	29262	29307	29722	30182	30667	31167	31877	32697	33417
	2021	29287	29557	29607	30022	30487	30977	31482	32202	33037	33762
	2022	29589	29864	29914	30334	30804	31299	31809	32539	33389	34124
	2023	29901	30181	30231	30656	31131	31631	32146	32886	33746	34491
	2024	30214	30494	30544	30974	31455	31964	32479	33224	34104	34859
	WTHI (1)	**78.49**	**78.73**	**79.00**	**79.39**	**79.88**	**80.30**	**80.72**	**81.14**	**81.96**	**82.33**
	Dry-Bulb Temperature (2)	**88.50**	**88.90**	**89.20**	**89.90**	**90.20**	**91.20**	**92.20**	**92.90**	**94.20**	**95.40**
	Probability of Forecast Being Exceeded	**90%**	**80%**	**70%**	**60%**	**50%**	**40%**	**30%**	**20%**	**10%**	**5%**
Winter (MW)	2015/16	22325	22440	22535	22595	22740	22890	23050	23150	23400	23755
	2016/17	22500	22620	22715	22775	22920	23070	23230	23335	23580	23935
	2017/18	22685	22800	22895	22960	23105	23255	23420	23520	23765	24120
	2018/19	22855	22975	23070	23130	23280	23435	23595	23700	23935	24295
	2019/20	23000	23120	23220	23280	23430	23585	23750	23850	24085	24445
	2020/21	23140	23260	23360	23420	23570	23725	23890	23995	24225	24585
	2021/22	23280	23400	23500	23565	23715	23870	24040	24145	24370	24730
	2022/23	23430	23550	23650	23715	23865	24020	24190	24295	24520	24880
	2023/24	23580	23705	23805	23865	24020	24180	24345	24455	24680	25035
	2024/25	23735	23855	23955	24020	24175	24335	24505	24610	24835	25190
	Dry-Bulb Temperature (3)	**10.72**	**9.66**	**8.84**	**8.30**	**7.03**	**5.77**	**4.40**	**3.58**	**1.61**	**(1.15)**

FOOTNOTES:

(1) WTHI - a three-day weighted temperature-humidity index for eight New England weather stations. It is the weather variable used in producing the summer peak load forecast. For more information on the weather variables see http://www.iso-ne.com/system-planning/system-plans-studies/celt .

(2) Dry-bulb temperature (in degrees Fahrenheit) shown in the summer season is for informational purposes only.

(3) Dry-bulb temperature (in degrees Fahrenheit) shown in the winter season is a weighted value from eight New England weather stations.

REDACTED

Table 7-2: 2026 Detailed Load Distributions by State and Company

ISO New England Basecase DB - Load File Report by Company

Study Date : 07/01/2026 **Study Name :** SEMA_RI_Needs_Reassessment

File Created : 2015-10-19 **CELT Forecast :** 2015 **Forecast Year :** 2026

Season : Summer Peak **Weather :** 90/10 **Load Distribution :** N+10_SUM

ISO-NE CELT : 35305 MW **% of Peak :** 100.000% **Tx Losses :** 2.50%

State CELT L&L		2.50% Tx Losses		Non-CELT Load		Station Service		Area 104 NE Load		Area 101 Load
35310 MW	-	817.4 MW	+	367.6 MW	+	933.9 MW	-	0.0MW	=	35794.6 MW

1: State CELT L&L: This represents the sum of the 6 State CELT forecasts. This number can sometimes be 5-10 MW different than the ISO-NE CELT forecast number due to round-off error.
2: Non-CELT Load: This is the sum of all load modeled in the case that is not included in the CELT forecast. An example is the "behind the meter" paper mill load in Maine.
3: Station Service: This is the amount of generator station service modeled. If station service is off-line, the Area 101 report totals will be different since off-line load is not counted in totals.
4: Area 104 NE Load: This load is load modeled in northern VT that is electrically served from Hydro Quebec. To make Area interchange load independent, this load is assigned Area 104.

Maine State Load = 2525 MW - 2.50% Tx Losses = 2466.55 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
CMP	86.10%	2123.74	689.73	0.951	342.41
EM	13.90%	342.81	122.09	0.942	14.29

New Hampshire State Load = 3350 MW - 2.50% Tx Losses = 3272.45 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
PSNH	78.56%	2570.86	366.33	0.990	5.80
UNITIL	12.08%	395.38	56.35	0.990	
GSE	9.36%	306.23	28.97	0.996	1.85

Vermont State Load = 1265 MW - 2.50% Tx Losses = 1235.72 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
VELCO	100.00%	1235.80	212.90	0.985	92.51

Massachusetts State Load = 16545 MW - 2.50% Tx Losses = 16162.01 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
BECO	28.27%	4568.36	1165.13	0.969	37.79
COMEL	11.47%	1852.98	377.78	0.980	
MA-NGRID	39.09%	6317.83	420.66	0.998	38.49
WMECO	7.03%	1136.36	161.89	0.990	
MUNI:BOST-NGR	3.36%	543.33	96.49	0.985	
MUNI:BOST-NST	1.25%	202.19	31.84	0.988	
MUNI:CNEMA-NGR	2.06%	332.61	42.74	0.992	
MUNI:RI-NGR	0.86%	138.83	16.70	0.993	
MUNI:SEMA-NGR	1.82%	293.82	30.15	0.995	
MUNI:SEMA-NST	1.70%	275.05	50.64	0.983	
MUNI:WMA-NGR	0.94%	151.77	15.37	0.995	
MUNI:WMA-NU	2.16%	349.26	49.73	0.990	

Rhode Island State Load = 2550 MW - 2.50% Tx Losses = 2490.97 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
RI-NGRID	100.00%	2490.94	210.82	0.996	45.44

Connecticut State Load = 9075 MW - 2.50% Tx Losses = 8864.93 MW

Company	State Share	Total P (MW)	Total Q (MVAR)	Overall PF	Non-Scaling (MW)
CLP	76.70%	6799.04	968.86	0.990	107.42
CMEEC	4.58%	406.10	57.87	0.990	
UI	18.72%	1659.78	166.62	0.995	10.00

REDACTED

Table 7-3: 2026 Detailed Demand Response Distributions by Zone

ISO New England Basecase DB - Demand Resources File Report

Study Date : 07/01/2026 **Study Name :** SEMA_RI_Needs_Reassessment
File Created : 2015-10-19 **CCP :** 2018/2019 **Load Season :** 2026 - Summer Peak
Load Distrb : N+10_SUM **Distrb Losses :** 5.50% **DR Season :** SUM

	Demand Reduction Value (DRV)		Load Dependent Capability Assumption (LDCA)		Performance Assumption (PA)		Distribution Losses Gross-Up		Area 104 DR		Area 101 DR
Passive :	2134.81 MW	X	100.00%	X	100.00%	+	117.41 MW	-	0.00 MW	=	2252.20 MW
Forecast EE :	1506.44 MW		100.00%		100.00%		82.85 MW		0.00 MW		1589.31 MW
Active RTDR :	484.06 MW		100.00%		75.00%		19.97 MW		0.00 MW		383.01 MW
Active RTEG :	N/A		N/A		N/A		N/A		N/A		N/A

Demand Reduction Value (DRV): Amount of DR measured at the customer meter without any gross-up values for transmission or distribution losses.
Load Dependent Capability Assumption (LDCA): De-rate factor applied based on % of CELT load. (i.e. Light load is 45% of 50/50 load, so the LDCA would be 45%.)
Performance Assumption (PA): De-rate factor applied based on expected performance of DR after a dispatch signal from Operations.
Area 104 DR: This load is modeled in northern VT and is electrically served from Hydro Quebec. To make Area Interchange load independent, this load is assigned Area

Passive Demand Resources - (On-Peak and Seasonal Peak)

DR Modeled = (DRV_SUM * 100.00% LDCA * 100.00% PA) + 5.50% Distrb Losses Gross-Up

Zone	ID	Description	DRV (MW)	Total P (MW)	Total Q (MVAR)
DR_P_ME	20	Load Zone - Maine	-167.54	-176.76	-61.87
DR_P_NH	21	Load Zone - New Hampshire	-94.90	-100.12	-13.84
DR_P_VT	22	Load Zone - Vermont	-116.80	-123.22	-21.12
DR_P_NEMABOS	23	Load Zone - Northeast Massachusetts & Boston	-526.86	-555.84	-121.69
DR_P_SEMA	24	Load Zone - Southeast Massachusetts	-284.19	-299.82	-33.16
DR_P_WCMA	25	Load Zone - West Central Massachusetts	-330.58	-348.76	-31.57
DR_P_RI	26	Load Zone - Rhode Island	-188.58	-198.96	-16.84
DR_P_CT	27	Load Zone - Connecticut	-425.34	-448.73	-60.40

Forecasted Energy Efficiency

DR Modeled = (DRV_EE * 100.00% LDCA * 100.00% PA) + 5.50% Distrb Losses Gross-Up

Zone	ID	Description	DRV (MW)	Total P (MW)	Total Q (MVAR)
DR_P_ME	20	Load Zone - Maine	-104.02	-109.74	-38.41
DR_P_NH	21	Load Zone - New Hampshire	-63.89	-67.40	-9.32
DR_P_VT	22	Load Zone - Vermont	-101.86	-107.47	-18.43
DR_P_NEMABOS	23	Load Zone - Northeast Massachusetts & Boston	-363.29	-383.27	-83.90
DR_P_SEMA	24	Load Zone - Southeast Massachusetts	-192.26	-202.83	-22.43
DR_P_WCMA	25	Load Zone - West Central Massachusetts	-224.57	-236.92	-21.44
DR_P_RI	26	Load Zone - Rhode Island	-132.41	-139.69	-11.82
DR_P_CT	27	Load Zone - Connecticut	-324.15	-341.98	-46.03

Active Demand Resources - (Real-Time Demand Resource - RTDR)

DR Modeled = (DRV_SUM * 100.00% LDCA * 75.00% PA) + 5.50% Losses Gross-Up

Zone	ID	Description	DRV (MW)	Total P (MW)	Total Q (MVAR)
DR_A_ME_EME	30	Dispatch Zone - ME - Emerea Maine	-27.25	-21.56	-9.29
DR_A_ME_MAIN	31	Dispatch Zone - ME - Maine	-96.93	-76.70	-26.41
DR_A_ME_PORT	32	Dispatch Zone - ME - Portland Maine	-16.59	-13.13	-4.25
DR_A_NH_NEWH	33	Dispatch Zone - NH - New Hampshire	-13.21	-10.45	-1.43
DR_A_NH_SEAC	34	Dispatch Zone - NH - Seacoast	-1.65	-1.31	-0.19
DR_A_VT_NWVT	35	Dispatch Zone - VT - Northwest Vermont	-24.49	-19.38	-3.24
DR_A_VT_VERM	36	Dispatch Zone - VT - Vermont	-5.04	-3.99	-0.72
DR_A_MA_BOST	37	Dispatch Zone - MA - Boston	-50.30	-39.80	-10.07
DR_A_MA_NSHR	38	Dispatch Zone - MA - North Shore	-17.79	-14.07	-1.70
DR_A_MA_CMA	39	Dispatch Zone - MA - Central Massachusetts	-32.00	-25.32	-2.13
DR_A_MA_SPFD	40	Dispatch Zone - MA - Springfield	-7.79	-6.16	-0.85
DR_A_MA_WMA	41	Dispatch Zone - MA - Western Massachusetts	-15.39	-12.18	-0.79
DR_A_MA_LSM	42	Dispatch Zone - MA - Lower Southeast Massachusetts	-7.11	-5.63	-1.01
DR_A_MA_SEMA	43	Dispatch Zone - MA - Southeast Massachusetts	-41.03	-32.46	-2.60
DR_A_RI_RHOD	44	Dispatch Zone - RI - Rhode Island	-55.90	-44.23	-3.74
DR_A_CT_EAST	45	Dispatch Zone - CT - Eastern Connecticut	-7.90	-6.25	-0.89
DR_A_CT_NRTH	46	Dispatch Zone - CT - Northern Connecticut	-28.37	-22.45	-3.20
DR_A_CT_NRST	47	Dispatch Zone - CT - Norwalk-Stamford	-3.36	-2.66	-0.36
DR_A_CT_WEST	48	Dispatch Zone - CT - Western Connecticut	-31.97	-25.30	-3.30

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Section 8
Appendix B: Upgrades Included in Base Case

A summary of the future generation and transmission projects included in the study base cases can be found in the file connected to the link shown below:

Appendix B: 2026 SEMA-RI Needs Assessment Study Case Future Projects Summary

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Section 9
Appendix C: Case Summaries

Study base case summaries can be found in the files connected to the links shown below:

Appendix C1: Stress A Case Summaries

Appendix C2: Stress B Case Summaries

Appendix C3: Stress C Case Summaries

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Section 10
Appendix D: Contingency List

Appendix D: 2026 SEMA-RI Needs Assessment Study Contingency Summary

Table 10-1: N-1-1 Transmission Line Element-Out Scenarios

Line	kV	Description	BPS Element
342	345	Pilgrim to Canal to Auburn	Yes
322	345	Carver to Canal	Yes
327	345	Brayton Point to Berry Street	Yes
355	345	Carver to Pilgrim	Yes
331	345	West Walpole to Carver	Yes
356	345	Bridgewater to Carver	Yes
399	345	Carver to Bourne to Oak Street	Yes
341	345	Lake Road to West Farnum	Yes
359	345	Kent County to West Farnum	Yes
344	345	West Medway to Bridgewater	Yes
335	345	Holbrook to Auburn Street	Yes
316	345	Stoughton to Holbrook	Yes
3161	345	West Walpole to Stoughton	Yes
3162	345	Stoughton to K Street	Yes
3163	345	Stoughton to K Street	Yes
3164	345	Stoughton to Hyde Park	Yes
3348	345	Killingly to Lake Road	Yes
389	345	West Medway to West Walpole	Yes
325	345	West Medway to West Walpole	Yes
303	345	ANP Bellingham to Brayton Point	Yes
315	345	Brayton Point to West Farnum	Yes
3520	345	ANP Bellingham to West Medway	Yes
333	345	Sherman Road to Ocean State	Yes
336	345	ANP Blackstone to NEA Bellingham to West Medway	Yes
3361	345	ANP Blackstone to Sherman Road	Yes
3271	345	Lake Road to Card Street	Yes
330	345	Lake Road to Card Street	Yes
332	345	West Farnum to Kent County	Yes
328	345	Sherman Road to West Farnum	Yes
347	345	Sherman Road to Killingly	Yes
366	345	Millbury to West Farnum	Yes
107	115	Bourne to Otis to Falmouth Tap	Yes
108	115	Tremont to Wareham to Valley to Manomet to Bourne	Yes
109	115	High Hill to Cross Road to Fisher Road	No
111	115	Industrial Park to High Hill to Dartmouth to Cross Road	No
112	115	Tremont to Rochester to Crystal Spring to Industrial Park to Wing Lane to Arsene to Acushnet	Yes
112-8	115	Acushnet to Pine Street	No
113	115	Tremont to Wareham to Valley to Manomet to Bourne	Yes

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Line	kV	Description	BPS Element
114	115	Tremont to Rochester	Yes
114-5	115	Acushnet to Pine Street	No
115-10-16	115	Middle Street to Potter Station	No
115-16-17	115	Potter Station to TA Watson	No
115-4-8	115	Plain Street to Church Hill	No
115-8-10	115	Middle Street to Church Hill	No
115-9-4	115	Plain Street to Grove Street	No
116	115	Carver to Brook Street	Yes
117	115	Kingston to Duxbury	No
118	115	Barnstable to Lothrop Ave. to Harwich to Orleans	No
119	115	Barnstable to Lothrop Ave. to Harwich to Orleans	No
120W	115	Bourne to Canal	Yes
121	115	Bourne to Canal	No
122	115	Bourne to Pave Paws to Sandwich	No
123	115	Barnstable to Hyannis Junction	No
124	115	Barnstable to Hyannis Junction	No
125	115	Wellfleet to Orleans	No
126	115	Bourne to Canal	Yes
126-501	115	Hopkinton Tap to Hopkinton	No
126-502	115	Hopkinton Tap to Hopkinton	No
127	115	SEMass Tap to Carver	Yes
128	115	SEMass Tap to Tremont	Yes
129	115	SEMass Tap to SEMass	Yes
130	115	Acushnet to Pine Street	No
131	115	Barnstable to Merchants Way	No
132	115	Brook Street to West Pond	No
133	115	Brook Street to West Pond	No
134	115	Tremont to Carver	Yes
135	115	West Barnstable to Barnstable	No
136	115	Falmouth Tap to Mashpee	No
137	115	West Barnstable to Mashpee	No
142	115	Acushnet to Pine Street	No
143	115	Acushnet to Pine Street	No
146-502	115	West Walpole to Walpole	Yes
1505	115	Killingly to Brooklyn to Tunnel	No
1607	115	Killingly to Exeter to Fry Brook to Tunnel	No
1621	115	Killingly to Tracy	No
1742	115	Killingly to Tracy	No
1870	115	Kenyon to Wood River	No
1870N	115	Kenyon to West Kingston	No
1870S	115	Wood River to Shunock	No
191	115	Auburn Street to Kingston to Duxbury to Marshfield	Yes
194	115	Auburn Street to Brook Street	Yes
274-509	115	Medway to Sherborn	No
398-537	115	Holbrook to East Holbrook	Yes
447-508	115	West Walpole to Walpole to Canton to South Randolph to Holbrook	Yes

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Line	kV	Description	BPS Element
447-509	115	West Walpole to Walpole to Canton to South Randolph to Holbrook	Yes
451-536	115	Holbrook to East Holbrook to Auburn Street	Yes
456-522	115	Dover to West Walpole	Yes
478-502	115	Edgar to Swift's Beach to Holbrook	Yes
478-503	115	Edgar to East Weymouth to Hobart Street to Holbrook	Yes
478-508	115	Edgar to East Weymouth to Hobart Street to Holbrook	Yes
478-509	115	Edgar to Mid Weymouth to Grove Street to Holbrook	Yes
495-532	115	Ellis Avenue to Norwood	No
495-533	115	Ellis Avenue to Norwood	No
517-524	115	North Quincy to Dewar Street	No
517-525	115	North Quincy to Dewar Street	No
517-532	115	North Quincy to Field Street to Edgar	No
517-533	115	North Quincy to Field Street to Edgar	No
65-502	115	Medway to West Walpole	Yes
65-507	115	Medway Jet to West Medway	No
65-508	115	Medway to West Walpole	Yes
A24	115	Bridgewater to Easton to Bird Road	No
A94	115	Auburn Street to Avon to Park View	Yes
B23	115	West Farnum to Nasonville	Yes
C-129	115	Beaver Pond to Union Street	No
C-129N / 201-502	115	Beaver Pond to Depot Street to Milford Power to Rocky Hill to Hopkinton to Millbury	Yes
C-129S	115	Union Street to South Wrentham	No
C-181N	115	South Wrentham to North Attleboro to Mansfield to Chartley Pond	No
C-181S	115	Brayton Point to Chartley Pond	Yes
C2	115	Dupont to Auburn	Yes
C3	115	Auburn Street to Plymouth to North Abington to Hanover to Norwell	Yes
D-130 / 201-501	115	Medway to Depot Street to Milford Power to Hopkinton to Millbury	Yes
E105	115	Franklin Square to Hartford Avenue	Yes
E183E	115	Brayton Point to Warren to Mink Street to Wampanoag	Yes
E183W	115	Manchester Street to Phillipsdale to Wampanoag	No
E20 / L1	115	Bridgewater to East Bridgewater to Auburn Street	Yes
F106	115	Franklin Square to Hartford Avenue	Yes
F184	115	Brayton Point to Warren to Bristol to Mink Street to Read Street	Yes
F19 / S1	115	Bridgewater to Belmont to Auburn Street	Yes
G18	115	Dupont to Bridgewater	Yes
G185N	115	Drumrock to Kent County	Yes
G185S	115	Kent County to Old Baptist Road to Davisville to West Kingston	Yes
I187	115	Drumrock to Blackburn to Kilvert to Pontiac Avenue to Lincoln Avenue to Sockanosset	Yes
J16	115	Riverside to Staples	No

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Line	kV	Description	BPS Element
J188	115	Drumrock to Blackburn to Pontiac Avenue to Lincoln Avenue to Sockanosset	Y
K15	115	Swansea to Robinson Avenue	No
K189	115	Drumrock to Kent County	Yes
L14	115	Canonicus to Bent Road to Bates Street to Tiverton to Bell Rock	No
L190	115	Kent County to Old Baptist Road to Davisville to West Kingston	Yes
P11	115	Pawtucket to Valley to Robinson Avenue	No
Q10	115	Robinson Avenue to Staples	No
Q143N	115	Millbury to Whitins Pond to Uxbridge	Yes
Q143S	115	Uxbridge to Woonsocket to Clarkson to Admiral Street to Franklin Square	Yes
R144	115	Woonsocket to Clarkson to Admiral Street to Franklin Square	Yes
R9	115	Riverside to Valley	No
S171	115	Hartford to Johnston to Rise to Ridgewood	Yes
S171N	115	Woonsocket to West Farnum to Farnum Pike to Wolf Hill to Putnam Pike to Hartford Avenue	Yes
S171S	115	Drumrock to West Cranston to Rise to Johnston to Hartford Avenue	Yes
S8	115	Bridgewater to Raynham to Taunton Cleary to Somerset	Yes
S9 / H1	115	Auburn Street to Plymouth to Hanover to Water Street	Yes
T172N	115	Woonsocket to West Farnum to Farnum Pike to Wolf Hill to Putnam Pike to Hartford Avenue	Yes
T172S	115	Hartford Avenue to Johnston to Rise to West Cranston to Drumrock	Yes
T7	115	Somerset to Pawtucket	Yes
U2	115	Stoughton to Parkview to Belmont	No
U6	115	Bridgewater to Raynham to Dighton to Somerset	Yes
V148	115	Woonsocket to Washington to Robinson Avenue to Read Street	Yes
V5	115	Bridgewater to Dighton to Somerset	Yes
W4	115	Swansea to Somerset	Yes
X3	115	Pawtucket to Phillipsdale to Somerset	Yes
Y2	115	Somerset to Hathaway Street	Yes
Z1	115	Somerset to Hathaway Street	Yes
H17	115	West Farnum to Farnum to Riverside	Yes
A94	115	Auburn Street to Park View	Yes
M1	115	East Bridgewater to Mill Street to Middleboro	No
L14	115	Bell Rock to Tiverton to Bates Street to Canonicus to Dexter	No
M13	115	Somerset to Sykes Road to Tiverton to Bell Rock to Bates Street to Canonicus to Dexter	No
D21	115	High Hill to Bell Rock	No
N12	115	Somerset to Sykes Road to Bell Rock	Yes
D911	115	Dupont to Ames Street	Yes
D-182N	115	Berry Street to South Wrentham	Yes

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Line	kV	Description	BPS Element
D182S	115	Brayton Point to Mansfield to Sherman Street to North Attleboro to Berry Street	Yes
E1	115	Bridgewater to Middleboro	Yes
1505	115	Killingly to Brooklyn to Fry Brook to Plainfield to Tunnel	Yes
Ridgewood Gen Lead	115	Ridgewood	Yes
3763	69	Jepson to Navy Tap to Newport	No
W23W	69	Northboro Road to Mass Water Resources Authority to Woodside to South Marlboro to Marlboro	No

Table 10-2: N-1-1 Autotransformer Element-Out Scenarios

Autotransformer	kV	Description	BPS Element
Auburn 210X	345/115	Auburn Street 210X Autotransformer	Yes
Auburn 220X	345/115	Auburn Street 220X Autotransformer	Yes
Berry 1X	345/115	Berry Street 1X Autotransformer	Yes
Brayton Point 3XA	345/115/20	Brayton Point 3XA Autotransformer	Yes
Bridgewater 161X	345/115	Bridgewater 161X Autotransformer	Yes
Bridgewater 162X	345/115	Bridgewater 162X Autotransformer	Yes
Canal 120X	345/115	Canal 120X Autotransformer	Yes
Canal 121X	345/115	Canal 121X Autotransformer	Yes
Canal 126X	345/115	Canal 126X Autotransformer	Yes
Carver 345A	345/115	Carver 345A Autotransformer	Yes
Carver 345B	345/115	Carver 345B Autotransformer	Yes
Card 5X	345/115	Card Street 5X Autotransformer	Yes
Holbrook 345A	345/115	Holbrook 345A Autotransformer	Yes
Kent County 3X	345/115	Kent County 3X Autotransformer	Yes
Kent County 4X	345/115	Kent County 4X Autotransformer	Yes

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Autotransformer	kV	Description	BPS Element
Kent County 8X	345/115	Kent County 8X Autotransformer	Yes
Killingly 2X	345/115	Killingly 2X Autotransformer	Yes
West Barnstable 345A	345/115	West Barnstable 345A Autotransformer	No
West Farnum 174T	345/115	West Farnum 174T Autotransformer	Yes
West Farnum 175T	345/115	West Farnum 175T Autotransformer	Yes
West Walpole 345A	345/115	West Walpole 345A Autotransformer	Yes

Table 10-3: N-1-1 Generator Element-Out Scenarios

Generator	Station
ANP Bellingham 1	ANP-Bellingham
ANP Bellingham 2	ANP-Bellingham
ANP Blackstone 1	ANP-Blackstone
ANP Blackstone 2	ANP-Blackstone
Canal 1	Canal
Canal 2	Canal
Cleary 8	Cleary
Cleary 9	Cleary
Dartmouth	Dartmouth
Dighton	Dighton
Edgar	Edgar
Lake Road 1	Lake Road
Lake Road 2	Lake Road
Lake Road 3	Lake Road
Manchester 9	Franklin Square
Manchester 10	Franklin Square
Manchester 11	Franklin Square
Milford Power 2	Milford Power
NEA Bellingham	NEA-Bellingham
Oak Bluffs	Falmouth
Ocean State 1	Ocean State
Ocean State 2	Ocean State
Pawtucket Power	Admiral Street
Pilgrim	Pilgrim
Potter 2	Potter Station
Medway Peaker 1	Medway
Medway Peaker 2	Medway

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Generator	Station
Ridgewood	Ridgewood
Rise	Rise
SEMASS 1	SEMASS
SEMASS 2	SEMASS
Tiverton	Tiverton
TA Watson 1	Potter Station
TA Watson 2	Potter Station
West Medway Jet	West Medway
West Tisbury	Falmouth

Table 10-4: N-1-1 Shunt Device Element-Out Scenarios

Reactive Device	Station	MVAR
115 kV Capacitor	Barnstable	35.3
Static VAR Compensator	Barnstable	112.5
115 kV Reactor R1	Edgar	40.0
115 kV Reactor R2	Edgar	40.0
115 kV Capacitor	Falmouth	35.3
115 kV Capacitor	Franklin Square	37.8
115 kV Capacitor	Harwich	21.2
115 kV Capacitor	Hyannis Junction	39.0
115 kV Capacitor C2	Kent County	63.0
115 kV Capacitor C5	Kent County	144.0
115 kV Capacitor	Mashpee	35.3
115 kV Capacitor	Orleans	13.6
115 kV Reactor R1	Pine Street	10.0
115 kV Reactor R2	Pine Street	10.0
345 kV Stoughton R1	Stoughton	110.0
345 kV Stoughton R2	Stoughton	110.0
345 kV Stoughton R3	Stoughton	110.0
345 kV Stoughton R4	Stoughton	70.0
115 kV Wing Lane	Wing Lane	35.3

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Section 11
Appendix E: Steady State Analysis Results

The complete set of steady state thermal and voltage analysis results can be found in the files connected to the links shown below:

Appendix E1: SEMA-RI 2026 Needs N-1 Thermal Results

Appendix E2: SEMA-RI 2026 Needs N-1 Voltage Results

Appendix E3: SEMA-RI 2026 Needs N-1-1 Thermal Results

Appendix E4: SEMA-RI 2026 Needs N-1-1 Voltage Results

Section 12
Appendix F: Short Circuit Analysis Results

The complete set of short circuit analysis results can be found in the file connected to the link shown below:

Appendix F: 2026 SEMA-RI Needs Short Circuit Results

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Section 13
Appendix G: NERC Compliance Statement

This report is the first part of a two part process used by ISO-NE to assess and address compliance with NERC TPL standards. This Needs Assessment report provides documentation of an evaluation of the performance of the system as contemplated under the TPL standards to determine if the system meets compliance requirements. If necessary, development of transmission solutions to address criteria violations identified in this Needs Assessment will be handled using either the Solutions Study process or Competitive Solicitation process described in Attachment K of the OATT. This Needs Assessment report and any report documentation developed as part of the solution development process provide the necessary evaluations and determinations required under the NERC TPL standards.

This study provides a detailed assessment of SEMA-RI electric system performance for 2026. The results of this study show a substantial number of violations across the study area: 30 elements showing thermal violations & 19 PTF elements showing voltage violations under N-1 conditions, and 84 elements showing thermal violations & 48 PTF elements showing voltage violations under N-1-1 conditions. As shown in Section 5.5, Critical Load Levels have been identified for these thermal violations from 10,063 MW to 30,307 MW and for the voltage violations from 15,279 MW to 30,228 MW in terms of equivalent net New England load level. As shown in Section 3.1.6, the study includes peak load testing. Shoulder and light load testing was unnecessary for this study area. This study uses normal operating procedures as illustrated by transfers, phase shifter settings and normal capacitor settings. Transfer levels used in this study are as described in Section 3.1.10. Note that while firm transfers are not explicitly modeled or used in New England the system conditions used in this study are always sufficiently stressed to ensure transfer capability across interfaces is maintained. As described in Section 3, this study includes the effects of existing and planned Demand Response, transmission and generation facilities. The study also includes the effects of area reactive resources which were found to provide inadequate voltage support for the next five years and beyond. Planned outages are addressed through testing of numerous generator dispatches. The effects of existing and planned protection systems can be found in Section 3.1.14. ISO New England Operations coordinates and approves planned generator and transmission outages looking out one year. Long term planning studies look at 90/10 load, stressed dispatch and line out conditions that historically provide ample margin to perform maintenance.

APPENDIX 4-1 CANDIDATE ROUTES ENVIRONMENTAL CONSTRAINTS MAP BOOK

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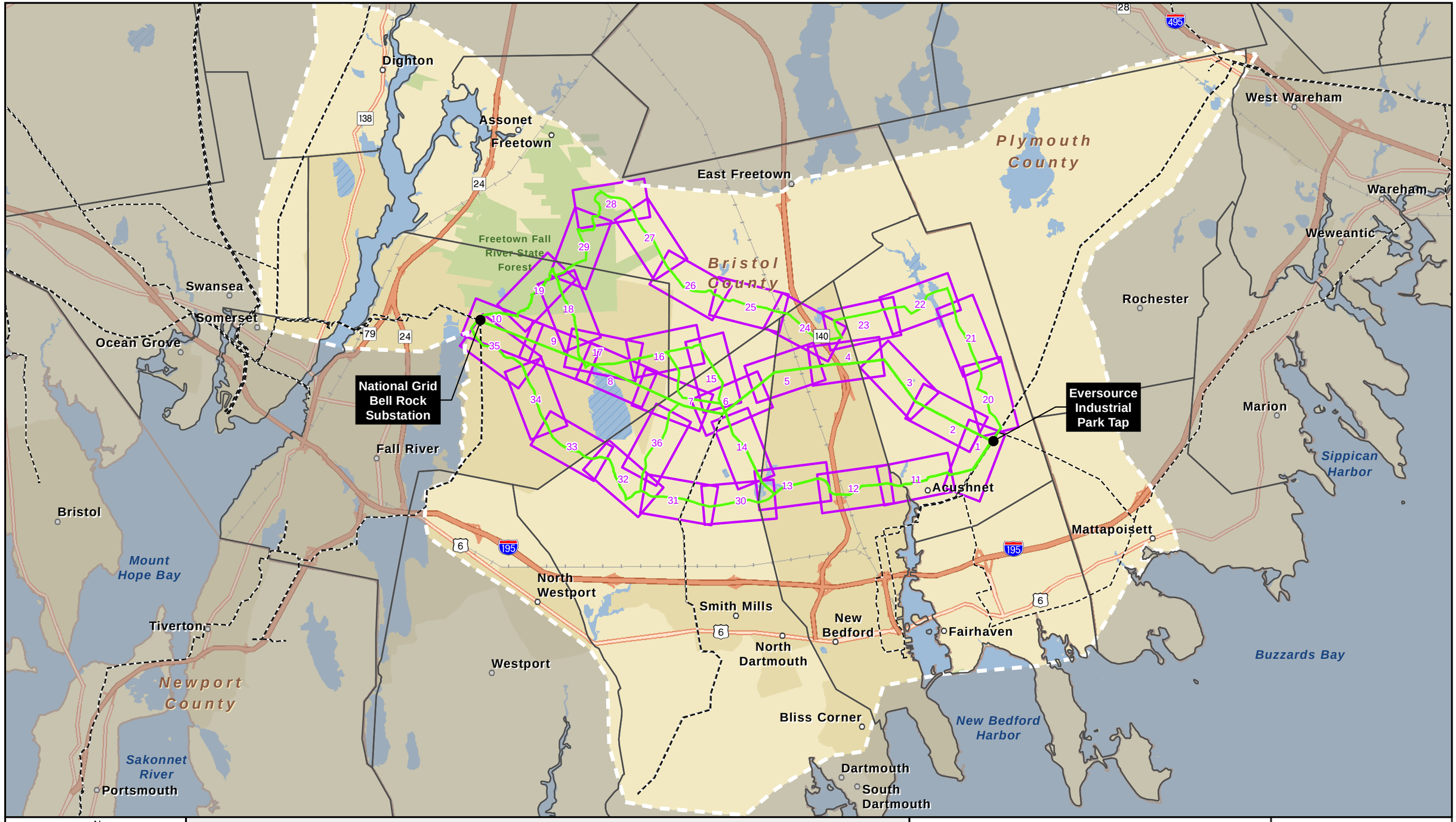

N
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Miles

Legend

- Candidate Route
- Existing Transmission Line
- Town Boundary
- Routing Study
- Map Book Index

Acushnet to Fall River Reliability Project

Appendix 4-1: Map Book Index
Environmental Constraints Map Book

Commonwealth of Massachusetts

12/6/2021

EVERSOURCE
nationalgrid
POWER ENGINEERS





Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Existing Station
- Local Road
- Town Boundary
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Other Protected Lands

1 inch = 500 feet
0 250 500
Feet

*Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

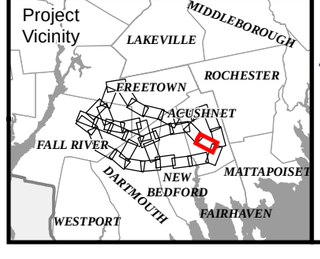
NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.





Legend

- Candidate Route
- Transmission Structure
- Existing Transmission Line
- Local Road
- Town Boundary
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties

N

1 inch = 500 feet
0 250 500
Feet

*Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Acushnet

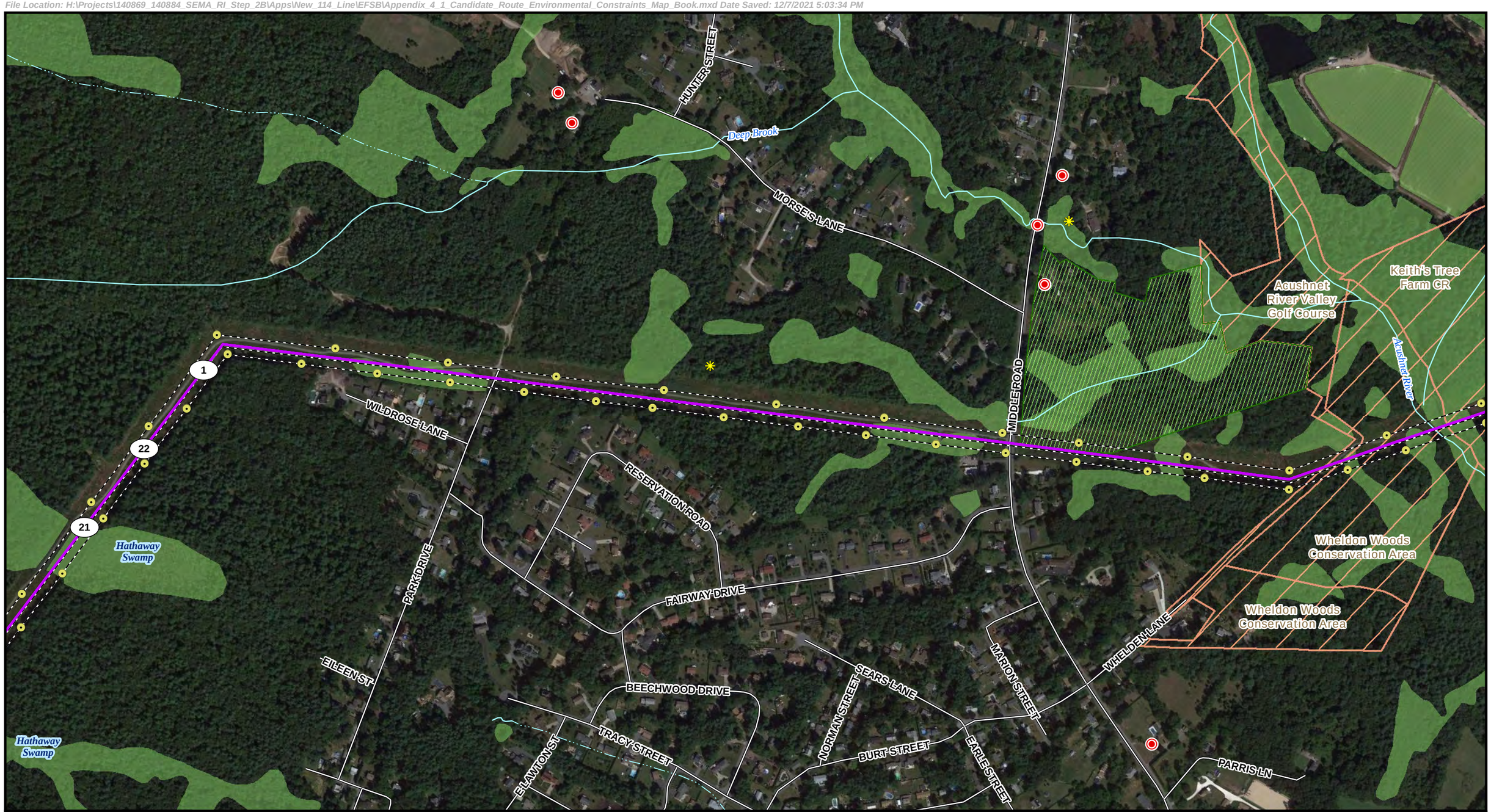
Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.





Legend

- Candidate Route
- Transmission Structure
- Existing Transmission Line
- Local Road
- Town Boundary
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties

1 inch = 500 feet
0 250 500
Feet

*Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Acushnet

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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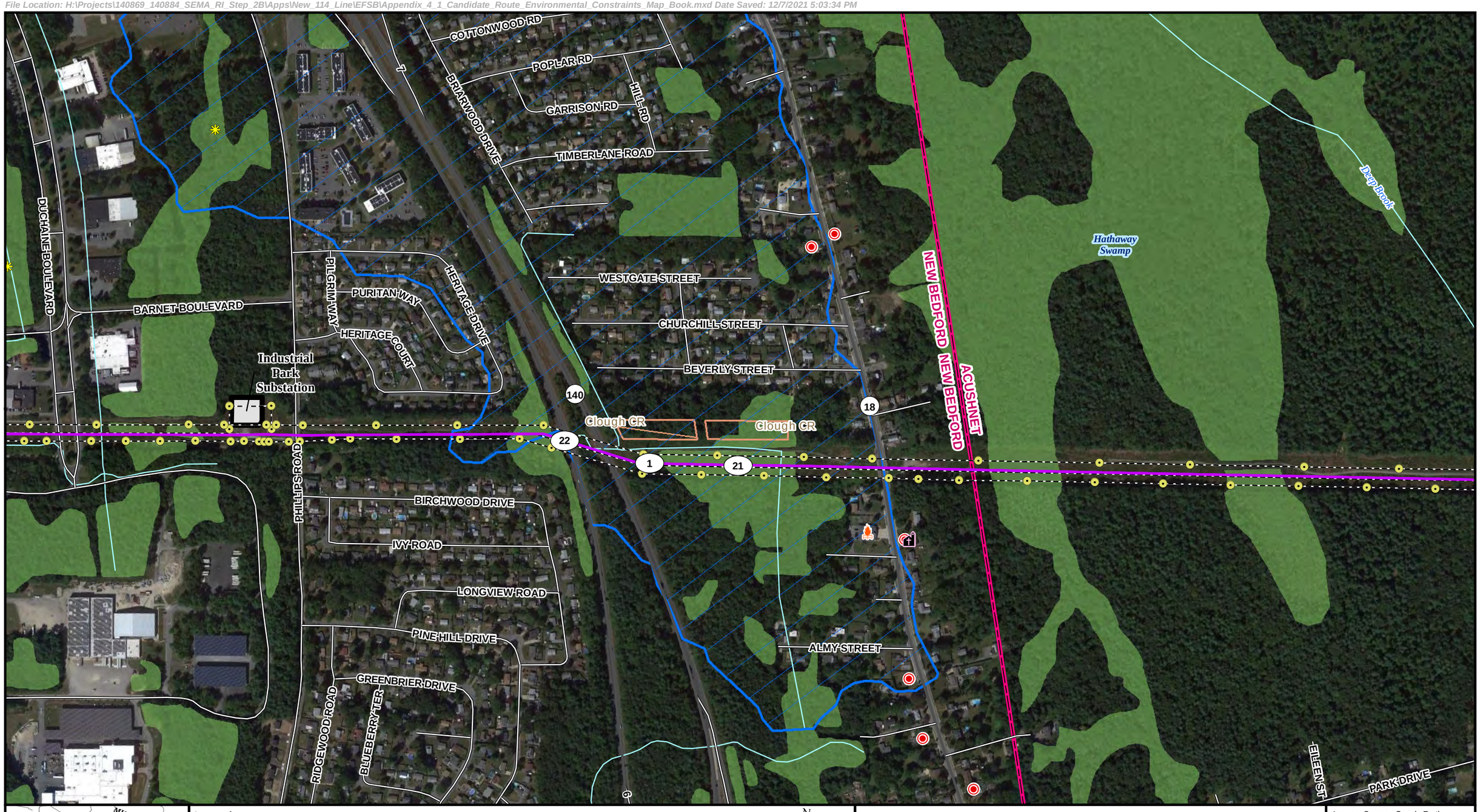



Legend

- Candidate Route
- Transmission Structure
- Existing Transmission Line
- Existing Station
- State Highway
- Local Road
- Town Boundary
- Fire Station
- Church
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 500 feet

0 250 500

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford, Town of Acushnet

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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Legend

- Candidate Route
- Transmission Structure
- Existing Transmission Line
- Local Road
- Railroad
- Town Boundary
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 500 feet

0 250 500

Feet

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford, Town of Dartmouth

Date: 12/6/2021

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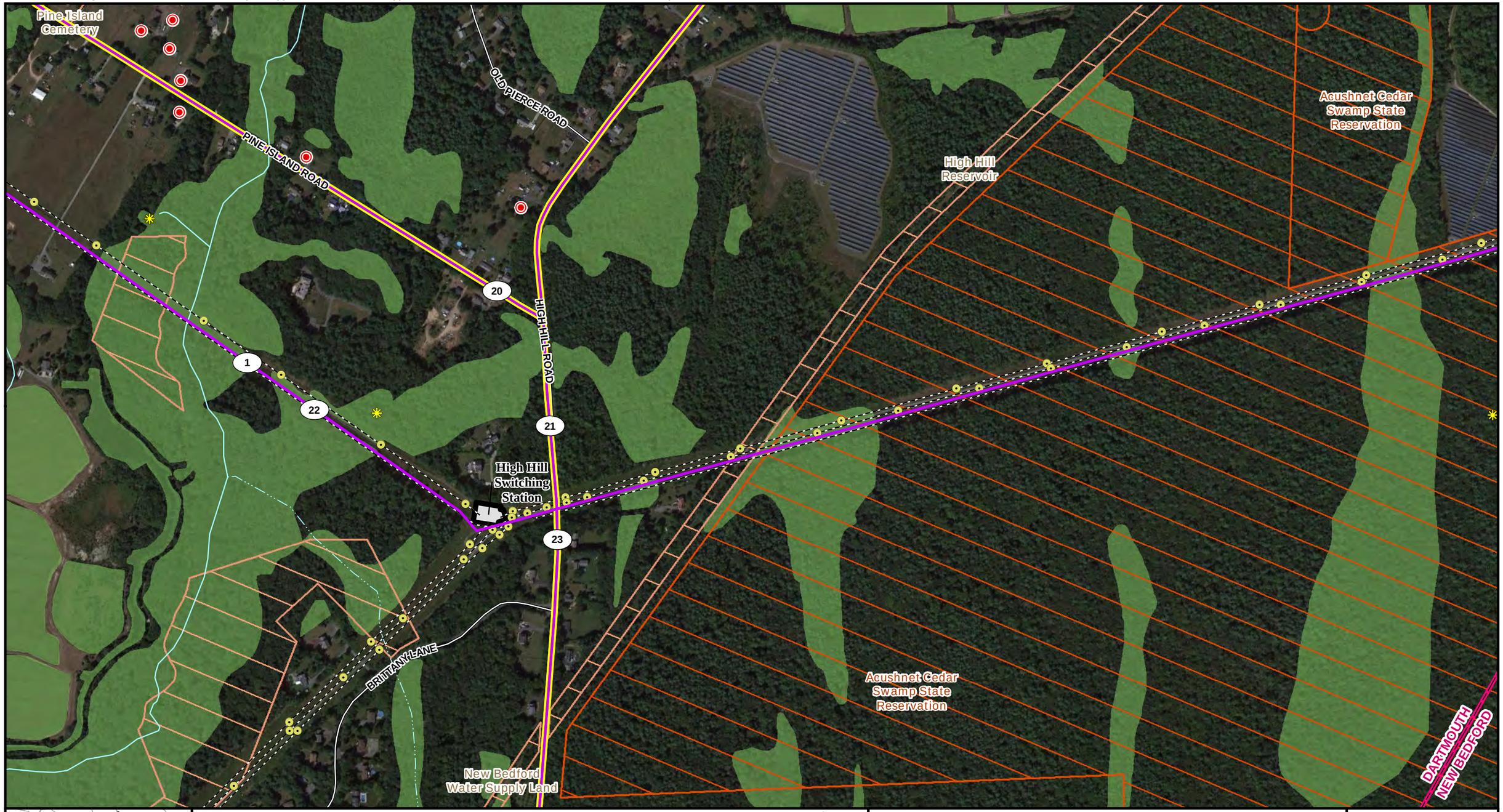



Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Existing Station
- Local Road
- Town Boundary
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

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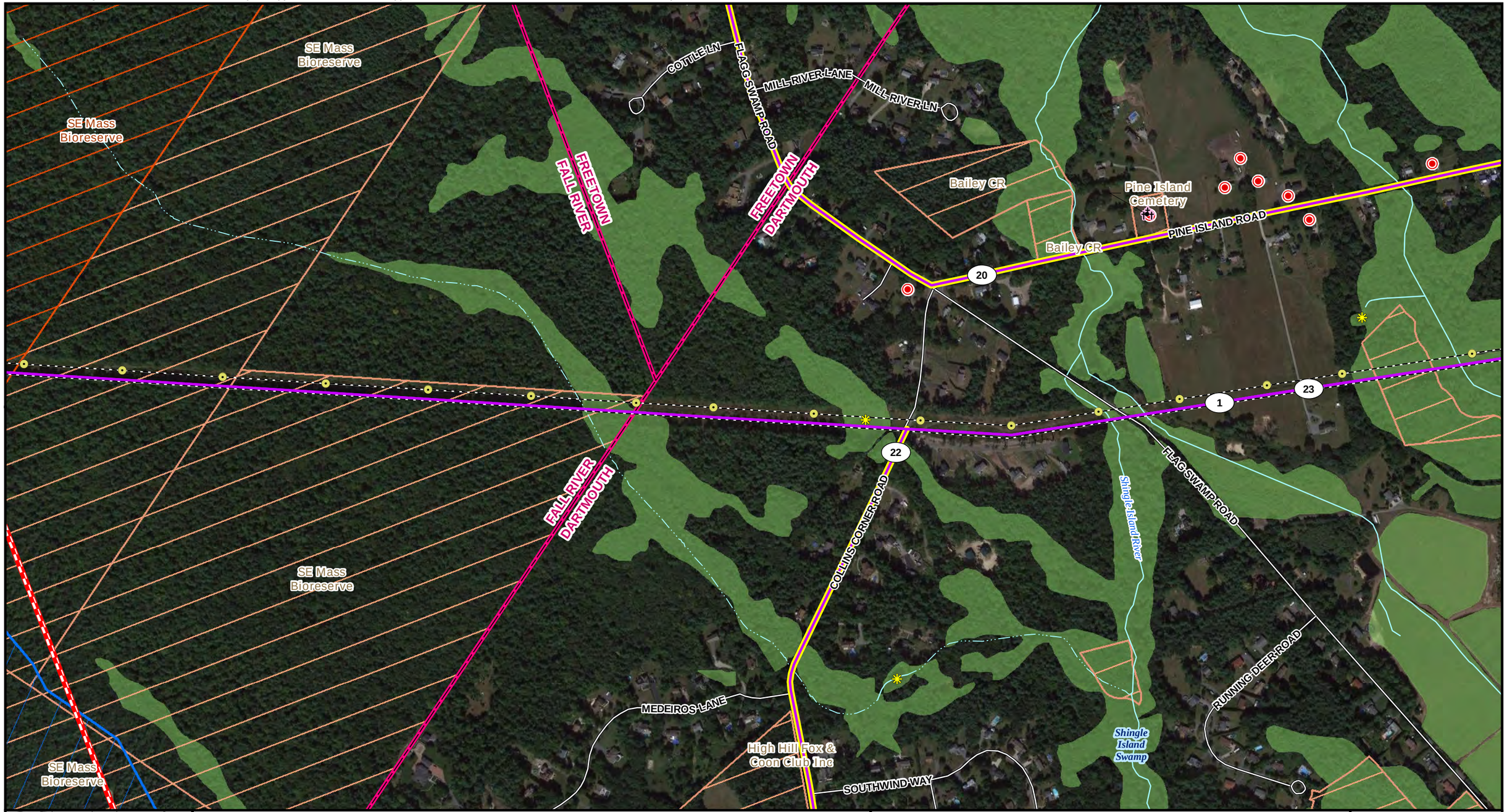



Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Cemetery
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
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- Other Protected Lands
- Outstanding Resource Waters (ORW)

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River, Towns of Dartmouth and Freetown

Date: 12/6/2021

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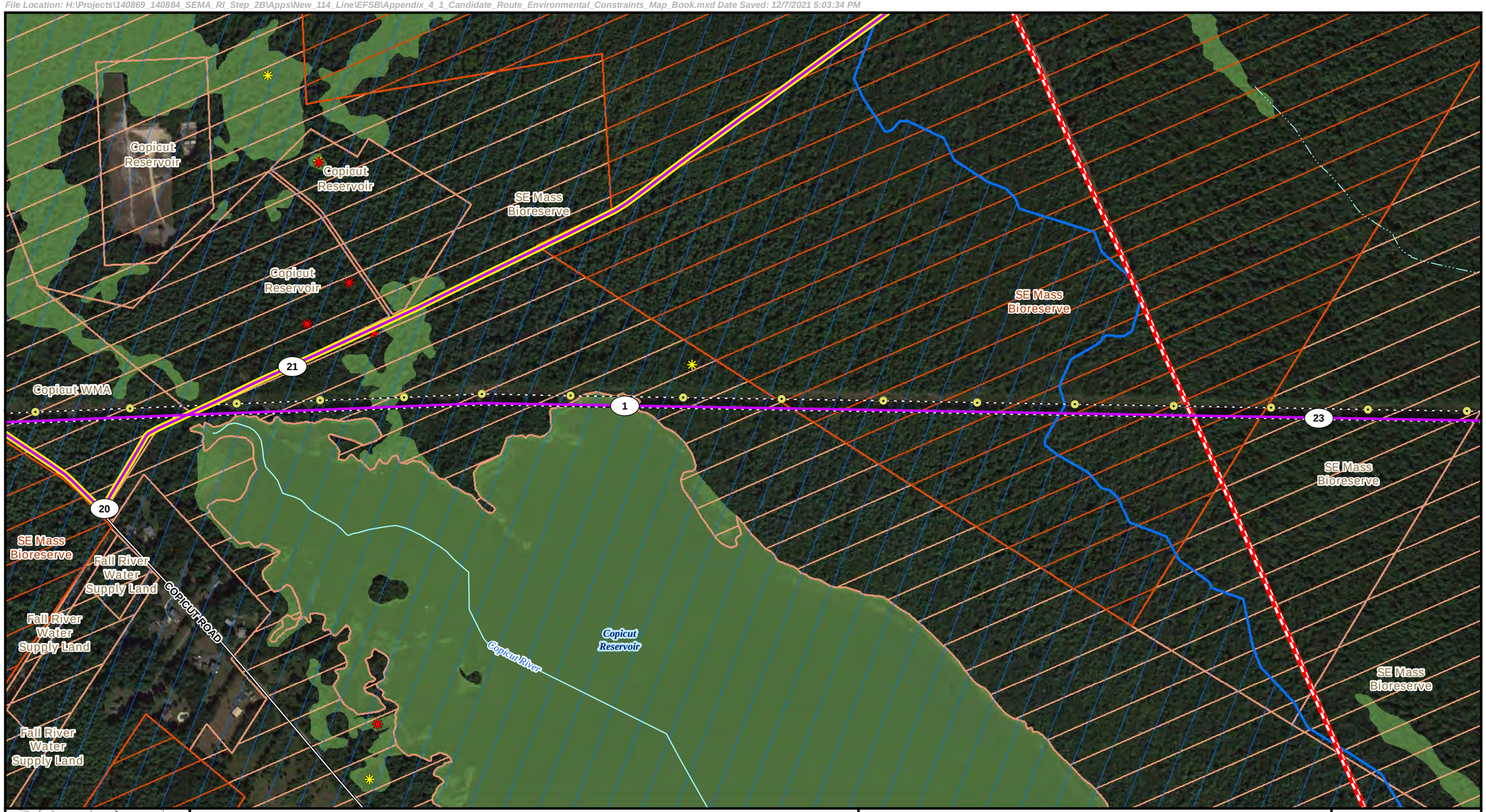



Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

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Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

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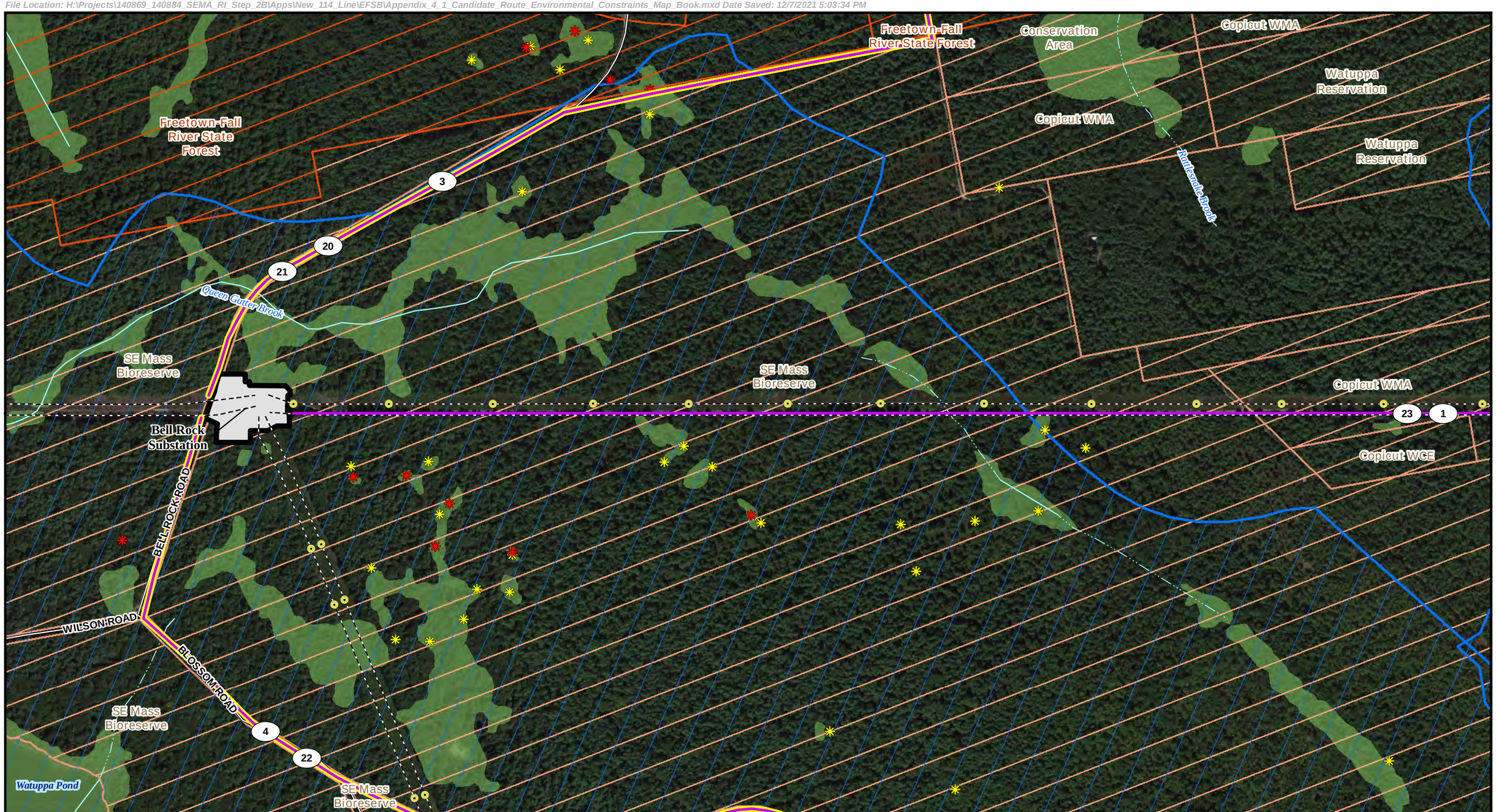



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- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Existing Station
- Local Road
- Town Boundary
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Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

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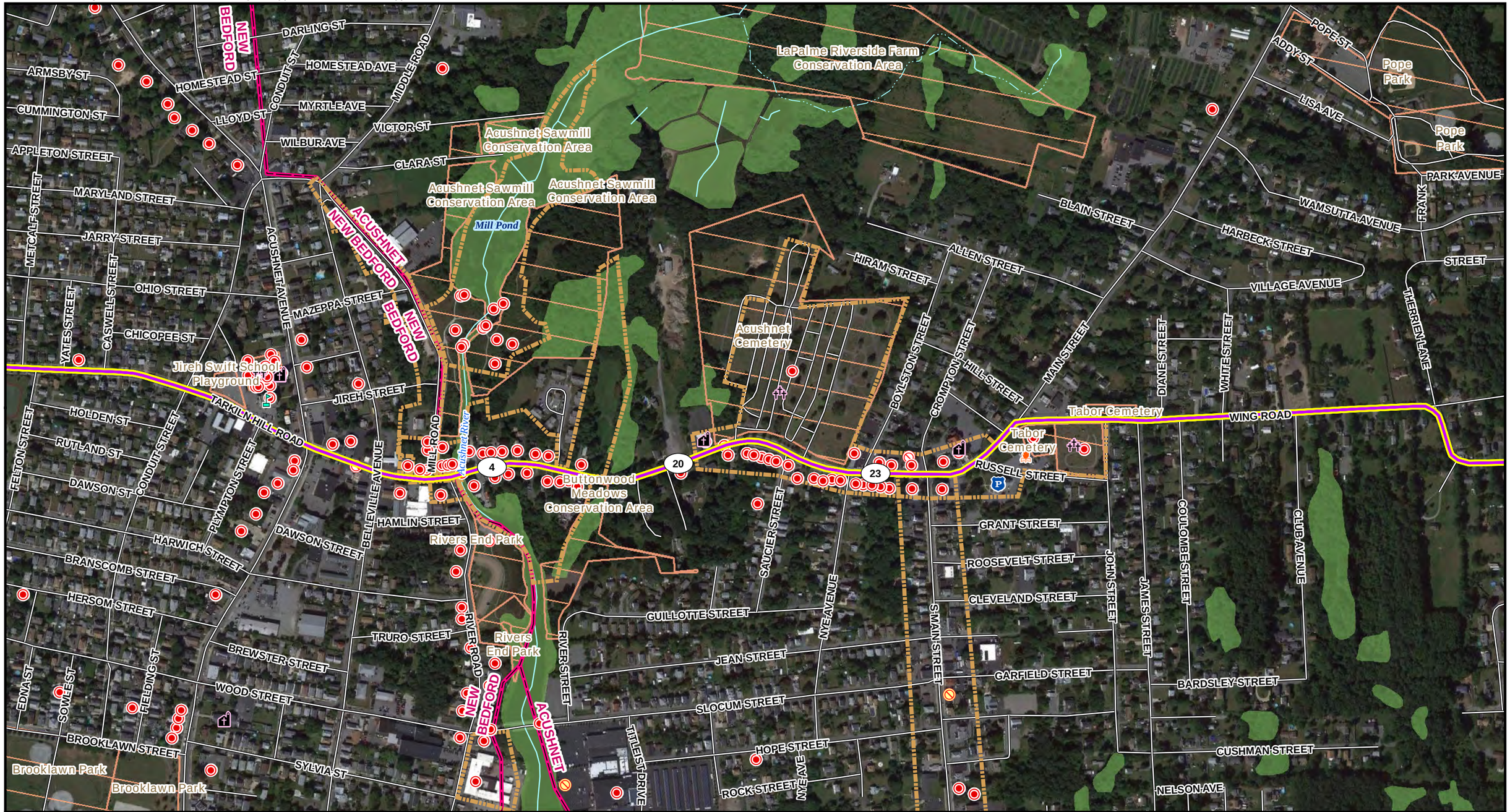



Legend

- Candidate Route
- Underground Portion of Route
- Local Road
- Town Boundary
- Fire Station
- Police Station
- Cemetery
- Church
- School
- MHC Historic Inventory
- MHC Historic Inventory Area
- MassDEP Tier Classified Oil and/or Hazardous Material Sites
- MassDEP Oil and/or Hazardous Material Sites with Activity and Use Limitations
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Other Protected Lands

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford, Town of Acushnet

Date: 12/6/2021

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Imagery Source: Google Earth

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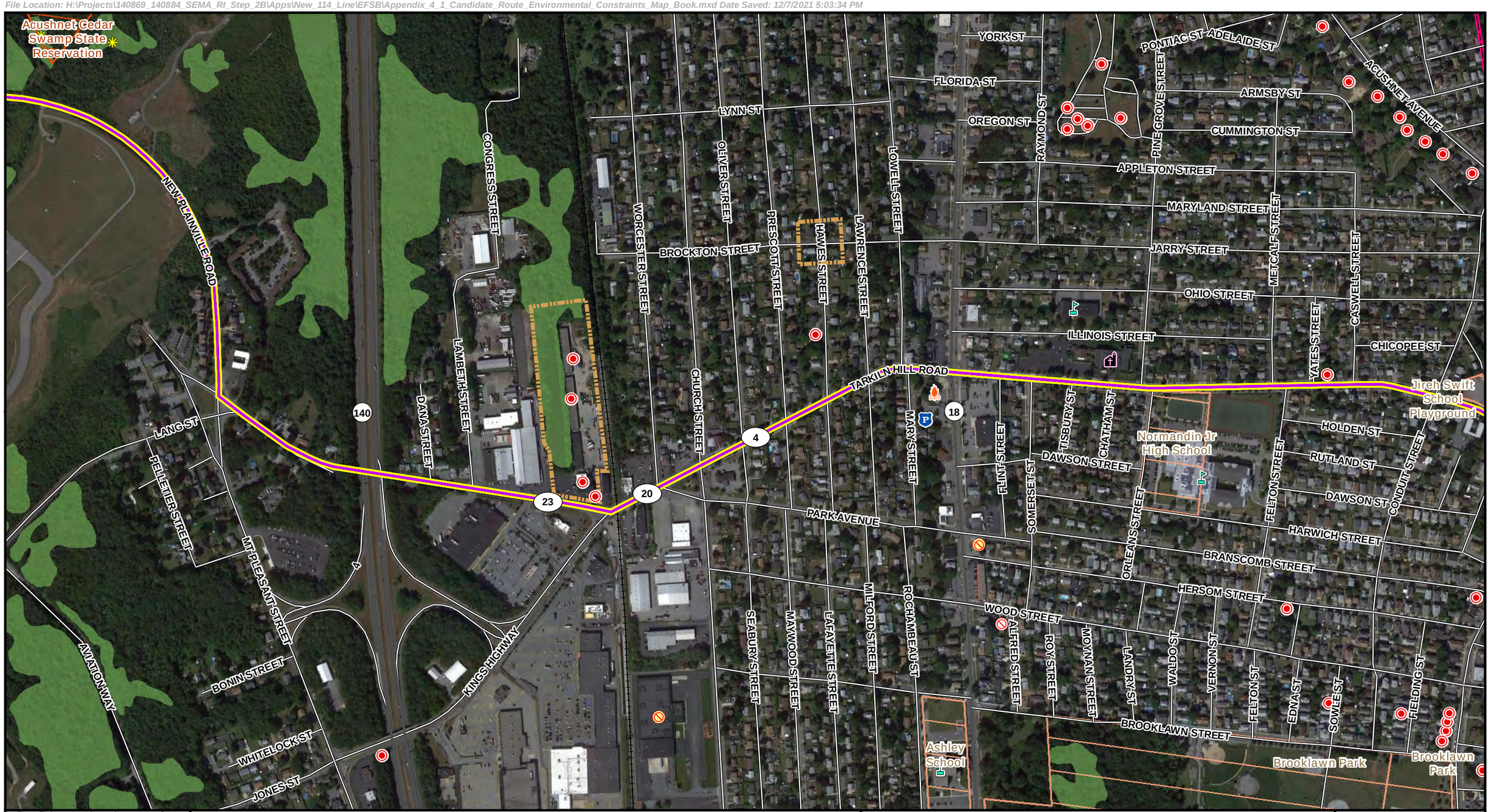



Legend

- Candidate Route
- Underground Portion of Route
- State Highway
- Local Road
- Railroad
- Town Boundary
- Fire Station
- Police Station
- Church
- School
- MHC Historic Inventory
- MHC Historic Inventory Area
- MassDEP Tier Classified Oil and/or Hazardous Material Sites
- MassDEP Oil and/or Hazardous Material Sites with Activity and Use Limitations
- Potential Vernal Pools (NHESP)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford

Date: 12/6/2021

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- Candidate Route
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- Local Road
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- Church
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- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford

Date: 12/6/2021

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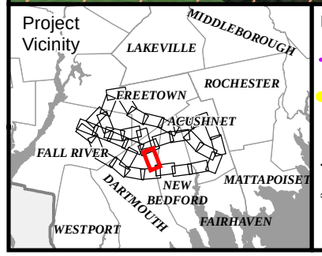
Acushnet Cedar Swamp State Reservation
Turner Pond
Acushnet Cedar Swamp State Reservation
Paskamansett River
Acushnet Cedar Swamp State Reservation
DARTMOUTH
Acushnet Cedar Swamp State Reservation
HIGH HILL ROAD
20
23
Cemetery
6-Family
High Hill Reservoir
Acushnet Cedar Swamp State Reservation
New Bedford Water Supply Land
FAUNCE CORNER ROAD
High Hill Conservation Area
McConvill APR
McConvill APR
McConvill APR
BRITTANY LANE
PLUMLEIGH DRIVE
New Bedford Water Supply Land
Faunce Corner Road Conservation Area

Project Vicinity



Legend

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

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- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Local Road
- Town Boundary
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties
- Outstanding Resource Waters (ORW)

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Freetown and Dartmouth

Date: 12/6/2021

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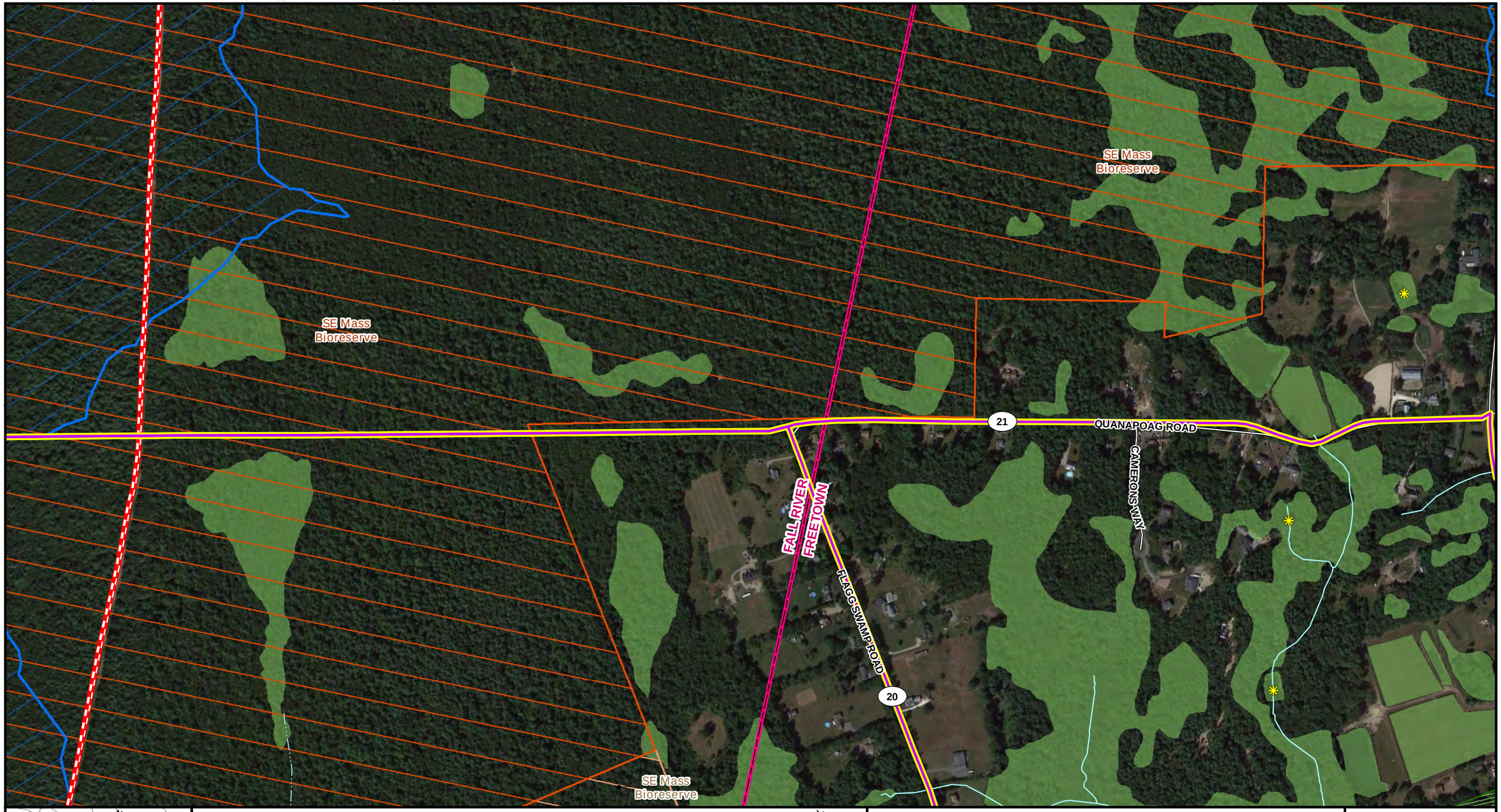



Legend

- Candidate Route
- Underground Portion of Route
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties
- Outstanding Resource Waters (ORW)

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River, Town of Freetown

Date: 12/6/2021

NOT FOR CONSTRUCTION

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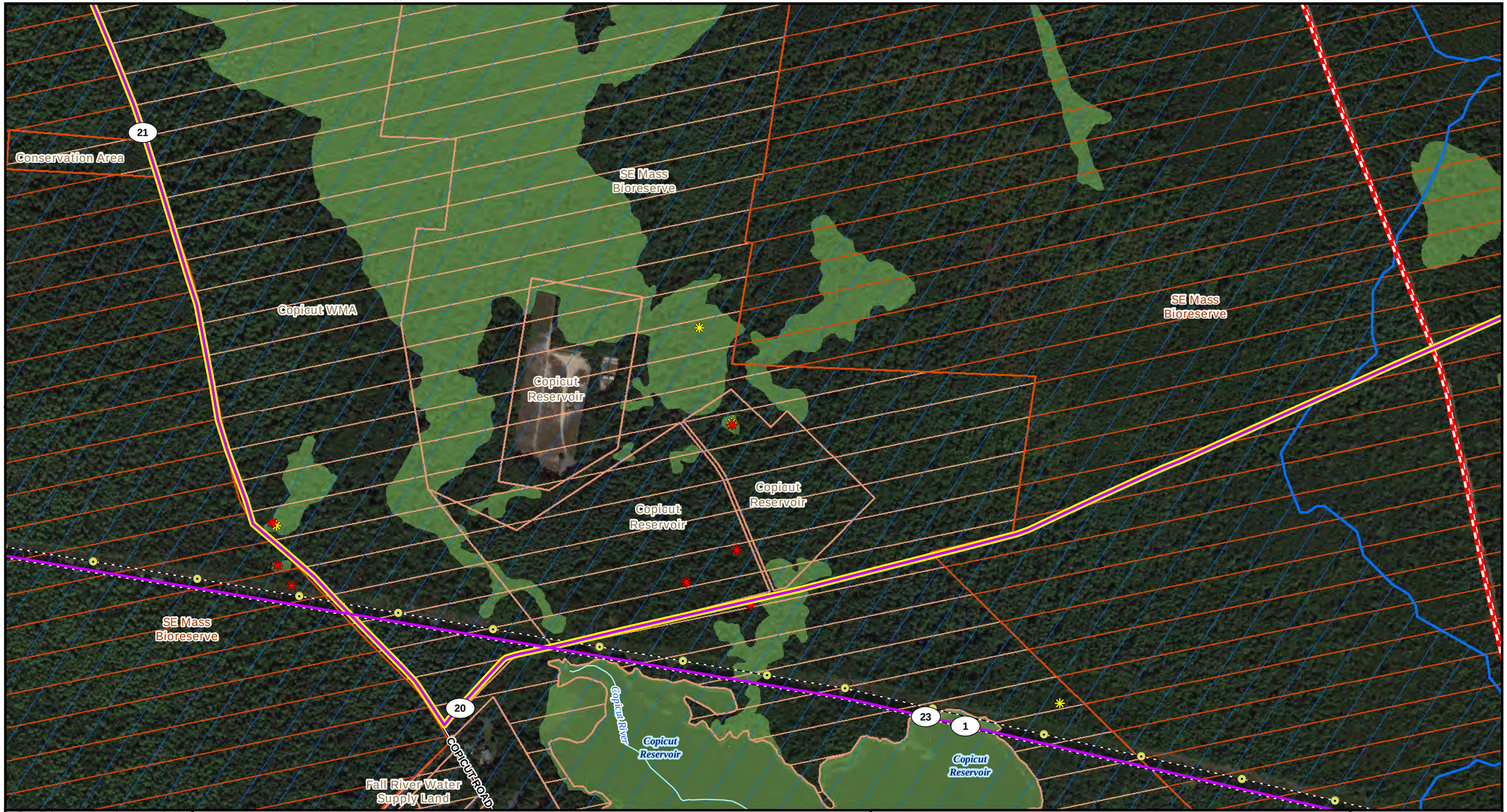



Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River

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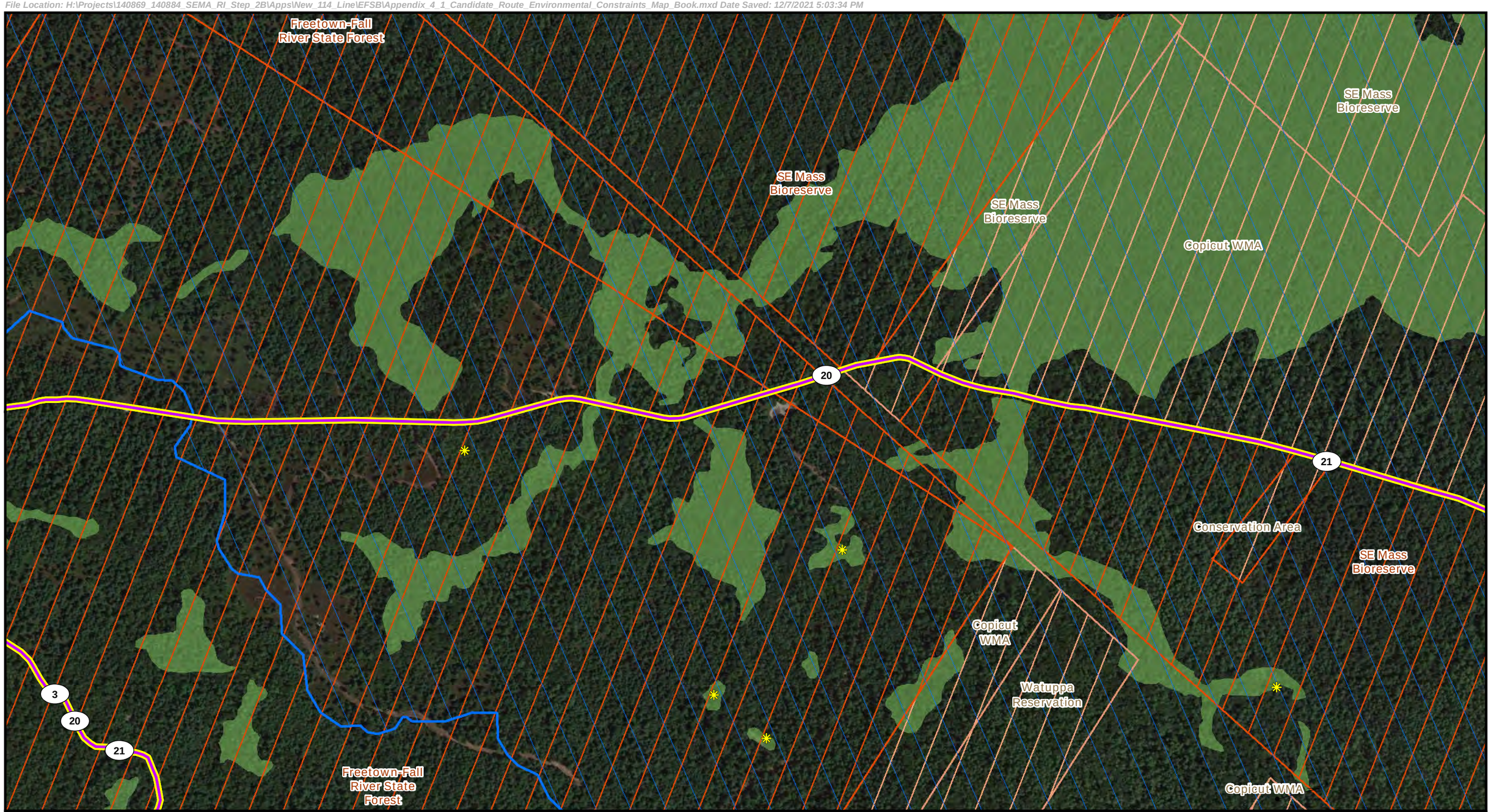



Legend

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- Town Boundary
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Commonwealth of Massachusetts
City of Fall River

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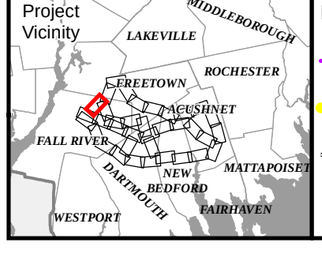

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- Underground Portion of Route
- Local Road
- Town Boundary
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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River

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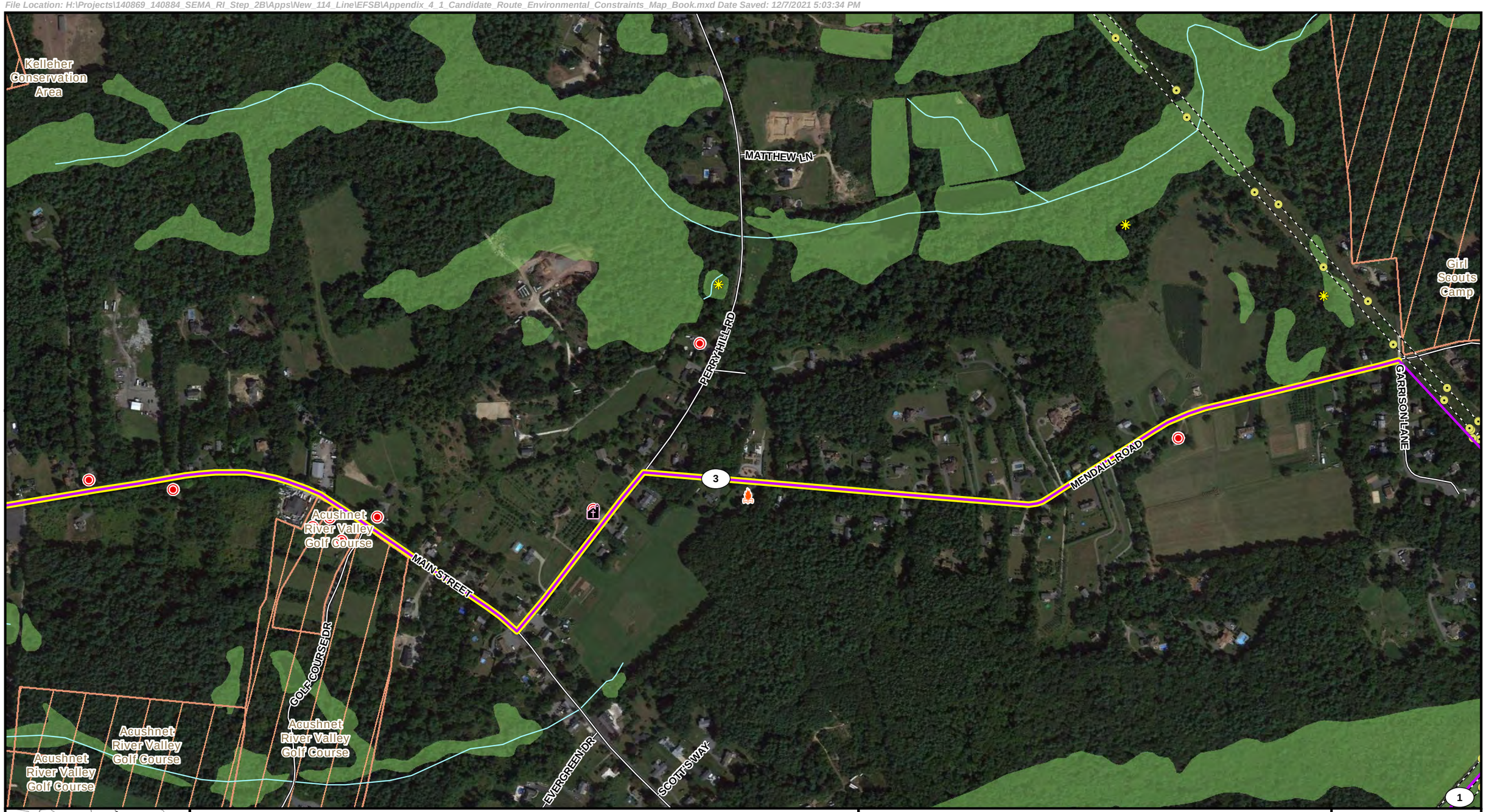



Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Local Road
- Town Boundary
- Fire Station
- Church
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
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Commonwealth of Massachusetts
Town of Acushnet

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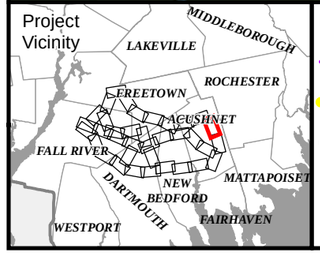

Legend

- Candidate Route
- Underground Portion of Route
- Local Road
- Town Boundary
- Fire Station
- Cemetery
- Church
- MHC Historic Inventory
- MHC Historic Inventory Area
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Wellhead Protection Area - DEP Approved Zone I
- Wellhead Protection Area - IWPA

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- Local Road
- Town Boundary
- Fire Station
- Church
- MHC Historic Inventory
- MHC Historic Inventory Area
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties
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- Wellhead Protection Area - DEP Approved Zone II
- Wellhead Protection Area - IWPA

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Town of Acushnet

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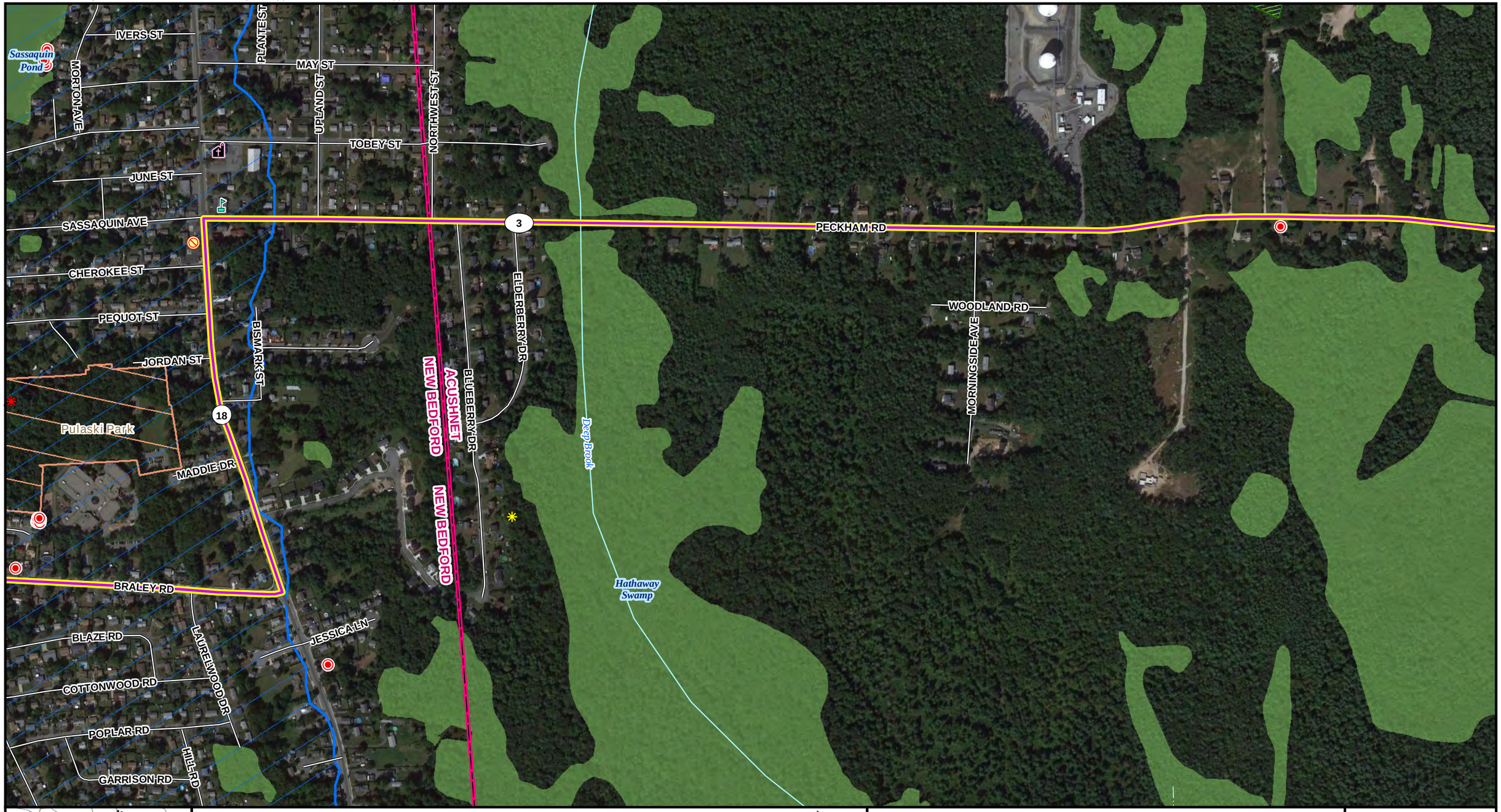

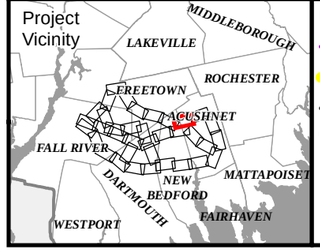

Legend

- Candidate Route
- Underground Portion of Route
- State Highway
- Local Road
- Town Boundary
- Church
- School
- MHC Historic Inventory
- MassDEP Oil and/or Hazardous Material Sites with Activity and Use Limitations
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- Potential Vernal Pools (NHESP)
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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford, Town of Acushnet

Date: 12/6/2021

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- Local Road
- Railroad
- Town Boundary
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Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford, Towns of Dartmouth and Freetown

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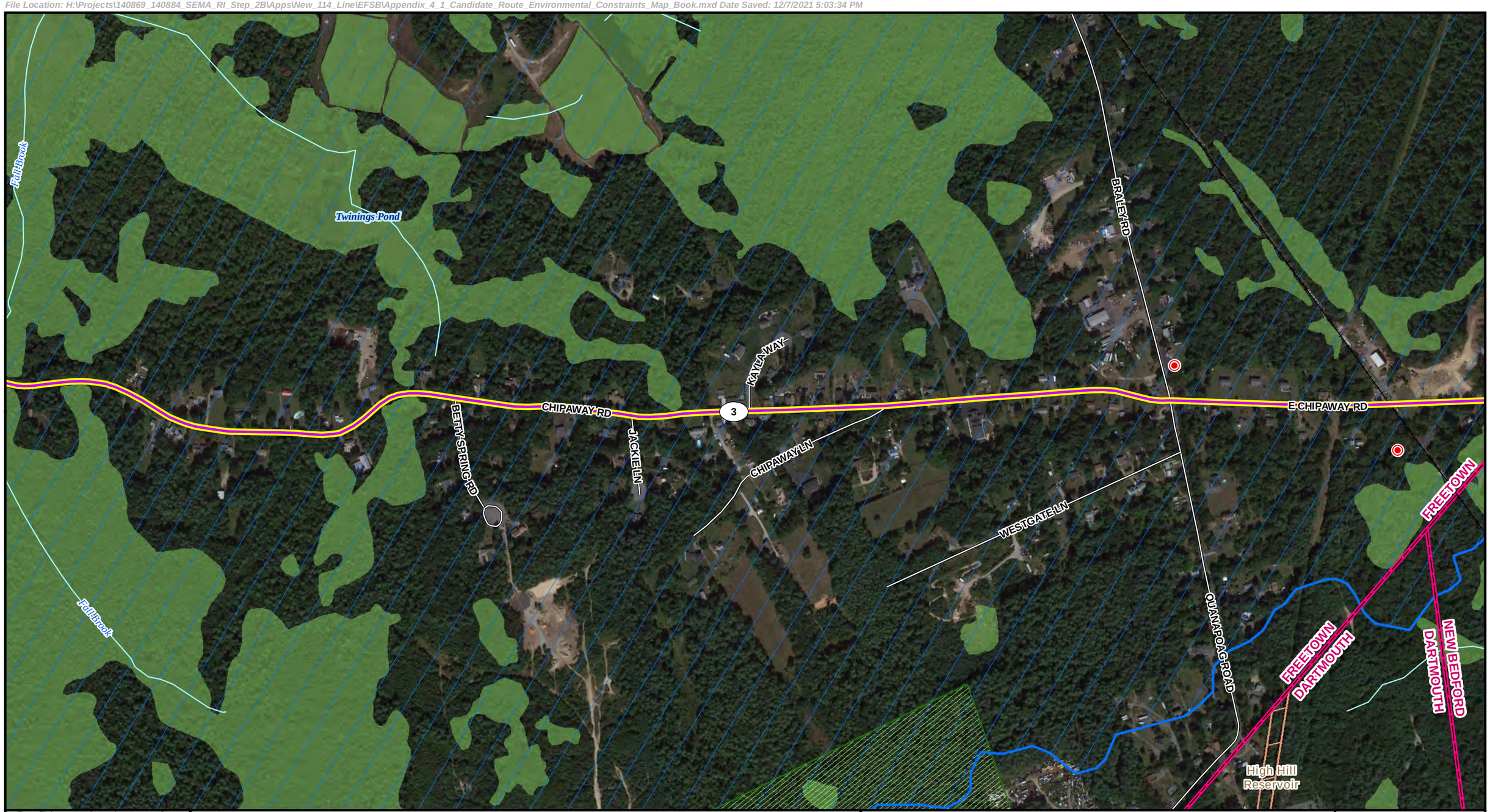



Legend

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- Underground Portion of Route
- Local Road
- Railroad
- Town Boundary
- MHC Historic Inventory
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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

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Commonwealth of Massachusetts
Town of Freetown

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Imagery Source: Google Earth

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THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.





Legend

- Candidate Route
- Underground Portion of Route
- Local Road
- Town Boundary
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 500 feet
0 250 500
Feet

*Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Freetown

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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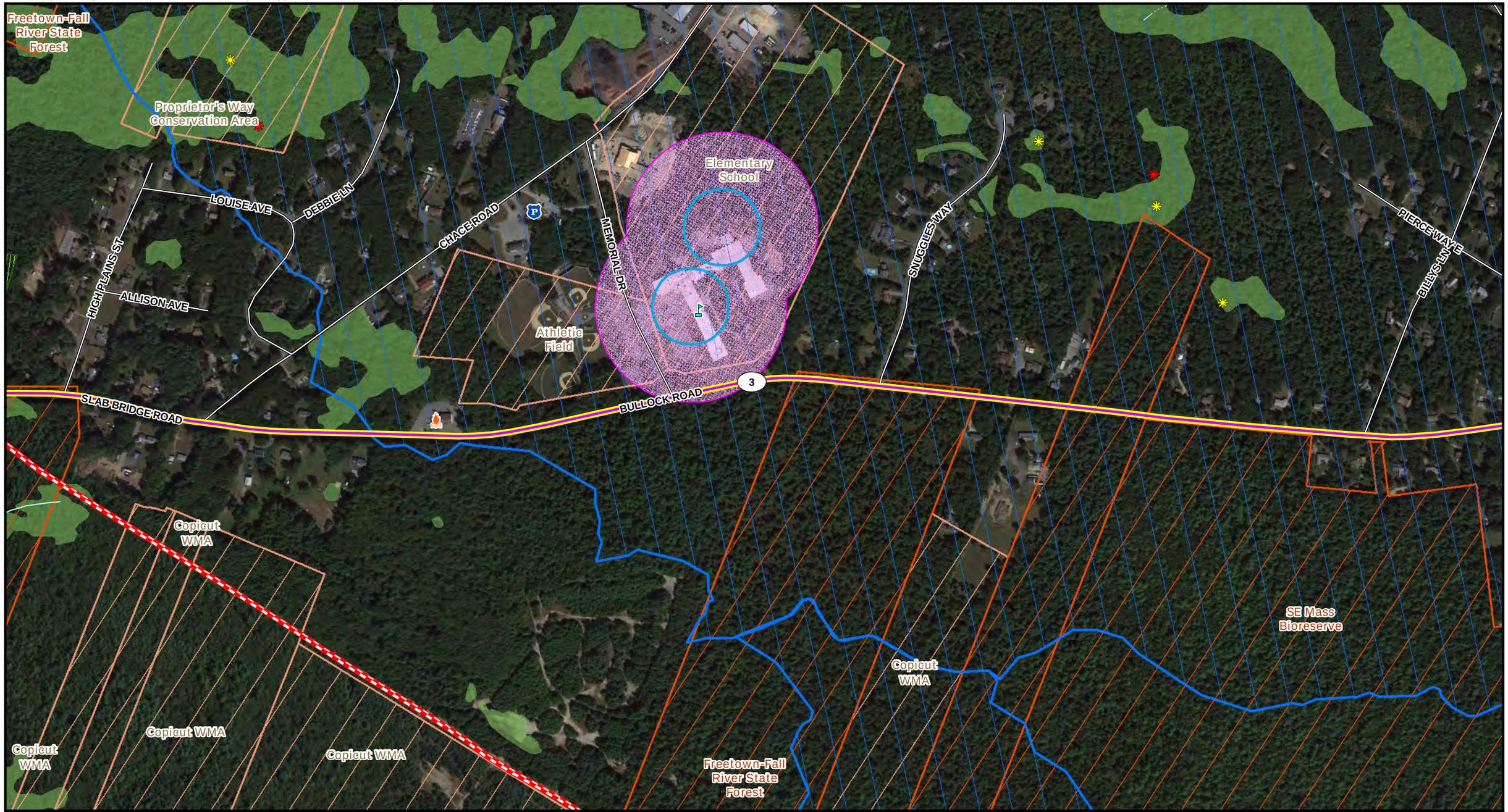



Legend

- Candidate Route
- Underground Portion of Route
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Fire Station
- Police Station
- School
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties
- Outstanding Resource Waters (ORW)
- Wellhead Protection Area - DEP Approved Zone I
- Wellhead Protection Area - IWPA

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Feet

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Freetown

Date: 12/6/2021

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Legend

- Candidate Route
- Underground Portion of Route
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties
- Outstanding Resource Waters (ORW)

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Town of Freetown

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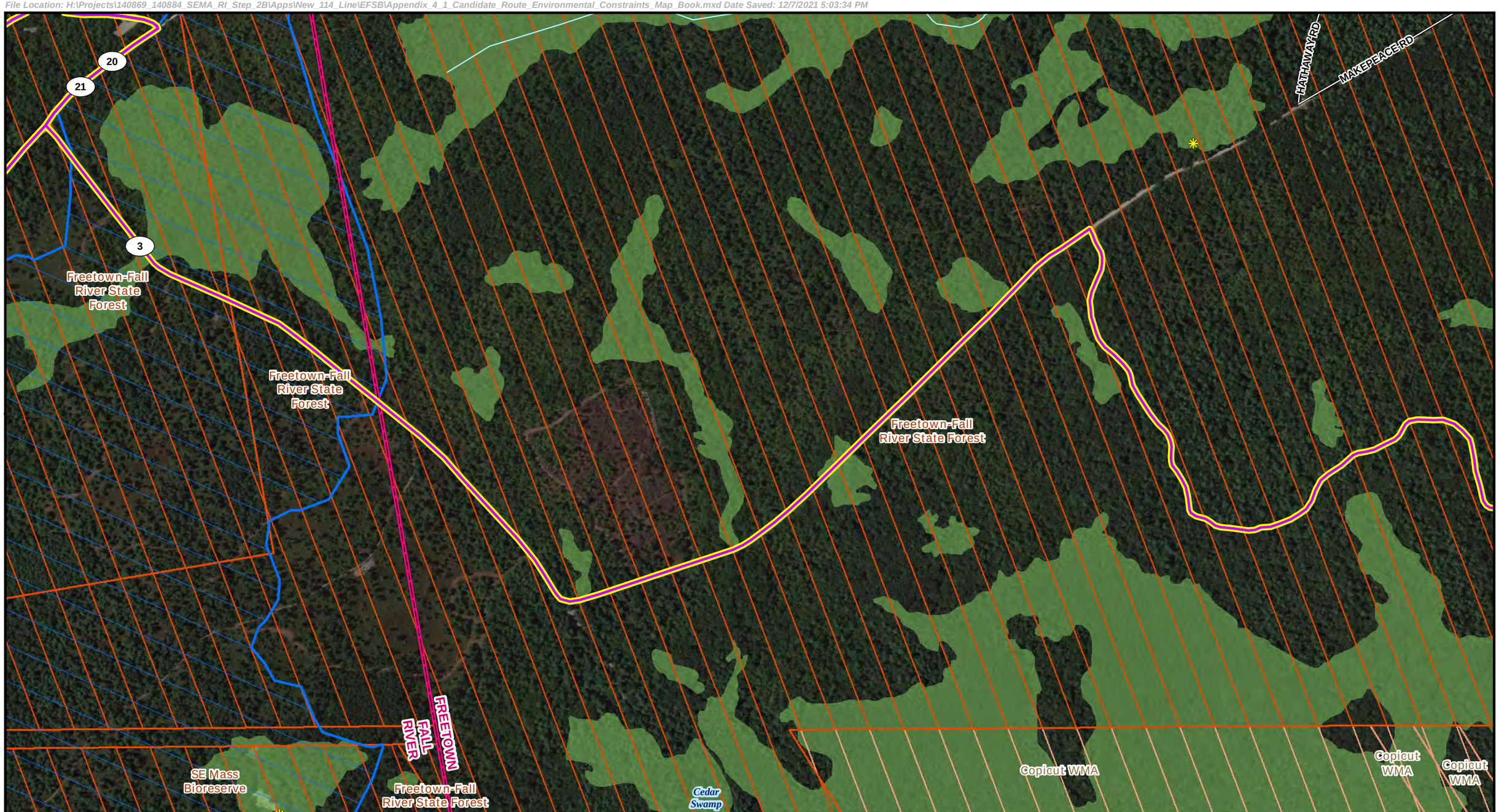



Legend

- Candidate Route
- Underground Portion of Route
- Local Road
- Town Boundary
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River, Town of Freetown

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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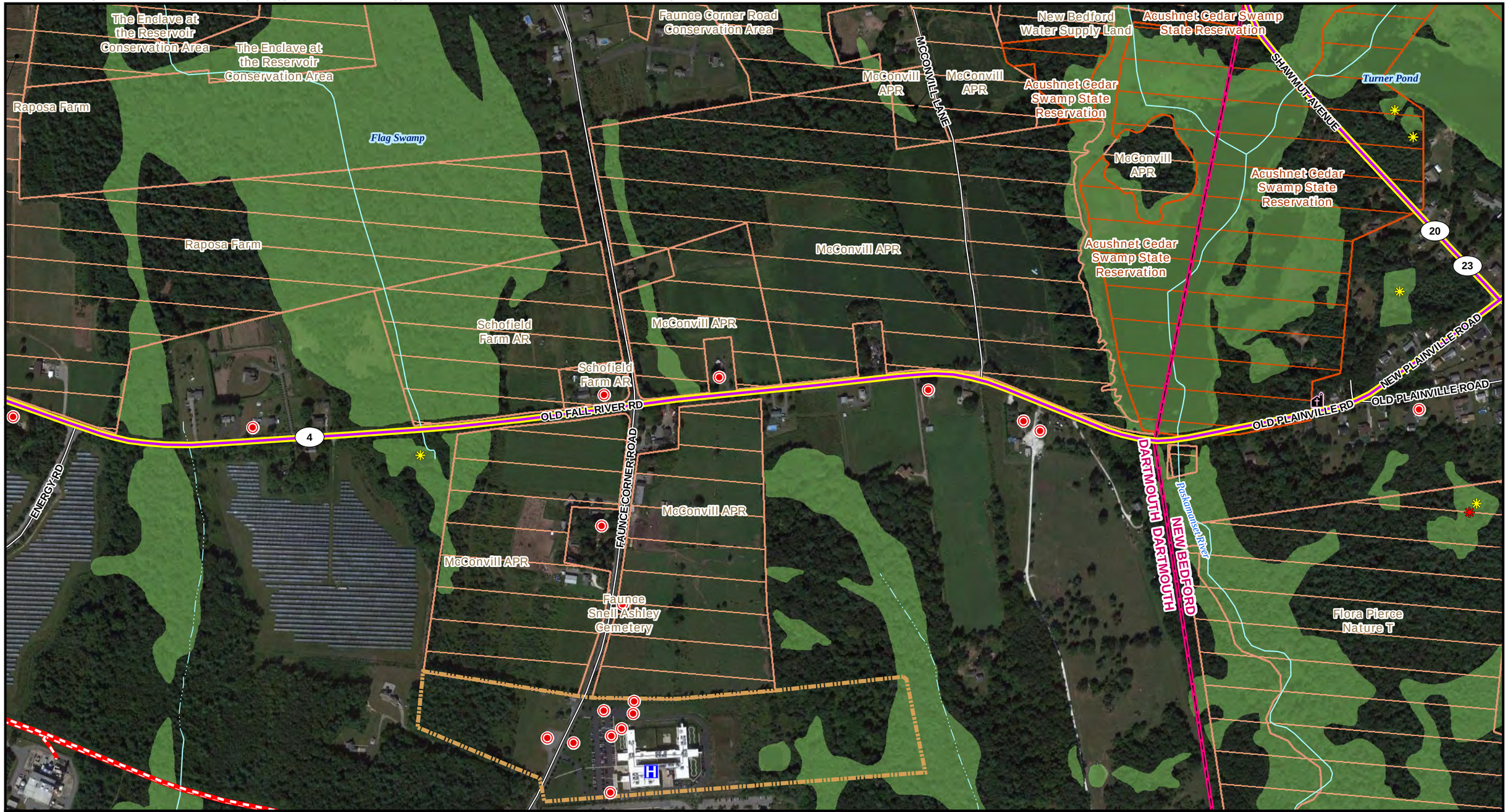



Legend

- Candidate Route
- Underground Portion of Route
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Hospital
- Church
- MHC Historic Inventory
- MHC Historic Inventory Area
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands

N

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0 250 500
Feet

*Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of New Bedford, Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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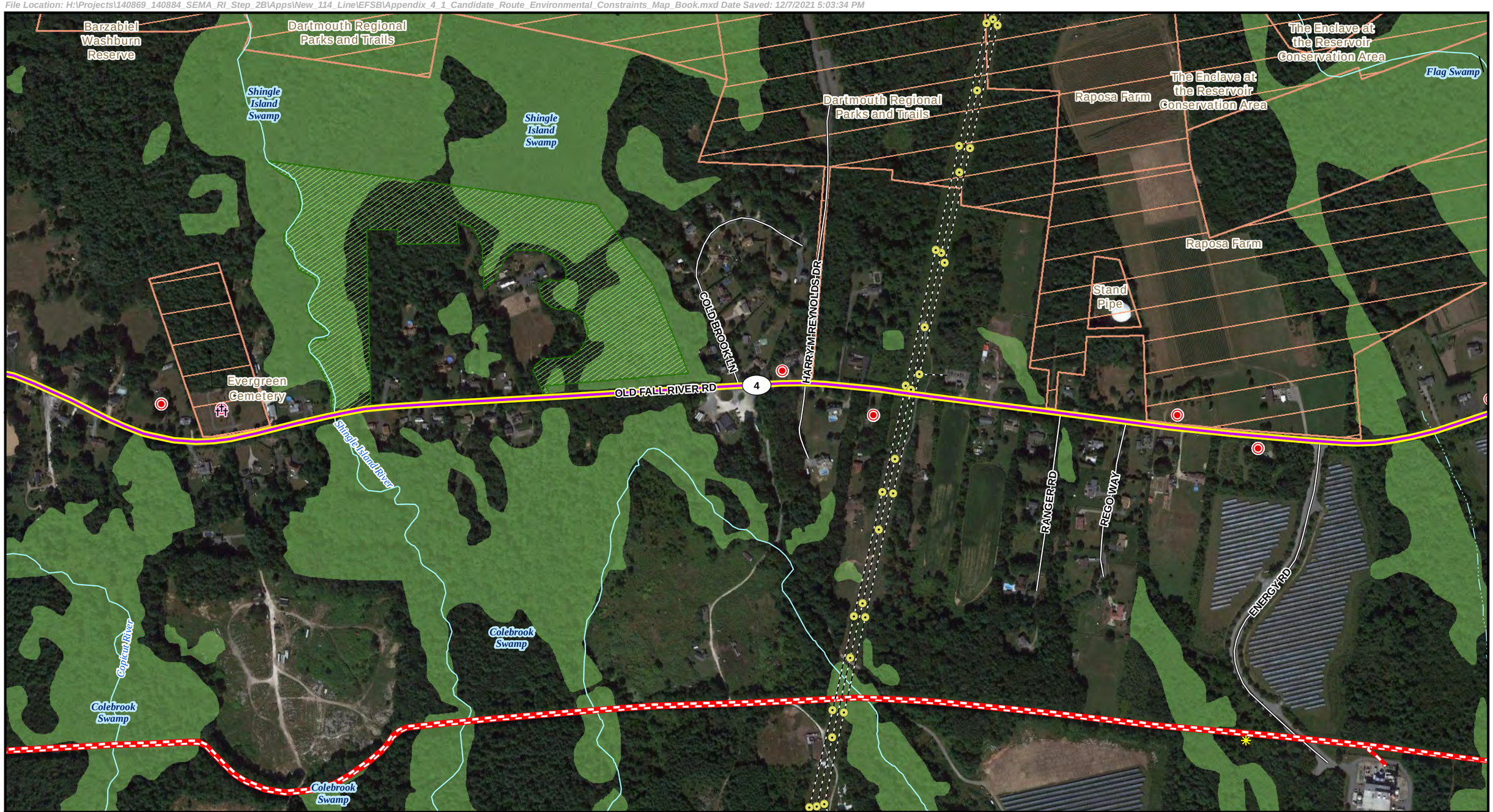



Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Cemetery
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties

N

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0 250 500
Feet

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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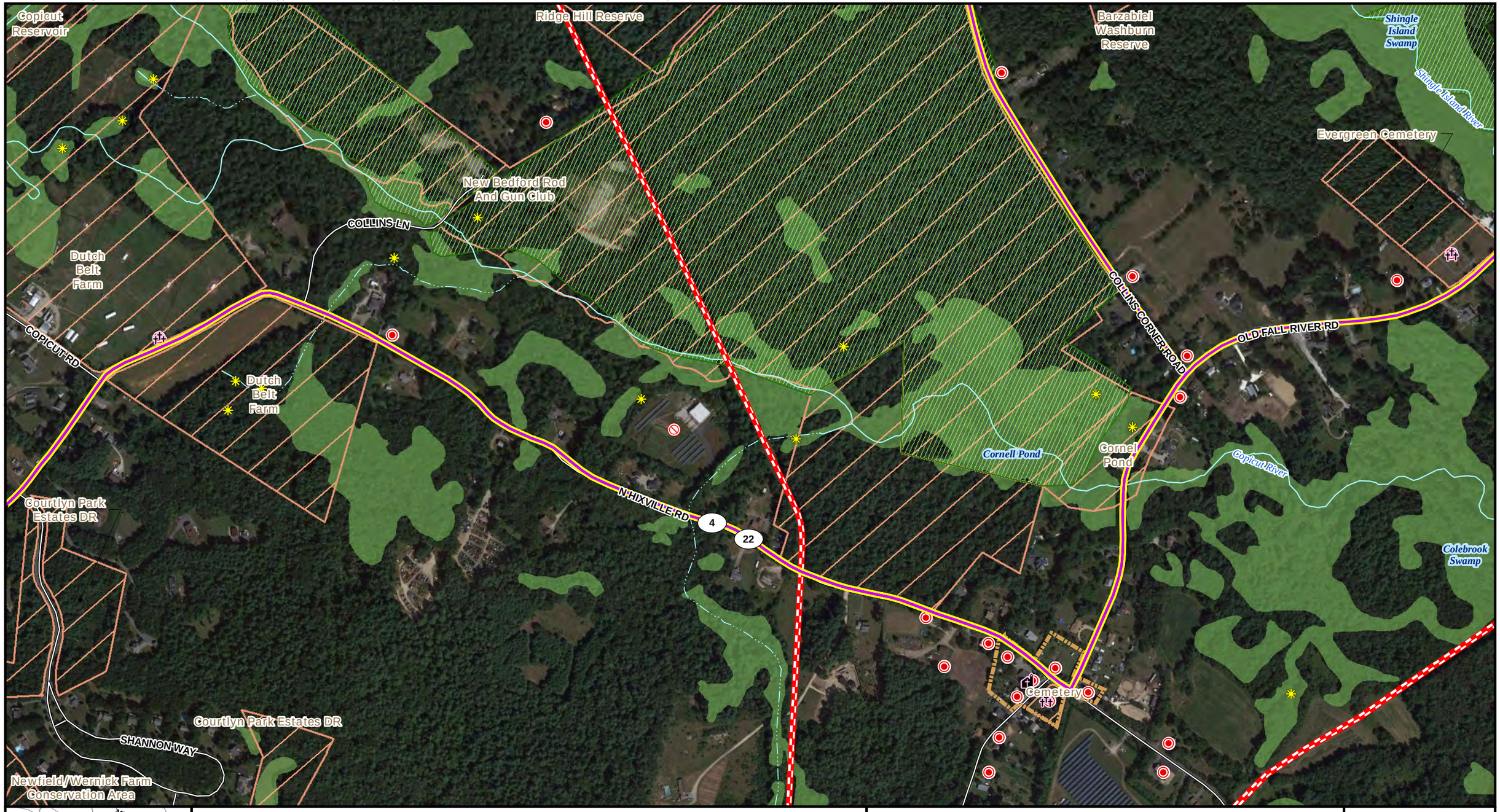

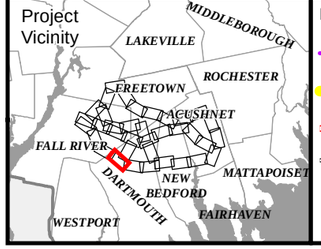

Legend

- Candidate Route
- Underground Portion of Route
- Natural Gas Pipeline
- Local Road
- Town Boundary
- Cemetery
- Church
- MHC Historic Inventory
- MHC Historic Inventory Area
- MassDEP Tier Classified Oil and/or Hazardous Material Sites
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties

N

1 inch = 500 feet

0 250 500

Feet

Indicates Layers Set to Transparency

ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

EVERSOURCE nationalgrid POWER ENGINEERS

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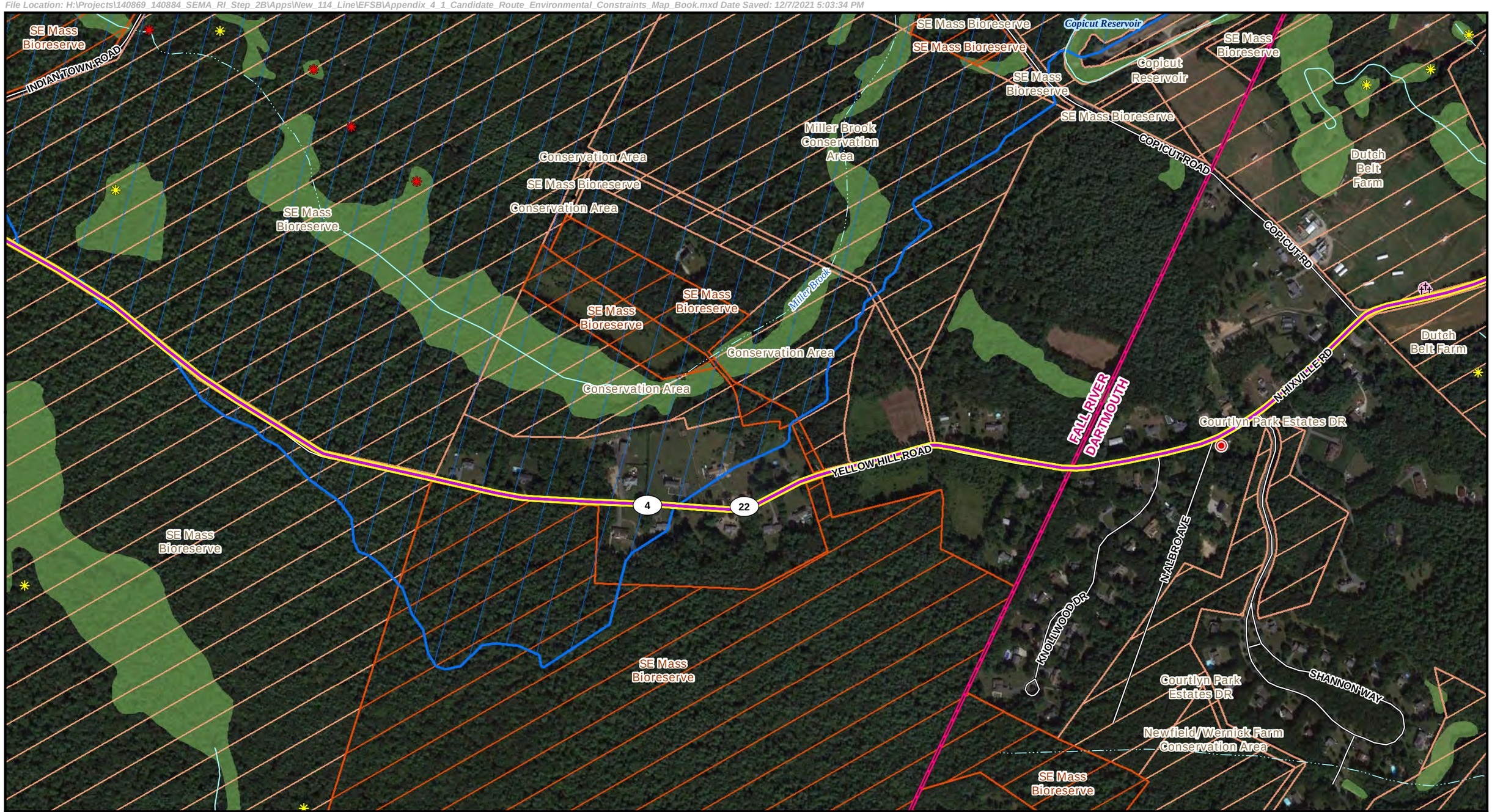

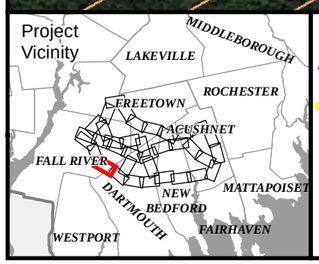

Legend

- Candidate Route
- Underground Portion of Route
- Local Road
- Town Boundary
- Cemetery
- MHC Historic Inventory
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

N

1 inch = 500 feet

0 250 500

Feet

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River, Town of Dartmouth

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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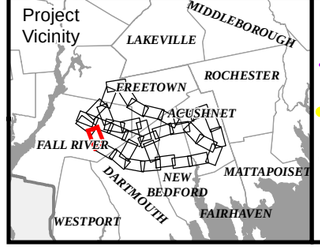

Legend

- Candidate Route
- Underground Portion of Route
- Local Road
- Town Boundary
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

NOT FOR CONSTRUCTION

Imagery Source: Google Earth

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Legend

- Candidate Route
- Underground Portion of Route
- Transmission Structure
- Existing Transmission Line
- Existing Station
- Local Road
- Town Boundary
- Certified Vernal Pools (NHESP)
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Massachusetts DCR Protected Lands
- Other Protected Lands
- Outstanding Resource Waters (ORW)

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
City of Fall River

Date: 12/6/2021

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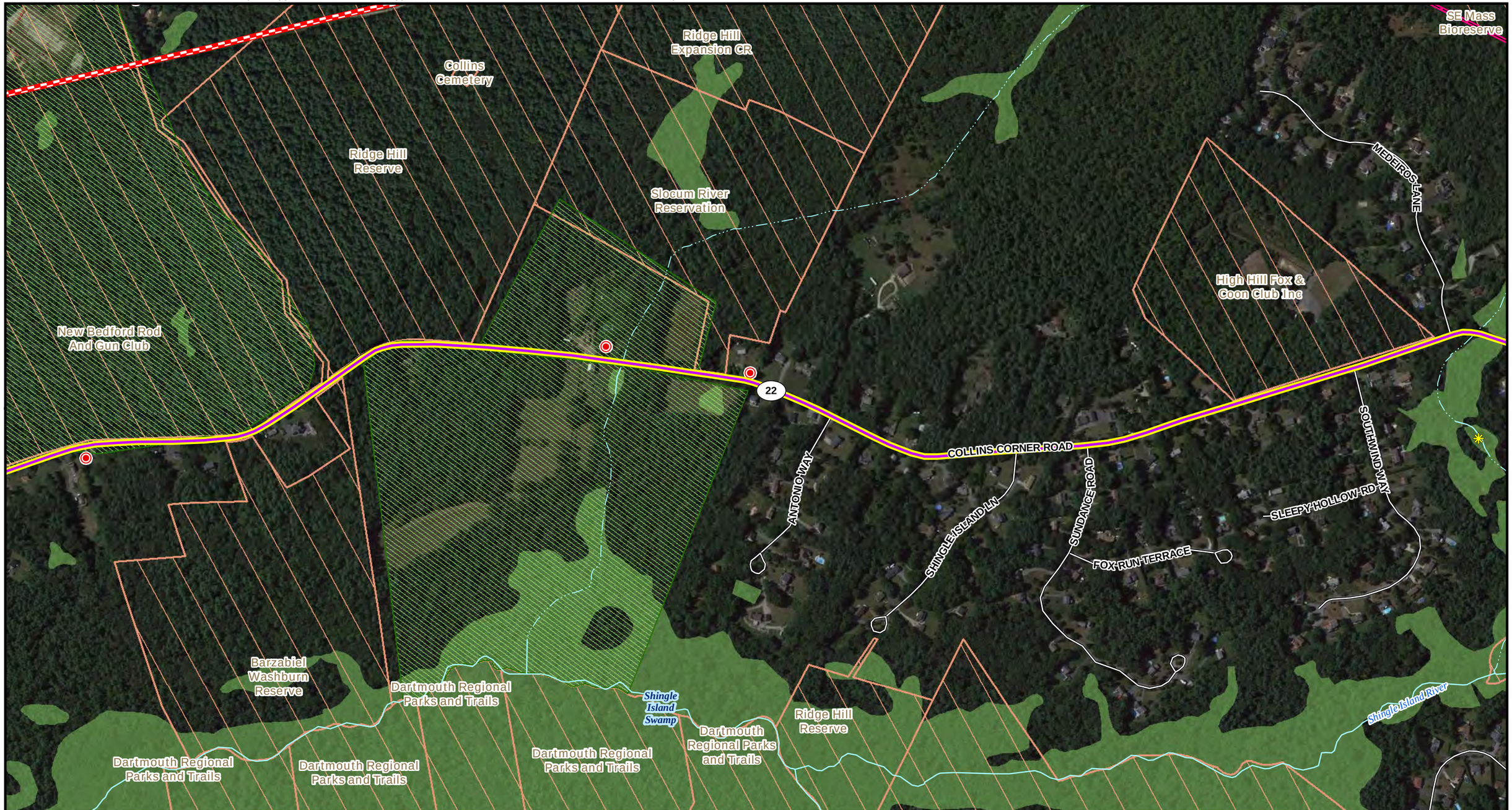

Project Vicinity



Legend

- Candidate Route
- Underground Portion of Route
- Natural Gas Pipeline
- Local Road
- Town Boundary
- MHC Historic Inventory
- Potential Vernal Pools (NHESP)
- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- DEP Wetlands*
- Other Protected Lands
- Massachusetts Forest Stewardship Program Properties

N

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Feet

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ACUSHNET TO FALL RIVER RELIABILITY PROJECT

Appendix 4-1: Candidate Route Environmental Constraints Map Book

Commonwealth of Massachusetts
Town of Dartmouth

Date: 12/6/2021

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Imagery Source: Google Earth

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APPENDIX 5-1 EVERSOURCE CONSTRUCTION AND MAINTENANCE ENVIRONMENTAL REQUIREMENTS BEST MANAGEMENT PRACTICES MANUAL FOR MASSACHUSETTS AND CONNECTICUT

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Tighe&Bond

Construction & Maintenance
Environmental Requirements

Best Management Practices Manual for Massachusetts and Connecticut

Prepared For:

Eversource Energy Environmental Licensing and Permitting Group
107 Selden Street
Berlin, CT

September 2016

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Appendix A Sediment and Erosion Controls

Appendix B Applicable Regulations in Connecticut

Appendix C Applicable Regulations in Massachusetts

Appendix D Example Frac-Out Plan

Table TOC-1
Best Management Practices Summary Table

	Area/Activity	Applicable BMPs	Tab	Tab Section
CONSTRUCTION	Upland	Construction Entrance Track Pad	1	A
	`	Stormwater Management BMPs (includes temporary water bars, drainage swales, and sedimentation basins)		B
	Wetland	Construction mats	2	A
		Permeable Road		B
	Watercourse Crossings	Without bridged crossings	3	A
		Bridged crossings		B
		Culverts		C
		Poled fords		D
	De-Energized	Construction mat workpads, including construction mats and lightweight mats	4	A
	Energized	Construction mat workpads		B
SOIL STOCKPILE MANAGEMENT	All	Soil Stockpile Management	5	A

Table TOC-2

Appendix A: Erosion/ Sedimentation and Water Control Summary Table

Type	Applicable Control	Location
EROSION/ SEDIMENTATION CONTROLS	Preservation of Existing Vegetation	
	Topsoil Segregation for Work in Wetlands and Agricultural Areas	
	Straw (or Hay) Bales*	Section I
	Silt Fence	
	Syncopated Silt Fence	
	Erosion Control Blankets	
	Straw/Compost Wattles	
	Wood Chip Bags	
	Catch Basin Protection	
	Loaming and Seeding	
	Mulching with Hay/Straw/Woodchips	
	Coir Log Use for Bank Stabilization	
	Level Spreader	
	Check Dams	
	Temporary and Permanent Diversions	
	Temporary and Permanent Trench Breaker	
WATER CONTROL	Dewatering Activities	
	- Overland Flow	
	- Frac Tank	
	- Filter Bags and Hay Bale Containment	
	- Discharge Hose Filter Socks	Section II
	Coffer Dam and Stream Bypass via Pumping	
	Coffer Dam and Stream Bypass via Gravity	
	Silt Barriers	

***** Straw bales preferred in wetlands, if allowed by permit, and hay bales in uplands

TABLE TOC-3
List of Acronyms

Acronym	Definition
ATV	All-Terrain Vehicle
BMP	Best Management Practices
ConnDOT	Connecticut Department of Transportation
ACOE	United States Army Corps of Engineers
CT	Connecticut
CTDEEP	Connecticut Department of Energy and Environmental Projection
EBT	Eastern Box Turtle
EPA	United States Environmental Protection Agency
Eversource	Eversource Energy
EL&P	Environmental Licensing and Permitting
FEMA	Federal Emergency Management Agency
HDD	Horizontal Directional Drilling
LGP	Low Ground Pressure
MA	Massachusetts
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassWPA	Massachusetts Wetlands Protection Act
NDDB	Connecticut Natural Diversity Database
NHESP	Massachusetts Natural Heritage Endangered Species Program
OLISP	Office of Long Island Sound Programs
ORV	Off-Road Vehicle
PSI	Pounds per square inch
RIM	Record Information Management System
ROW	Right of Way
TOC	Table of Contents

Section 1
Introduction

1.1 Purpose

As a matter of Eversource Energy (Eversource) policy regarding environmental stewardship and in accordance with local, state, and federal regulations, all construction and maintenance projects shall use environmentally sound best management practices (BMPs) to minimize or eliminate environmental impacts that may result from construction activities. Regardless of whether a specific permit is needed for the work, construction and maintenance projects must follow internal environmental performance standards, which is the purpose of these BMPs. In many cases, maintenance activities are exempt from regulatory authorization. Permits are usually required for new work. Contractors will be provided with copies of any project specific permits, and will be required to adhere to any and all conditions of the permit(s). Permit conditions that are more detailed than the BMPs outlined in this manual shall always be given priority. However, where certain construction elements are not addressed by permit conditions, or where permitting is not required, or for emergency situations where obtaining a permit before the work occurs may not be an option, these BMPs shall be considered as Eversource's standards. In some cases, and at the discretion of the Eversource Management, the BMPs presented herein may be modified to be more appropriate for site-specific conditions.

1.2 Scope and Applicability

These BMPs primarily address the disturbance of soil, water, and vegetation incidental to construction within on- and off-road utility corridors, substations, including the establishment of access roads and work areas, within rights of way (ROWs) and on private property, in and near wetlands, watercourses, or other sensitive natural areas (such as protected species), including storm drain systems (e.g., catchbasins). Types of construction include, but are not limited to, installation or maintenance of underground and overhead utilities, access road repair/improvement or installation, and upgrades or maintenance of substations and other facilities. Other common construction issues such as noise, air pollution, oil spill procedures, handling of contaminated soils, and work safety rules are addressed in the Eversource Energy Contractor Work Rules and related appendices.

1.3 Definitions

The following definitions are provided to clarify use of common terms throughout this document.

Best Management Practice (BMP): A means to reduce and minimize impact to natural resources.

Casing: A galvanized steel corrugated pipe that serves as the form for a utility structure foundation.

Emergency Projects: Actions needed to maintain the operational integrity of the system or activities necessary to restore the system and affected facilities in response to a sudden and unexpected loss of electric or gas service or events that affect public health and safety.

Embedded Culvert: A culvert that is installed in such a way that the bottom of the structure is below the stream bed and there is substrate in the culvert.

Environmentally Sensitive Areas: An area containing natural features, cultural features or ecological functions of such significance to warrant protection. Some examples are rivers, streams, ponds, lakes, wetlands, rare species habitat, water supply protection areas, cultural sites, parks, and agricultural land.

Erosion Control: A measure to prevent soil from detachment and transportation by water, wind, or gravity.

Existing Access Roads: Previously permitted or grandfathered access roads that are used to access structures that are clearly visible or can be found by mowing or by the presence of road materials in soil cores.

Grubbing: A site preparation method that is used to clear the ground of roots and stumps.

Intermittent Watercourse: An intermittent watercourse is broadly defined as a channel that a flowing body of water follows at irregular intervals and does not have continuous or steady flow. Regulatory definitions for intermittent water courses are:

- Connecticut—Per the Connecticut Inland Wetland and Watercourses Act, intermittent watercourses are delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation.

- Massachusetts—Under the Massachusetts Wetlands Protection Act (MassWPA), a jurisdictional intermittent watercourse is defined as a body of running water which moves in a definite channel in the ground due to a hydraulic gradient, does not flow throughout the year, and which flows within, into or out of an area subject to protection under the MassWPA. Intermittent watercourses upgradient of any Bordering Vegetated Wetlands are not jurisdictional under the MassWPA. A watercourse can be determined to be intermittent if it meets MassWPA criteria in regards to watershed characteristics found on the Stream Stats website or documented observations of no flow.

Limit of Work/Disturbance: The boundaries of the approved project within regulated areas. All project related activities in regulated areas must be conducted within the approved limit of work/disturbance. The limit of work/disturbance should be depicted on the approved permit site plans, which may require the limits to be identified in the field by flagging, construction fencing, and/or perimeter erosion controls.

Low-Impact Vehicles: Vehicles that have a lesser impact on an environmentally sensitive area due to the vehicle being smaller, lighter, or different in another way than a vehicle which would have a greater impact. Low impact vehicles could include ORVs or

ATVs, tracked vehicles with low ground pressure, or vehicles with oversized balloon-type tires.

Maintenance Projects: Typically consist of activities limited to the repair and/or replacement of existing and lawfully located utility structures and/or facilities where no substantial change in the original structure or footprint is proposed. Maintenance activities also include vegetation management.

Minimization: Causing as little disturbance to an area as practicable during construction.

New Construction: Construction of new transmission or distribution facilities that previously did not exist or construction that substantially modifies existing facilities. All new (and existing) construction projects are required to go through a full permit review by the Eversource Environmental Licensing and Permitting Department.

Pre-Construction Notification (PCN): Project activities that do not qualify for SV or where otherwise required by the terms of the MA and CT GPs must submit a PCN and obtain written verification before starting work in ACOE jurisdiction. Refer to MA and CT GP appendices for PCN thresholds. Projects that cannot be completed under a PCN must file for an Individual Permit with the ACOE. In CT, for coastal projects, notification is provided to ACOE by CT DEEP, Office of Long Island Sound Programs (OLISP) or by applicants as necessary. Written approval from ACOE is required.

Restoration: To return a disturbed area to its former, original or unimpaired condition. A site is considered fully restored when it has returned (as closely as practicable) to its original state. Restoration of disturbed areas should occur as soon as practicable following the completion of activities at that location.

Re-Vegetation: Establishment of plant material for temporary or permanent soil stabilization.

Right of Way: A pathway, road, or corridor of land where Eversource Energy has legal rights (either fee ownership, lease, or easement) to construct, operator, and maintain an electric power line and/or natural gas pipeline.

Self-Verification (SV): Activities that are eligible for SV are authorized under the MA and CT GPs and may commence without written verification from the ACOE provided the prospective permittee has:

i. Confirmed that the activity will meet the terms and conditions of applicable MA and CT GPs

ii. Submitted the Self-Verification Notification Form (SVNF) to the ACOE.

In CT, coastal projects do not require filing of a Self-Verification Notification Form. ACOE relies on CT DEEP and OLISP submittals.

Stabilization: A system of permanent or temporary measures used alone or in combination to minimize erosion from disturbed areas.

Sediment Control: Control of eroded so that it does not wash off and pollute nearby wetland and water resources.

Vehicles with Low Ground Pressure: Vehicles which have tires or tracks that apply less than three pounds per square inch (psi) on the ground surface.

Work: For the purposes of this BMP Manual, the disturbance of soil, water, and vegetation incidental to construction within on- and off-road utility corridors, substations, including but not limited to the establishment of access roads and work areas, in and near wetlands, watercourses, or other sensitive natural areas, including storm drain systems (e.g., catch basins). Types of construction include, but are not limited to installation or maintenance of underground and overhead utilities, substations and other facilities.

1.4 BMP References

The following table lists the public guidance documents utilized during the preparation of this BMP manual. Refer to these documents for additional information.

TABLE 1-2

Document Title
General
Best Management Practices (BMPs) Manual for Access Road Crossings of Wetlands and Waterbodies, EPRI, Palo Alto, CA (2002) 1005188.
Gas Research Institute. Horizontal Directional Drilling Best Management Practices Manual (2002) ENSR Corporation, Westford, MA and Trenchless Engineering Corp., Houston, TX.
Connecticut
Connecticut Department of Transportation (ConnDOT). ConnDOT Drainage Manual (October 2000) http://www.ct.gov/dot/cwp/view.asp?a=1385&Q=260116
Connecticut Standard Specifications for Roads, Bridges and Incidental Construction, FORM 816 (2004) http://www.ct.gov/dot/cwp/view.asp?a=3609&q=430362
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Massachusetts
Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways and Bridges (1988) http://www.mhd.state.ma.us/default.asp?pgid=content/publicationmanuals&sid=about
Massachusetts River and Stream Crossing Standards (Revised March 1, 2011) http://www.nae.usace.army.mil/Portals/74/docs/regulatory/StreamRiverContinuity/MA_RiverStreamCrossingStandards.pdf
Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas. Original Print: March 1997. *Reprint: May 2003*. http://www.mass.gov/eea/docs/dep/water/essec1.pdf
The Massachusetts Unpaved Roads BMP Manual (Winter 2001) http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/dirtroad.pdf

Section 2
Project Planning

After undergoing an initial screening review by the department conducting the proposed project, if resources are identified, the project is required to go through a permit review by the Environmental Licensing and Permitting Group. The permit review process is supported by Geographic Information Systems (GIS) or a similar program that references the most current spatial data for the project areas in question. Through the GIS review process various geo-processing tools are used to compose maps and provide a spatial reference to environmentally sensitive areas. In consultation with the Environmental Licensing and Permitting Group, the Project Engineer, permitting specialist, or other project planner should determine regulatory jurisdiction and which (if any) environmental permits or approvals are required before starting any project. Questions regarding which activities may be conducted in regulated areas or within environmentally sensitive areas should be referred to the Environmental Licensing and Permitting Group. Summaries of potentially applicable laws and regulations are provided in Appendices B and C of this document.

2.1 Types of Wetlands

Wetland areas common to New England and common to both Connecticut and Massachusetts include, but are not limited to, the following:

Forested Wetlands

Forested wetlands are wetlands that are dominated by trees that are 20 feet or taller. These wetlands are typically drier with standing water typically occurring during periods of high precipitation, seasonally high groundwater, snowmelt, and runoff (e.g., early spring through mid-summer). Tree species typical of this type of wetland include red maple (*Acer rubrum*) and eastern hemlock (*Tsuga canadensis*). "Pit and mound" topography is common in forested wetlands, where mature trees grow on the higher and drier mounds and obligate wetland species are found in the lower pits.

Scrub-Shrub Wetlands

Scrub-shrub wetlands are dominated by woody vegetation less than 20 feet tall, and may include peat bogs. Typical bog species include leatherleaf (*Chamaedaphne calyculata*), cotton grasses (*Eriophorum* sp.), cranberry (*Vaccinium macrocarpon, V. oxycoccus*), and black spruce (*Picea marina*). Other non-bog scrub-shrub wetlands are characterized by buttonbush (*Cephalanthus occidentalis*), alders (*Alnus* sp.), dogwoods (*Cornus* sp.), and arrowwoods (*Viburnum* sp.).

Marshes

Marshes are dominated by erect, herbaceous vegetation and appear as grasslands or stands of reedy growth. These wetlands are commonly referred to by a host of terms, including marsh, wet meadow, fen. These areas are flooded all or most of the year and, in New England, tend to be dominated by cattails (*Typha* sp.).

Wet Meadows

Typical wet meadow species include grasses such as bluejoint (*Calamagrostis canadensis*) and reed canary grass (*Phalaris arundinacea*), sedges (*Carex* sp.) and rushes (*Juncus* sp.), and various other forbs such as Joe-Pye-weeds (*Eupatorium* sp.) and asters (*Aster* sp.).

Floodplains

A floodplain is generally defined as an area of low-lying ground adjacent to a stream or river that is formed mainly of river sediments and is subject to flooding. State-specific regulatory definitions vary and are described as follows:

- In Connecticut, areas that contain alluvial or floodplain soils are regulated as wetlands. These areas may flood so infrequently or be so freely drained that hydrophytic vegetation and hydric soils are not present. Soils in these areas must be examined carefully to determine whether well drained alluvial or floodplain soils are present.

- In Massachusetts, a floodplain is a type of wetland resource are that floods following storms, prolonged rainfall, or snowmelt. There are three types of floodplain areas protected under the MassWPA: coastal areas, areas bordering rivers and streams, and isolated depressions that flood at least once a year.

Streams

A stream is any natural flowing body of water that empties to any ocean, lake, pond or other river. Perennial streams, or rivers, have flows throughout the year. Intermittent streams do not have surface flows throughout the year, though surface water may remain in isolated pockets.

Vernal Pools

Vernal pools are typically contained basin depressions lacking permanent aboveground outlets. These areas fill with water with the rising water table of fall and winter and/or with the meltwater and runoff of winter and spring snow and rain. The pools contain water for a few months in the spring and early summer. Due to periodic drying cycles, vernal pools do not support breeding fish populations and can thus serve as breeding grounds for a variety of amphibians, including some rare and protected species of frogs and salamanders.

Other Considerations

Other regulated factors taken into consideration during the project planning process include the presence of protected (i.e., threatened, rare or endangered) species, non-native invasive plant species and/or historical and archaeological resources. Special requirements may need to be evaluated as part of new construction and/or some maintenance activities.

2.2 Meetings

A pre-construction meeting is typically held prior to the commencement of all work with the purpose to appoint responsible parties, discuss timing of work, and further consider options to avoid and/or minimize disturbance to sensitive areas. The meeting

confirms that there is consensus on work methods and responsibilities, and ensure that tasks will be fulfilled with as little disturbance to the environment as practicable. These meetings can occur on or off-site and should include all the applicable stakeholders (i.e., Eversource, contractors, consultants, inspectors and/or monitors, and regulatory agency personnel). A short and less formal briefing should suffice for smaller maintenance projects.

2.3 Site Staging and Parking

During the project planning and permitting process, locations should be identified for designated crew parking areas, material storage, and staging areas. Where possible, these areas should be located outside of buffer zones, watershed protection areas, and other environmentally sensitive areas. Any proposed locations should be evaluated for all sensitive receptors and for new projects requiring permitting, should be incorporated onto permitting and access plans.

2.4 Construction Monitoring

Construction projects require environmental monitoring, which can be conducted either internally or by consultants. Some permitted projects require oversight by designated and pre-approved compliance monitors. Environmental monitoring is a way to keep a chronological record of pre-construction site conditions, progress, and changes that are made, as well as to document issues and authorized solutions.

If work will occur in a wetland resource area or an area mapped or otherwise designated as rare or endangered species habitat, permit conditions may dictate that construction be monitored by a qualified and pre-approved wetland or wildlife specialist.

2.5 Signage/Limit of Boundaries

Where appropriate, wetland delineation flagging or signage shall be installed that makes clear where critical boundaries (i.e., the limits of jurisdictional wetland resource areas and/or rare species habitat) and setbacks occur, regulatory authorization by agencies, and certain uses on ROWs are prohibited, such as ORV traffic.

Where appropriate, signage shall be installed along sediment and erosion control barriers at appropriate intervals, heights and sizes to ensure that the presence and location of said barriers is clear to construction personnel during deep snow or other low visibility conditions. Inspection and maintenance of this signage shall be conducted on a regular basis to ensure effectiveness.





Examples of signage at wetlands.

Section 3
Construction Considerations

During all project activities (e.g., maintenance, new construction), federal, state, and local regulatory authorities require steps be taken to avoid, minimize, and/or mitigate disturbance to the environment. Wetlands and other sensitive areas should be avoided whenever practicable. However, some work may require entrance into these areas in order to perform work. This section discusses measures that should be taken to minimize disturbance to if work must occur within sensitive areas.

BMPs were developed to aid in this process and should be carefully selected and implemented based on the proposed activities and the nature of sensitive area(s) encountered at each site. Proper selection of BMPs should take into consideration the project goals, permit requirements, and site specific information. Once an assessment of the area is made and requirements of the project are established, all BMPs should be considered and implemented as appropriate.

Tables TOC-1 and TOC-2 summarize BMP types. This section addresses BMPs specific to construction of new access roads, repair of existing access roads, the installation of work pads, structure-related work, and soil stockpile management. Information regarding recommended erosion and sedimentation controls or stormwater controls is also discussed. Please refer to Appendix A for typicals and representative photographs of BMPs used for erosion and sedimentation control and water diversion during construction.

3.1 Avoidance and Minimization

Avoidance and minimization should always be considered before beginning any construction or maintenance project. Take appropriate measures to avoid construction impacts to wetlands, waterways, rare species habitats, known below and above ground historical/archeological resources, and other environmentally sensitive areas. Use existing ROW access whenever practicable. Keep to approved routes and roads and do not widen or deviate from them. Consult with the Environmental Licensing and Permitting Group, when avoidance is not practicable, to determine measures to minimize the extent of construction impacts. Alternate access routes and/or staging areas that will minimize construction impacts to the natural environment may be considered.

3.2 Rare Species Habitat

The Environmental Licensing and Permitting Group coordinates with state and local agencies when work is within areas that are identified as rare species habitat. In Connecticut, the Natural Diversity Database (NDDB) is used to identify rare species habitat and is under the Department of Energy and Environmental Projection (CTDEEP). In Massachusetts, the Natural Heritage Endangered Species Program (NHESP) is consulted to identify rare species habitat, which is under the Department of Fisheries and Wildlife and part of the Natural Heritage network. State regulatory agencies may require crew training and turtle sweeps of work areas, botanist identification of rare plants for avoidance, and protection of vernal pools, prior to starting the work.

3.3 Vernal Pools

Construction within and across wetlands and in proximity to vernal pools should be limited to the extent practicable to avoid working in the periods between April 1st and June 1st. This will allow for obligate vernal pool species to emigrate to the breeding areas, deposit egg masses, and allow for hatching and development of juveniles. Silt fence should be installed at the limits of the construction to prevent individual reptiles and amphibians from entering the workspace, but in a manner that does not impede movement to and from pools from adjacent forested uplands. Consider installing syncopated silt fencing.

Protection Measures

When performing construction activities in proximity to vernal pools, a number protection measures should be implemented.

Vegetation Removal

- Maintain existing scrub-shrub vegetation (consistent with ROW vegetation management requirements) within 25 feet of vernal pools, except in areas where access roads and work pads must be installed.

- Minimize removal of low growing (scrub-shrub) vegetation surrounding vernal pools by utilizing construction matting where access is needed. If vegetation must be cut adjacent to vernal pools, the cut vegetation (slash) should be left in place to serve as recruitment for leaf litter and coarse woody debris.

Erosion and Sedimentation Control

- Install and maintain erosion and sedimentation control measures along construction access roads and work pads to protect water quality and to limit the potential for sediment transport to vernal pools.

- Promptly remove erosion and sedimentation control devices upon final revegetation and stabilization of the ROW.

Access Roads

- Use construction mats, corduroy roads, or clean materials (i.e., clean riprap, gravel, stone or equivalent and rock fords) in locations where existing on-ROW access roads must be improved and are adjacent to vernal pools.

- Man-made depressions along existing on-ROW access roads provide low-quality vernal pool breeding habitat (due to an insufficient hydroperiod). Access roads must be graded and/or improved to accommodate project construction vehicles and may eliminate these depressions and the associated potential for amphibian breeding habitat. Perform improvements to on-ROW access roads outside of the breeding and migration seasons of vernal pool species to avoid direct impacts to amphibians that may breed in the man-made depressions along existing on-ROW access roads.

Scheduling and Site-Specific Considerations

- To the extent practicable (considering circuit outages and other construction timing constraints), schedule access road and work pad installation in and around vernal pool habitats to minimize interference with amphibian breeding and migration seasons.

- For project activities that must occur adjacent to vernal pools during amphibian migration periods, implement measures on a site-specific basis to facilitate unencumbered amphibian access to and from vernal pools. Consider the site-specific conditions including the type of construction activity that will occur in proximity to a vernal pool, the amphibian species known to occur in the vernal pool, and seasonal conditions. Identify appropriate mitigation measures. Options to be evaluated to allow amphibian access to vernal pools may include, but not be limited to: syncopated silt fencing in the immediate vicinity of vernal pools; elevated construction matting; and aligning erosion and sedimentation controls to avoid bifurcating vernal pool habitat.

3.4 Access Roads

Existing construction access roads are unpaved roadways that work crews use to access a site within a ROW. These access roads were generally either permitted previously or constructed prior to the promulgation of regulations and are grandfathered in under past general permits.

3.4.1 New Access Roads

New access roads are generally associated with new or large-scale projects that have separate permitting requirements. Construction of new access roads will be based on plans that are reviewed and approved by applicable federal, state, and local agencies. If a new access road is needed and not associated with a large project, notify the Environmental Licensing and Permitting Group to make a decision on best access routes and identification of the necessary permits and approvals required to construct the new road. **Permit requirements must be followed.**

3.4.2 Existing Access Roads

The travel surface width of access roads in upland areas will not exceed 16 feet. This does not include side slopes. Maintaining existing access roads includes mowing of vegetation, grading, placement/replacement of stone, and the installation/maintenance of erosion control features (e.g., water bars, swales, sedimentation basins).

When access roads are in wetlands, measures should be taken to avoid disturbance to wetlands, waterways, and sensitive areas. If avoidance is not practicable, then measures should be taken to minimize the extent of disturbance. Alternate access routes should always be considered. Below is a list of methods that should be considered where disturbance is necessary:

- Minimize the width of typical access roads through wetlands. If an existing access road is evident in the wetland, the existing width of the access road must be maintained. If unable to ascertain the original width of the access, then do not make the road wider than 16 feet (including side slopes).

- To the extent practicable, use low-impact vehicles and/or vehicles with low ground pressure when driving through wetlands.
- Coordinate the timing of work to cause the least impacts during the regulatory low-flow period under normal conditions, when water/ground is frozen, after the spring songbird nesting season, and, outside of the anticipated amphibian migration window (mid- February to mid-June). The United States Army Corps of Engineers defines the low-flow periods for streams as follows:
    - Connecticut streams—July 1 through September 30
    - Massachusetts non-tidal streams—July 1 through September 30
    - Massachusetts tidal streams—November 16 to February 15
    - New Hampshire streams—July 15 through October 1
- Use construction mats in wetlands to minimize soil disturbance and rutting when work needs to occur during non-frozen ground conditions.
- If practicable, conduct work manually if warranted (decision to be made by Project Team).

Existing access roads that have become part of the wetland are considered previous fill that were either permitted or grandfathered and where it is evident that an access road exists, it is acceptable to place stone over the previously placed fill. Where the existing access road is not evident, Environmental Licensing and Permitting must be consulted to make a determination whether stone can be placed in the wetland. If stone is not evident, through soil cores, hand digging or other methods, construction mats will be used. If permanent access is warranted through the wetland, the new access road will need to have a permitting review and will likely require permits.

The access road in the wetland should not exceed 16 feet in width (unless there is evidence that the road was originally wider than 16 feet).

Over time, existing access roads require maintenance and repair. Travel by construction equipment and general traffic to reach a particular portion of the ROW must be via the designated access road and route. Changes in the location of the access road or the use of alternate roads must be reviewed and approved by the Project Team prior to their construction or use. Access road routes were selected to prevent degradation of the utility corridor, and must be constructed, used, and maintained in accordance with this manual, as well as federal, state, and local requirements, and other project plans.

Though, in some situations, they may be necessary, constructing duplicate access roads should be avoided to the extent practicable. Some appropriate reasons for suggesting alternate routes are:

- Poor site conditions along preferred route because of weather or season.
- Property rights constraints, or property owner's preference.
- Equipment requirements.
- Unanticipated off-site access limitations along existing roads.
- Unanticipated access opportunities (e.g., ice, snow, other developments) which may avoid environmental disturbance and/or reduce cost.

General Design: New and Existing Access Roads

Construction access roads that require new grading and/or filling, or are to be heavily used require the creation of a stable, tractable, load-bearing surface resistant to erosion. If the existing soil and subsoil are not well drained, it may be necessary to import an aggregate road base (i.e., gravel borrow) such as that meeting the requirements of aggregate found in the:

- *Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways and Bridges*, Section 400
- Connecticut *Standard Specifications for Roads, Bridges and Incidental Construction*, Section M1.02

When the construction access road follows the same route as the permanent design road, constructing the grades and subgrade for the permanent roadway early in the construction sequence is recommended.

The travel surface of construction access roads shall typically not exceed 16 feet in width except for passing points, where necessary. Subgrading shall not extend beyond the space required for the finished road and normal side slopes.

Where practicable, construction access roads should conform to the contours of the land, avoiding grades steeper than 10 percent and creating side slopes no steeper than a ratio of 2:1. If the side slopes are steeper than 2:1, then use of engineered slope stabilization methods may be necessary Consider the volume and type of construction traffic as well as the extent that natural ground must be altered to accommodate the traffic. If no grading is required and the construction traffic is very intermittent (i.e., access roads used to maintain utility lines) the measures used may be limited to water bars, or some top dressing with gravel or stone in areas where the vegetation over soft soil is destroyed by traffic.

During wet weather, these roadways can generate significant quantities of sediment if not constructed with adequate stormwater management and erosion control measures. During an active construction or maintenance activity, inspection of the construction access road and the associated erosion and sedimentation measures should be conducted by the person(s) designated at the pre-construction meeting, should occur regularly while the activity is occurring, and repairs to controls should be made in a timely matter. Repairs may include regrading and/or top dressing the traveled surface with additional aggregate to eliminate ruts, as well as those repairs required by each erosion and sedimentation measure used. When the roadway is no longer needed on a regular basis, the access road should be reviewed to ensure that the road is left in a condition that prevents future erosion and sedimentation (i.e., installation of water bars, gravel, etc.). In some cases, permit conditions may warrant that the access road be removed and that the disturbed area be seeded and mulched as required to match the pre-construction conditions.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during access road construction or maintenance by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Outlet protection**, a **level spreader**, a **trench breaker**, a **sediment trap or basin**, or a **stone check dam** may be used to de-energize concentrated flows from diversions and in temporary channels.
- **Geotextile silt fencing**, **compost filter berms**, **straw wattles** and **hay/straw bale barriers** may be utilized to provide protection at the toe of fill slopes and discharges from water bars.
- Side slopes can be protected by installing **erosion control blankets** and **seeding** the area with a fast-growing native or annual grass mix.
- **Dust contro**l should be employed when construction access road conditions create airborne dust.
- **Geotextile fabric** shall be used beneath all new fill and construction entrances, where needed.

3.4.2.1 Best Management Practices – New Access Roads

The following are BMPs that are applicable to new access roads in uplands and are described at the following tabs:

Construction Entrance Track Pad – Tab 1A

Stormwater Management BMPs (includes Water Bars, Drainage Swales, and Sedimentation Basins) – Tab 1B

TAB 1A

Construction Entrance Track Pad

Applications: Erosion and sedimentation control, roadway protection

Limitations:

- Maintenance is required if the pad becomes clogged with soil.
- Muddy conditions may warrant the use of a tire wash station.

Overview:

Where access roads or construction areas connect to paved roads, a stone track pad must be installed at the construction entrance to prevent construction machinery from tracking soil onto paved roadways. Materials appropriate to construction site soil conditions should be employed and/or replenished, as necessary.

Installation:

- Use 3- to 6-inch washed stone to install stone tracking pads at a minimum length of 50 feet and a minimum depth of 12 inches.
- On sites with clayey soils, underlay stone tracking pads with a geotextile liner to prevent the stone from sinking into the soil.

Maintenance:

- Periodically inspect the stone in the entrance tack pad. If the pad becomes clogged with soil, remove and refresh and/or clean stone.

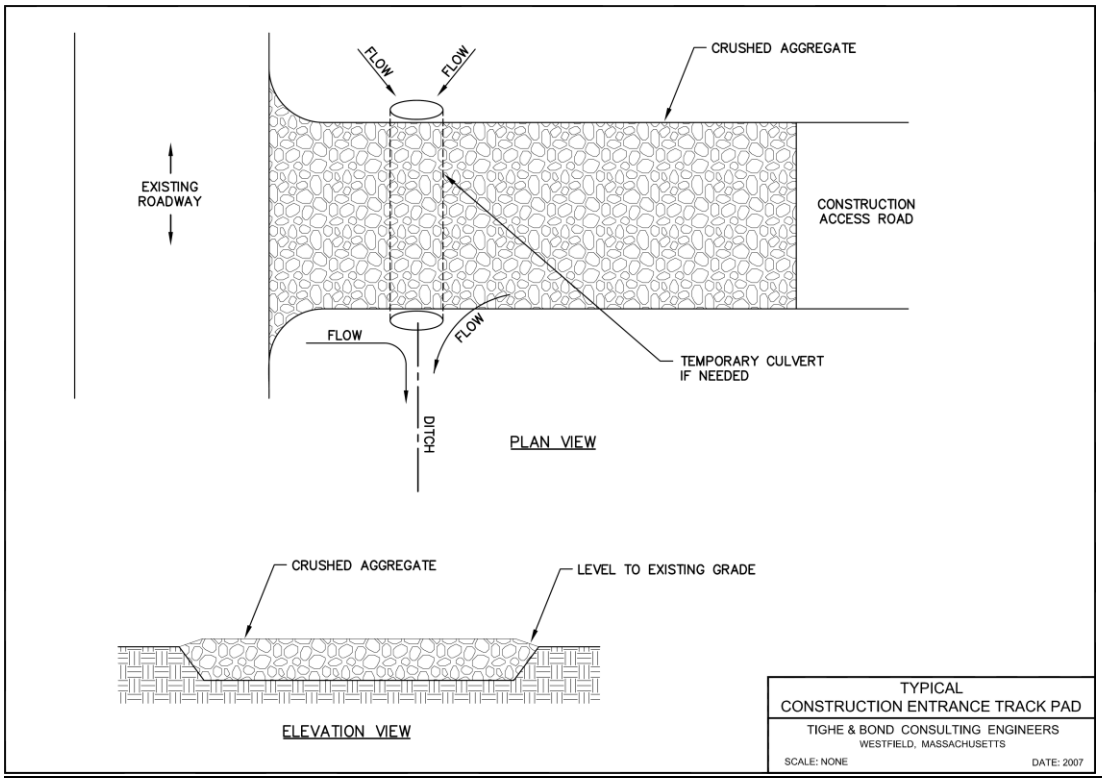
Additional Comments:

If muddy conditions warrant the use of a tire wash station, procedures should be established to ensure soils are not tracked off site.

Where appropriate and when safety and environmental conditions are considered, vehicle tires or tracks may be spun quickly ("burn out") on the track pad to further facilitate the removal of soil.



Construction entrance track pad.



TAB 1B

Water Bar

Applications: Erosion and sedimentation control

Limitations:

- Should never be used to direct a watercourse into another waterbody or to divert unfiltered runoff to a wetland.
- Can impede vehicular movement.
- Damage from vehicle traffic and stormwater flow may require water bars to be reinstalled/reworked at the beginning and end of each construction season.

Overview:

Water bars are linear features built diagonally across access roads or ROWs to redirect waterflow off of the road surface at non-erosive intervals. In general, they consist of a trench dug at least 6 inches below grade followed by an earthen mound at least 6 inches above grade. Use water bars to prevent erosion on sloping roadways less than 100-feet wide. Water bars must be designed to be stable throughout their useful life and meet the criteria in the table below. The maximum capacity should be the peak runoff from a 10-year storm. Permanent diversions (Appendix A) may also be used if water bars are not suitable.

Installation:

- Set water bar direction to utilize stable outlets and do not allow upslope water bar runoff to converge with down slope water bars.
- Construct the bar immediately after vegetation has been cleared on constant or slightly increasing grades, not exceeding 2%. Avoid reverse grades.
- Mark the location and width of the ridge and disk the entire length.
- Fill ridge to above the design height and compact with wheeled equipment to the design cross section.
- Construct sediment traps or outlet stabilization measures, as needed.
- After the area has been permanently stabilized, remove the ridge and channel to blend with the natural ground level.
- Seed and mulch diversions that are intended for use for more than 30 days.

Minimum Cross Section

Top Width (ft)	Height (ft)	Side Slopes
0	1.5	4:1
4	1.5	2:1

Maximum Recommended Spacing

Land Slope (%)	Spacing (ft)
1 or less	300
2	200
3 to 5	150
Greater than 5	100

Maintenance:

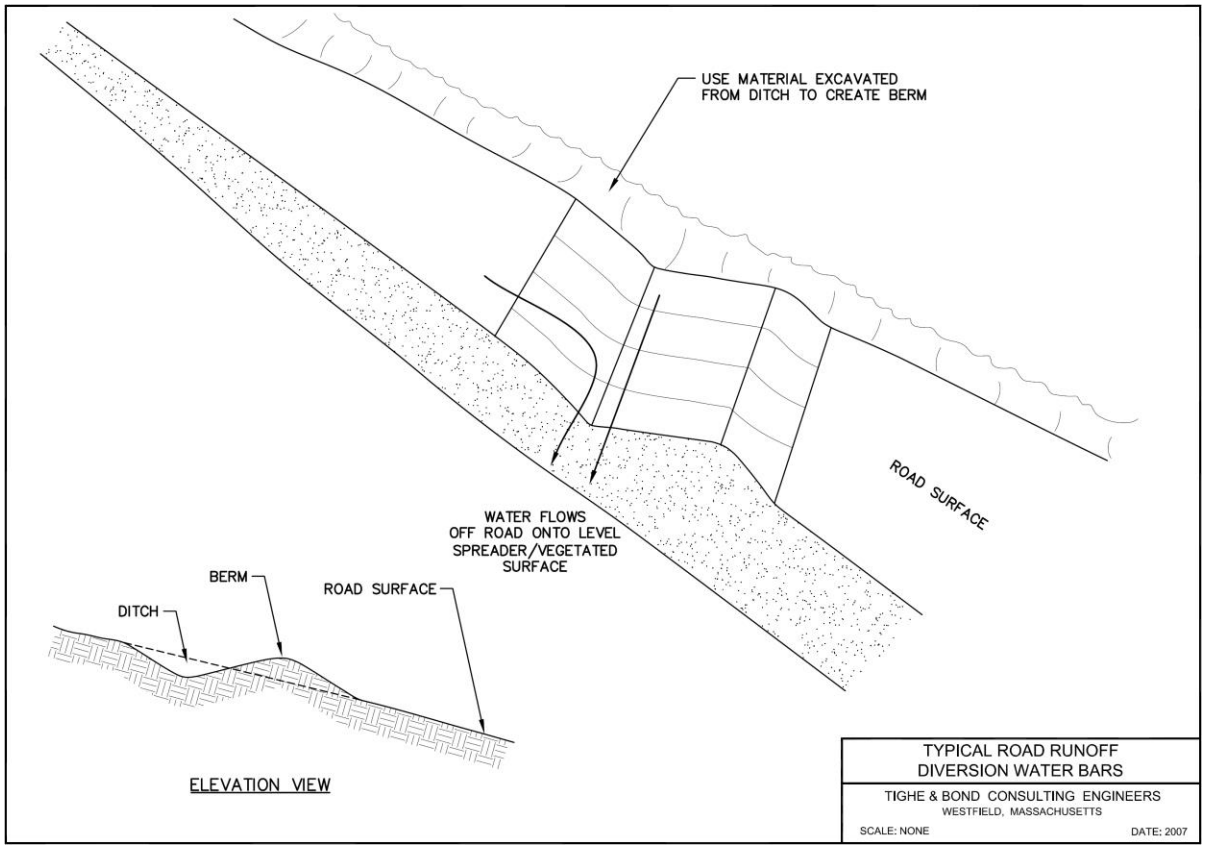
- Inspect each week and after rain events. Repair damage caused by construction traffic or erosion.
- Remove accumulated sediment and debris from the trench and stabilize outlets.
- If necessary, repair ridge to a positive grade and cross section, and add gravel at crossing areas.
- Use routine inspections to determine if the original spacing is adequate or if additional water bars need to be constructed.

Additional Comments:

Water bars may include the use of hardwood logs to provide structural stability.



Diversion waterbar.


USE MATERIAL EXCAVATED
FROM DITCH TO CREATE BERM
ROAD SURFACE
WATER FLOWS
OFF ROAD ONTO LEVEL
SPREADER/VEGETATED
SURFACE
BERM
ROAD SURFACE
DITCH
ELEVATION VIEW
TYPICAL ROAD RUNOFF
DIVERSION WATER BARS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

Drainage Swales

Applications: Convey stormwater away from work area and/or improve water quality and reduce peak runoff.

Limitations:

- Vegetated swales need to have adequately established vegetation before flow is diverted to them.
- Need to have adequate bottom stabilization to prevent scouring.

Overview:

Drainage swales usually consist of a ditch that is either vegetated or lined with rip rap, erosion control blankets, or other materials. They are natural or constructed waterways/outlets that intercept, redirect, and convey stormwater away from the work area to a stable location and are used in areas where concentrated runoff would otherwise cause erosion/flooding. Swales can be used to reduce erosion in uplands and/or prior to discharge of stormwater flows to natural receiving waters (e.g., wetlands or streams). They also help to reduce surface flow velocity and turbidity.

Grass Lined Channels (Stabilized with vegetation)

- Use where vegetative lining will provide sufficient stability, slopes are less than 5%, and space is available for large cross section.

Installation:

- Remove trees, brush and stumps.
- Excavate and shape channel to dimensions on plans. Overcut 0.2 ft for vegetative growth.
- Install temporary liner or riprap at inflows and stabilize outlets.
- Vegetate immediately after construction and divert water until grass establishes. Install matting if flow cannot be diverted.
- Install sod rather than seeding where slopes approach 5%.
- Spread topsoil to a minimum of 4 inches where soil conditions are unfavorable. Seeded channels should be mulched.

Vegetated Swales (Stabilized with dense vegetation)

- Use for water quality improvement and peak runoff reduction. Applicable for small drainage areas with relatively small amount of impervious cover. The grassed waterway is used to convey runoff at a non-erosive velocity. Dense vegetation can be established and a stable outlet constructed.

Installation:

- General design parameters are as follows: minimum capacity 10-year, 24-hour storm; design slopes to prevent erosion during the 2-year storm event; maximum side slopes 3:1; bottom width 2 to 8 feet.
- Vegetate with water resistant grasses and divert flow until established.

Riprap Lined Channels (Contains lining of riprap or stone)

- Use on sites where channel flow velocities exceed those acceptable for grass lined waterway. Applicable where vegetative establishment is not possible or there are steep grades, wetness, highly erodible soils, seepage or prolonged base flow.

Installation:

- Remove trees, brush, and vegetation from channel area.
- Stabilize inlets and install outlet protection.
- Construct channel and install filter and lining as shown on plan.
- Use the maximum stone size for riprap plus thickness of filter.

Maintenance:

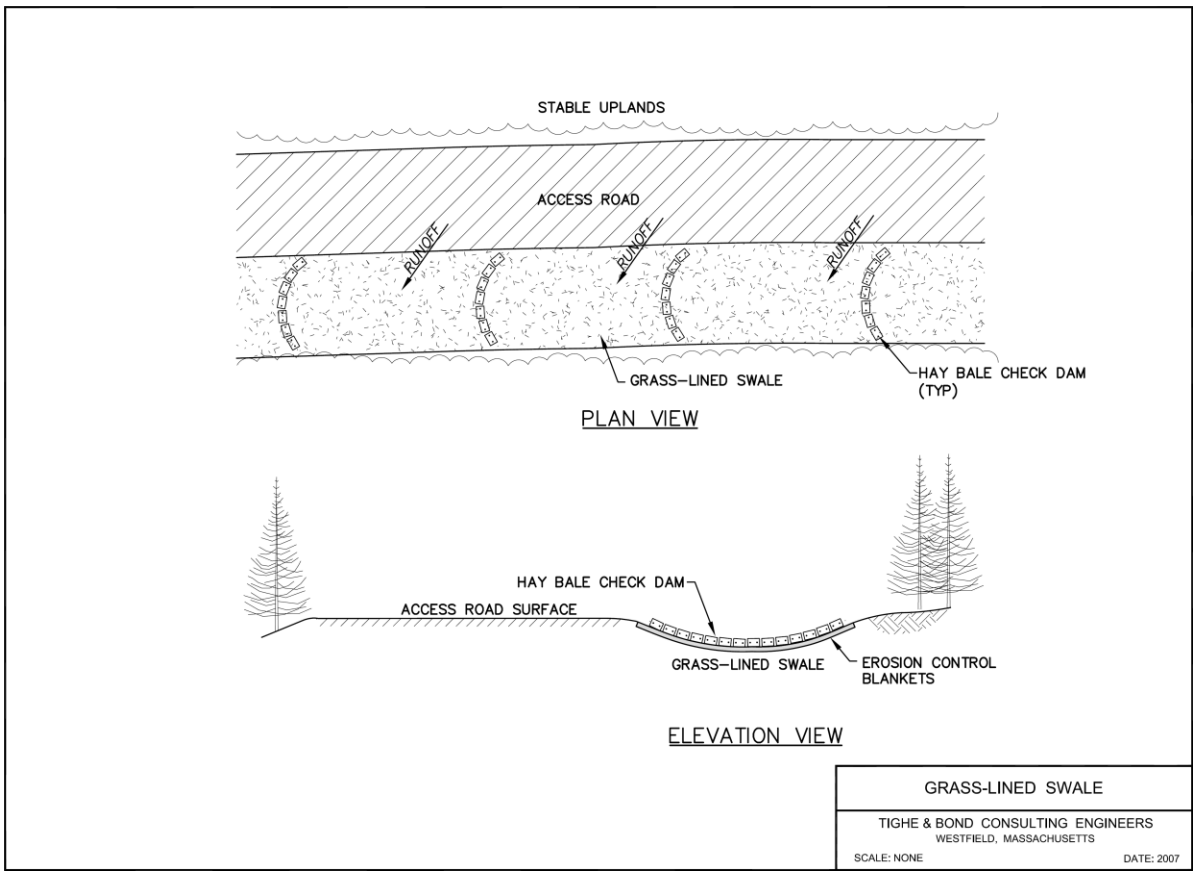
- Swales need to be routinely maintained to prevent brush/sediment buildup. Inspect swale regularly and after every rain event (0.25 inches or greater). Repair and/or re-seed rill or gully erosion. Remove accumulated sediments and brush before it reaches a depth of six inches.

Additional Comments:

- Depth and spacing of swales should be dependent on runoff conditions of the specific site.
- If required, install check dams constructed of rip rap or other materials to slow flows along certain reaches of a swale.
- Remove temporary swales once construction is complete or areas are stabilized. If leaving swales in place will allow for long-term benefits and be compatible with the ultimate use of the site, then they may remain in place.



Grass-lined swale underlain with erosion control blanket and containing hay bale check dams; used to quickly stabilize soils along a construction access road subjected to significant stormwater runoff. Blue arrow indicates direction of flow.



Sedimentation Basins

Applications: Erosion and sedimentation control

Limitations:

- Traps and basins need to be adequately sized based on expected rain events and the contributing drainage area.

Overview:

Sediment traps and basins are used to filter and settle out sediment in stormwater runoff before water is released into a wetland or other unprotected and/or sensitive area. A sediment trap is a temporary measure installed during construction to detain runoff, while a basin is a more permanent measure. Basins are also used where other erosion control measures are not adequate to prevent off-site sedimentation.

A sediment traps and basins should have three components: a forebay, a check dam, and a basin. Debris and some sediments begin to settle out of the water in the forebay. The stone or hay bale check dam filters more sediments as water flows through. The actual basin is a low velocity pool where sediments settle out of the water column before the water is released at the outlet.

Based on the size of the project area, a qualified engineer may be required to calculate the appropriate size of the basin. State-specific guidance for basin sizing can be found in the following locations:

- *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas* (Page 140); http://www.mass.gov/eea/docs/dep/water/esfull.pdf
- *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* (Section 5-11-1); http://www.ct.gov/dep/cwp/view.asp?A=2720&Q=325660.

Installation:

Drainage area of 5 acres or less

- Install to direct stormwater runoff to the sedimentation trap or basin. Form basin by excavating a depression similar to a small pond or by placing an earthen embankment across an existing drainage swale or naturally low area.
- The ratio between the basin length and width should be greater than 3:1 (L:W). A ratio of 9:1 is recommended.
- Clear, grub, and strip all vegetation and root material from area of embankment and place embankment fill in lifts (<9”/lift, max). Compact fill and construct side slopes 2:1 or flatter. Excavate rectangular outlet section from compacted embankment.
- Filter fabric may be installed on bottom and sides of basin and covered by riprap.
- Extend outlet apron/spillway below toe of dam on level grade until stable conditions are reached (5 feet minimum). Cover inside face of stone outlet section with a 1-foot layer of ½- to ¼-inch aggregate.
- Use permanent or temporary seeding to vegetate embankments, spillways, and disturbed areas downgradient of the basin.

Drainage area of 10 acres or less

- Locate the basin in an easily accessible upland area, not a wetland area.
- Install the basin so that it intercepts the largest possible amount of runoff from the disturbed area.
- Divert sediment-laden water to the upper end of the sediment pool to improve trapping effectiveness.
- Basin should have a minimum volume based on ½-inch of storage for each acre of drainage area.
- Size basin to provide a minimum detention of 12 to 24 hours at the maximum runoff quantity expected for the duration of the basin's use.

Maintenance:

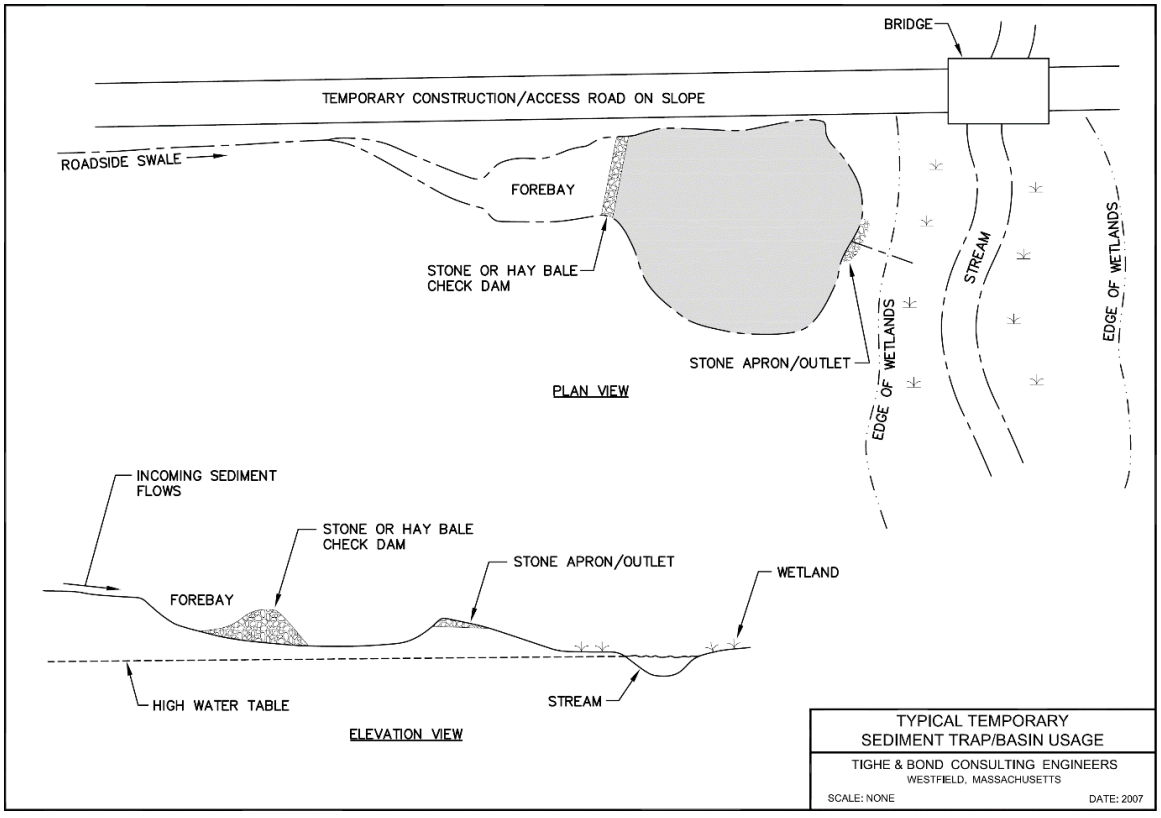
- Monitor the amount of sedimentation in the trap/basin. Install a stake with a marking at half the design depth. Remove sediment when it reaches this mark.
- Inspect after every rain event.
- Clean or replace the spillway gravel and re-seed/plant vegetation, as needed.
- Monitor embankment, spillway, and outlet for erosion. Repair erosion problems immediately.

Additional Comments:

Construction of sediment traps and/or basins should occur before primary construction on a project begins. They are often a critical stormwater management component for larger construction sites and/or those with poorly drained upland soils. If compatible with the post-construction site use, it may be appropriate to leave sediment basins in place indefinitely.



Sedimentation basin with hay bale filters.



3.4.3 Construction in Wetlands

Access roads that are constructed in or across wetlands require the following considerations in addition to the considerations for access roads in uplands:

- Construction of new access roads in wetlands, whether temporary or permanent, that do not utilize construction mats (e.g., earthen and/or rock fill roads, corduroy roads) require considerable project specific permitting and design. These kinds of projects should comply with project specific permits and plans, while only using this BMP manual as a general reference source. Permits often also require wetlands replication when permanent new access roads are constructed in wetlands.
- Avoid putting the construction access road in a wetland whenever practicable. Explore all feasible and prudent alternatives before determining that a wetland crossing is necessary. When avoidance is not practicable, consider crossings that will result in the least amount of disturbance. This may involve locating the construction access road so that it crosses the wetland at its narrowest width or uses areas previously disturbed for access or other purposes.
- Minimize the width of the temporary construction access road through the wetlands (generally no wider than 16 feet when using construction mats). It is preferable to have a passing point created before and after the wetland crossing, but internal passing points may be needed if the crossing is very long or critical sight line restrictions exist.
- Construct access roads so that wildlife is able to pass under or go through the road. In areas where the road is only one construction mat thick, allow for passageways or "gaps" between construction mats. In locations where the access road is greater than one mat thick, install elevated construction mat road crossings or "bridges." Gaps and/or bridges are to be placed along the access road at intervals no less than 50 feet.
- Consider the soil conditions. Expect deep organic wetland soils to require geotextiles, construction mats, or other materials during use to keep imported road materials separated from wetland soils. In shallow organic or saturated soils, thick plywood sheets or AlturnaMATS® may be sufficient to support a stable travel surface for small, lightweight vehicles. In addition, in areas which are inundated or have deep organic wetland soils, it may be necessary to use more than one layer of construction mats.
- Prevent obstructions to surface and subsurface flow across and through the construction access road. Provide adequate drainage. This may require the use of crushed stone, a layer of log corduroy, construction mat bridges, or multiple cross culverts, particularly if the wetland does not contain a well-defined watercourse channel and/or the wetland crossing is long. If the wetland soils are susceptible to seasonal high groundwater tables or flooding, then give additional consideration for maintaining flows across and/or over the construction access road without causing erosion or siltation during such times.
- Plan in advance how the construction access road will be removed and the wetland restored. A road stabilization geotextile can facilitate the segregation of imported soils and crushed stone and/or log corduroy from the native wetland soils and make wetland restoration easier. However, after the end of an extensive project and a highly traveled crossing, stone removal from the wetland surface will still usually have to occur, even when placed in conjunction with geotextile.

In some cases, access roads may not need to be constructed in a wetland to get access into or through a wetland if the work can be designed such that disturbance to the wetland are avoided or negligible. Options to be considered are presented below.

Equipment Selection and Usage

- **Low ground pressure equipment**. Using equipment that reduces the pressure it exerts on the ground can minimize disturbance to sensitive areas. Employing the use of equipment with wide tires, rubberized tracks, and low ground pressure (<3 psi) can help minimize soil compaction.
- **Wide tires**. Increasing the width of tires will increase traveling surface area and therefore reduce the amount of ground compaction that the equipment will cause. Ultimately, this will reduce rutting, and allow for easier maneuvering of the vehicle. However, wide tires may be costly and will require a wider travel area.
- **Rubberized tracks**. Equipment with rubberized tracks spreads the weight of the vehicle over a much larger surface, reducing ground pressure and enabling the vehicle to move more freely through wet substrates. Each track can be between 1.5 and 3 feet wide, length depending on the width of the vehicle. This can greatly reduce rutting and allow the vehicle to move with less difficulty through wet substrates.
- **Lightweight equipment**. Disturbance in a wetland area can be lessened by reducing the size of equipment (e.g., ORVs, Gator™) used in sensitive areas. This reduces the amount of pressure to the travel surface as well as the necessary width of access ways.



Equipment with rubberized tracks.

Timing of Work

- **Work during frozen conditions**. Activities conducted once wetland areas are frozen can minimize rutting and other disturbance to the surrounding environment. Work during this time also generally reduces disturbance of aquatic and terrestrial wildlife movement by avoiding sensitive breeding and nesting seasons.
- **Work during the "low flow" period**. Conducting work during the low flow period can reduce disturbance to surface water and generally avoids spawning and breeding seasons of aquatic organisms. The United States Army Corps of Engineers defines the low-flow periods for streams as follows:
    - Connecticut streams—July 1 through September 30
    - Massachusetts non-tidal streams—July 1 through September 30
    - Massachusetts tidal streams—November 16 to February 15
    - New Hampshire streams—July 15 through October 1

Alternate Access

- **Manual access.** Consider accessing work areas on foot through terrestrial areas and/or by boat through open water or ponded areas. Smaller projects (e.g., repairs

to individual structures or parts of structures) do not categorically require the use of heavy machinery and should be accessed manually to the extent practicable.

- **Limit trips.** Multiple trips through a wetland have shown to increase the potential for damage and requirement for matting. Try to limit trip to one in and one out.

Use of overhead/aerial access (e.g., helicopters)

- Using overhead or aerial equipment can be expensive and is not always feasible, but it may be appropriate in some situations in order to get vehicles and other equipment to a site that may be otherwise very difficult to access. The use of overhead and/or aerial equipment may be beneficial for work in areas where large water bodies, deep crevices, or mountainous areas hinder ground access.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during new access road construction by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Straw wattles, Geotextile silt fencing** and **hay/straw bale barriers** may be installed at the edges of earthen roads or construction mat roads to prevent erosion of soil into wetlands from the road fill or tracked soil on construction mats.
- In areas where silt fencing is required for more than one activity season, **syncopated silt fencing** may be installed to permit animal crossings.
- Side slopes of earthen roads can be protected by installing **erosion control blankets** and **seeding** the area with a fast-growing native or annual grass mix.
- **Dust control** should be employed as necessary when construction access road conditions create airborne dust when necessary.

3.4.3.1 Best Management Practices – Construction in Wetlands

The following are BMPs that are applicable to new access roads in wetlands and are described at the following tab:

Construction Mats (includes Elevated Construction Mats and AlturnaMATs) – Tab 2A

Permeable Road- Tab 2B

Dewatering – Appendix A Section II

TAB 2A

Construction Mats (i.e., timber or swamp mats)

Applications: Wetland crossings, rut minimization

- Used for access where the ground surface is unstable due to shallow, standing water, saturated soils, or other substrates not suitable for heavy vehicles.

Limitations:

- Only for temporary use. Generally mats should be removed upon construction completion.
- May float away in high water conditions.
- Need to be installed with heavy machinery.
- AlturnaMATs® limited to smaller vehicles and equipment.
- Equipment operators should remain cautious so as not to drive off or slip off the side of the mats.
- In winter, mats must be plowed and sanded or heated to prevent equipment from sliding off mats. Use of a deicing agent requires approval by the Environmental Licensing and Permitting Group.

Installation:

- Place mats along the travel area without any gaps and so that each board is positioned perpendicular to the direction of traffic. Position mats so that they are offset far enough from the resource area so that ruts are not created when equipment enters and exits a sensitive area.
- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils.
- Clean mats after use to remove any invasive plant species seed stock. Cleaning methods may include, but are not limited to, shaking or dropping mats in a controlled manner with a piece of machinery to knock off attached soil and debris, spraying with water or air, sweeping, or exposing the mats to high temperatures.
- Clean mats that were used in wetlands dominated by invasive species using brooms, shovels, and compressed air, if needed.

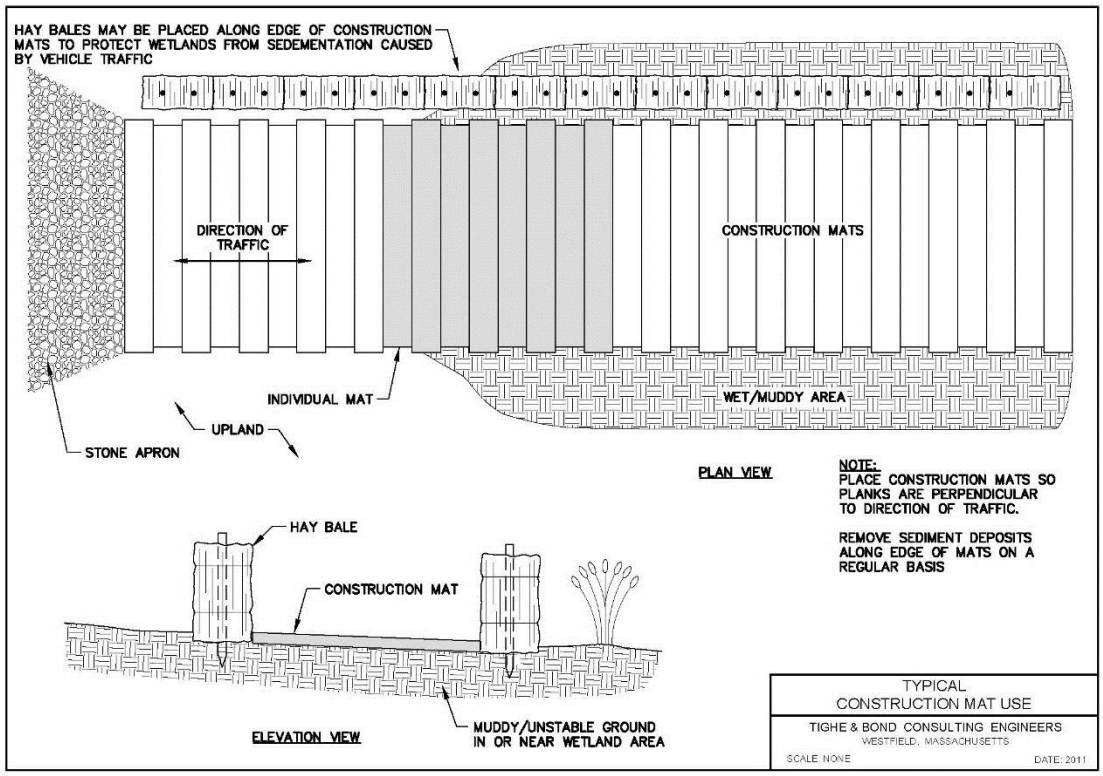
Additional Comments:

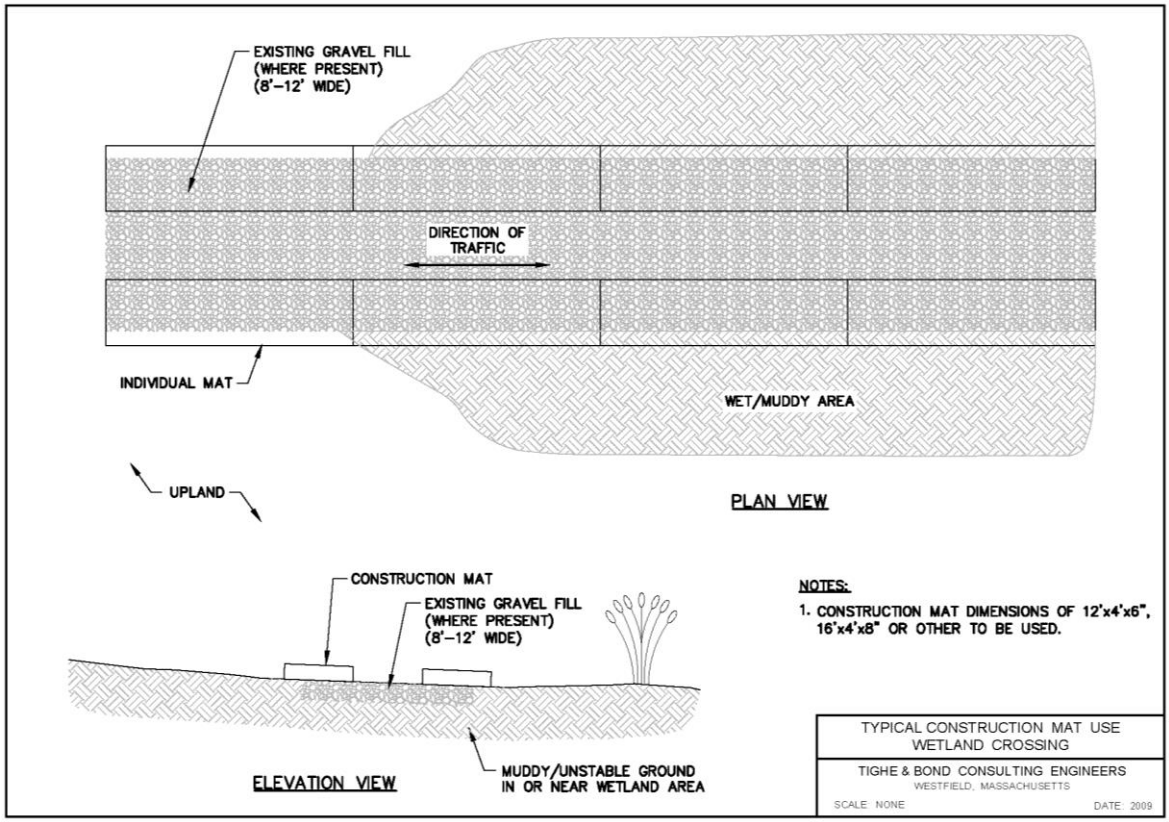
Lightweight, easy to maneuver alternatives to traditional mats are available. For example, AlturnaMATS® are half-inch thick polyethylene slip-resistant ground protection mats available in dimensions up to 4 feet by 8 feet and weigh between 21.5 and 86 pounds.

See photograph and typical sheet on following pages.



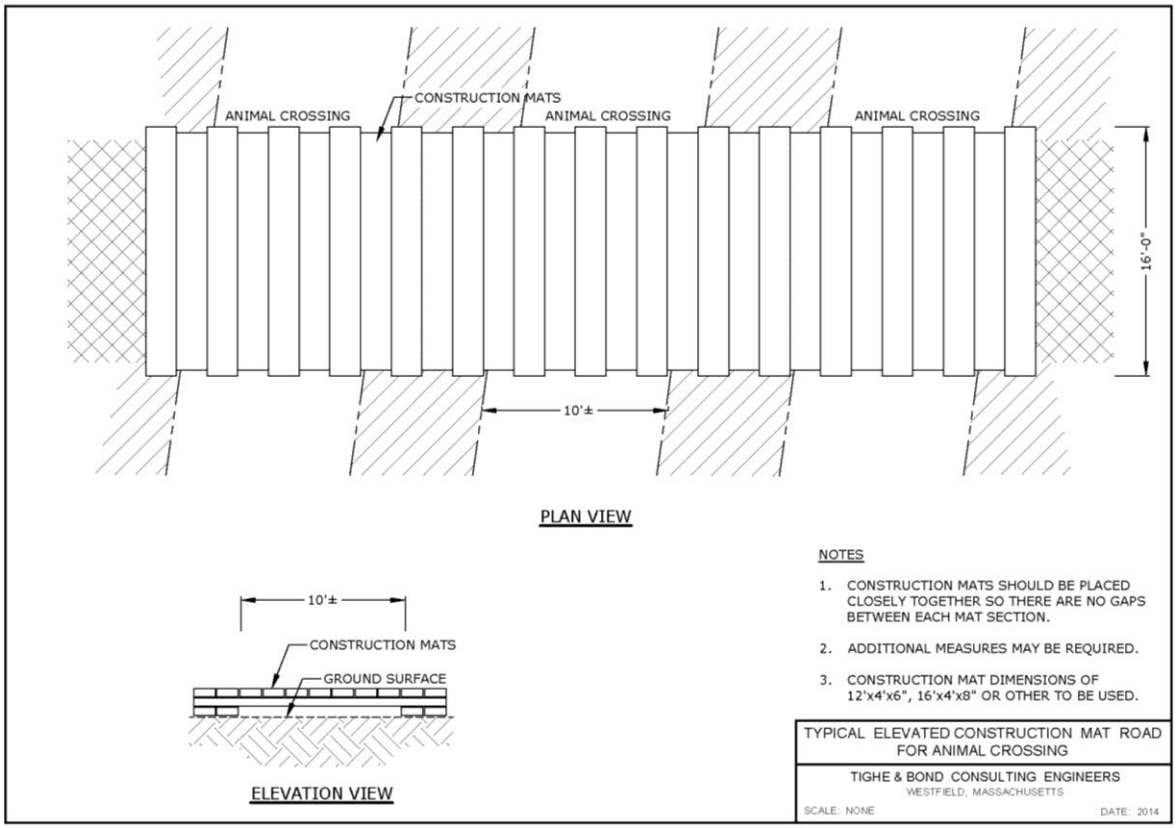
Construction mat access road.




EXISTING GRAVEL FILL
(WHERE PRESENT)
(8'–12' WIDE)
DIRECTION OF
TRAFFIC
INDIVIDUAL MAT
WET/MUDDY AREA
UPLAND
PLAN VIEW
CONSTRUCTION MAT
EXISTING GRAVEL FILL
(WHERE PRESENT)
(8'–12' WIDE)
ELEVATION VIEW
MUDDY/UNSTABLE GROUND
IN OR NEAR WETLAND AREA
NOTES:
1. CONSTRUCTION MAT DIMENSIONS OF 12'x4'x6",
16'x4'x8" OR OTHER TO BE USED.
TYPICAL CONSTRUCTION MAT USE
WETLAND CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2009

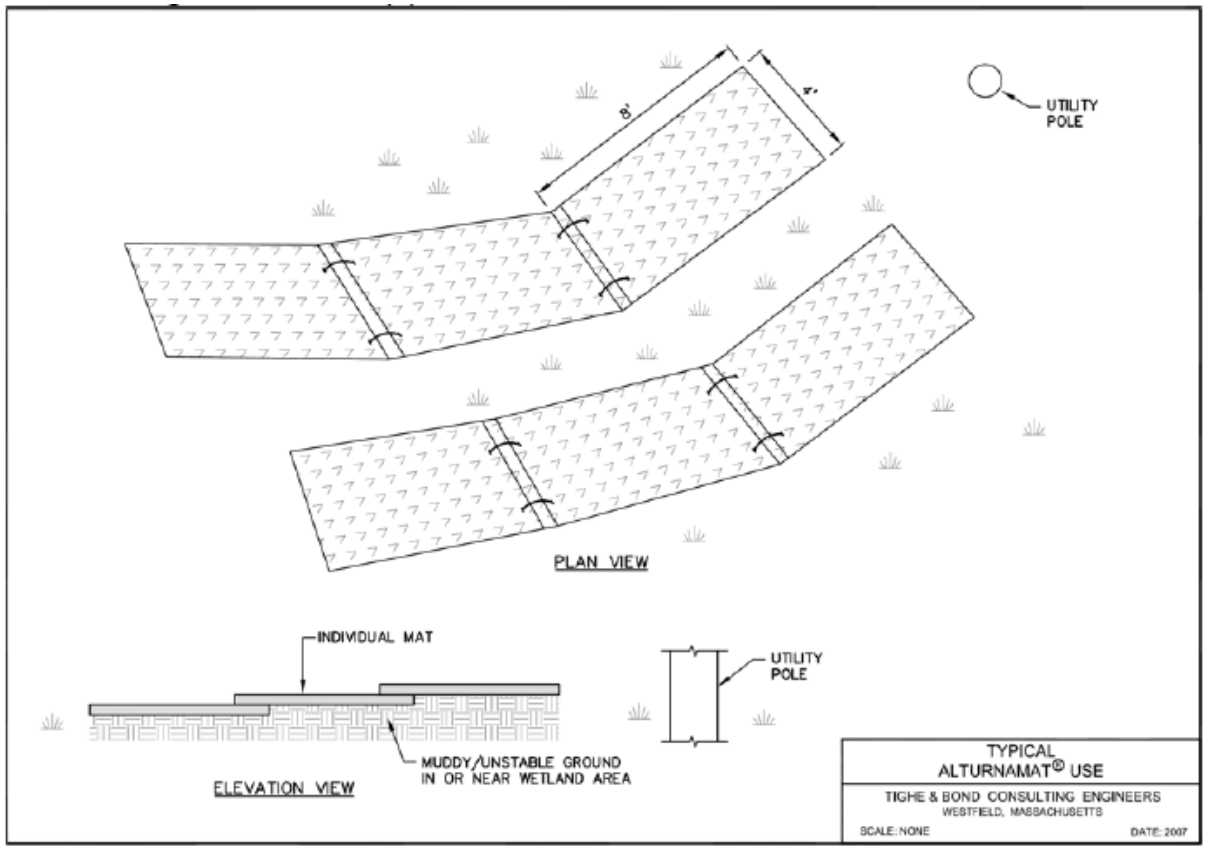


Elevated construction mat road with bridging for animal crossing.





AlturnaMAT® tracks to utility pole in wetland.



TAB 2B

Permeable Road (i.e., rock sandwich, French Mattress, or road with continuous cross-drainage)

Applications: Wetland crossings, rut minimization

Limitations:

- Not appropriate for areas where concentrated, high volume and/or velocity water flow will intersect the road (i.e., stream crossings).
- Need to be installed with heavy machinery.
- Equipment operators should remain cautious so as not to drive or slip off the side of the road.

Overview:

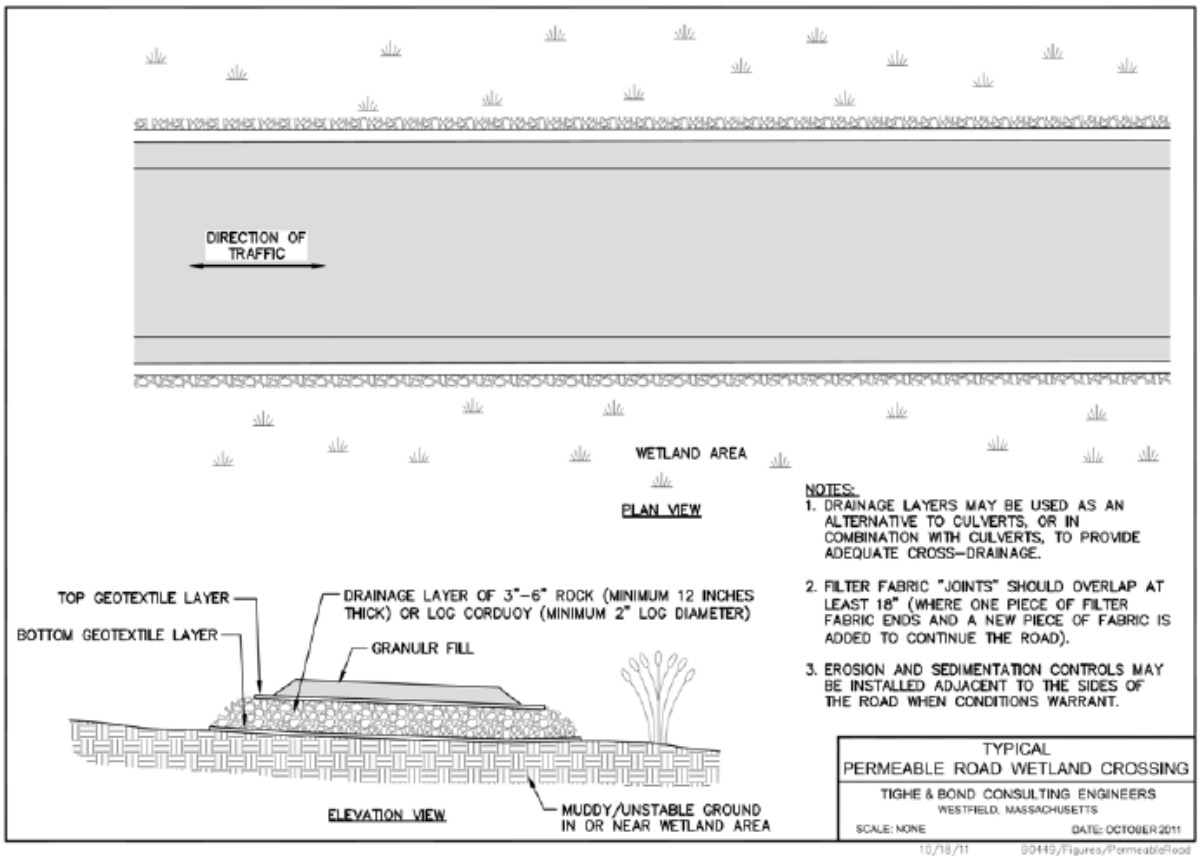
Permeable roads are used for access in situations not suitable for heavy vehicle use often due to unstable ground surfaces with shallow standing water, saturated soils, or other unstable substrate. Installation of a permeable road can also help reduce the potential for frost action and pothole creation by preventing groundwater from wicking up into the road fill material.

Installation:

- Cover existing soil with a geotextile fabric prior to road construction. Excavation of existing soil is generally not recommended in order to minimize impacts to the resource area. Construct road on top of the soil surface, as shown on the typical on the next page. Drainage layer materials include 3- to 6-inch rock (12-inch minimum depth) or log corduroy (2-inch minimum diameter).
- Install the road so that it is offset far enough from the resource area so that ruts are not created when equipment enters and exits a sensitive area.
- Remove road by "backing" out of the site and removing road one section at a time. Regrade soils to pre-existing contours while taking care not to compact soils.

Maintenance:

- Regularly inspect and clean edges of cross-drainage layer along the sides of the road to prevent clogging by debris, leaf litter, sediment, etc.


DIRECTION OF TRAFFIC
WETLAND AREA
PLAN VIEW
NOTES:
1. DRAINAGE LAYERS MAY BE USED AS AN ALTERNATIVE TO CULVERTS, OR IN COMBINATION WITH CULVERTS, TO PROVIDE ADEQUATE CROSS-DRAINAGE.
2. FILTER FABRIC "JOINTS" SHOULD OVERLAP AT LEAST 18" (WHERE ONE PIECE OF FILTER FABRIC ENDS AND A NEW PIECE OF FABRIC IS ADDED TO CONTINUE THE ROAD).
3. EROSION AND SEDIMENTATION CONTROLS MAY BE INSTALLED ADJACENT TO THE SIDES OF THE ROAD WHEN CONDITIONS WARRANT.
TOP GEOTEXTILE LAYER
BOTTOM GEOTEXTILE LAYER
DRAINAGE LAYER OF 3"-6" ROCK (MINIMUM 12 INCHES THICK) OR LOG CORDUOY (MINIMUM 2" LOG DIAMETER)
GRANULR FILL
ELEVATION VIEW
MUDDY/UNSTABLE GROUND IN OR NEAR WETLAND AREA
TYPICAL
PERMEABLE ROAD WETLAND CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: OCTOBER 2011
10/18/11
S0449/Figures/PermeableRoad

3.4.4 Watercourse Crossings

There are a number of BMPs that can be used to minimize disturbance to streams. For each application, consider the site and project needs to select a method that is cost effective and will incur the fewest secondary disturbances. Additional erosion and sedimentation controls (e.g., hay or straw bales) may be required in conjunction with the stream crossing BMPs to protect sensitive areas. The stream crossing methodology chosen will depend largely on the equipment required for a particular task, the existing environmental conditions, and the duration of the crossing. In constructing any stream crossing, care should be taken to limit disturbance to the extent practicable within 100 feet of the stream banks (the riparian area). The riparian area provides habitat to a number of species and provides protection and shading to the stream.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during new watercourse crossings by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Straw wattles, Geotextile silt fencing** and **hay/straw bale barriers** may be installed at the edges of earthen roads or construction mat roads to prevent erosion of soil into watercourses from the road fill or tracked soil on construction mats. These controls however should generally not be placed within a watercourse.
- Side slopes of earthen roads can be protected by installing **erosion control blankets** and **seeding** the area with a fast-growing native or annual grass mix.

3.4.4.1 Best Management Practices – Watercourse Crossings

The following are BMPs that are applicable to new access roads watercourse crossings and are described at the following tabs:

Stream Crossings without Bridges (includes limiting turbidity and stone crossing) – Tab 3A

Bridged Crossings (includes construction mat bridges and rail car frame bridges) – Tab 3B

Culverts – Tab 3C

Poled Fords – Tab 3D

Dewatering – Appendix A Section II

TAB 3A

Stream Crossings Without Bridges: Limiting Turbidity

Applications: Stream crossing, turbidity control

Limitations:

- Limited to areas where stream banks and bottoms will not be significantly damaged by the crossing.

Overview/Use:

- In some situations, such as routine or emergency maintenance with small ORVs, pickup trucks or tracked equipment, it may be acceptable for equipment to simply travel (perpendicularly) through a stream.
- Crossings are generally considered acceptable in situations where there is an existing or historic access road, a stable rock or sand/gravel stream bottom, and/or the crossing is at a relatively narrow reach of the stream and any adjacent wetlands.
- Cross streams slowly to minimize in-stream turbidity.

Stream Crossings Without Bridges: Stone Crossings

Applications: Stream crossing, turbidity control

Limitations:

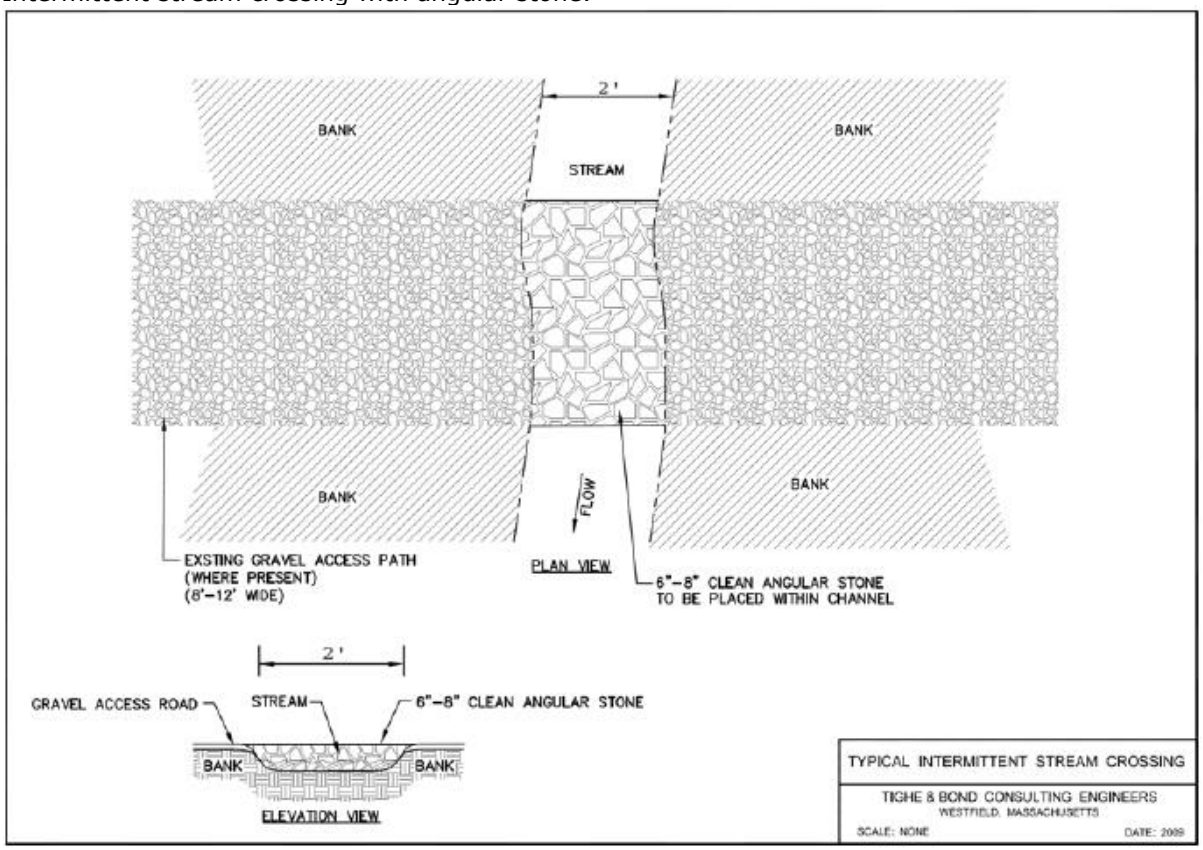
- Only use in small (less than 2-feet wide or braided) intermittent streams which do not appear on USGS topographic maps, and have a downstream section with a gradient greater than 20%.
- Not suitable in areas where there could be a potential for fish passage.
- Stone size should be sufficient to allow for macroinvertebrate passage.
- Not preferred for new access road crossings. Generally is a BMP more suitable for existing access road crossings.

Overview/Use:

- Use to cross small streams with stable stream bottoms.
- Carefully place 6-inch to 8-inch clean angular stone within stream at crossing. Limit width of stone to that needed for widest vehicle/equipment to crossing the stream.
- Drive over stone slowly.
- Leave riprap in intermittent streams for future use. More damage will occur by removing stone.



Intermittent stream crossing with angular stone.



TAB 3B

Bridged Crossings: Construction Mats as Temporary Bridge

Applications: Watercourse crossings

Limitations:

- Installation requires machinery.
- May become unstable under high flows.

Overview/Use:

- Untreated wooden construction mats may be used as a temporary bridge over a stream to allow construction vehicles access to the work site. Construction mat bridging is suitable for crossing intermittent and perennial streams. Before constructing a stream crossing, confirm that the construction mats are capable of supporting the equipment to be used.
- Place small sections of matting on either side of the stream parallel to the flow of water at top of banks to act as supports. Then place mats perpendicular to the stream and resting on top of the initial construction mat supports.
- It may be necessary to place a large steel plate along the top of the construction mats for extra stability and to minimize the amount of sediment that could fall between the spaces of each timber.



Construction mat bridge.

Bridged Crossings: Rail Car Frame as Temporary Bridge

Applications: Watercourse crossings

Limitations:

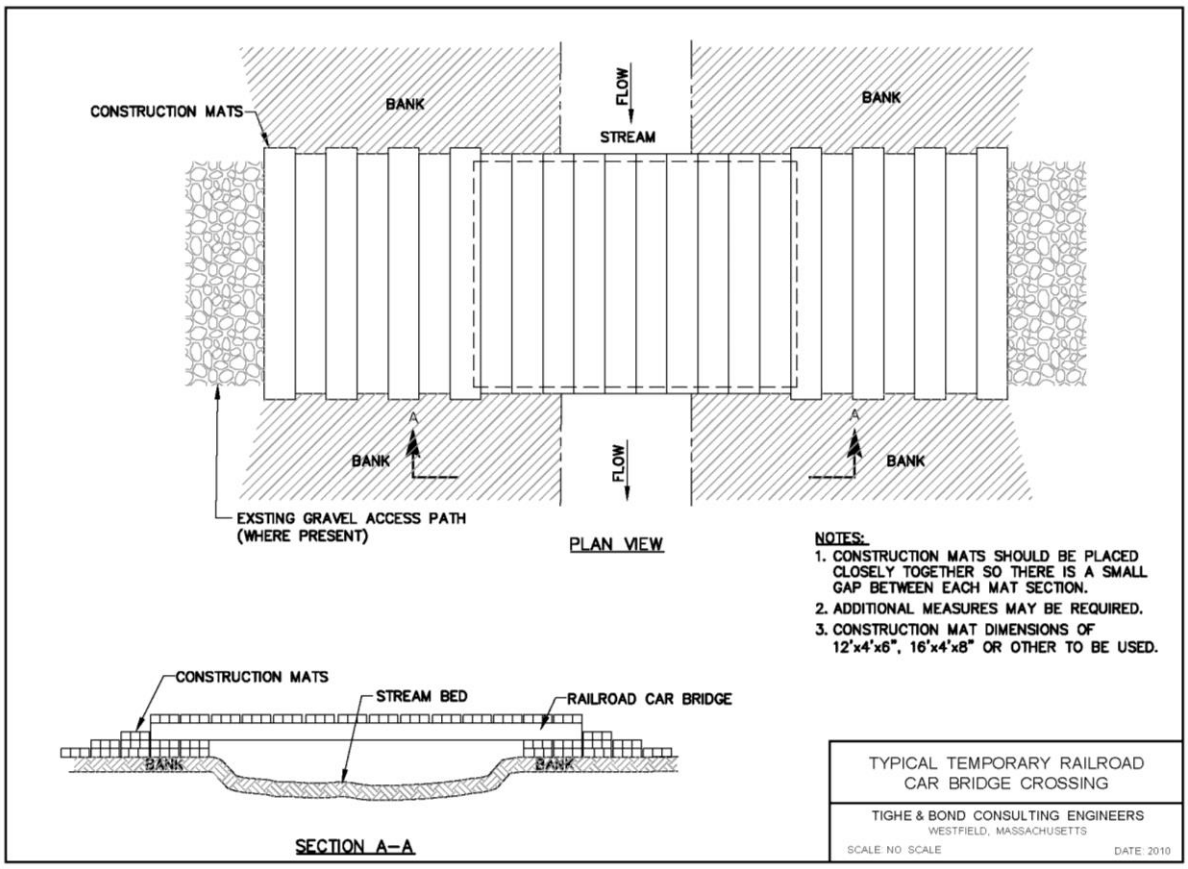
- Requires heavy equipment for transport and installation.
- Expensive.
- Banks must be stable to support heavy loads.

Overview/Use:

- Used rail car frames can be used for crossing larger and deeply incised streams where construction mats are unsuitable.
- Place the rail car frame perpendicular to the stream flow and between opposing banks. Use timber frame footings, if necessary. Next, place construction matting on the rail car frame to provide vehicle access.



Rail car frame bridge crossing.


CONSTRUCTION MATS
BANK
FLOW
STREAM
BANK
A
BANK
FLOW
A
BANK
EXSTING GRAVEL ACCESS PATH
(WHERE PRESENT)
PLAN VIEW
NOTES:
1. CONSTRUCTION MATS SHOULD BE PLACED CLOSELY TOGETHER SO THERE IS A SMALL GAP BETWEEN EACH MAT SECTION.
2. ADDITIONAL MEASURES MAY BE REQUIRED.
3. CONSTRUCTION MAT DIMENSIONS OF 12'x4'x6", 16'x4'x8" OR OTHER TO BE USED.
CONSTRUCTION MATS
STREAM BED
RAILROAD CAR BRIDGE
BANK
BANK
SECTION A–A
TYPICAL TEMPORARY RAILROAD CAR BRIDGE CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NO SCALE
DATE: 2010

TAB 3C

Culvert Installation/Repair/Replacement

***Contact Environmental Licensing and Permitting prior to performing any culvert installations or replacements.**

Applications: Stream and wetland crossings

Limitations:

- Permitting and design are required for new culvert installation or expansion of existing culvers over streams and wetlands. Significant regulatory requirements must be followed. Permitting restrictions on time of year use.
- Installation may require in-stream work; dewatering and sedimentation concerns.
- Culverts are susceptible to washouts, sedimentation, erosion, and failure during heavy wet-weather events and flooding.
- Culverts require routine and long-term maintenance because they often become clogged with debris or other obstructions.

Overview:

Culverts are installed to maintain wetlands or streams at road crossings. Hydraulic calculations are required at all crossings to determine the area that will drain to the culvert.

General Design Guidelines:

- Size culverts to handle the maximum expected flow of the wetland or watercourse. It is preferable to one large culvert rather than multiple culverts. Corrugated culverts are favored because they slow the water velocity. Plastic pipes are preferred to metal.
- Design culverts to withstand and accommodate high flows while maintaining existing low flows and not impeding on the movement of indigenous aquatic life. Culverts must be sized to accommodate flows from at least the 100-year storm and preferably 500-year storm.
- The maximum velocity at the culvert outlet should be consistent with the velocity of the natural channel. To mitigate higher velocities, use outlet protection measures, energy dissipation, and channel stabilization, if necessary.
- Refer to state specific stream crossing guidance documents for additional design requirements:
    - Connecticut: Stream Crossing Guidelines, CT DEEP, Inland Fisheries Division Habitat Conservation and Enhancement Program, February 26, 2008, www.ct.gov/deep/lib/deep/fishing/restoration/streamcrossingguidelines.pdf
    - Massachusetts: Massachusetts River and Stream Crossing Standards, River and Stream Continuity Partnership, March 1, 2006, Revised March 1, 2011, www.nae.usace.army.mil/Portals/74/docs/regulatory/StreamRiverContinuity/MA_RiverStreamCrossingStandards.pdf

Installation:

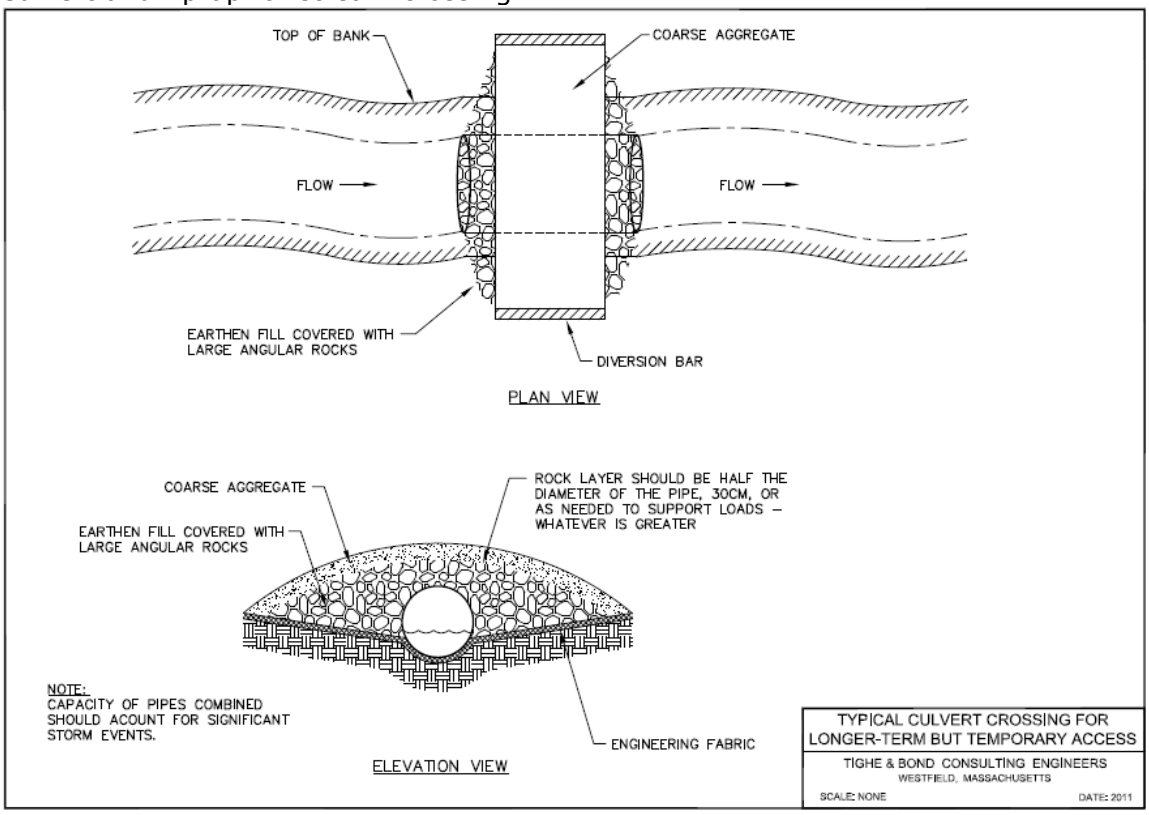
- Construction mats may be placed over culverts to provide structural protection from heavy loads.
- Backfill culverts with natural substrate matching the upstream and downstream streambed substrate, even when fish passage is not a concern. Other aquatic organisms rely on natural streambed sediment to aid their movement.
- Strive to install culverts with minimal disruption to the watercourse and riparian buffer zone.
- Culvert length should be as short in length as practicable. Cut culverts to size if they are protruding into the natural streambed.

Maintenance:

- Remove debris and sediment from culverts to maintain an open channel for flow. A clogged culvert could result in flooding and washout.

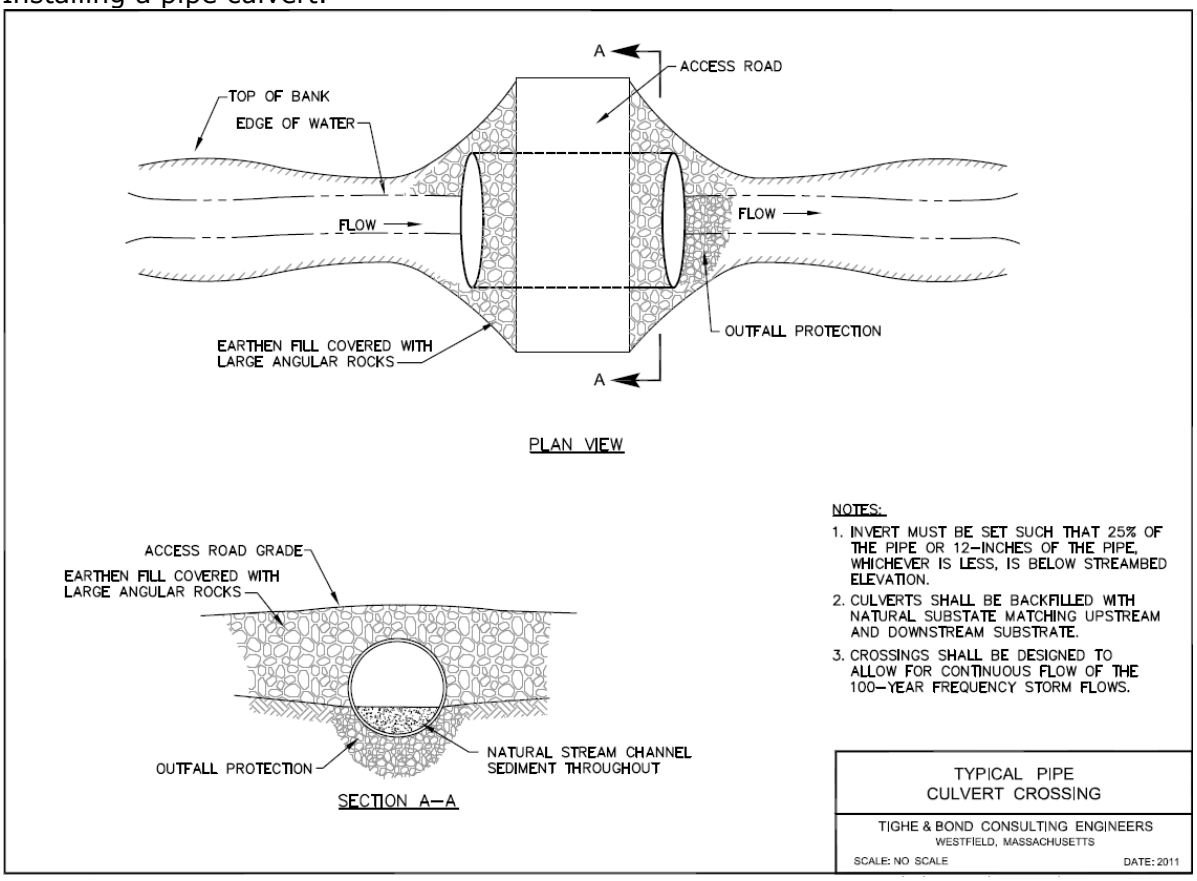


Culvert and riprap for stream crossing.



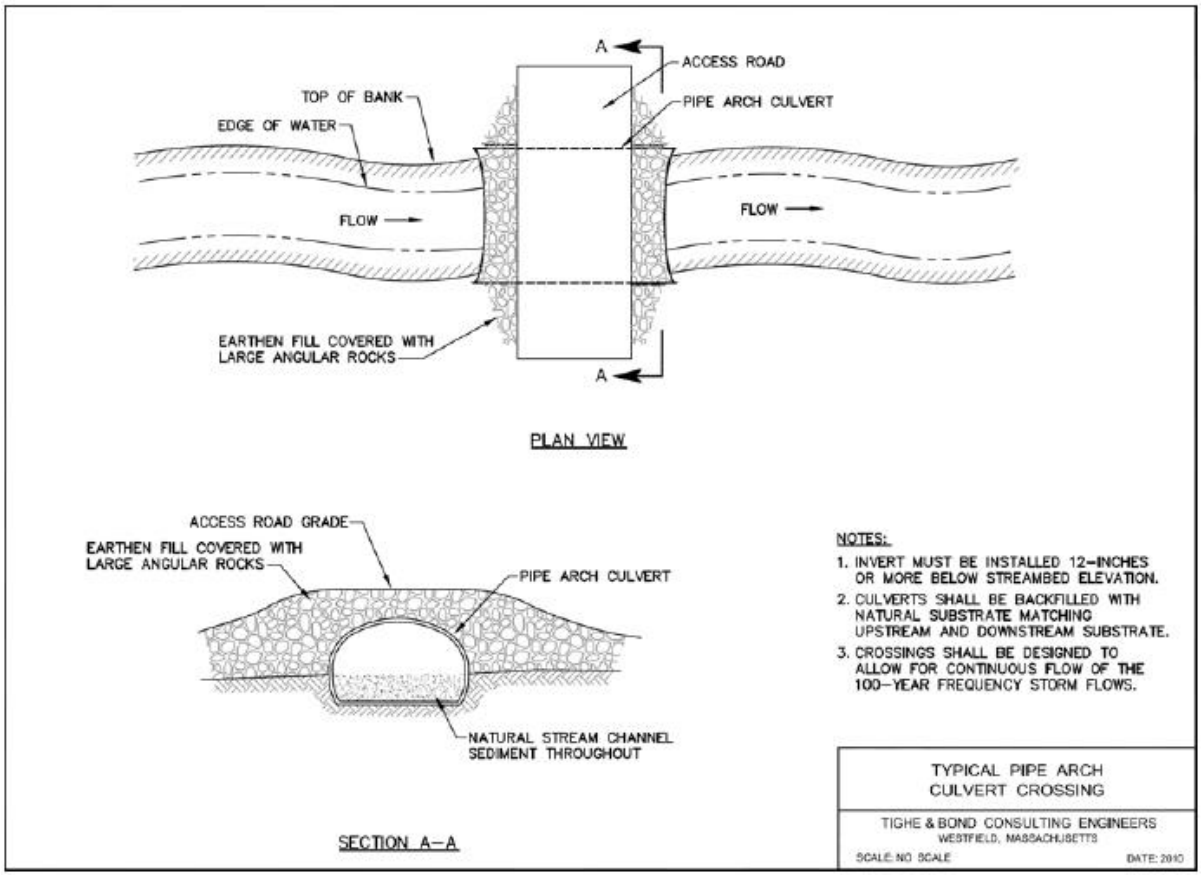


Installing a pipe culvert.



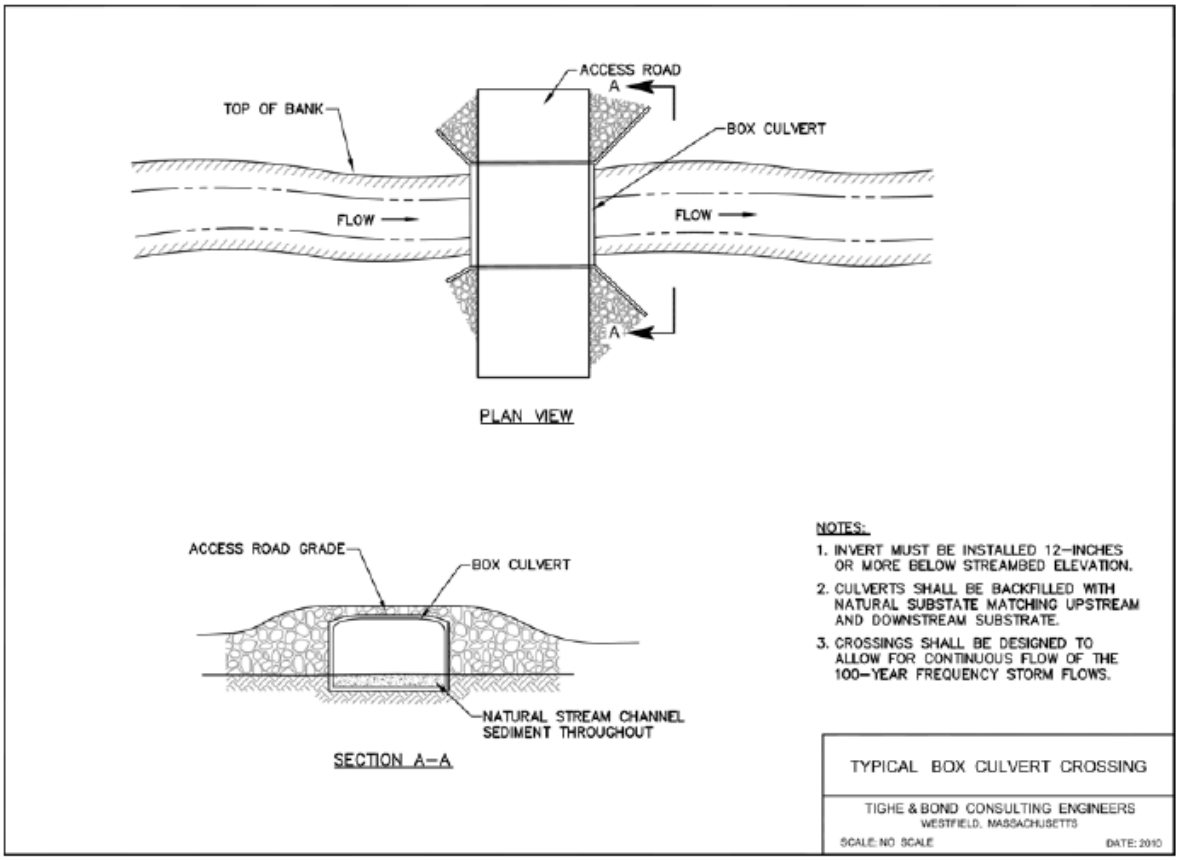


Pipe arch culvert.





Embedded box culvert with wing walls.



TAB 3D

Poled Fords

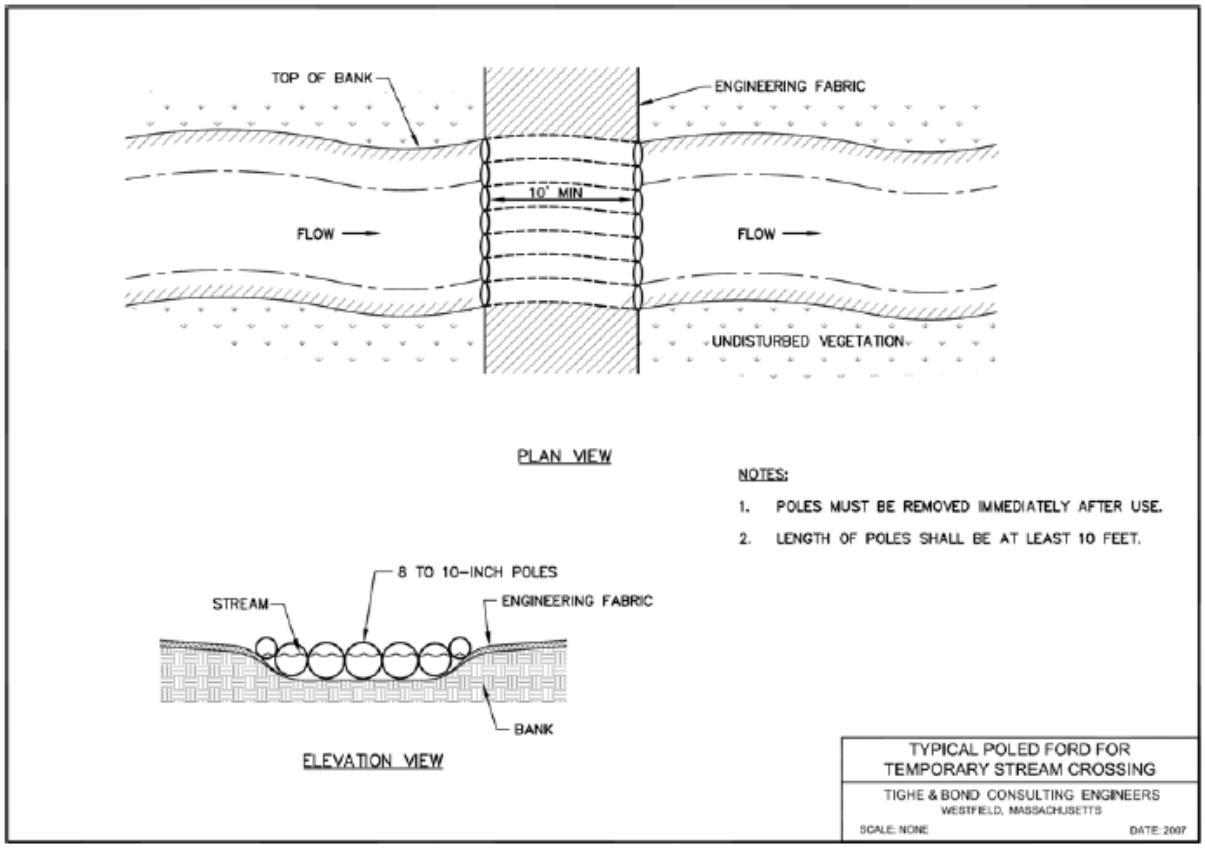
Applications: Stream Crossings

Limitations:

- Limited to streams with gently sloping adjacent land.

Overview/Use:

- Poled fords are used in remote locations where a stream crossing requires a functional BMP, but it is impractical to bring in larger materials. Sufficiently sized wood poles or saw logs of may be laid in the streambed parallel to the flow.
- Gently slope the road to and from the streambed at a maximum ratio of 1:5 (V:H). To limit disturbance to the riparian area, install engineering fabric and cover with an aggregate bed at the approach and exit.
- Use poles with a minimum length of ten feet.
- Remove poles immediately after use.



3.5 Slope Excavation

Engineering designs may be required for any upland changes that could potentially direct or channel water across the face of a terrace escarpment slope. No snow or soil piles, construction materials, or equipment should be stored in the immediate vicinity at the top of the terrace escarpment slope.

3.6 Vegetation Removal and Preservation

Care should be taken to limit disturbance to the extent practicable when removing vegetation. Grubbing is not preferred as it results in considerable erosion and should be avoided to the extent feasible. Utilize grubbing only when all other methods cannot be used to prepare stable and safe work areas. If grubbing is necessary, the area must be covered with seed and mulch to protect it prior to the end of the work day. During mowing and trimming, woody debris greater than two (2) inches in diameter should not be placed in wetlands, and no woody debris should be placed in standing water. All woody debris must be removed from wetlands if required by a permit condition. Mowing must be kept to a minimum, particularly at road crossings.

3.6.1 Right of Way (ROW) Vegetation and Eastern Box Turtle (EBT)

Eastern box turtles (EBT) are often found near small streams and ponds and inhabit old fields, deciduous forests, and logged woodlands. Adults are completely terrestrial, while the young may be semiaquatic and hibernate on land by digging down in the soil between October and April. EBTs have an extremely small home range and can usually be found in the same area year after year. EBT populations have been negatively impacted by the loss of suitable habitat. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated. Therefore, vegetation removal in ROWs should be performed in a manner that minimizes impacts to turtle populations.

Cleared and Maintained ROW—EBTs have been found to use existing ROWs for foraging and nesting. Whenever feasible, perform maintenance mowing in identified habitat during inactive periods (November 1 to April 1). If mowing during the active turtle season (April 1 to November 1) is required, mow vegetation to no lower than seven (7) inches. Use Brontosaurus or Fecon mower heads to minimize the impact to identified habitat areas. Do not used Flail-type mowers during the active season.

Uncleared ROW—When project work requires vegetation removal in an uncleared ROW, cut and mow uncleared portions of EBT habitat during the active season (April 1 to November 1). If clearing must be conducted during hibernation periods, pre-planning will involve conducting a turtle survey and the possible use of telemetry. Consult Environmental Licensing and Permitting before performing work because this activity may not be covered under the Operation and Maintenance Plan and may require a permit.

		Recommended Maintenance Activity if the Existing ROW is:	
Time Period	Turtle Status	Cleared and Maintained	Uncleared
April 1 to November 1	Active	*Perform only if required*—Mow vegetation no lower than seven (7) inches and use recommended mower heads	*Recommended*—Cut and mow uncleared areas
November 1 to April 1	Inactive	*Recommended*—Perform maintenance mowing	*Not recommended*—Requires turtle survey at minimum before removing vegetation

General Construction Recommendations –The following are general construction guidelines for protecting turtles:

- Install silt fencing around the work area prior to construction activity. Consider using syncopated silt fencing (Appendix A).
- Turtle training is required for all contractors. Apprise workers of the possible presence of turtles and provided a description of the species. Include a turtle sweep reminder on the Tail Board.
- Conduct a turtle sweep after installing silt fencing and before conducting work.
- Perform daily turtle sweeps in work areas before performing any work.
- Carefully move any turtles that are discovered to an area immediately outside of the fenced area. Position turtle in the same direction that it was walking.
- Perform work with caution during early morning and evening hours. Take special care not to harm basking or foraging individuals.
- Remove silt fencing after work is completed and soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.
- Return temporary cross country access routes to pre-construction grade, seed if adequate root and seed stock are absent, and mulch. Do not seed pre-existing sandy soils that are within mapped rare turtle habitats unless directed by Environmental Licensing and Permitting in order to avoid altering nesting habitat

3.6.2 Preservation of Existing Vegetation

Preserve the existing vegetation (i.e., groundcovers, vines, shrubs, trees) on a site when practicable to improve soil stability and decrease the runoff volume and velocity. Identify and protect specified trees for erosion and sediment control benefits and/or aesthetic purposes. Consider saving trees that provide shading or screening benefits, particularly in residential areas. Preserve existing vegetation by reducing the width of a cleared ROW at stream crossings. See Appendix A for preserving existing vegetation BMP.

3.7 Work Pads

3.7.1 De-Energized and Energized

Applications: Work in wetlands

- Reconnaissance of each workpad area in or adjacent to wetlands should be performed to determine if the construction mat workpad areas could be located outside of wetland resource areas. Wetland disturbances should be avoided or minimized where practicable. Contact Environmental Permitting and Licensing.

Limitations:

- Requires heavy machinery for installation.
- Significant amount of time required for installation and removal.
- Pads for live line work require a considerably larger footprint.
- Several layers of matting may be needed in deep, construction areas.
- Animals may be injured or killed when attempting to cross workpads.
- May not be suitable in deep/open water wetlands.

How to Use:

- Work at structures may require placement of construction mats to provide safe and stable workpad areas for employees and contractors.
- Live line work, which is work that is done while the line is energized, requires a much larger workpad area. Efforts should be made to stay out of wetland areas to the extent practicable.
- Sizes of workpads vary based on the type of work being proposed.
- Workpad areas may extend into wetlands where structures that require maintenance either fall within or are in close proximity to wetlands. In these cases, untreated wooden construction mats shall be used to limit disturbance.
- Install silt fencing around work pads in identified amphibian and reptile priority habitat and where matting is greater than one mat thick. The exclusionary silt fencing will deter animals from moving across workpads and reduce the likelihood of being crushed by heavy equipment.
- Following construction activities all mats at each workpad and vehicle access locations must be removed.
- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils.
- In areas with invasive species, plant material should be removed from mats following removal from the infested area to prevent the spread of invasive species.

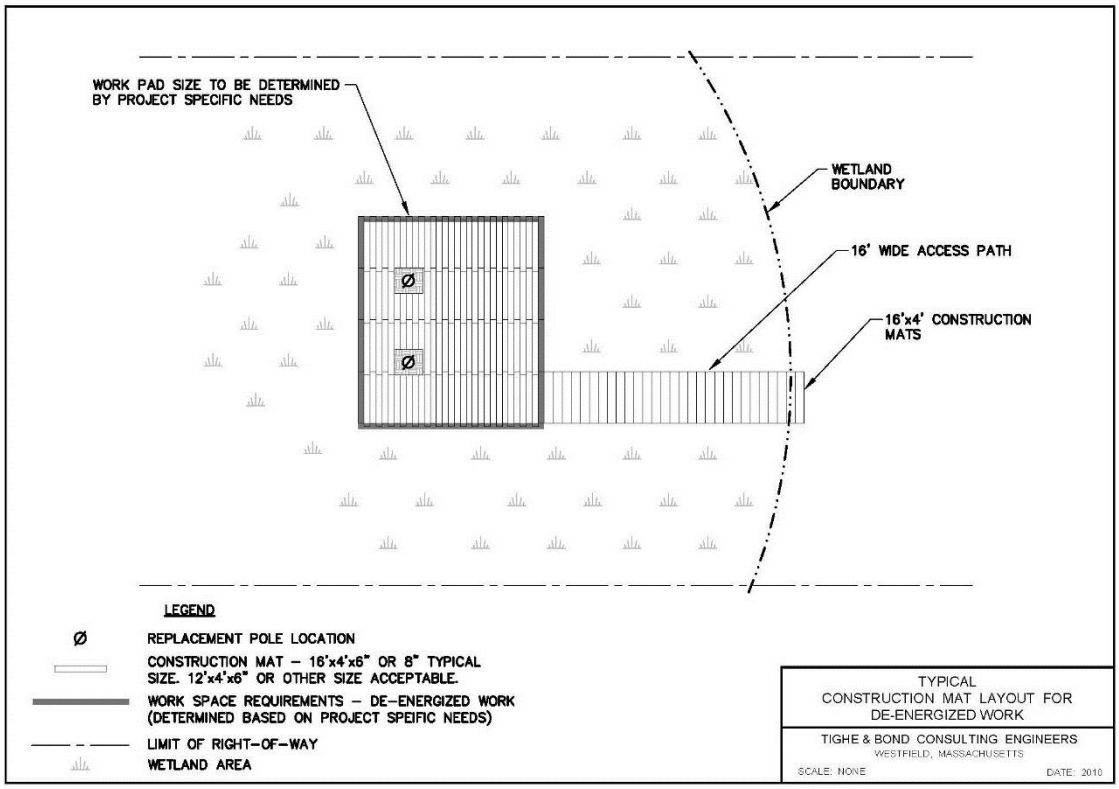
3.7.1.1 Best Management Practices – Work Pads

De-energized work requires small workpad areas, while live line work (i.e., work that is done while the line is energized) requires a much larger workpad areas.

De-energized construction mat workpads – Tab 4A

Energized construction mat workpads – Tab 4B

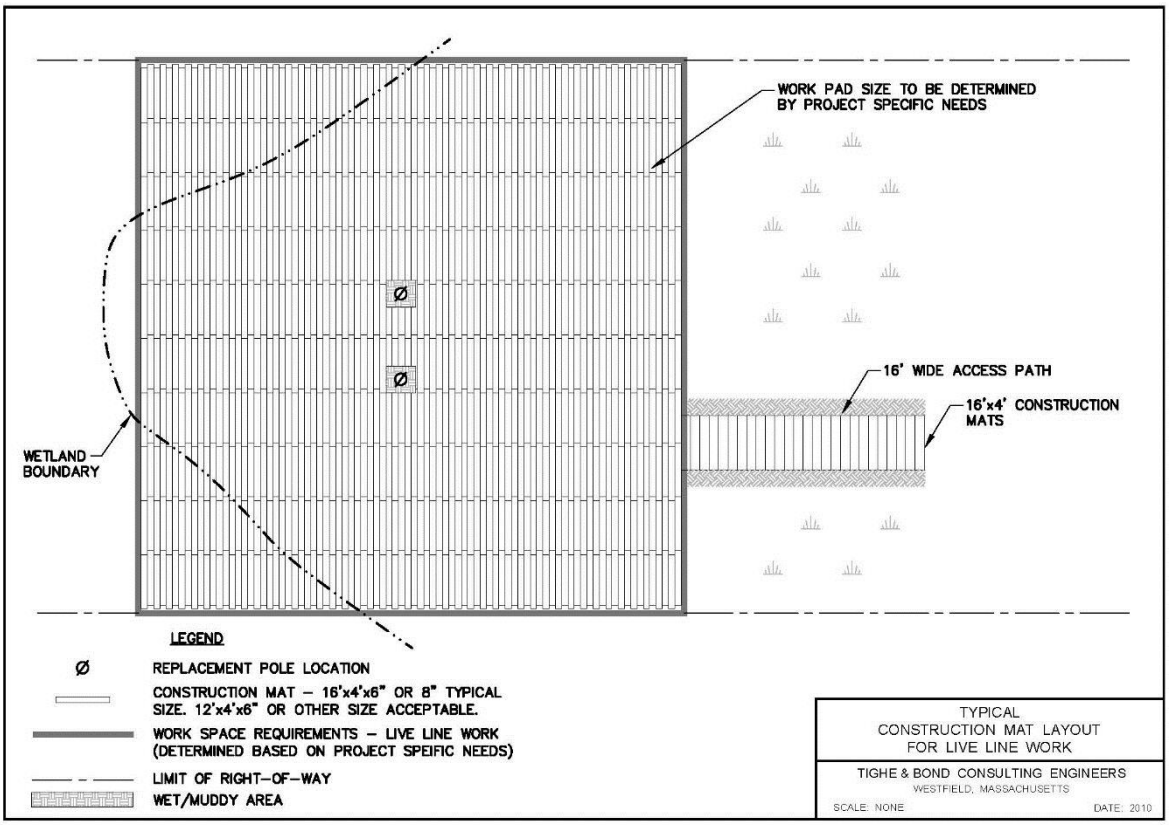
TAB 4A





Construction mat wetland work-pad for de-energized work.

TAB 4B





Construction mat wetland workpad for live line work.

3.8 Structure-Related Work

3.8.1 Wetland

Structure-related activities that may occur in wetlands include structure replacement/ installation (including casing installation), guy wire anchor installation, counterpoise installation, and pole butt removal. Access to these areas and completion of the activities can cause disturbance to wetland vegetation and soils. Therefore, structure-related activities in wetlands should entail use of adequately sized work-pads and proper dewatering methods. Inspection of the construction access and associated dewatering measures should occur daily during construction to ensure that controls are in working order, and repairs to damaged/deteriorating controls are made in a timely matter. Repairs may include regrading the traveled surface to eliminate ruts as well as those repairs required by each erosion and sedimentation measure used.

Structure Replacement/Installation

Structure replacement may require impacts to wetlands to install new poles and their casings. Poles that are significantly damaged must be replaced to comply with engineering and safety standards. Not replacing damaged structures could result in the eventual failure of one or more structures within or adjacent to wetlands.

Replacement structures will often be replaced within a few feet of the original structure to maintain the required distances and line sags between other existing structures. Therefore, options for relocating proposed replacement structures are limited. Pole replacement will also require placement of construction mats in wetlands to provide a safe workpad for the required structure replacement activities. Usually, there are no alternatives to conduct this work from nearby upland areas or to install the replacement structures in upland areas. Each structure replacement area should be assessed to determine the required footprint needed for construction mat workpads. Typical installation is as follows:

- At each pole location, remove wetland topsoil with an excavator and stockpile.
- If a borehole is drilled, collect and dispose of drilling spoils in an upland area.
- A galvanized steel casing is then driven into place at least 12 inches below the ground surface. The new pole is installed within the casing with a crane. The casing is then backfilled with crushed rock and compacted.
- Stockpiled wetland topsoil is placed above the casing to the ground surface. No net fill in wetlands occur, as the original poles are removed.
- Following installation of the new structures, the old structures are removed. Each pole is cut with a chainsaw and allowed to fall to the ground, which in wetland areas is protected by construction mats. Pole butts will remain in place; if removing the pole butt will cause more damage than if left in place.
- Remove the pole and all appurtenant accessories (e.g., cross-arms, insulators) and properly dispose off-site. Remove each pole butt by pulling with an excavator positioned on a construction mat. If it is apparent that pole removal will compromise the integrity of the new pole installation, or that removal will result in additional disturbance to wetland areas, cut off the old pole at least 12 inches below ground level.

Guy Wire Anchor Installation

Guy wire anchors supporting the structures may also require replacing. There are two types of anchors: 1) helical and 2) plate type. The helical anchor is preferred over the plate anchor because the installation of the helical anchor results in less disturbance to the wetland.

- Load test the existing anchor to 15,000 pounds to determine whether it will support the pole structure. In the event the existing anchor cannot be re-used, remove it and install a new anchor.
- Screw in place a special triple helix ("screw type") anchor with 1 ½-inch square rods with an anchor installation rig operated from the matting area. Add rod sections in five foot increments as needed until proper holding capacity of the anchor is achieved.
- Helical anchors are turned into the ground with only the rods protruding. Disturbance to the wetland from the helical anchor is minimal.
- Plate anchors are used in wetlands when proper holding cannot be achieved with screw anchors. To install a plate anchor, a pit is excavated to a sufficient depth and if necessary a concrete footing would be installed several feet below surface grade.
- When excavating to install plate anchors, segregate the top 12 inches of wetland topsoil from the underlying material. When the plate anchor has been set, backfill the excavation with underlying material. Then following the backfilling of underlying material return the segregated topsoil to the surface of the excavation.

Counterpoise Installation/Grounding

To install grounding equipment in wetlands, use hand digging or minimally invasive methods to dig around the structure and restore soil to previous grades. In some cases, grounding rods can be driven directly into the ground with hand tools. Where work is occurring in the vicinity of wetland areas, sedimentation and erosion controls will be used to limit disturbance to wetlands.

Underground facility repair/replacement

Underground facilities such as cables and conduits may be present beneath wetland areas. In the event underground facilities require repair, BMPs are required for both access and construction. Construction mats are used for access where warranted, and sedimentation and erosion controls are used to isolate the work area. During excavation activities, excavate wetland topsoil and store separately from subsurface soils. Dewatering is often required during excavation and repair activities.

An alternative to repairing a subsurface line by excavation would be to install a new line via trenching or horizontal directional drilling. The decision to use one of these alternatives is made on a case by case basis. Consult with Environmental Licensing and Permitting to determine if any permits will be needed.

Pole Butt Removal

When transmission poles are decommissioned or otherwise taken out of service, in most cases the entire pole shall be removed. Treated wood pole butts shall be removed completely from the ground and properly disposed at an off-site location. Locations where

the removal of pole butts may cause significant disturbance to wetlands or other sensitive areas will be considered for exception to this practice on a site-by-site basis. The Transmission Line Construction and Maintenance Manager, in consultation with Environmental Licensing and Permitting, will be responsible for determining if a pole butt can be removed if located in a sensitive area.

All pole butt holes must be backfilled and compacted (every 3') with appropriate fill material. Existing material on-site can be reused if it does not include materials that can rot (e.g., vegetation) and cause sink holes.

Disposal

Treated and non-treated wood products owned by the Transmission Group shall be stored in an area(s) designated by the Transmission Line Construction/Contract Field Services Supervisor until collected by an approved disposal vendor.

3.9 Gas Piping-Related Work

Gas piping-related activities will typically occur within roadways or along roadway shoulders. There may be some instances where wetland permitting is required when wetlands are located adjacent to or in the vicinity of roadways. However, when work is performed within the roadway/shoulder, no permitting is typically required. In all cases, BMPs should be followed to ensure environmental compliance.

Roadways and Shoulders

When working in roadways, particularly in residential areas, the following activities should be performed in addition to standard construction BMPs:

- Repave disturbed paved areas and return to original elevations on the same day that construction is performed.
- Restore all non-paved areas to preexisting or better conditions. Replace any sod or other plantings in kind or with an acceptable alternative.
- Employ dust control as necessary to minimize airborne dust.

Under certain circumstances, gas piping must be installed beneath existing culverts within roadways. Take care to ensure that any saturated material excavated from the trench be properly stored and disposed as to not cause sedimentation issues. Implement dewatering methodologies, as required.

There may be cases where a drainage ditch or swale must be crossed to gain construction access from paved roads onto ROWs along the roadway shoulder. Install construction mats, mat bridges, or temporary culverts, as necessary, to facilitate access. Culverts should be for temporary use, sized for peak flow, and removed after construction is complete. Consult with Environmental Licensing and Permitting prior to installation.

Bridges and Culverts

Attachment of gas piping to bridges or culverts is the environmentally preferable method for crossing a wetland or watercourse. Consult with the appropriate people (engineers,

the Department of Transportation (DOT), etc.) to determine if attachment to a bridge or culvert is a technically feasible option at the desired crossing location. Environmental Licensing and Permitting should also evaluate the impacts to FEMA flood storage quantities and potential Coast Guard permitting requirements. Ensure that proper erosion and sedimentation controls are in place on either side of the bridge or culvert throughout construction.

Rivers and Streams

There are two primary approaches for crossing a river or stream with a gas pipeline: direct bury (open trenching) and trenchless methods (e.g., horizontal directional drilling, standard bore/pipe jacking).

Direct bury methods involve erecting a coffer dam to isolate the work area and redirecting water flow using gravity or pumping to move water from one side of the work area to the other. Direct bury methods have larger direct environmental impacts than trenchless methods. Typical coffer dam examples are included in Appendix A.

Trenchless methods use specialized equipment to install piping beneath a waterbody (or a major roadway, railroad, etc.). The most common method used for gas piping is horizontal directional drilling (HDD) which uses remote controlled, steerable drilling equipment to install pipe along a long arc alignment. The drilling process can be divided into three steps: pilot, reaming, and pull-in. The first step is to drill a pilot bore-hole. Next, a larger diameter fly cutter is used to enlarge the opening. A specialized bentonite slurry drilling fluid is injected into the bore-hole to stabilize the surrounding soil and to lubricate and cool the drill bit. For the final step, a barrel reamer is used to further enlarge the bore-hole and to pull the pipe into place.

A notable environmental concern with HDD is called "frac-out." This occurs when drilling fluid breaks through the soil surface and into the waterbody. Regulatory agencies may require a "frac-out plan" which details preventative controls and response measures should frac-out occur. A typical frac out plan is included in Appendix D.

3.10 Construction Material along the Right of Way (ROW)

Once a site is prepared by clearing and/or installing erosion and sediment controls, materials may be stored along the ROW prior to the start of construction. Such materials may include the following: piping, poles, cross-arms, cable, insulators, stone, and other engineered backfill materials. In general, the stockpiling of stone and other unconsolidated material on construction mats should be avoided. If it is determined necessary due to access and workpad constraints, the material should be placed on a geotextile fabric and be properly contained with a sedimentation barrier such as straw wattle or hay bales. No construction materials should be placed in wetlands or other sensitive resource areas.

3.11 Winter Construction

3.11.1 Snow Management

Snow should not be stockpiled or disposed in any waterbody or near water supply sources. These include wetlands, rivers/streams, the ocean, reservoirs, ponds, stormwater catch basins, wellhead protection area, in high or medium yield aquifer, or within 200 feet of a

private well. In addition to water quality impacts and flooding, snow disposed in surface water can cause navigational hazards when it freezes into ice blocks. Maintain a minimum buffer of 25 feet between any snow disposal area and the high water mark of any surface water. A silt fence or equivalent barrier should be installed between the snow storage area and the high water mark of rivers, streams, ponds, or the ocean. Consult with Environmental L&P regarding any specific state and local snow management requirements.

Avoid disposing of snow on top of storm drain catch basins or in storm water drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system and cause localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water and could also result in fines or a violation.

All debris in a snow storage area should be cleared from the site and properly disposed of no later than May 15th of each year. Care shall be taken not to plow road materials away when removing snow.

3.11.2 De-Icing

Where permitted, calcium chloride is the preferred de-icing agent when applied according to manufacturer's guidelines in upland areas. Sand should be used on construction mats through wetland areas. Consult with Environmental Licensing and Permitting on de-icing agents when working in a facility or substation near resource areas. Many municipalities have specific de-icing agent requirements for work within 100 feet of wetland resources and other sensitive areas.

3.11.3 Snow and Ice Management on Construction Mats

Promptly and properly remove snow from construction mats to avoid ice formation. Remove snow from construction mats before applying sand to avoid forming ice. A round street sweeping brush mounted on the front of a truck may be an effective way to remove snow from construction mats. Propane heaters may also be suitable solutions for snow removal and/or de-icing of construction mats. Sand should be collected from the construction mats and disposed of in an upland area prior to removing construction mats from wetlands. Once construction mats are removed, wetlands shall be inspected for sand buildup that may have fallen through construction mats.

3.12 Dust Control

Dust control measures are used to reduce surface and air movement of dust from exposed soil surfaces during land disturbance, demolition, and construction activities. These practices reduce the amount of dust in the air and decrease the potential for accidents, respiratory problems, and airborne sedimentation. Construction activities should be scheduled appropriately to minimize the amount of site surface exposed at one time in order to reduce the amount of areas requiring dust control. Use dust control measures on disturbed soil surfaces and exposed soil surfaces, especially during hot or dry weather periods and in areas with excessively well-drained soils. Repetitive treatments should be used as needed, or required by permits, and until the surface is permanently stabilized.

Type	Description/Use
Vegetative Cover	• Most effective and practical method. • Use in disturbed areas not subject to traffic. • Follow seeding requirements as directed by local guidelines or permit requirements.
Stone	• Cover soil surface with crushed stone/coarse gravel.
Water/Sprinkling	• Sprinkle exposed soils until wet (Water trucks may be used depending on size of the site). • Do not excessively wet the soil as this causes run-off and also wastes water.
Barriers	• Board fences, wind fences, and sediment fences control air currents and blowing soil. • Wind barriers protect soil downgradient for a distance of ten times the barrier height. • Perennial grasses and stands of existing trees also serve as wind barriers, stressing the importance of planning work phasing properly and minimizing the amount of exposed soil.
Plastic Covering	• Cover soil piles with sheets of plastic/tarp to minimize dust.
Calcium Chloride	• Loose, dry granules of calcium chloride may be applied with a mechanical spreader. • Apply at a rate that keeps the surface moist but not high enough to cause water pollution or plant damage. This method should be done under consultation with an expert in order to maintain this balance and to determine if the site is applicable.

3.13 Soil Stockpile Management

Some projects may involve excavation and stockpiling of soil. Stockpiles should be located outside sensitive areas to the extent practicable and managed to prevent erosion and sedimentation of adjacent areas. Typical measures include the installation of protective measures (e.g., siltation fence and/or hay bales) around the perimeter of the stockpile. The stockpile must be seeded if left in place for more than 30 days. No snow or soil piles, construction materials, or equipment should be stored in the immediate vicinity at the top of a terrace escarpment slope.

When polluted/contaminated soil is encountered, it must be handled in accordance with the appropriate regulatory requirements. In addition to the measures discussed above, contaminated soils should be stockpiled on and covered by polyethylene sheeting. Sheeting used to cover the stockpile should be weighted down to prevent the wind migration of contaminated dust.

For soil stockpiles in substations, contact Environmental Licensing and Permitting. If soil/water must be stored and/or disposed, comply with existing soil and groundwater management guidelines. Coordinate with the Environmental Affairs Department (EAD) to ensure appropriate procedures are followed.

3.13.1 Best Management Practices – Soil Stockpile Management

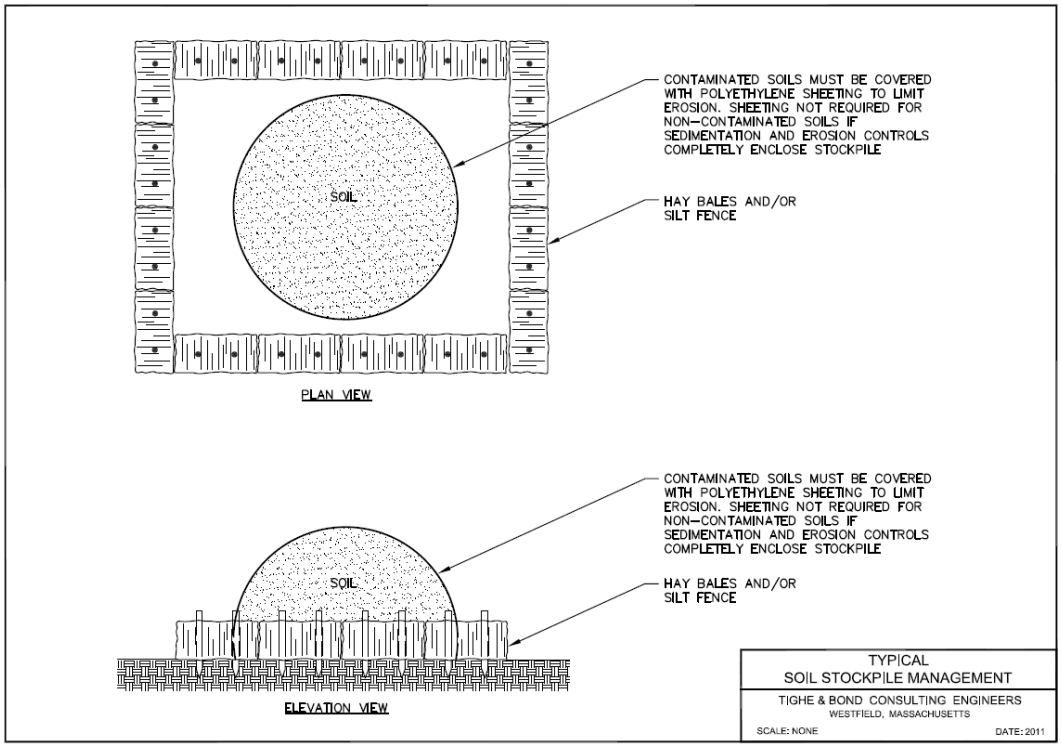
The following BMP is applicable to soil stockpile management and is described at the following tab:

Soil Stockpile Management – Tab 5A

TAB 5A



Soil stockpile management.



Section 4
Inspection and Maintenance

A pre-construction meeting will be held to discuss how often and who will be checking that all erosion and sedimentation controls are in working order. All BMPs will be inspected at least once per week during construction and at least once per month during restoration. Construction sites will be inspected after major storm events (rainfall events greater than 0.25 inches).

4.1 During Construction

Construction sites, construction access roads, and the associated erosion and sedimentation controls should be inspected by the person(s) designated at the pre-construction meeting, as required by permit conditions. Any damage observed must be repaired in a timely matter, at least within 48 hours of observation. Repairs may include regrading and/or top dressing the surface with additional aggregate to eliminate ruts as well as those repairs required by each erosion and sedimentation measure used.

All inspections will be documented in the project folder.

4.1.1 Maintenance of E&S Controls

Spare erosion and sedimentation control materials such as straw wattles, hay/straw bales and silt fencing should be kept on site or readily available so they may be replaced if they become non-functional due to deterioration or damaged during a storm, extreme water or wind, or other unexpected events.

4.1.2 Rapid Wetland Response Restoration

In the event of unintended discharges of sediment into wetlands, Eversource will quickly control, contain and remove sediment using non- or marginally invasive methods. Responding quickly to unintended discharges minimizes the difficulty and cost of restoration if the sediment is left in place for an extended period of time. Eversource will conduct sediment removal activities at the time of discharge and will notify the appropriate regulators of the discharge and the restoration process.

4.1.3 Vehicle Storage

All storage and refueling of vehicles and other equipment must occur outside of and as far away as practical from sensitive areas such as wetlands, unless specifically agreed by the Project Team and an alternate protocol is developed and approved internally. Refueling for larger, less mobile equipment such as drill rigs or large cranes, may be allowed within wetland resources only with prior approval and if specified precautions and protocols are followed. A proper location for refueling should be identified and designated before site work begins. The recommended minimum distance from wetland areas for storage of fuel and refueling is 100 feet. Additionally, equipment should be checked regularly for evidence of leaks. Construction material storage should also be located at least 100 feet from wetlands.

4.1.4 Spills

Spill kits consist of emergency cleanup and spill containment materials that can be used in the event of a fuel or other chemical spill. Spill kits must be kept on site and accessible at all times in case of an emergency spill. Such kits should generally contain multiple absorbent socks and/or pillows and wipes and temporary disposal bags. Follow the applicable Eversource Contractor Work Rules.

4.1.5 Post Construction

Post-construction inspections of restored areas will be conducted at regular intervals throughout the growing season, as required by any applicable permits, and/or after major storm events. Sites should be inspected for success or failure of revegetation, invasive species colonization, and erosion and sedimentation. In the event additional measures are required to achieve site restoration and stabilization, corrective actions shall be identified and implemented.

All information collected during inspections, regular maintenance, and repair procedures should be documented in project folders. In addition, photographic or diagrammatic logs may be kept to help record certain events and for documentation of project progress and any noteworthy observations.

The construction work is not complete until all areas are restored.

Section 5
Rehabilitation and Restoration

5.1 Restoration

All areas disturbed by construction, repair, and maintenance activities shall be substantially restored to pre-construction conditions. Please refer to Appendix A Section I for photos and typicals for loaming, seeding, and mulching. Prompt restoration minimizes the extent and duration of soil exposure and protects disturbed areas from stormwater runoff. Stabilization should be conducted as soon as practicable. Where appropriate, it is preferable to allow wetlands to naturally revegetate.

5.1.1 Seed Mixes

Several different seed mixes are available for upland and wetland restoration. State-specific comprehensive summaries of seed mixes for both temporary and permanent seeding of disturbed sites can be found within the following documents:

- Massachusetts: Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, page 157: http://www.mass.gov/eea/docs/dep/water/essec1.pdf

- Connecticut: 2002 Connecticut Guidelines for Soil and Erosion Sediment Control, page 5-3-8: http://www.ct.gov/deep/cwp/view.asp?A=2720&Q=325660

Upland Seed Mix: If significant grading or upland alteration has occurred, annual rye grass seed shall be placed following manufacturer's recommendations after regrading activities.

Wetland Seed Mix: If significant grading or wetland alteration has occurred, a wetland seed mix shall be placed following manufacture's recommendations after regrading activities.

5.1.2 Upland

The following restoration techniques apply to restoration projects in upland areas.

- Soil excavated during construction and not used as backfill must be evenly spread onto disturbed areas to restore grades. Topsoil shall be stripped and separated to the extent practical, for re-use. Permanent soil protection shall be provided for all areas disturbed by construction activities. All areas will be seeded either by Hydro-seeding or broadcast seeding. If areas cannot be seeded due to the time of year, then mulch (hay or straw) is still required prior to the next precipitation event.
- Topsoil removed during construction activities will be replaced, seeded, and mulched.
- All areas that are broadcast seeded shall be treated with a layer of mulch, such as hay, but preferably straw, up to one inch thick to enhance moisture retention, dissipate disturbance from precipitation, and detract birds foraging on broadcast seed.

- Rehabilitation of access routes and other areas must be performed as soon as practicable after construction is completed, including reestablishment of water bars or other BMPs to control erosion of the access road, and the removal and restoration of temporary wetland or waterway crossings.
    - Temporary breaks in construction activities may warrant seeding and mulching of disturbed areas as interim erosion control measures.
- Erosion control measures shall remain in place until soils are clearly stabilized. Once soils are stable, erosion controls – especially silt fence, which presents an obstacle to movement of small animals shall be removed and properly disposed. Stakes should be removed from hay bales and spread as mulch to remove barriers to wildlife movement.
- Straw is preferred over hay to prevent the spread of invasive plant species seed stock.
- If a grading operation at a site shall be suspended for a period of more than 29 consecutive days, the disturbed area shall be stabilized by seeding, mulching, and/or other appropriate means within the first 7 days of the suspension of grading.
- Within 7 days after a final grade is established in any grading operation the disturbed area shall be stabilized by seeding, loaming, and/or other appropriate means.

5.1.3 Wetland/Watercourses

Regrading of Ruts: Upon removal of construction mats, or other BMPs, the wetland resource area should be inspected for rutting or disturbance from eroded upland soils. Any rutting should be regraded to pre-existing contours and upland soils removed from wetland areas while taking care not to compact soils.

The following restoration techniques apply to restoration project in wetlands:

Maintenance, Repair, and Emergency Projects (When No Permit is Required)

- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils.
- Soils excavated from wetland areas shall be segregated and stockpiled separately (i.e., topsoil/muck apart from mineral subsoil) in a dry/upland area at least 100 feet from wetland boundaries unless other provisions have been made to facilitate restoration activities.
- Excavated wetland soils that have been stockpiled during underground utility installations within wetlands shall be replaced in the same order (i.e., mineral subsoil beneath organic topsoil/muck) to the extent practicable and restored to pre-disturbance grades.
    - Grading activities should include the elimination of ruts within the area to be restored.
- If replacement of soil associated with temporary wetland or watercourse crossings for access roads is necessary, disturbed areas must be restored to pre- disturbance grades, either seeded and mulched, or allowed to revegetate from the natural seed bank.

- Disturbed wetland areas shall generally be allowed to revegetate from the natural seed bank. Measures to discourage the establishment or spread of plant species identified as non-native, invasive species by federal or state agencies shall be utilized. Environmental Licensing and Permitting can evaluate whether to let the wetland vegetate naturally.
- Any restoration plantings or seed mixes used in restoration shall consist of species native to the project area and, if feasible, from local nursery stock.
- Any stream banks and beds damaged shall be restored through use of geotextile erosion control blankets, and/or coir logs.
- All seeded areas shall be treated with a layer of mulch (i.e., hay, but preferably straw) up to one inch thick to enhance moisture retention, dissipate disturbance from precipitation, and detract songbirds foraging on broadcast seed.

5.2 Private Property

5.2.1 Improved Areas

Access to and along the ROW over private property must be improved to the extent necessary to ensure suitable passage for construction equipment, provide erosion control, and maintain proper drainage. Upon completion of construction activities, altered yards, lawns, agricultural areas, and other improved areas must be restored to a condition equal to or better than before their use for the construction project. If access is over a property off the transmission easement, then it is the responsibility of a construction representative to determine if legal access rights are available to cross the property.

5.2.2 Overall Work Site

Construction personnel should remove all work-related trailers, buildings, rubbish, waste soil, temporary structures, and unused materials upon satisfactory completion of work. All areas should be left clean, without any litter or equipment (wire, pole butts, anchors, insulators, cross-arms, cardboard, coffee cups, water bottles, etc.) and restored to a stable condition and close to the original condition. Debris and spent equipment should be returned to the operating facility or contractor staging area for disposal or recycling as appropriate.

5.2.3 Material Storage/Staging and Parking Areas

Upon completion of all work, all material storage yards, staging areas, and parking areas shall be completely cleared of all waste and debris. Unless otherwise directed or unless other arrangements have been made with an off ROW or off-property owner, material storage yards and staging areas shall be returned to the condition that existed prior to the installation of the material storage yard or staging area. Regardless of arrangements made with a landowner, all areas shall be restored to their pre-construction condition or better. Also any temporary structures erected by the construction personnel, including fences, shall be removed by the construction personnel and the area restored as near as possible to its original condition, including seeding and mulching as needed.

5.3 Work in Agricultural Lands

Transmission lines often cross agricultural lands. In some instances, this may affect ongoing agricultural activities in and around the ROWs. If a construction or maintenance project occurs on agricultural lands, Eversource will work closely with landowners, licensees and stakeholders to minimize agricultural impacts. Whenever practical, Eversource will make reasonable efforts to coordinate the schedule of construction-related activities around the growing and harvest seasons to minimize the impacts on agricultural operations. When this is not practical, Eversource will pursue reasonable measures to mitigate any impacts.

Eversource recognizes that disturbed soils, or soils compacted by heavy construction equipment, may affect the soil's ability to support certain agricultural activities. Eversource will take reasonable steps to avoid or minimize soil compaction, and will restore soils that are compacted by construction equipment. Eversource will also work with affected landowners to determine the appropriate method for restoring the soils, and is open to discussing and implementing the landowners' alternative restoration suggestions. After the transmission improvement is complete, Eversource will remove all construction-related equipment and debris from the ROW.



Tighe&Bond

APPENDIX A

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Introduction

Adequate erosion and sedimentation control management measures shall be installed and properly maintained to reduce erosion and retain sediment on site during and after construction. These devices shall be capable of preventing erosion, collecting sediment (suspended and floating materials) and filtering fine sediment. Sediments collected by these devices shall be removed and placed in an upland location beyond buffer zones/upland review areas and any other regulatory setbacks preventing later migration into a waterway or wetland. Once work has been completed, all areas shall be stabilized with erosion control blankets and/or robust vegetation and erosion control devices shall then be removed. Erosion and sedimentation controls are provided in Section I of this Appendix. Note that stormwater management is an important part of erosion and sedimentation control. Accordingly, temporary stormwater management measures are outlined in Section II of this Appendix. Please refer to the below table for a complete list of BMP typicals and photos provided in this appendix.

Appendix A

Section I

Section 1
Erosion and Sedimentation Controls

1.1 Preservation of Existing Vegetation

Applications: Erosion and sedimentation control, habitat and aesthetic preservation, reduce landscaping and restoration costs

Limitations:

- Access needs on ROWs.
- Required distances between underground utilities and mature trees.

Overview:

Examine the area to identify vegetation (i.e., groundcovers, vines, shrubs, trees) that may be saved. Focus on preserving vegetation on steep slopes, near drainage ways, and/or drainage swales in order to help increase soil stability and decrease runoff volume and velocity. Use construction phasing to preserve vegetation in areas where activities are not scheduled to occur or will occur at a later time.

Identify and protect specified trees for erosion and sediment control benefits and/or aesthetic purposes. Consider saving trees that provide shading or screening benefits, particularly in residential areas.

Installation:

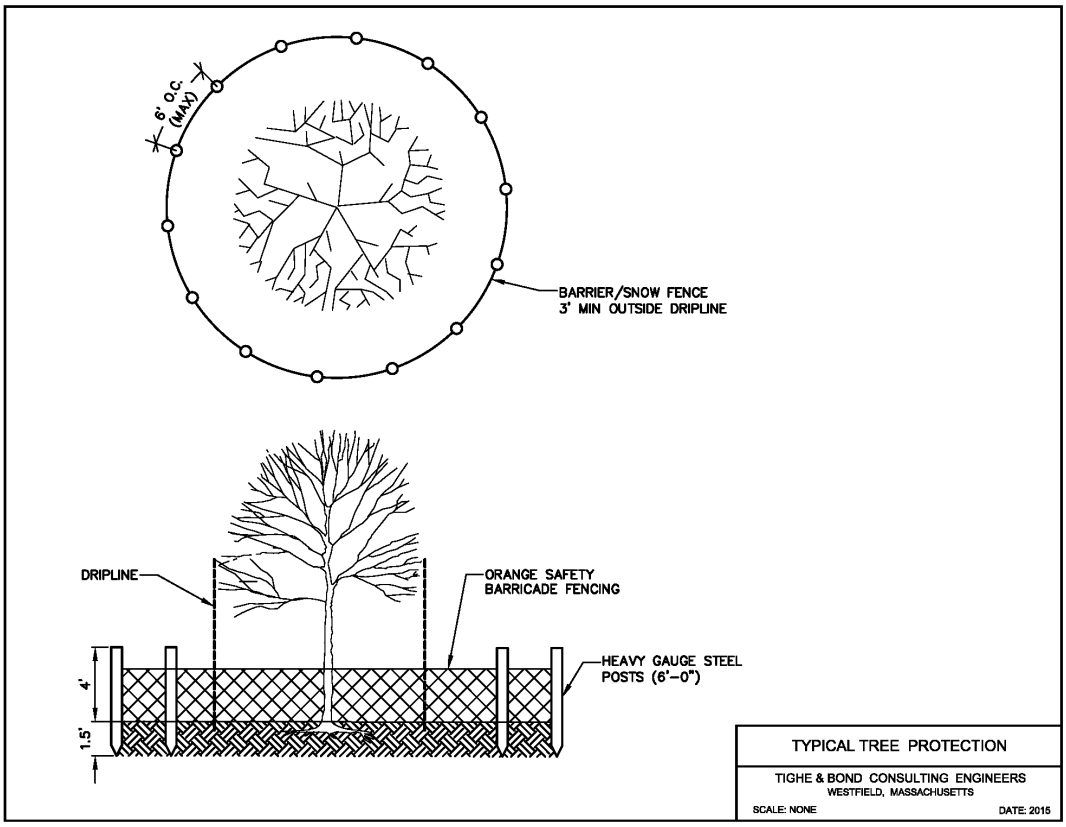
- Select healthy, relatively young trees (less than 40 years old) and vegetation that will not interfere with the installation or maintenance of utilities. Pay attention to the aesthetics of trees along roadways and preserve wherever practicable.
- Place barriers around trees least three feet from the drip line or five feet from the trunk (whichever is greater) using wooden and wire fencing made from scrap lumber or snow fencing. If fencing is not feasible, mark the selected trees with bright flagging.
- Construct the barrier (or place the flags) before heavy equipment arrives to the site and leave in place until the last piece of machinery is gone.
- Dig trenches as far from the trunks and outside of the canopy drip line as practicable. If large roots are encountered, consider trenching under them.
- The width of the ROW will vary depending on the corridor's designated use. Federal guidelines suggest that 15 feet on either side of a buried pipeline should remain clear of mature trees.

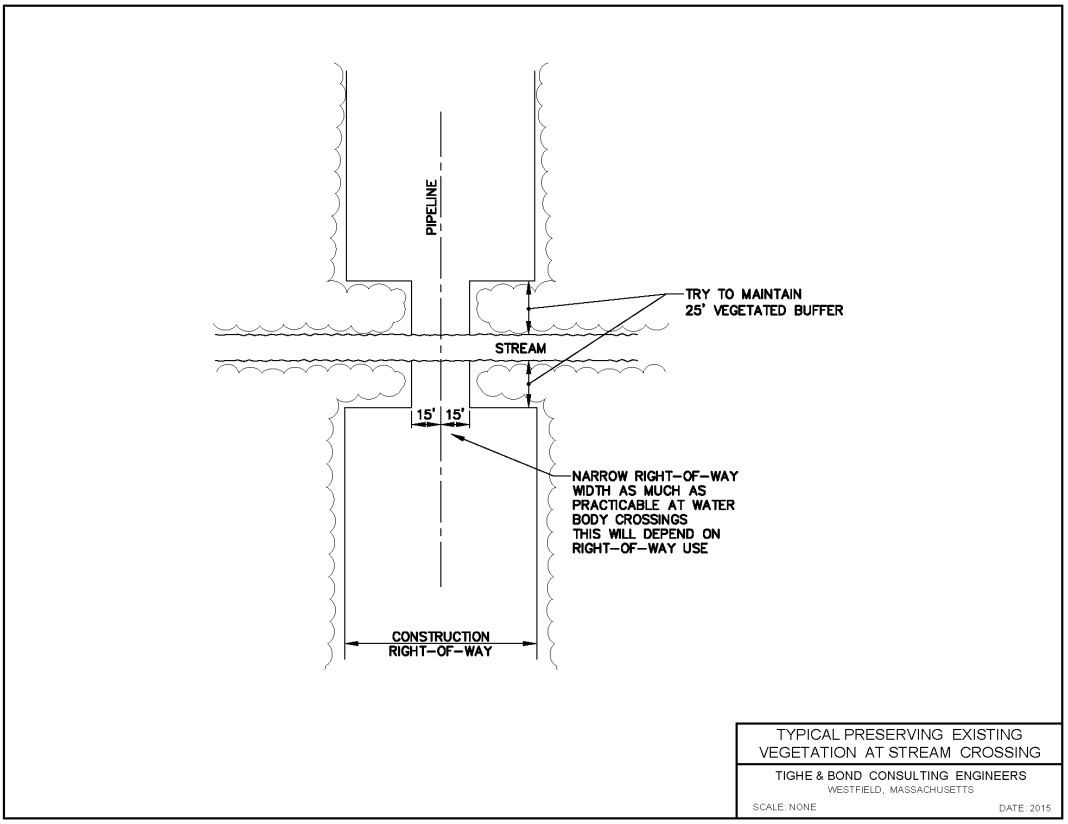
Maintenance:

- Inspect flagged and/or barricaded areas throughout construction. Replace flagging and repair/replace barriers as needed.
- Inspect exposed tree roots. Re-cover or re-seal roots that have been exposed and/or injured by construction activity.

Additional Comments:

When approaching a stream crossing, limit the amount of clearing of the existing stream bank and riparian vegetation to only the areas essential for construction and maintenance. Maintain a 25-foot wide vegetated buffer between the stream bank and the cleared ROW, except in locations where the line is directly installed.




PIPELINE
TRY TO MAINTAIN
25' VEGETATED BUFFER
STREAM
15'
15'
NARROW RIGHT-OF-WAY
WIDTH AS MUCH AS
PRACTICABLE AT WATER
BODY CROSSINGS
THIS WILL DEPEND ON
RIGHT-OF-WAY USE
CONSTRUCTION
RIGHT-OF-WAY
TYPICAL PRESERVING EXISTING
VEGETATION AT STREAM CROSSING
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015

1.2 Topsoil Segregation for Work in Wetlands and Agricultural Areas

Applications: During excavation in wetlands and agricultural areas

Limitations:

- May be site-specific limitations; otherwise none.

Overview:

The top 12 inches of soil are the most important for providing nutrients and a suitable growth medium to the existing vegetative cover in an area, as well as containing the root stock and seed bank of the plant community. Topsoil segregation is recommended for the first 12 inches of soil in all wetlands and agricultural land, but is also a good practice in any area, including uplands in order to provide a suitable growth medium and more rapid revegetation and restoration of the original plant species.

When digging a trench for installation or maintenance of a pipeline or conduit, or excavating for the installation or replacement of the base of a utility pole, it is good practice to segregate the first 12 inches of topsoil and stockpile it separately from the subsoil until the layers can replaced into the excavation in the proper order. In some cases, it may be necessary to strip topsoil off the areas where the subsoil will be stockpiled as well. Additional topsoil can also be brought into an upland or residential area if necessary where the existing soil is too shallow to provide adequate rooting depth, moisture and nutrients, or too much topsoil was lost during construction.

Installation:

- Set up proper erosion control (i.e., hay bales, silt fence) around the work area before beginning any excavation near wetland areas.
- Identify the stockpile locations near the trench or excavation.
- Locate stockpiles from active work areas to the extent practicable.
- Remove the top 12 inches of topsoil from the trench or excavation. If less than 12 inches are available, remove the entire layer of soil.
- Place the topsoil in a separate stockpile than the layers of excavated subsoil.
- Place additional lines of erosion control around the stockpiles to control sedimentation, if necessary.
- Side slopes of soil stockpiles should not exceed 2:1.
- Stabilize stockpiles with temporary seeding or plastic covering if they will remain exposed for more than 21 days.
- Backfill the trench with the proper soil layers, subsoil followed by topsoil, when work activities are completed. Backfilling should take place immediately after activities are completed, and grading and site stabilization should take place within 10 days following backfilling.

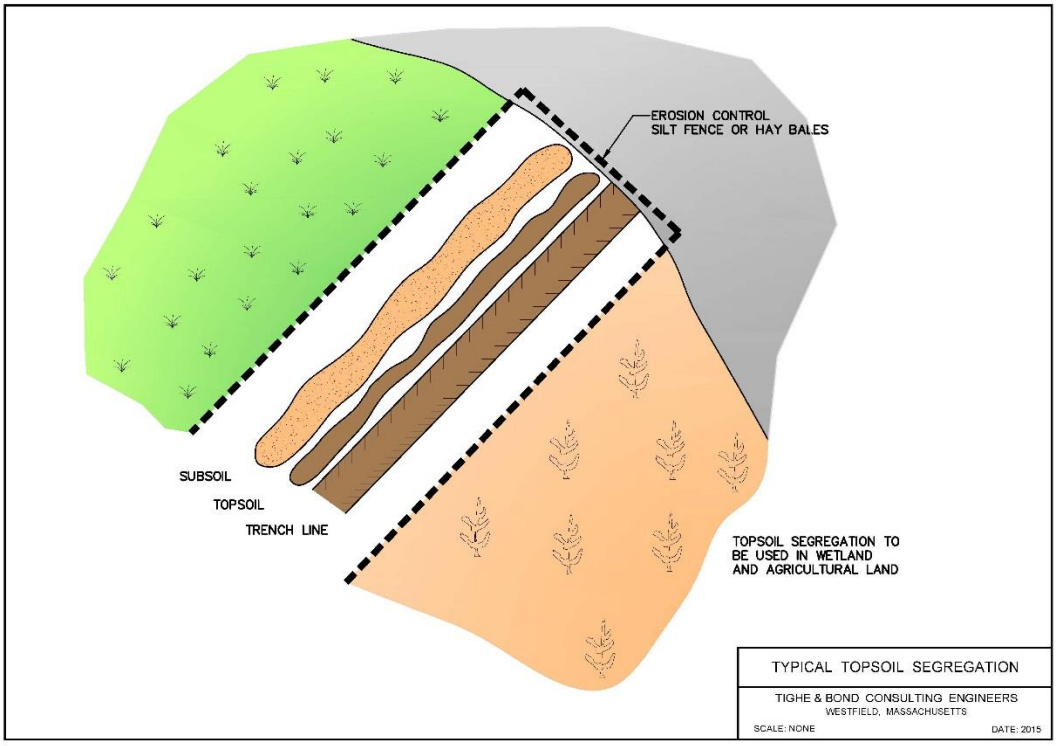
Maintenance:

- Inspect and maintain erosion control on a regular basis and observe the stockpiles for any signs of sedimentation or mixing.
- In residential and agricultural areas, make a reasonable effort to remove all rocks larger than 4 inches in diameter from the topsoil that have been turned up during construction.

Additional Comments:

If the topsoil and subsoil stockpiles are mixing:

- The piles are located too close together. Try placing the separate stockpiles on opposite sides of the trench or work area.
- The topsoil stockpile could also be individually enclosed in hay bales or silt fence. This will help create a barrier, keeping it separate from the subsoil.
- Avoid working with large amounts of trench or excavation open when heavy rains are predicted.
- If polluted/contaminated soil is encountered, handle in accordance with appropriate regulatory requirements. Stockpile contaminated soil on and cover with polyethylene sheeting. Weigh down sheeting covering contaminated soil to prevent the wind migration of contaminated dust.



1.3 Straw (or Hay) Bales

Applications: Erosion and sedimentation control, mulch

Limitations:

- Hay bales degrade quickly.
- Hay bale height can provide an obstacle to movement of smaller wildlife.
- Should not be used as a temporary check dam/ stormwater control within waterways.
- Difficult to install during frozen conditions.
- Generally only effective for 3-6 months (hay) or 6-12 months (straw) before replacement.

Overview:

Hay/straw bales should be placed end-to-end to form a temporary sedimentation control barrier. This barrier should run perpendicular to the slope and direction of runoff, and should be installed downgradient of the disturbed site (i.e., construction area). Hay/straw bales are intended to slow flow velocity and trap sediments to prevent siltation in sensitive areas, specifically downgradient areas with open and/or flowing water. Barriers should be removed once the project is complete and soils are stabilized with erosion control blankets and/or well-established vegetation.

Installation:

- Install hay/straw bales end-to-end lengthwise along the toe of a slope or along a slope contour being sure the bales are butted tightly against each other without gaps between them. The outer ends of the barrier should be turned slightly upslope.
- Entrench to a minimum depth of 4 inches and backfill around the base of the bale. If additional protection is needed, backfill both upslope and downslope to create better ground contact and reduce sediment passage through or beneath hay/straw bales.
- Stake each hay/straw bale into the ground by two stakes each approximately 3 feet long
- If a silt fence is being used with the hay/straw bale barrier, position the silt fence downgradient of the hay/straw bales (hay bales filter first).
- Since hay/straw bales degrade quickly, check barriers often and replace as needed. Routinely remove and dispose of sediment buildup in a stable upland area.
- The hay/straw bale barrier should be as far away from downgradient sensitive areas, and as close to the work areas as construction limitations allow, in order to minimize the total work area and disturb as little area as possible.
- Once the project is complete and soils are stabilized, hay/straw bales should generally be compacted and allowed to decay in place, as their height can provide an obstacle to movement of smaller wildlife. Spreading hay bales around a site as mulch could introduce weed seeds. Using hay/straw as mulch is not generally

problematic if the site is already colonized by invasive species. Plastic bailing twine should be removed from hay/straw bales. Wooden stakes should also be removed.

Maintenance:

- Inspect before a forecasted storm event and daily during a prolonged rain event.
- Remove accumulated sediment and properly disposed outside sensitive areas when it has reached a thickness of ½ to ⅔ the height of the bale.
- Replace rotted or sediment-covered bales when necessary.

Additional Comments:

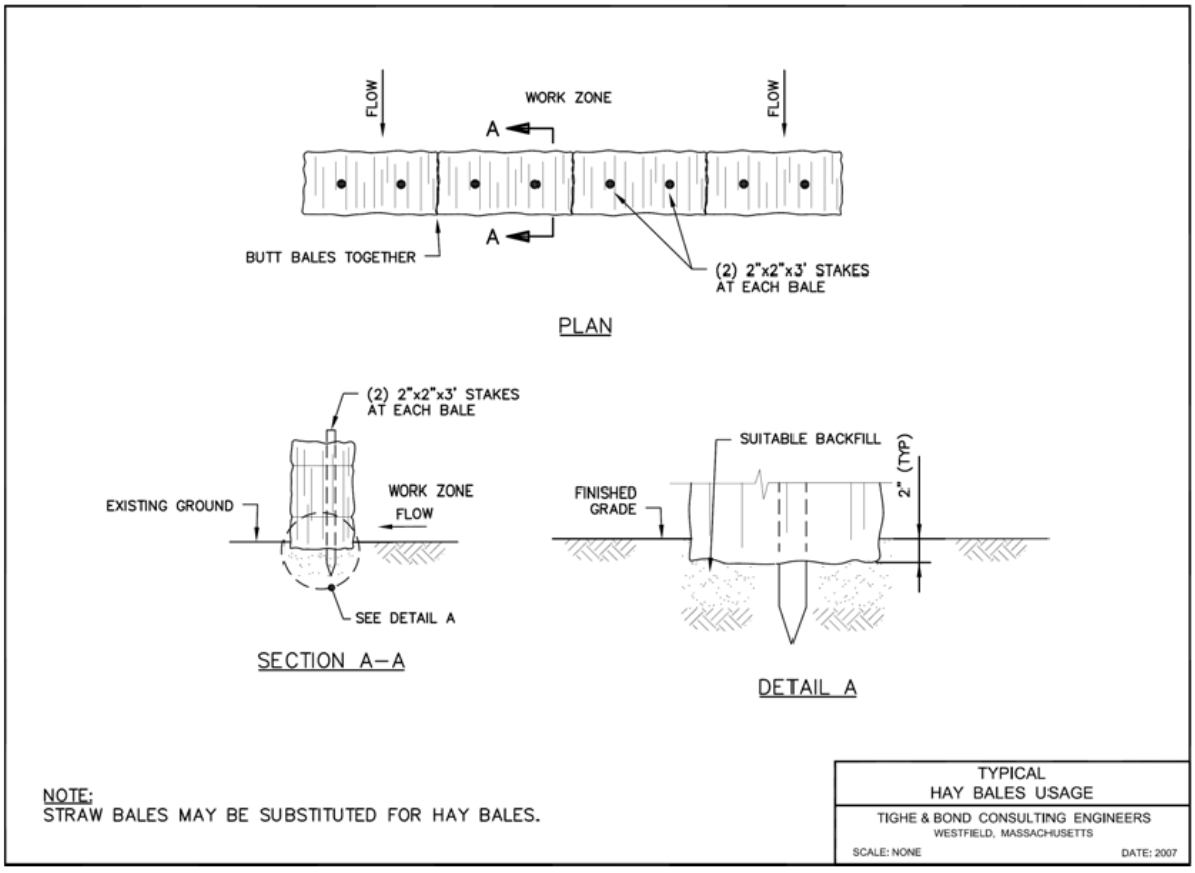
Straw bales are favored over hay bales for use as erosion control barriers. Since straw bales are composed of the dried stalks left over after a grain is harvested, they do not contain the plant's seeds and therefore will not spread growth of such species, some of which may be exotic, invasive or otherwise undesirable. Hay bales are generally less expensive, but consist of the seed heads and the upper, thinner portion of the stems which generally decay faster than straw.



Properly installed hay bale barrier with silt fence.



Properly installed hay bale barrier with silt fence.



1.4 Silt Fence

Applications: Sedimentation control, work limits, temporary animal barrier, slows flow on steep slopes

Limitations:

- Frozen or rocky ground (for installing stakes).
- May prevent critical movements of sensitive wildlife species.
- Disposal.

Overview:

Silt fence is constructed of a permeable geotextile fabric secured by wooden stakes driven into the ground. It is installed as a temporary barrier to prevent sediments from flowing into an unprotected and/or sensitive area from a disturbed site. A silt fence should be installed downgradient of the work area. Once the project is complete and soils are stabilized, silt fence materials (i.e., geotextile fabric and wooden stakes) must be removed and properly disposed off-site (see environmental scientist to determine if area is stabilized).

Installation:

- Install silt fence along the toe of a slope or along a fairly level contour with the outermost ends directed upslope. The fabric should be laid into a 6-inch wide by 6-inch deep trench dug on the upslope side of the fence and tamped down with fill material to ensure a sturdy base and so sediments will not flow beneath the fabric. Use of a Ditch Witch® or similar equipment is suggested for this task.
- Drive the silt fence stakes into the ground until secure (≥6 inches below grade).
- If a hay bale or straw bale barrier is being used with the silt fence, position the silt fence downgradient of the bales.
- The silt fence should be as far away from downgradient sensitive areas, and as close to the work areas as construction limitations allow, in order to disturb as little area as possible.

Maintenance:

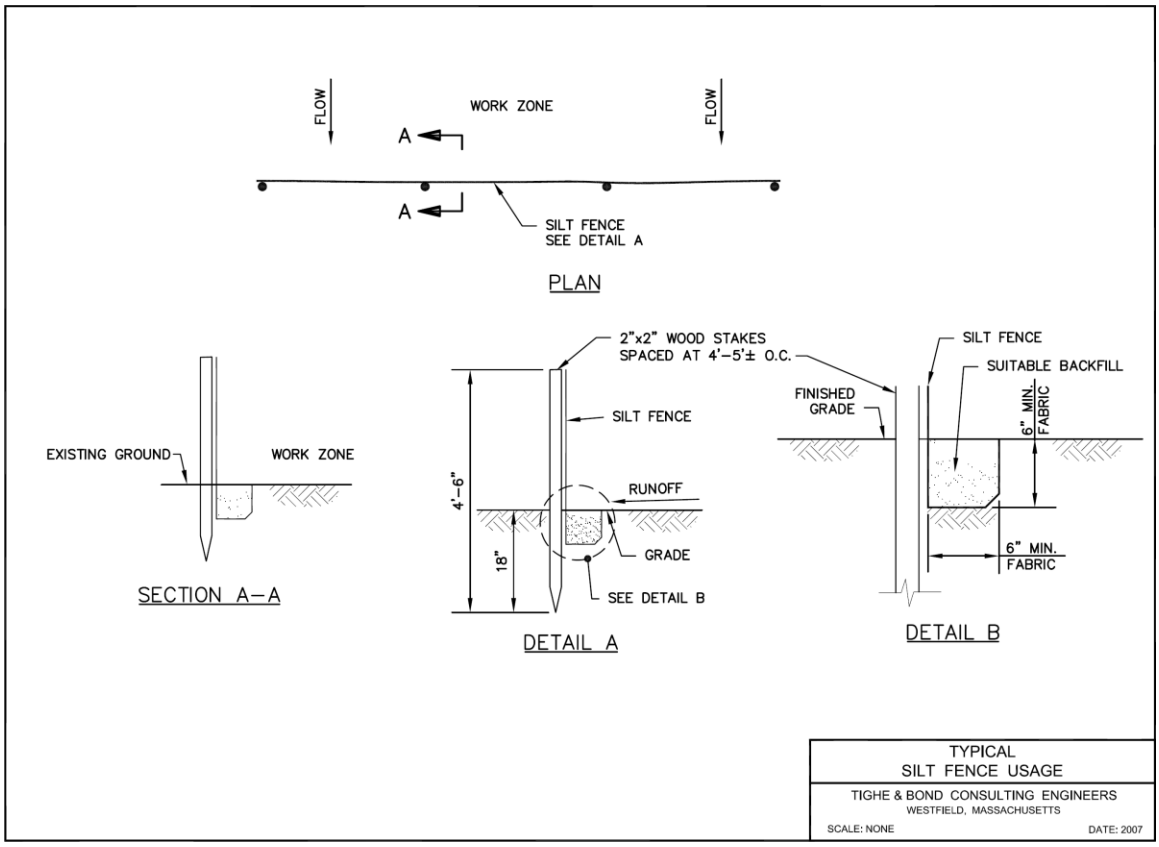
- Inspect frequently and replace or repair as needed, especially during long-term projects.
- Routinely remove and properly dispose of sediment buildup in a stable upland area, outside of sensitive areas. Remove sediment when it has accumulated to a thickness of ½ the height of the silt fence.

Additional Comments:

A silt fence must be installed in an excavated trench and located where shallow pools can form so sediment can settle. The fence must be placed along the contour. If placed otherwise, water may concentrate to a low point and is likely to flow beneath the fence.



Properly installed and functioning silt fence. Direction of flow indicated by blue arrow.


FLOW
WORK ZONE
FLOW
A
A
SILT FENCE
SEE DETAIL A
PLAN
EXISTING GROUND
WORK ZONE
SECTION A–A
2"x2" WOOD STAKES
SPACED AT 4'–5'± O.C.
SILT FENCE
4'–6"
18"
RUNOFF
GRADE
SEE DETAIL B
DETAIL A
SILT FENCE
SUITABLE BACKFILL
FINISHED
GRADE
6" MIN.
FABRIC
6" MIN.
FABRIC
DETAIL B
TYPICAL
SILT FENCE USAGE
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

1.5 Syncopated Silt Fence

Applications: Sedimentation control, work limits, slow flows on steep slopes, and permit wildlife movement.

Limitations:

- Frozen or rocky ground (for installing stakes).
- Complex installation compared to standard silt fence.
- Disposal.

Overview:

Syncopated silt fence refers to silt fence that is installed in a specific layout that permits wildlife movement. Many construction projects continue over at least one wildlife activity season, and silt fence may impede the movement of animals. Syncopated silt fencing is to be installed in areas where silt fencing may impede wildlife access to a resource (i.e., vernal pool, wooded area). These areas will be identified when developing wetland protection measures.

Installation:

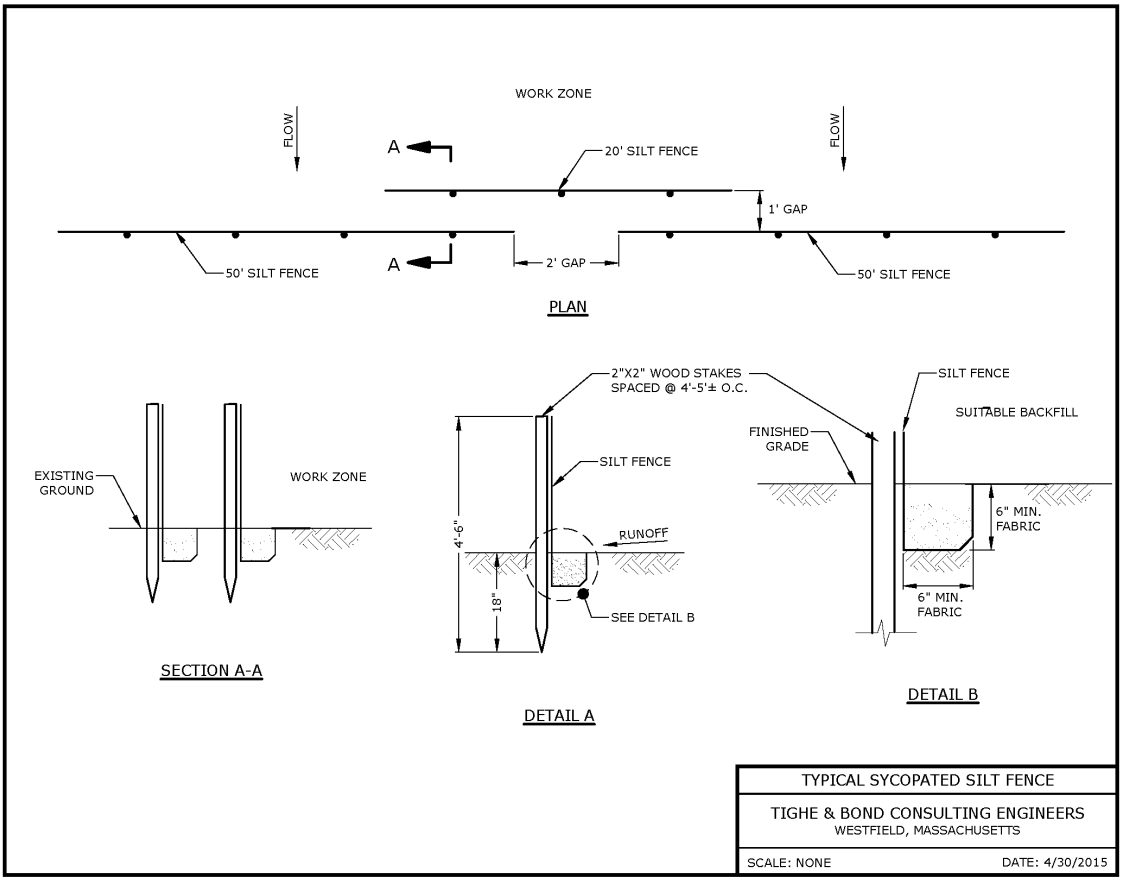
- The syncopated silt fence layout is shown on the typical below. For every 50 feet of siltation fence installed, allow for a gap of two feet before installing the next section. The gap allows wildlife movement One foot behind the main silt fence line, install a second row of silt fence approximately 20 feet in length and centered at the gap.
- Install silt fence along the toe of a slope or along a fairly level contour with the outermost ends directed upslope. The fabric should be laid into a 6-inch wide by 6-inch deep trench dug on the upslope side of the fence and tamped down with fill material to ensure a sturdy base and so sediments will not flow beneath the fabric. Use of a Ditch Witch® or similar equipment is suggested for this task.
- Drive the silt fence stakes into the ground until secure (≥6 inches below grade).
- If a hay bale or straw bale barrier is being used with the silt fence, position the silt fence downgradient of the bales.
- The silt fence should be as far away from downgradient sensitive areas, and as close to the work areas as construction limitations allow, in order to disturb as little area as possible.

Maintenance:

- Inspect frequently and replace or repair as needed, especially during long-term projects.
- Routinely remove and properly dispose of sediment buildup in a stable upland area, outside of sensitive areas. Remove sediment when it has accumulated to a thickness of ½ the height of the silt fence.

Additional Comments:

A silt fence must be installed in an excavated trench and located where shallow pools can form so sediment can settle. The fence must be placed along the contour. If placed otherwise, water may concentrate to a low point and is likely to flow beneath the fence.



1.6 Erosion Control Blankets

Applications: Slope stabilization, erosion and sedimentation control

Limitations:

- Can be used on steep (i.e. greater than 45°) slopes but not on rocky soils.
- Mulches may be more cost effective on flatter areas.

Overview:

Erosion control blankets are generally composed of biodegradable or synthetic materials and are used as a temporary or permanent aid in the stabilization of disturbed soil on slopes. These blankets are used to prevent erosion, stabilize soils, and protect seeds from foragers while vegetation is recolonized.

Installation:

- Always follow manufacturer's instructions for properly installing erosion control blankets. Different composition blankets are recommended for site-specific conditions (slope grades, contributing watershed areas) and use requirements (biodegradable, photodegradable, non-biodegradable).
- Prior to installation, clear the slope of any rocks, branches, or other debris.
- Rolled out blankets in a downward direction starting at the highest point of installation. Secure blankets above the crest of the slope using a berm tamped down along the top of the disturbed area.
- Tack down blankets with stakes or staples every 11 to 12 inches (or closer) horizontally and every 3 feet (or closer) vertically. Biodegradable staples are preferred.
- Overlap each blanket section horizontally with the next section by approximately 2 or 3 inches. Vertical overlaps should be approximately 6 inches, with the upslope section overlaying that of the down-slope section.

Maintenance:

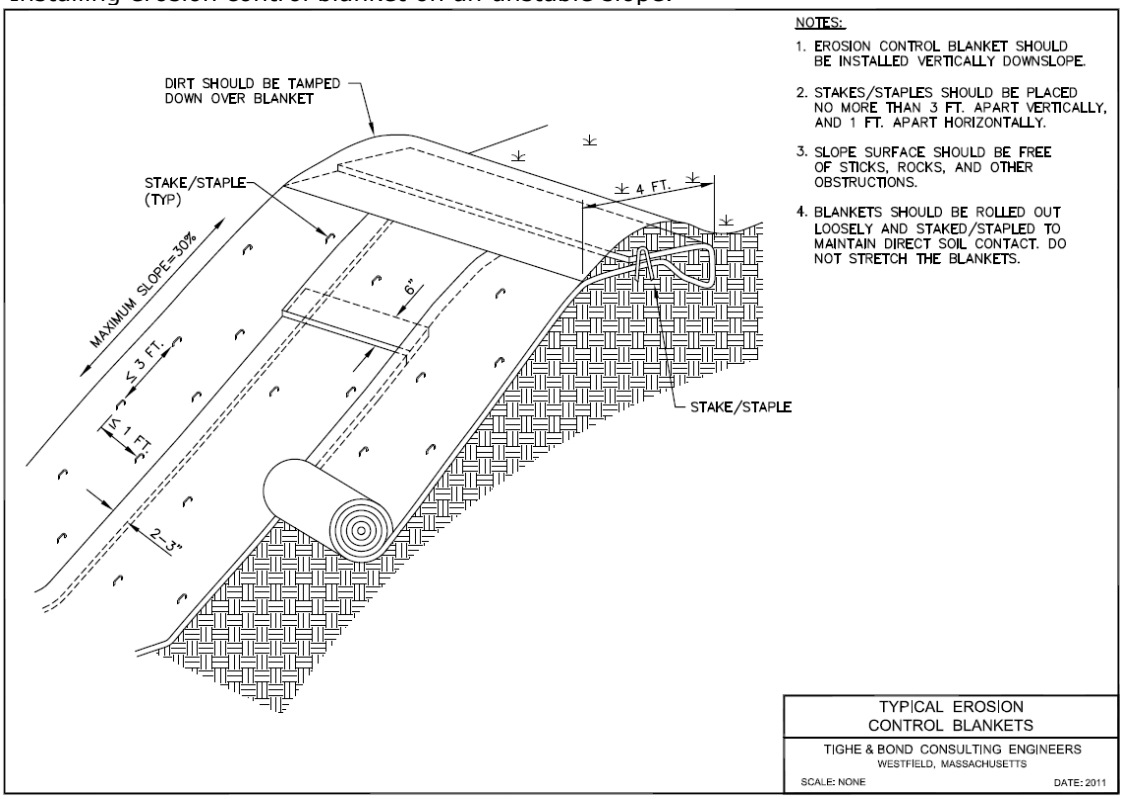
- Inspect for movement of topsoil or erosion weekly and after major precipitation events. Inspect until vegetation is firmly established.
- Repair surface, reseed, replace topsoil, and install new netting if washout, breakage, or erosion occurs.

Additional Comments:

Additional materials used for erosion control with a continuous sheet or material include Jute Mats (sheets of woven jute fiber) and Turf Reinforcement Matting (geotextile matrix most effective for channels).



Installing erosion control blanket on an unstable slope.



1.7 Straw/Compost Wattles

Applications: Erosion and sedimentation control, work limits

Limitations:

- Not recommended for steep slopes.

Overview:

Straw wattles are used as an erosion control device to slow runoff velocities, entrain suspended sediments, and promote vegetation growth until an area is stabilized. They are not generally intended for steep slopes, but rather, to stabilize low to moderate grades where there is a broad area of disturbance. Straw wattles may also be used along small stream banks to protect areas before vegetation has stabilized the soils. The wattles are constructed from a biodegradable netting sock stuffed with straw and may be left to biodegrade in place once a project is complete.

Wattles should be placed lengthwise, perpendicular to the direction of runoff. The wattles are typically spaced about 10 to 40 feet apart, depending on the slope angle. Additionally, the soil texture should be considered – for soft, loamy soils, wattles should be placed closer together; for coarse, rocky soils, they may be placed further apart.

Installation:

- Install prior to disturbing soil in the upgradient drainage area.
- Install so that the ends of each row of wattles on a slope are slightly turned downhill to prevent ponding behind them.
- Where straw wattles are installed end-to-end, butt the wattles tightly together so as not to allow water/sediments to flow between them.
- Place straw wattles in a shallow trench to assure stabilization and soil should be packed against the wattle on the uphill side.
- Securely stake straw wattles to the ground by driving a stake directly through the wattle approximately every four feet. A portion of each stake should remain approximately 2 to 3 inches above the wattle.
- Use *without* silt fence reinforcement: at the base of shallow slopes, on frozen ground, bedrock, and rooted, forested areas.
- Use *with* silt fence reinforcement: at low points of concentrated runoff, below culvert outlets, at the base of slopes more than 50 feet long, and in places where standalone mulch wattles have failed.

Maintenance:

- Routinely inspect wattles and after rain events. Repair as needed with additional wattles and/or stakes.
- Remove sediment deposits when they reach half the height of the wattle. Repair or reshapes wattles when they have eroded or have become sediment clogged or ineffective.

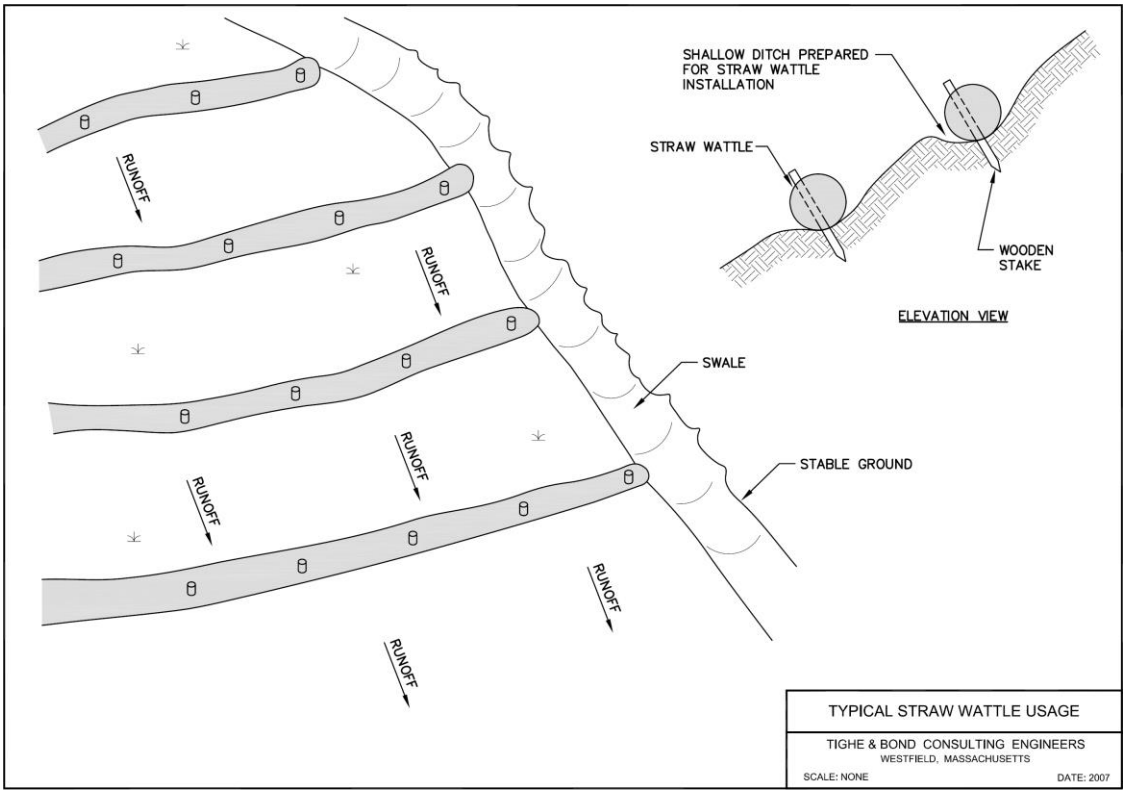
- If flow is evident around the edges, extend the barriers or evaluate replacing them with temporary check dams.

- Reinforce the berm with an additional sediment control measure, such as silt fence or a temporary rock check dam, if there is erosion or undercutting at the base or sides of the berm or if large volumes of water are being impounded behind the berm.

Additional Comments:

Woody vegetation and tall grasses may need to be removed before installing the berm to prevent voids that allow sediment under the berm. Wattles can also be planted with woody vegetation and seeded with legumes for additional stability.




SHALLOW DITCH PREPARED FOR STRAW WATTLE INSTALLATION
STRAW WATTLE
WOODEN STAKE
ELEVATION VIEW
RUNOFF
SWALE
STABLE GROUND
TYPICAL STRAW WATTLE USAGE
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

1.8 Wood Chip Bags

Applications: Erosion and sedimentation control, mulch

Limitations:

- Frozen or rocky ground (for installing stakes).
- Can pose a barrier to small animal movements.
- Requires close attention for maintenance and repair.

Overview:

Wood chip bags are perimeter barriers that intercept, filter, and reduce the velocity of stormwater run-off. They may be used separately or in conjunction with hay/straw bales and are installed and maintained in a similar manner. Wood chip bags should be staked in a line around perimeters of disturbed areas, especially those adjacent to wetlands, waterways, roadways or at the base of slopes.

Installation:

- Install wood chip bags end-to-end lengthwise in a single row along the toe of a slope or along a slope contour. Ensure that the bags are butted tightly against each other without gaps between them.
- Entrench to a minimum depth of 4 inches and backfill around the base of the bag.
- Stake each hay/straw bale into the ground using two stakes each that are approximately 3 feet long.

Maintenance:

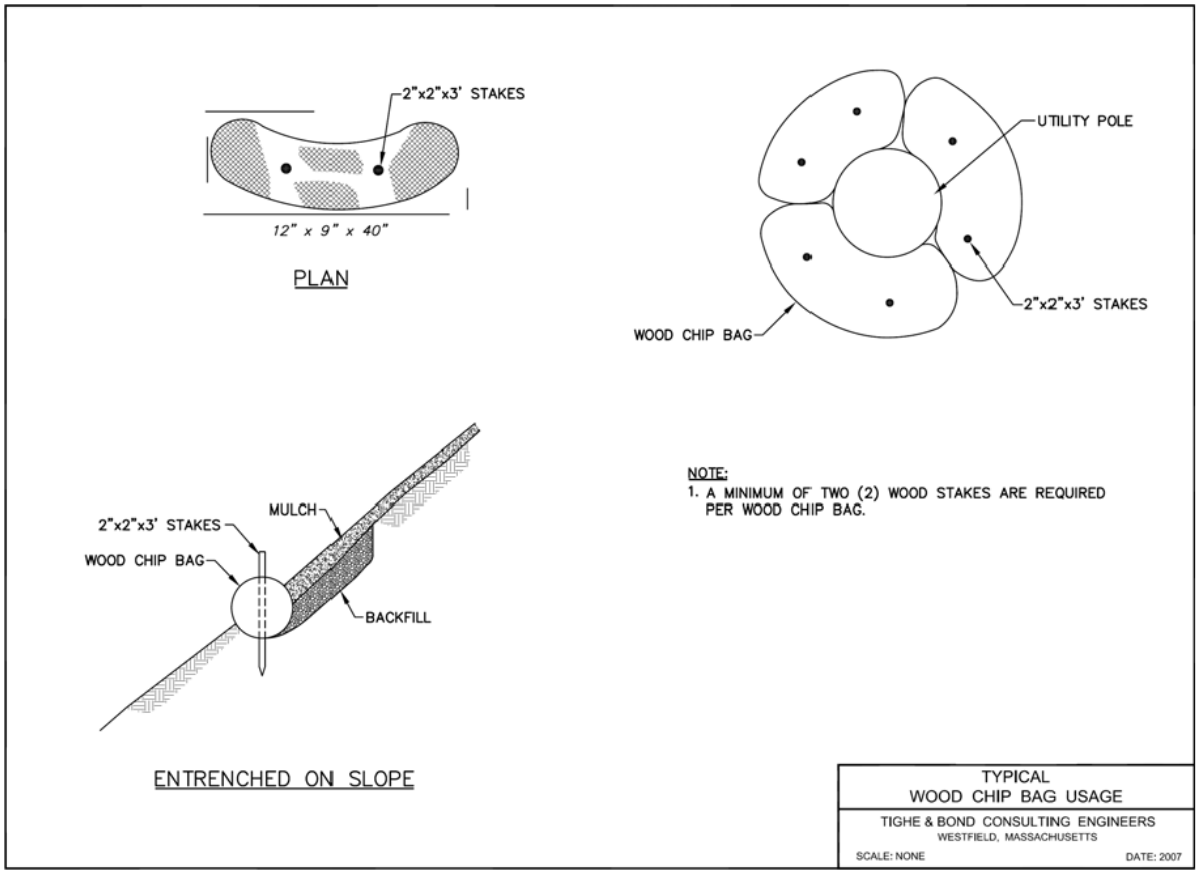
- Inspect before a forecasted storm event and daily during a prolonged rain event.
- Remove accumulated sediment and properly disposed outside sensitive areas when it has reached a thickness of ½ to ⅔ the height of the bag.
- Replace rotted or sediment-covered bag when necessary.

Additional Comments:

Wood chip bags can stabilize soils in a number of applications. They may be left in place as they eventually photo-degrade, as long as they do not pose a barrier to small animal movements.



Wood chips in photo-degradable bags used to stabilize soils.



1.9 Catch Basin Protection

Applications: Erosion and sedimentation control

Limitations:

- For small quantity and low velocity stormwater flows.
- Hay/straw bales hard to stake into paved areas.
- Ineffective for very silty water.
- May require authorization from local government for discharge to municipal system.
- Fabric drop inlet should be used where stormwater runoff velocities are low and where the inlet drains a small, nearly level area.
- Undercutting and erosion under filter fabric if fabric is not buried at bottom.

1.9.1 Hay/Straw Bales, Filter Fabric, and Filter Baskets

Overview:

Hay bales, filter fabric, and filter baskets are all temporary devices placed around and within existing catch basin inlets to protect the stormwater management system from high sediment loads and high velocities during construction. Use in areas where stormwater runoff is relatively small and velocities are low and where shallow sheets of run-off are expected.

Hay/Straw Bales Installation: Hay/straw bales are recommended for areas which have the storage space to allow temporary ponding since they are one of the least permeable protection methods.

- Installation is similar to perimeter hay/straw bale barriers.
- Use bales that are wire bound or string tied. Place bales so that the bindings are on the sides of the bales rather than against the ground.
- Install hay/straw bales in a box configuration around the drop inlet with the ends of the bales placed tightly against each other.
- If the area is unpaved, anchor bales using two stakes driven through the bale and into the ground.
- Hay bales can be placed around the perimeter of the inlet in order to extend the life of the filter fabric and/or basket by removing much of the sediment before-hand.

Filter Fabric Installation: Filter fabric is used to protect catch basins from excessive sediment.

- Cut fabric from a single roll.
- Place fabric beneath catch basin grate.
- Avoid setting top of fabric too high, which will lead to flow bypassing the inlet.

Filter Baskets/Bags Installation: Install filter baskets/bags within catch basins in combination with hay bales, fabric, stone or sod drop inlets. They may be used alone where drainage area is small with shallow flows.

- Install per manufacturer's instructions.
- Filter baskets typically consist of a porous fabric bag which is fitted under the catch basin grate.
- Sediments are filtered out of the stormwater and accumulate in the basket or bag.

Maintenance:

- Inspect weekly and after each major rain event.
- Remove accumulated sediment on a regular basis.
- Replace or make repairs as needed.
- Remove after area is permanently stabilized.

Additional Comments:

Discharge of clean water into municipal system catch basins may be an option for certain sites. However, this activity must be coordinated with the municipality and shall not occur without their written consent.

1.9.2 Sod or Stone Mound Drop Inlets

Overview:

Sod or stone mound drop inlets are temporary devices placed around and within existing catch basin inlets to protect the stormwater management system from high sediment loads and high velocities. They are used in areas where stormwater run-off is relatively heavy and overflow capacity is necessary. Sod should only be used in well vegetated areas and when the general area around the inlet is planned for vegetation and is well suited for lawns. Stone mounds are well suited for the heaviest flows.

Installation:

- For Sod: Place a mound of permanently vegetated sod around the perimeter of the inlet to a minimum height of 6 inches.
- For Stone: Stone can be used alone or in combination with stacked concrete blocks. Gravel alone will slow drainage time and increase settlement.
- Place wire mesh with ½" openings over the inlet with 1 foot extending on each side. Overlay with filter fabric.
- Surround inlet with mound of gravel, 1" diameter or smaller, to a minimum height of 6", placed over the mesh.
- If blocks are used, stack them around the inlet, between 12 and 24" high, place mesh over the openings and pile the gravel against the outside face of the blocks.

Maintenance:

- Inspect weekly and after each major rain event.
- Remove accumulated sediment when it reaches ½ of the height of the filter mound. Stone especially must be regularly maintained.

- Repair erosion as necessary.
- If the storm flow bypasses inlet and causes erosion, the top of the structure is too high.
- If the trap is not efficient and/or there is sediment overload, the drainage area is too large to handle load. Consider constructing a temporary sediment trap.
- If scour holes develop (if blocks are being used), blocks are not placed snugly against the inlet grate.

Filter Baskets/Silt Bags

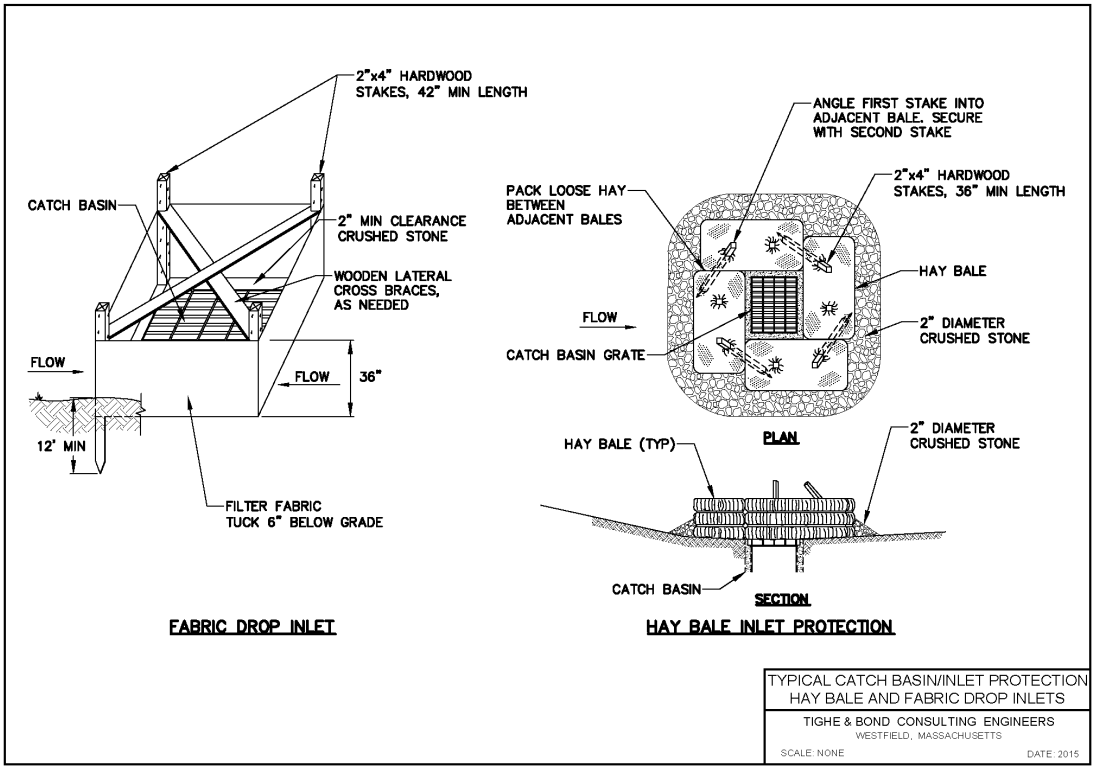
Filter baskets/silt bags are installed within catch basins in combination with hay bales, fabric, stone or sod drop inlets. They can potentially be used alone where drainage area is small with shallow flows. They may cause ponding or may rip under heavier flows without the additional external filtering method.

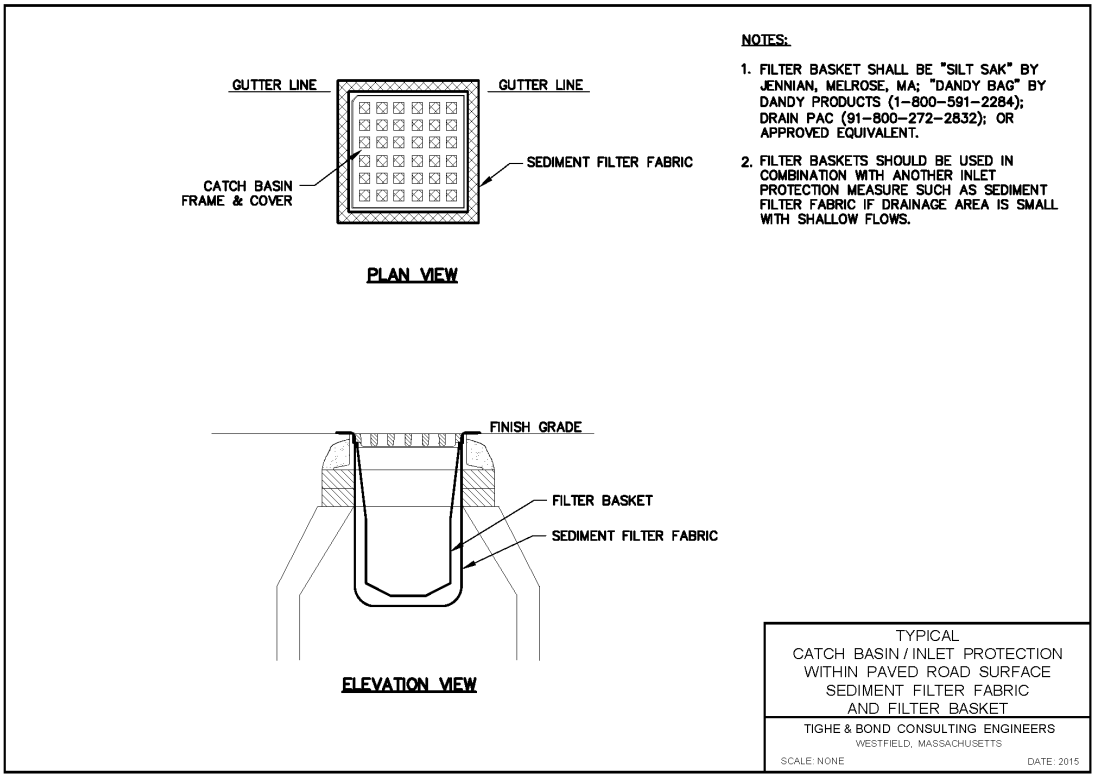
Installation:

- Several trademarked/name brand filter/silt bags exist and should be installed per the manufacturer's instructions. Almost all consist of a porous fabric bag which is fitted under the catch basin grate. Sediments are filtered out of the stormwater and accumulate in the bag.

Maintenance:

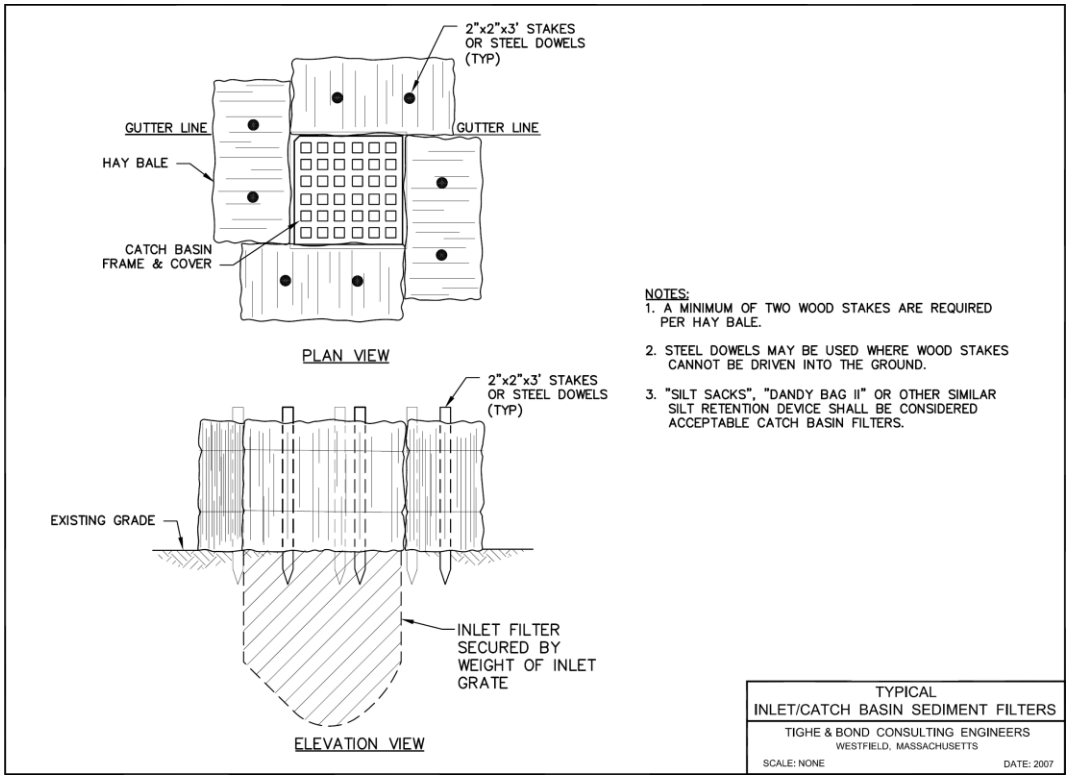
- Inspect inlet and fabric weekly and after each major rain event.
- Remove sediment when the bag is halfway full.
- Replace bags as necessary due to wear or ripping.







Catchbasin protected from sedimentation by filter fabric.


2"x2"x3' STAKES
OR STEEL DOWELS
(TYP)
GUTTER LINE
GUTTER LINE
HAY BALE
CATCH BASIN
FRAME & COVER
PLAN VIEW
2"x2"x3' STAKES
OR STEEL DOWELS
(TYP)
EXISTING GRADE
INLET FILTER
SECURED BY
WEIGHT OF INLET
GRATE
ELEVATION VIEW
NOTES:
1. A MINIMUM OF TWO WOOD STAKES ARE REQUIRED PER HAY BALE.
2. STEEL DOWELS MAY BE USED WHERE WOOD STAKES CANNOT BE DRIVEN INTO THE GROUND.
3. "SILT SACKS", "DANDY BAG II" OR OTHER SIMILAR SILT RETENTION DEVICE SHALL BE CONSIDERED ACCEPTABLE CATCH BASIN FILTERS.
TYPICAL
INLET/CATCH BASIN SEDIMENT FILTERS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

1.10 Loaming and Seeding

Applications: Erosion control, soil stabilization, site restoration

Limitations:

- May be site specific limitations (e.g. permit or State requirements).
- Applies to upland areas only.

Overview:

Permanent seeding is appropriate for vegetated swales, steep slopes, or filter strips. Temporary seeding is used if construction has ceased and if an area will be exposed.

Installation:

- Apply loam/ topsoil prior to spreading seed mix per manufacturer's recommendations. Apply water, fertilizer, and mulch to seedbed, as needed.
- Plant native species of grasses and legumes where practicable.

Maintenance:

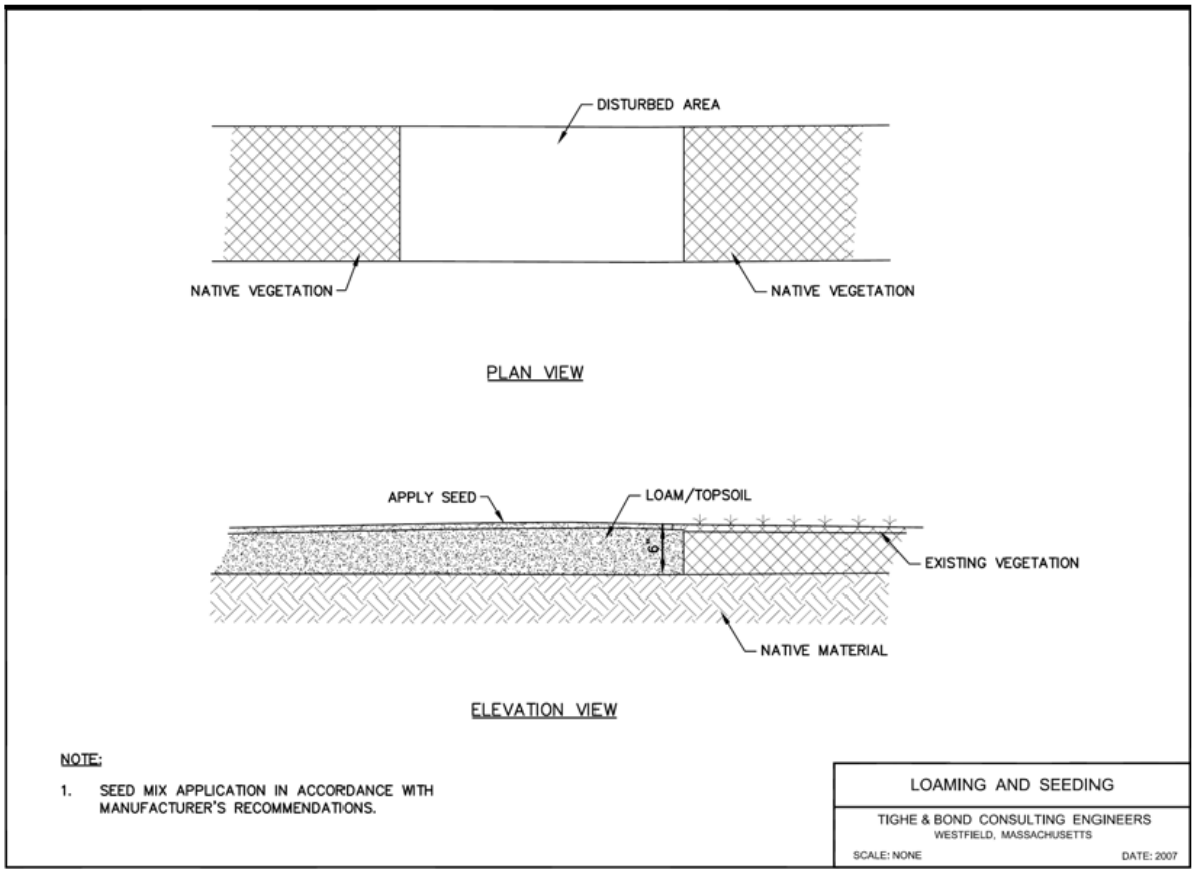
- Inspect on regular basis until vegetation has established.
- If washout or erosion occurs, repair surface, re-seed, re-mulch and install new netting.
- Follow permit requirements regarding use of wetland seed mix in wetlands where required.

Additional Comments:

Cool Season Grasses	Warm Season Grasses
• Best growth in the cool weather of fall and spring, set seed in June and July. • Seed April 1-May 31 and Aug 1-Sept 10.	• Growth begins in the spring, accelerates in the summer, and plants set seed in the fall. • Seed April 1-May 15, dormant seeding Nov 1-Dec 15.



Loaming and seeding of recently disturbed right of way.



1.11 Mulching with Hay/Straw/Woodchips

Applications: Erosion control, soil stabilization, site restoration

Limitations:

- May be site specific limitations (e.g. permit or State requirements).
- Applies to upland areas only.
- Thick mulch may prevent seed germinations.
- Mulch on steep slopes must be secured with netting to prevent it from being washed away.

Overview:

Mulching consists of an application of a protective blanket of straw or other plant residue, gravel, or synthetic material to the soil surface to provide short term soil protection. It enhances plant establishment by conserving moisture and moderating soil temperatures, and anchors seed and topsoil in place. Mulch also reduces stormwater runoff velocity.

Application rates and technique depend on material used. Select mulch material based on soil type, site conditions and season. Straw/hay provides the densest cover if applied at the appropriate rate (at least ½ inch) and should be mechanically or chemically secured to the soil surface. Woodchip application can be less expensive if on-site materials are used.

Installation:

- Use in areas which have been temporarily or permanently seeded.
- Use mulch netting on slopes greater than 3% or in concentrated flows.
- Mulch prior to winter (ideally in mid-summer).

Maintenance:

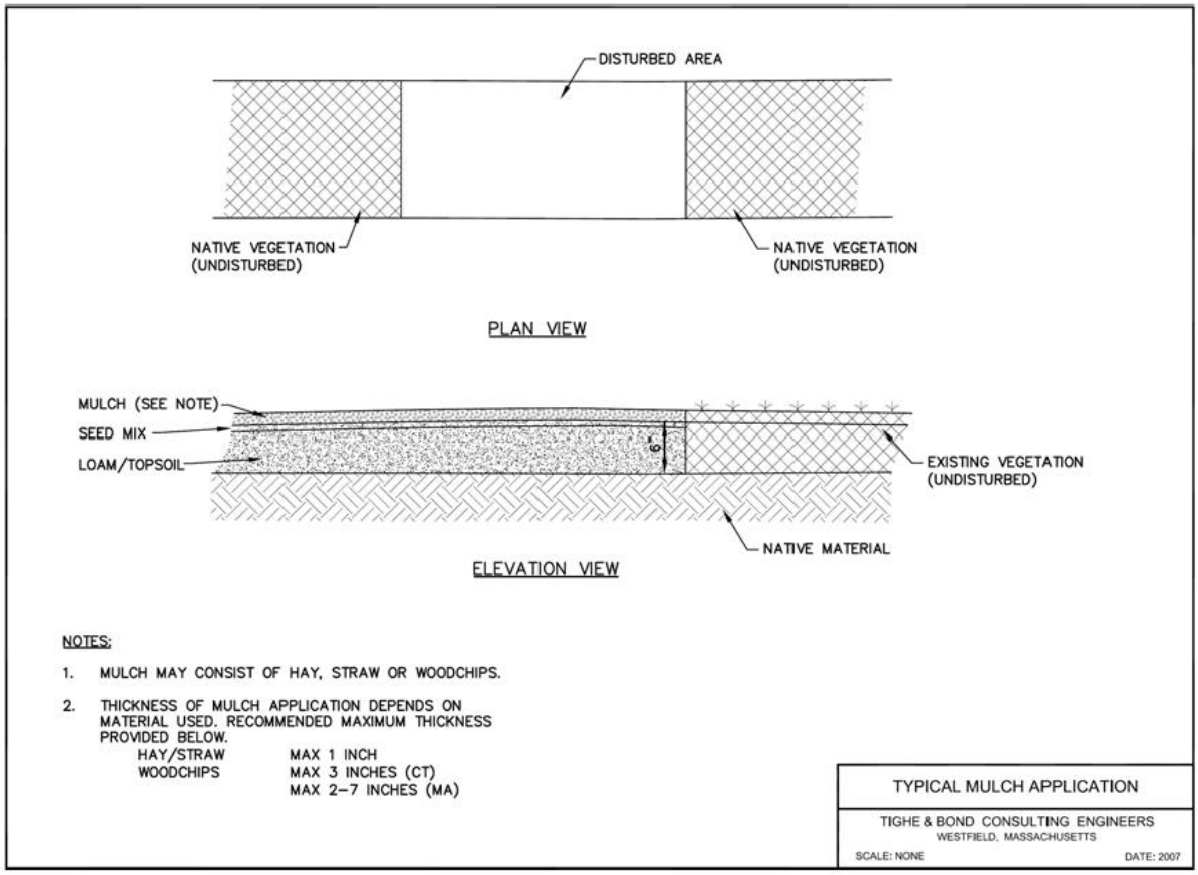
- Inspect on regular basis until vegetation has established.
- If washout or erosion occurs, repair surface, re-seed, re-mulch, and install new netting.

Additional Comments:

Type	Description/Use
Straw/Hay	• Straw or hay applied to surface at 2-4 tons per acre • Mechanically or chemically secured to soil surface • Provides the densest cover to protect soil and seeds
Wood Fiber/Hydraulic Mulch	• Chopped up fibers applied to the soil surface with a hydroseeder • Tackifier when necessary can be applied with fiber, seeds and fertilizer in one step. This is best when done with fast growing seeds
Compost	• Compost acts as a soil amendment but is more expensive than most mulches • Its efficiency is comparable to wood fiber
Wood Chips	• Use of wood chips as a mulch saves money if on-site materials are used • Effective when applied at high levels (6 tons per acre) and on up to 35% slopes



Typical view of light mulching atop unstable, seeded soils.



1.12 Coir Log Use for Bank Stabilization

Applications: Bank stabilization, wetlands and watercourse restoration

Limitations:

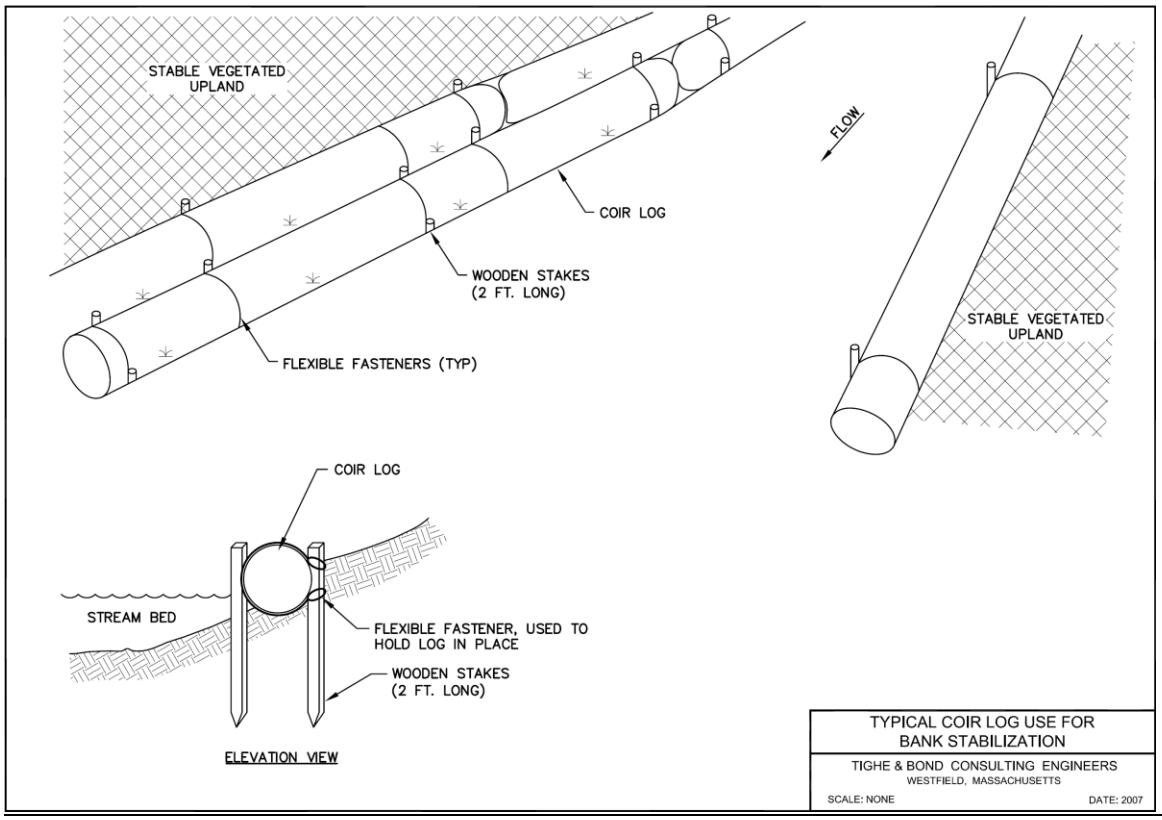
- Moderately expensive.

Overview:

- Refer to permit requirements (if applicable) and manufacturer's specifications.
- Install along banks between upland and watercourse using wooden stakes (2 foot long) and flexible fasteners (to hold log in place).



Coir logs used to restore a stream bed and banks.



1.13 Level Spreader

Applications: Erosion and sedimentation control

Limitations:

- Downgradient area must be adequately vegetated and have minimum width of 100 feet before surface water
- No vehicle traffic over level spreader

Overview:

Level spreaders, also called grade stabilization structures, are excavated depressions constructed at zero percent grade across a slope. They convert concentrated flow into sheet flow and discharges to stable areas without causing erosion.

Level spreaders are not applicable at all locations. Some general site requirements include:

- Drainage area of 5 acres or less
- Undisturbed soil (not fill)
- A level lip that can be installed without filling
- Area directly below is stabilized by existing vegetation
- At least 100 feet of vegetated area between the spreader and surface waters
- Slope of the area below the spreader lip is uniform and a 10% grade or less
- Water won't become concentrated below the spreader and can be released in sheet flow down a stabilized slope without causing erosion
- There will be no construction traffic over the spreader

Installation:

- Set the channel grade to be no steeper than 1% for the last 20 feet entering the level spreader.
- Install level spreader using the suggested dimensions: length—5 to 50 feet, width—at least 6 feet, and depth—approximately 6 inches (measured from the lip) and uniform.
- Stabilize the level spreader with an appropriate grass seed mixture and mulch, if necessary. Protect the level lip with an erosion stop and jute netting/excelsior matting. The downgradient area should have stable, complete, erosion resistant vegetative cover.

Maintenance:

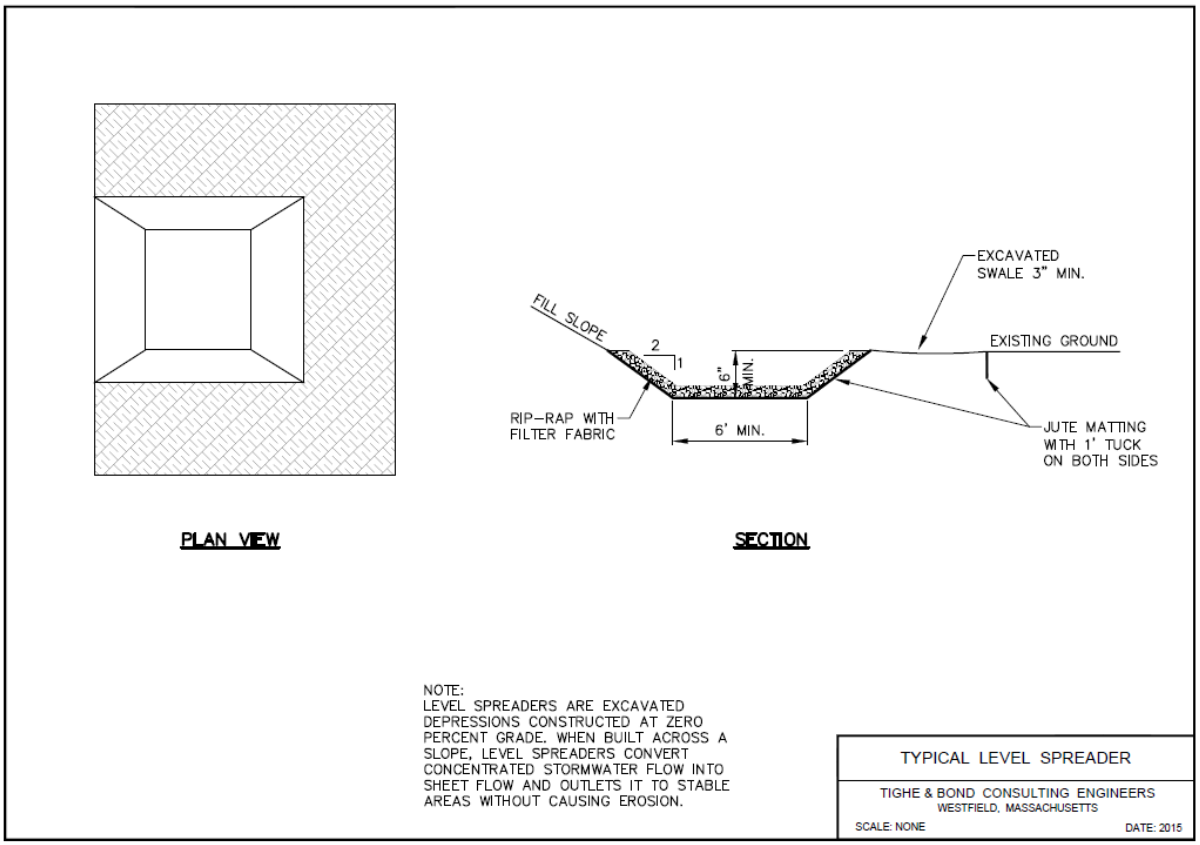
- Inspect after every rain event and remove accumulated sediment. Repair erosion damage and re-seed as necessary.

- Mow vegetation occasionally to control weeds and the encroachment of woody vegetation.

Additional Comments:

If channels form and erosion is evident in level spreader, the level spreader is not uniformly flat. Repair the low spots in the level spreader.

If erosion is occurring downgradient of the level spreader, the level spreader is not long enough or not wide enough. Alternatively, the vegetation is not stable. Re-seed the area.



1.14 Check Dams

Applications: Stormwater management, erosion control

Limitations:

- Need to be adequately sized based on expected rain events.

Overview:

Check dams are porous physical barriers placed across a drainageway to reduce the velocity of concentrated stormwater flows and erosion. Check dams also temporarily pond stormwater runoff to allow sediment in the water column to settle out. Permanent or long-term check dams are typically constructed of rip rap or other stone material. Short-term check dams can be constructed of rip rap. Rip rap check dams are preferred over hay bales.

Installation:

- Place stone by hand or machine, making side slopes no steeper than 1:1 and with a maximum height of 3 feet at the center of the check dam. A geotextile may be used under the stone to provide a stable foundation and/or to facilitate removal of the stone.
- The minimum height of the check dam shall be the flow depth of the drainageway, but shall not exceed 3 feet at the center.
- Install the check dam so that it spans the full width of the drainageway, plus 18 inches on each side. Leave the center of the check dam approximately 6 inches lower than the height of the outer edges.
- The maximum spacing between check dams should be such that the toe of the upstream check dam is at the same elevation as the top of the center of the downstream check dam.

Maintenance:

- For permanent stone check dams, inspect and maintain the check dam in accordance with the standards and specifications provided in the design for the site.
- For temporary check dams, inspect at least once per week and within 24 hours of the end of a precipitation event of 0.5 inches or more to determine maintenance needs.
- Maintenance may include, but are not limited to, the replacement of stone, repair of erosion around or under the structure, and/or the removal and proper disposal of accumulated sediment.

Problem	Solution/Explanation
Stone displaced from face of dam	Stone size too small and/or face too steep
Erosion downstream from dam	Install stone lined apron
Erosion of abutments during high flow	Rock abutment height too low
Sediment loss through dam	Inadequate layer of stone on inside face or stone too coarse to restrict flow through dam



Stone check dams at construction site.



Stone check dam at construction site.

1.15 Temporary and Permanent Diversions

Applications: Stormwater management, erosion control

Limitations:

- Need to be adequately sized based on expected rain events and the contributing drainage area.

Overview:

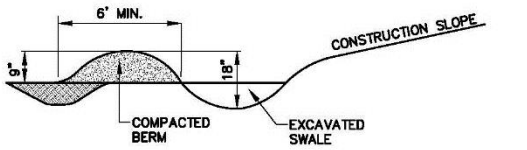
Temporary and permanent diversions are ridges or channels constructed across steep slopes that convey the runoff to a stable outlet at a non-erosive velocity. Use permanent diversions on slopes with high runoff velocities to break up concentrated flow. They can be installed as temporary diversion and completed as permanent when the site is stabilized or can be installed in the final form initially.

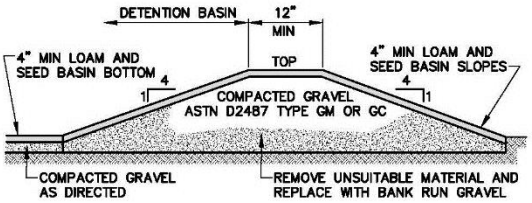
Installation:

- Remove woody vegetation and fill and compact the ditches and gullies that must be crossed before construction.
- Remove vegetation around the proposed location of the base of the diversion ridge to form a strong bond between the ground and fill material.
- Stabilize the outlet of the diversion channel using sediment traps, natural or constructed vegetated outlets, or level spreaders.
- Stabilize the diversion channel with riprap, vegetation, paving, or stone.
- Install a filter strip of close growing grass above the channel to prevent sediment accumulation.
- Seed and mulch diversions that are intended for use for more than 30 days.
- After the area has been permanently stabilized, remove the ridge and channel to blend with the natural ground level.

Maintenance:

- Inspect bi-weekly and repair any erosion problems.
- Remove accumulated sediment and debris.





DETENTION BERM

NOTE:
FILL FOR BERMS SHALL BE A COMBINATION OF GRAVEL, SAND AND SILT TO ENSURE WATER TIGHTNESS AND STABILITY.

SLOPE %	DISTANCE APART
< 5	125
5–10	100
10–20	75
30–35	50
> 35	25

TYPICAL TEMPORARY AND PERMANENT DIVERSIONS

TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE DATE: 2015

1.16 Temporary and Permanent Trench Breakers (Trench Plugs)

Applications: Keeping work areas dry, long-term stabilization of soil (prevents sinkholes)

Limitations:

- Water that accumulates behind the trench breaker requires pumping to a filtering device, preferable in a well-vegetated, upland area.

Overview:

Trench breakers (trench plugs) are temporary or permanent measures used to slow the movement of groundwater and surface runoff within a trench. They are often used when runoff draining to downgradient work areas causes problems within the trench. Trench breakers may be placed adjacent to waterways and wetlands to prevent water from seeping into work areas or disrupting the hydrology of the resource areas. They can be used on slopes throughout all types of land uses (including agricultural and residential). Trench breakers should be installed upslope of each permanent slope breaker or waterbar.

Temporary Trench Breakers (Trench Plugs)

Temporary trench plugs may consist of hard or soft plugs. Hard plugs leave small portions of the ditch unexcavated at certain intervals. Soft plugs involve placing compacted subsoil or sandbags into the ditch following excavation.

Installation:

- Install temporary trench plugs at the same intervals as temporary slope breakers or water bars (see table).

Maintenance:

- Inspect trench breakers regularly for signs of any instability, and repair any erosion problems.
- If water accumulates behind the trench breaker, pump to a filtering device, preferably in a well-vegetated, upland area.

Permanent Trench Breakers

Permanent trench breakers are left in the trench and backfilled to slow the movement of subsurface water along the trench. This helps prevent undermining the stability of the right of way that may lead to sinkholes or erosion.

Installation:

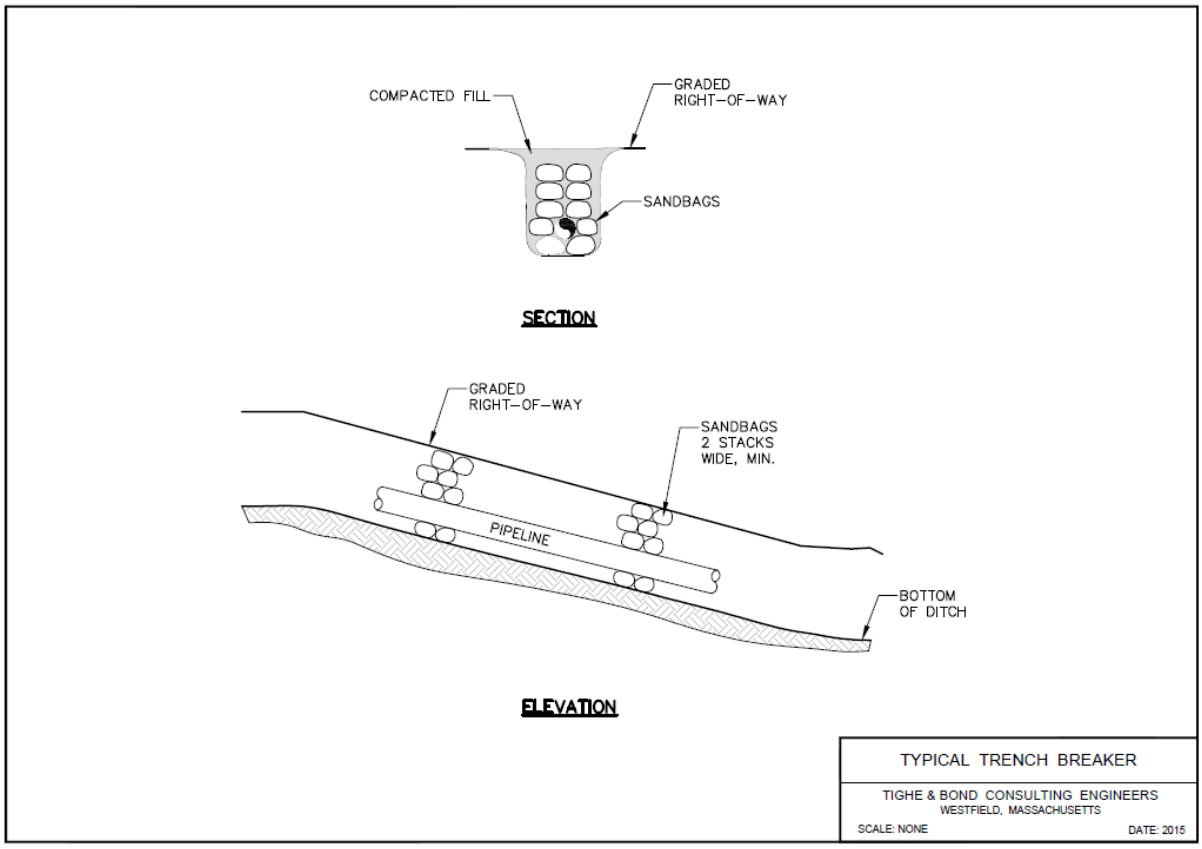
- Trench breakers can be composed of sandbags or polyurethane foam. Do not use topsoil to construct trench breakers.
- Build the trench breaker under and around the pipeline at intervals specified by the local soil conservation service or as shown in the table below.
- Install temporary trench plugs at the same intervals as temporary slope breakers or water bars (see table).
- When using sandbags, construct the trench breakers to be a minimum of two bags wide.
- Backfill the top of the trench breakers along with the rest of the trench. Grade the entire area to the original contours and stabilize.

Maintenance:

- Inspect trench breakers for stability and effectiveness before the trench is backfilled.
- During future inspections of the completed right of way, observe the ditch line for any unusual settling or erosion.
- Inspect wetlands and waterways for any change to their original hydrology.

Additional Comments:

Recommended Spacing	
Land Slope	**Spacing (ft)**
5-15%	300
>15-30%	200
>30%	100


COMPACTED FILL
GRADED
RIGHT–OF–WAY
SANDBAGS
SECTION
GRADED
RIGHT–OF–WAY
SANDBAGS
2 STACKS
WIDE, MIN.
PIPELINE
BOTTOM
OF DITCH
ELEVATION
TYPICAL TRENCH BREAKER
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015

Appendix A

Section II

Section 2
Water Control

Several methods exist for temporarily diverting and dewatering surface water from work areas. No untreated groundwater shall be discharged to wetlands or water bodies. A variety of methods may be employed to prevent sedimentation due to dewatering. These methods, which are primarily appropriate during construction of capital projects, are described below.

2.1 Dewatering Activities

Applications: Dewatering

Limitations:

- Overland flow limited to sites with appropriate upland area.
- Frac tanks have limited capacity and are expensive.
- Pumps require oversight at all times.
- Filter bags clog and require replacement.

Overview:

Dewatering activities may be necessary to expose the ditch line and provide drier workspace when high groundwater or saturated soil is present. This condition often occurs in wetlands or near streambanks during excavation activities for installing or replacing utility poles or natural gas pipelines. *Under no circumstances should trench water or other forms of turbid water be directly discharged onto exposed soil or into any wetland or waterbody.*

2.1.1 Overland Flow

Applications: Dewatering

Limitations:

- Space constraints and adjacent wetlands or watercourses may prevent use of this dewatering method.

Overview:

Overland Flow may be used if a discharge location is available where there is no potential for discharged water to flow overland into wetlands or waterbodies. Discharge water overland without any filtering to well-drained, vegetated upland areas and allow to naturally infiltrate into soils.

2.1.2 Frac Tank

Applications: Dewatering, managing contaminated groundwater

Limitations:

- Expensive
- May be site specific limitations (e.g. extremely unlevel ground)
- May require proper disposal at a regulated facility (in cases of contaminated groundwater)

Overview:

Frac Tanks are pre-fabricated and self-contained units that contain a series of baffles that allow fine materials to settle out of the water column. Use frac tanks when the work requires dewatering in an area with very silt laden water and/or contaminated groundwater.



Frac tank on-site for dewatering activities.

2.1.3 Filter Bags and Hay Bale Containment Area

Applications: Dewatering

Limitations:

- Pumps require oversight at all times.
- Filter bags clog and require replacement.

Overview:

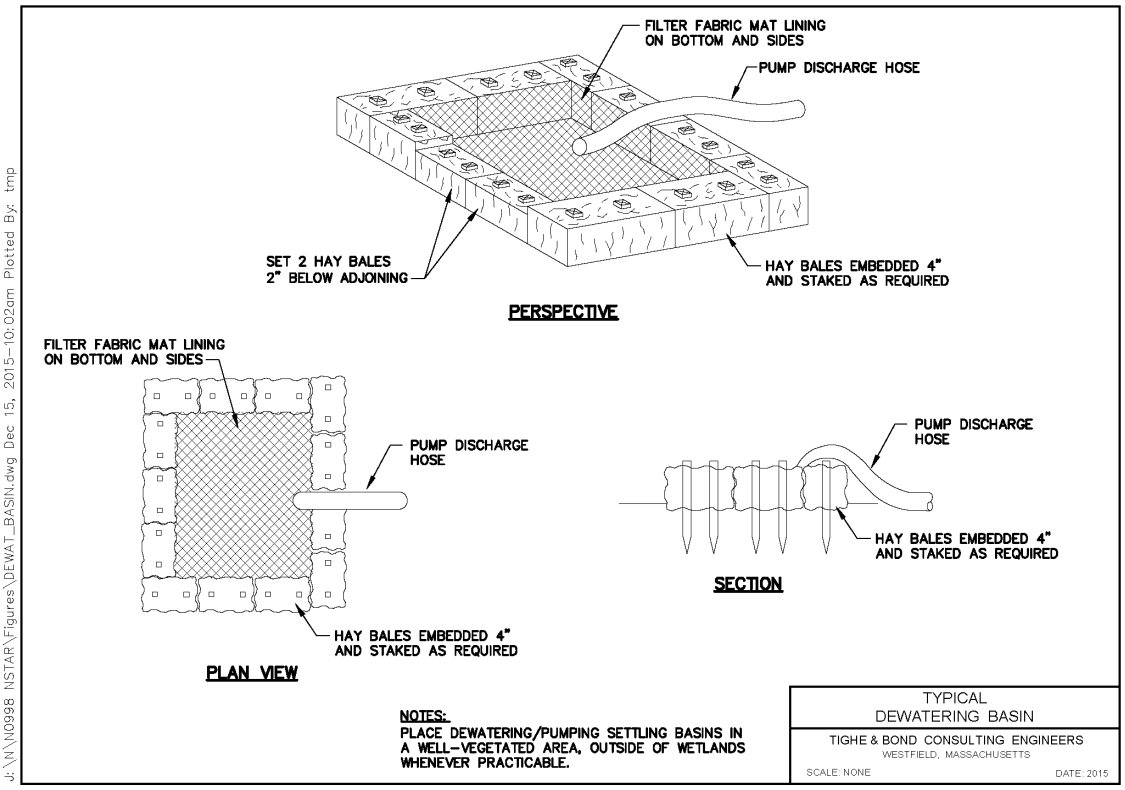
Use filter bags with hay bale containment area for dewatering when there is the potential for discharged water to flow overland into wetlands or waterbodies. Locate dewatering sites in well-vegetated areas within the right of way or approved work areas. Locate discharges outside of wetlands and over 100 feet from a streambank or waterbody, if practicable.

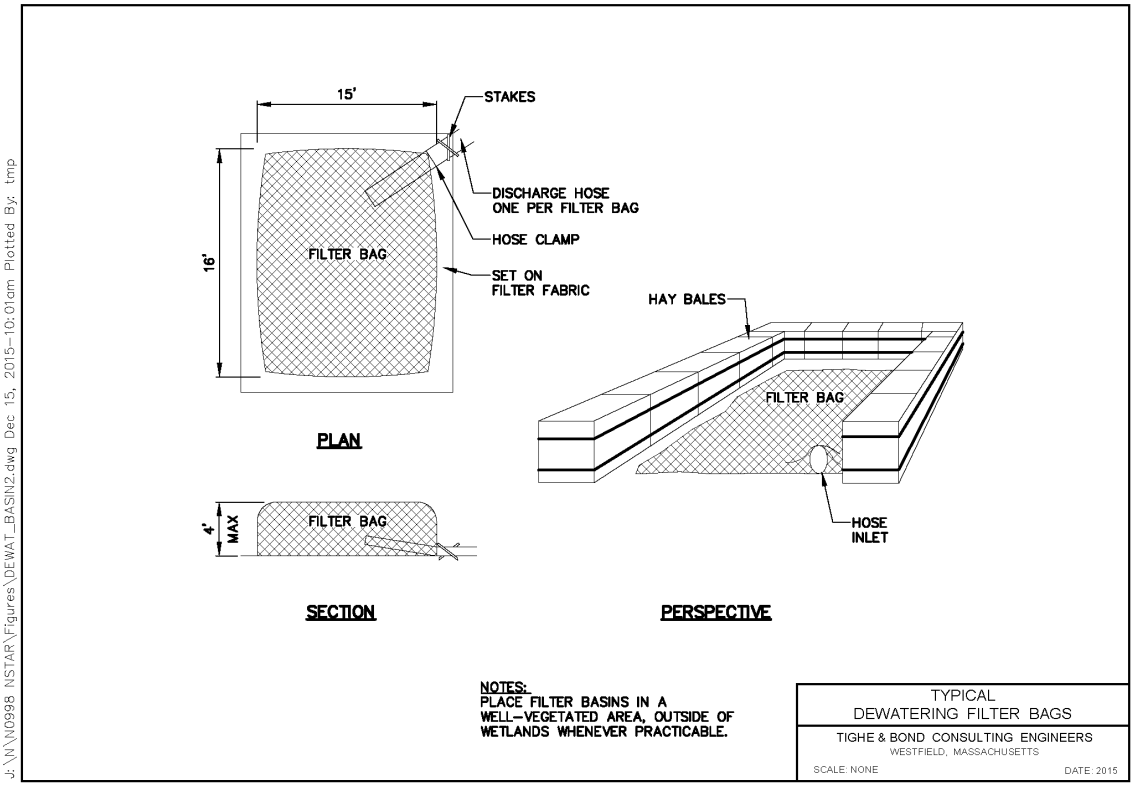
Installation:

- Place pump in a containment structure (i.e., child-sized plastic pool) to avoid fuel leakage to the wetlands or waterways.
- Properly place the discharge hose into a pre-manufactured, geotextile filter bag per the manufacturer's instructions.
- Place the filter bag in a well-vegetated area outside of a wetland area and over 100 feet from a waterbody, if practicable.
- Elevate the intake hose off the trench bottom and create a sump with clean rock in order to avoid pumping additional sediment.
- Build a hay bale corral for the filter bag if the water must be discharged within 100 feet of a wetland, waterbody, or other sensitive area.
- Stake a double vertical line of hay bales in an "L" or "U" shape on the downgradient sides of the bag to further filter the discharge water.

Maintenance:

- Man the pump at all times.
- Refuel pump within a plastic containment structure and/or over 100 feet from the wetland or waterbody.
- Routinely check the filter bag during pumping activities to ensure that it is not reaching its holding capacity.
- If the bag appears to be nearing its limits, stop dewatering until more water has filtered out and the bag can be replaced.
- Properly dispose of used filter bags and trapped sediment.


FILTER FABRIC MAT LINING
ON BOTTOM AND SIDES
PUMP DISCHARGE HOSE
SET 2 HAY BALES
2" BELOW ADJOINING
HAY BALES EMBEDDED 4"
AND STAKED AS REQUIRED
PERSPECTIVE
FILTER FABRIC MAT LINING
ON BOTTOM AND SIDES
PUMP DISCHARGE
HOSE
HAY BALES EMBEDDED 4"
AND STAKED AS REQUIRED
PLAN VIEW
PUMP DISCHARGE
HOSE
HAY BALES EMBEDDED 4"
AND STAKED AS REQUIRED
SECTION
NOTES:
PLACE DEWATERING/PUMPING SETTLING BASINS IN
A WELL-VEGETATED AREA, OUTSIDE OF WETLANDS
WHENEVER PRACTICABLE.
TYPICAL
DEWATERING BASIN
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015
J:\N\N0998 NSTAR\Figures\DEWAT_BASIN.dwg Dec 15, 2015-10:02am Plotted By: tmp


15'
STAKES
DISCHARGE HOSE
ONE PER FILTER BAG
HOSE CLAMP
16'
FILTER BAG
SET ON
FILTER FABRIC
PLAN
HAY BALES
FILTER BAG
HOSE
INLET
4'
MAX
FILTER BAG
SECTION
PERSPECTIVE
NOTES:
PLACE FILTER BASINS IN A
WELL-VEGETATED AREA, OUTSIDE OF
WETLANDS WHENEVER PRACTICABLE.
TYPICAL
DEWATERING FILTER BAGS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015
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2.1.4 Discharge Hose Filter Socks

Applications: Dewatering

Limitations:

- Ineffective for very silty water

Overview:

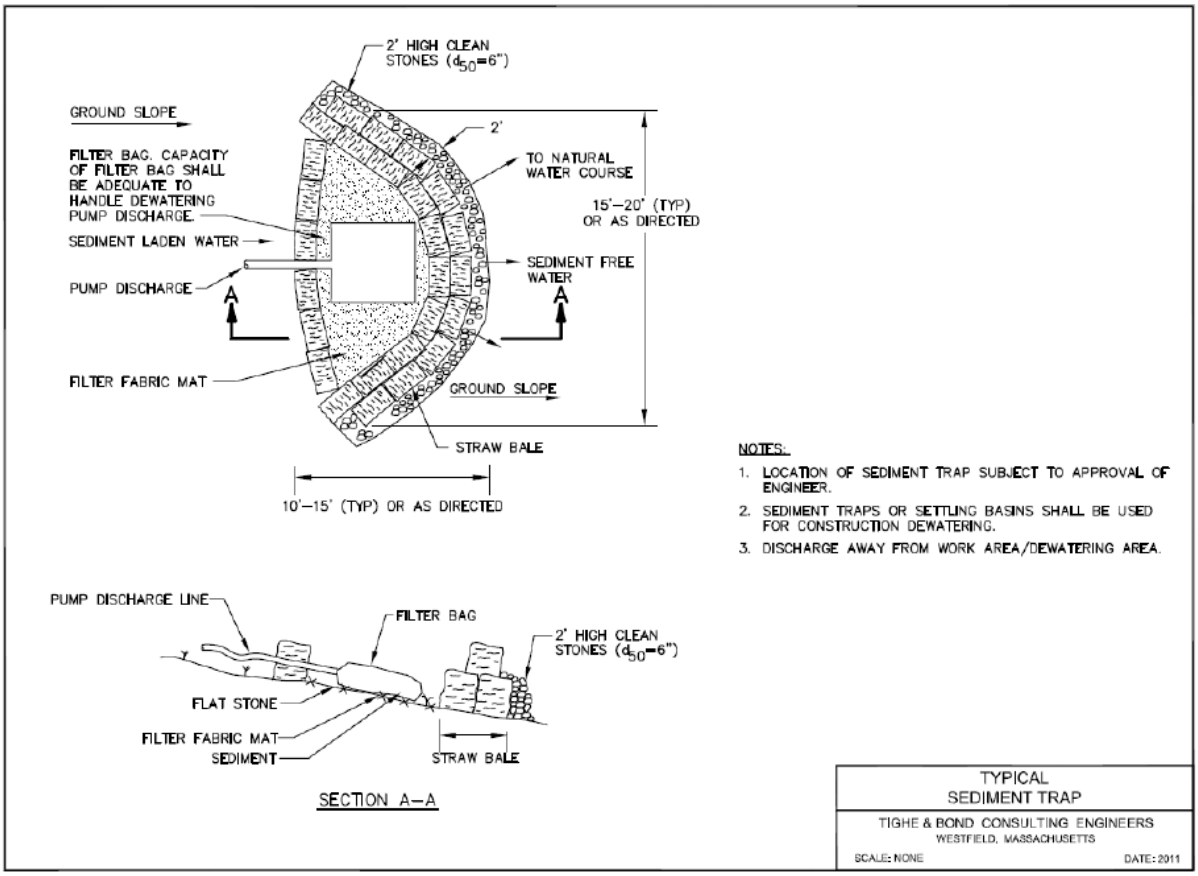
Use discharge hose filter socks at sites where there is insufficient space to construct sediment basins or enough suitable uplands for overland flow and infiltration. Filter "socks" or bags may be affixed to the end for the discharge hose of the pump and used for dewatering. It is important that enough socks be on hand at the site to accommodate the anticipated need, as they fill fast with more turbid water. Additional measures such as hay or straw bales can be installed around the filter device for added protection.



Dewatering to filter "sock" surrounded by hay bales.



Riprap underlain by geotextile fabric



2.2 Coffer Dam and Stream Bypass Pumping

Applications: Dewatering/water diversion, turbidity control

Limitations:

- Pipes need to be adequately sized to accommodate heavy rain events.
- Coffer dams require careful maintenance at all times.

Overview:

A coffer dam is a temporary structure used during instream work to enclose a work area by diverting stream flow using pumps (or gravity) while containing sediment and turbidity. Coffer dams make an impoundment upstream of a work area and then use pumps to remove the water from inside the dammed (isolated) area to beyond the work area. They are used in areas with high flows where siltation barriers are not effective. Coffer dams can consist of sandbags, concrete structures, or pre-manufactured products and should be used on a site-by-site basis according to engineering specifications and/or manufacturer's instructions.

Dewatering measures may be necessary if groundwater is encountered within an excavation (e.g., during installation or repair of a buried cable, footings, foundations or structure replacement) or other area if the presence of water is incompatible with construction. In rare cases, surface water diversions will be necessary in order to create dry working conditions for subsurface work in water bodies.

Installation:

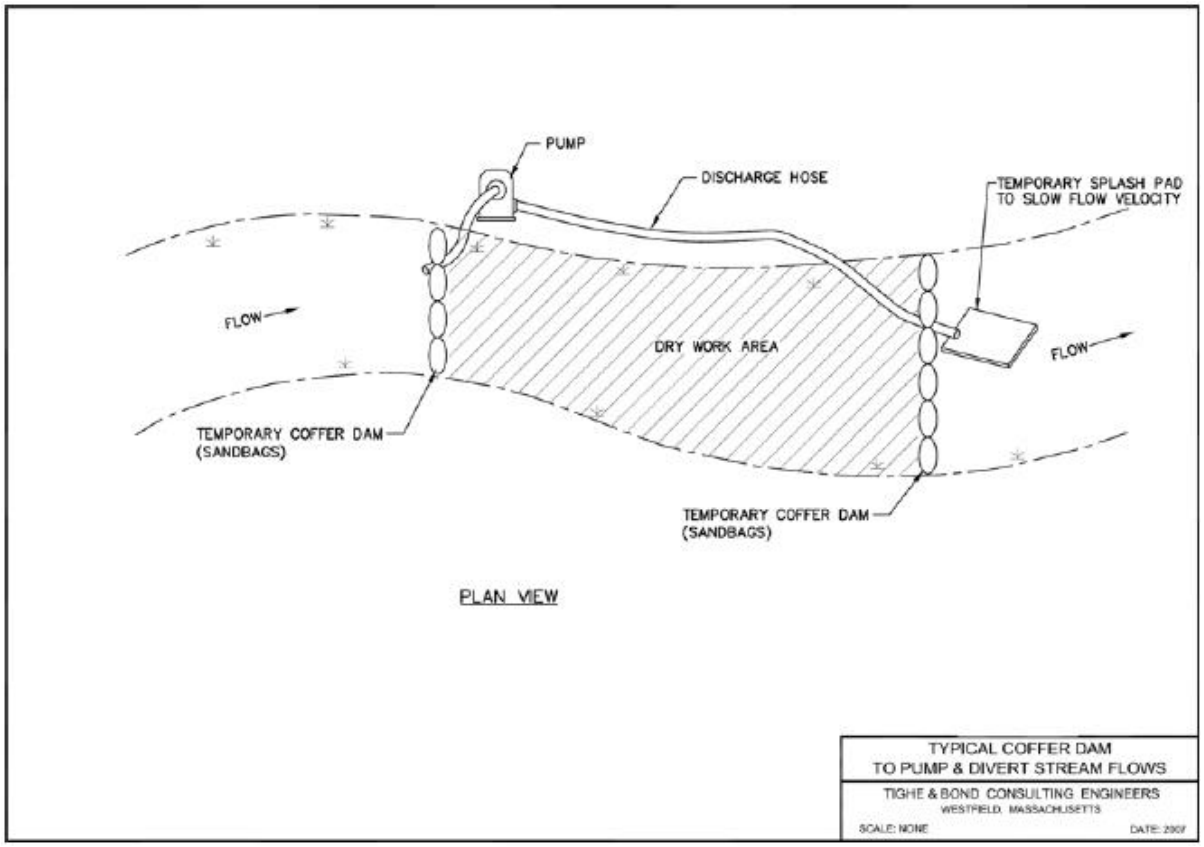
- All cofferdam installations should be designed and approved by engineering staff following geotechnical and hydrological studies. If using a pre-fabricated product, follow manufacturer's instructions and engineer's guidance.
- Place hay bales or silt fence along the streambanks approaching the edges of the workspace.
- Coffer dams should be a semicircle or U-shaped and lined with a geotextile. Use clean durable rockfill or large pre-cast concrete blocks for construction.
- Locate the geotextile outside of the dam for the upstream half and inside for the downstream half to prevent displacement of the geotextile. Place the geotextile with a short flap (1 foot) at the base of the dam, weighted down with clean rockfill.
- Dewatering of the isolated work area may or may not be necessary or even possible. If dewatering is necessary, install an impermeable liner or clay plug.
- After the sediment in suspension has settled out, remove the cofferdam carefully so that sediment disturbance is minimized.
- Do not install in channels where dams would hinder the passage of boats or fish.

Maintenance:

- Cofferdams require careful maintenance at all times.
- Observe the stream flow for any turbidity as a result of the construction activities.

Additional Comments:

Where use of pumps is impractical, coffer dams and temporary pipes can be used to divert flows via gravity and dry out a work area. The instream constriction caused by the cofferdam should be small in order to avoid generating unacceptable scour velocities in the remaining channel section.



2.3 Coffer Dam and Stream Bypass via Gravity

Applications: Dewatering/water diversion, turbidity control

Limitations:

- Pipes need to be adequately sized to accommodate heavy rain events.
- Coffer dams require careful maintenance at all times.

Overview:

A coffer dam is a temporary structure used during instream work to enclose a work area by diverting stream flow via gravity (or using pumps) while containing sediment and turbidity. Coffer dams make an impoundment upstream of a work area and then use a piping and gravity to remove the water from inside the dammed (isolated) area to beyond the work area. They are used in areas with high flows where siltation barriers are not effective. Coffer dams can consist of sandbags, concrete structures, or pre-manufactured products and should be used on a site-by-site basis according to engineering specifications and/or manufacturer's instructions.

Dewatering measures may be necessary if groundwater is encountered within an excavation (e.g., during installation or repair of a buried cable, footings, foundations or structure replacement) or other area if the presence of water is incompatible with construction. In rare cases, surface water diversions will be necessary in order to create dry working conditions for subsurface work in water bodies.

Installation:

- All cofferdam installations should be designed and approved by engineering staff following geotechnical and hydrological studies. If using a pre-fabricated product, follow manufacturer's instructions and engineer's guidance.
- Place hay bales or silt fence along the streambanks approaching the edges of the workspace.
- Coffer dams should be a semicircle or U-shaped and lined with a geotextile. Use clean durable rockfill or large pre-cast concrete blocks for construction.
- Locate the geotextile outside of the dam for the upstream half and inside for the downstream half to prevent displacement of the geotextile. Place the geotextile with a short flap (1 foot) at the base of the dam, weighted down with clean rockfill.
- Dewatering of the isolated work area may or may not be necessary or even possible. If dewatering is necessary, install an impermeable liner or clay plug.
- After the sediment in suspension has settled out, remove the cofferdam carefully so that sediment disturbance is minimized.
- Do not install in channels where dams would hinder the passage of boats or fish.

Maintenance:

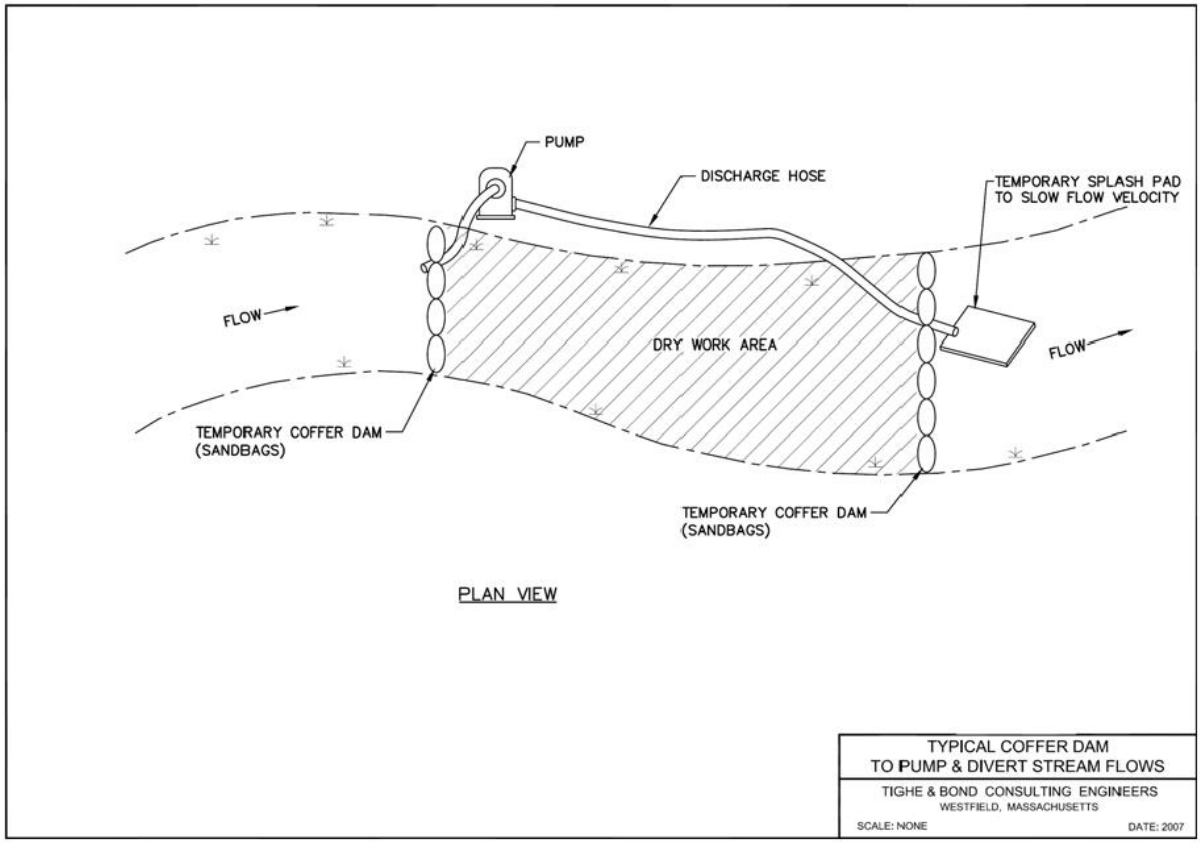
- Cofferdams require careful maintenance at all times.
- Observe the stream flow for any turbidity as a result of the construction activities.

Additional Comments:

Where gravity flows cannot be circumvented through a coffer dam and temporary flexible pipe via gravity, use a pump, discharge hose and downstream temporary splash pad to slow flow velocity can be used. The instream constriction caused by the cofferdam should be small in order to avoid generating unacceptable scour velocities in the remaining channel section.



Sand bag coffer dam and streamflow gravity bypass.


PUMP
DISCHARGE HOSE
TEMPORARY SPLASH PAD
TO SLOW FLOW VELOCITY
FLOW
DRY WORK AREA
FLOW
TEMPORARY COFFER DAM
(SANDBAGS)
TEMPORARY COFFER DAM
(SANDBAGS)
PLAN VIEW
TYPICAL COFFER DAM
TO PUMP & DIVERT STREAM FLOWS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2007

2.4 Silt Barriers

Applications: Turbidity control

Limitations:

- Must be rated to withstand anticipated flow velocity and quantity.

Overview:

Staked and floating silt barriers are temporary flexible barriers used within a waterbody to separate or deflect natural flow around a work area. Barriers are placed around the sediment source to contain the sediment-laden water, allowing suspended soil particle to settle out of suspension and stay in the immediate area. The staked barrier consists of geotextile fabric attached to support posts and a wire support fence and a chain sewn into a sleeve along the bottom edge to allow the barrier to conform to the channel.

The floating silt barriers are often called silt or turbidity curtains, and can be purchased from manufacturers or can be made on site. Construction generally includes a skirt (geotextile fabric) that forms the barrier, flotation segments such as styrofoam sealed in a seam along the top of the fabric, a ballast chain sealed into a sleeve along the bottom edge of the fabric, a loadline built into the barrier above or below the floatation segments, and piles or posts tied back to underwater or on shore anchor points.

Staked Silt Barriers

- For installations which only isolate a part of the stream, barriers can be used in higher flows (shallow streams with currents less than 0.5 ft/s).
- Do not use in streams/river with strong currents, strong waves, ice, floating debris, or boats and do not place barriers completely across stream channels unless they are minor or intermittent streams with negligible flow.

Installation:

- Place the staked barrier and wire support fence at least 1 foot above the waterline. Do not install in a waterbody deeper than 4 feet.
- Place support stakes 10 feet apart and drive them 2 feet into the channel bottom.
- Fasten the wire mesh securely against the fabric with heavy duty wire staples at least 1” long. If possible, use a continuous roll of fabric and fasten securely to the posts with heavy duty staples with a maximum spacing of 2”.
- Where possible, prefabricate a staked barrier on shore. Carefully roll it up lengthwise and move it into place.
- Secure the bottom edge of fabric to the channel bottom by placing a heavy chain into a sewn sleeve along the fabric edge, or by placing clean rockfill over the edge.

Floating Silt Barriers

- Use only in negligible or low flow conditions. Can be used for instream areas between 2.6 feet and 6 feet deep and with waves potentially up to 10 feet.

- Do not use to stop, divert, or filter a significant volume of water.

Installation:

- Purchasing a pre-manufactured silt curtain such as Siltmaster® will save time constructing the barrier. Follow manufacturer's advice for the area.

- Enclose the smallest area as practicable. Locate the barrier far enough away from construction equipment to avoid damage.

- Launch the furled barrier from a ramp, pier or shore. Set the shore anchor points and tie off one end of the barrier to the stream anchor point and the downstream end to a boat. Bring to the downstream point to be anchored.

- Anchor the barrier in the desired formation and make sure the skirt is not twisted around the flotation.

- Cut the furling ties and let the ballast sink to its maximum depth.

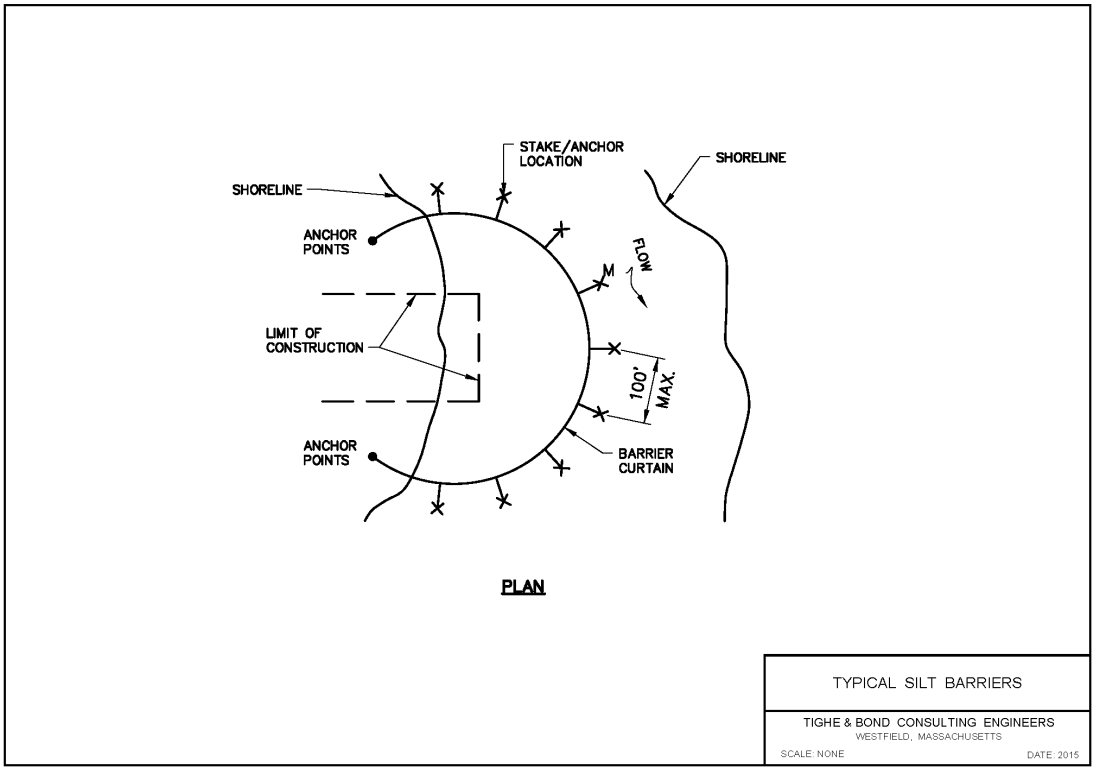
- Slant the barrier at an angle, not perpendicular to the flow. If the barrier will be exposed to reversing currents, anchor it on both sides.

Maintenance for both:

- Inspect daily for any rips or tears or turbidity in the stream flow. Repair immediately with overlapping pieces of geotextile fabric.

- Remove accumulated sediment from the base of the barrier. If necessary, dewater turbid water to an onshore filter bag before removing the barrier.

- Remove the barrier carefully when the work is completed and after suspended sediments have time to settle out.


STAKE/ANCHOR LOCATION
SHORELINE
SHORELINE
ANCHOR POINTS
FLOW
LIMIT OF CONSTRUCTION
100' MAX.
ANCHOR POINTS
BARRIER CURTAIN
PLAN
TYPICAL SILT BARRIERS
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS
SCALE: NONE
DATE: 2015

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Tighe&Bond

APPENDIX B

Appendix B

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Appendix B

B.1 Applicable Laws/Regulations

In Connecticut, there are no fewer than eight potentially pertinent regulatory programs associated with activities proposed in environmentally sensitive areas. The following list of laws and regulations are most likely to apply to electrical utility projects in the State.

- Connecticut Inland Wetlands and Watercourses Act (C.G.S. §§ 22a-36 through 22a-45a)
- Municipal inland wetland and zoning regulations
- Connecticut General Permit for Water Resource Construction Activities (C.G.S. §§ 22a-6, 22a-45a and 22a-378a)
- Connecticut Environmental Policy Act (C.G.S. §§ 22a-1a through 22a-1h)
- Connecticut Coastal Management Act (C.G.S. §§ 22a-359 through 22a-363; 22a-28 through 22a-35; 22a-90 through 22a-112; 33 U.S.C. § 1314)
- Connecticut Water Diversion Policy Act (C.G.S. §§ 22a-365 through 22a-379)
- Connecticut Endangered Species Act (C.G.S. §§ 26-303 through 26-315)
- Section 10 of the Rivers and Harbors Act of 1899 (C.G.S. §§ 22a-426; 33 U.S.C. § 403)
- Section 401 of the Clean Water Act (33 U.S.C. § 1251)
- Section 404 of the Clean Water Act (33 U.S.C. § 1344)

B.2 Geographic Areas Subject to Jurisdiction

The following areas are subject to regulatory jurisdiction by at least one of the regulatory programs discussed in this section: It is important to note that more than one jurisdictional resource type may be present at any given location.

- Inland wetlands, watercourses (rivers, streams, lakes, ponds), and floodplains
- Areas subject to municipal wetlands bylaws or ordinances. (These vary by town.)
- Coastal Resource Areas (beaches, dunes, bluffs, escarpments, coastal hazard areas, coastal waters, nearshore waters, offshore waters, estuarine embayments, developed shorefront, intertidal flats, islands, rocky shorefronts, shellfish concentration areas, shorelands, and tidal wetlands)
- Navigable waters
- Essential Fish Habitat (EFH)
- Rare species habitat as mapped by the Connecticut Natural Diversity Database

B.3 Applicable Regulatory Agencies

Activities subject to jurisdiction under the above-referenced programs will generally be subject to review by one or more regulatory agencies (refer to list below). Most stream and wetland crossings will require notification or consultation with municipal Inland Wetland and Watercourses Agencies, and may require permitting with the U.S. Army Corps of Engineers (Corps) and Connecticut Department of Energy & Environmental Protection (CT DEEP) under Sections 404 and 401 of the Clean Water Act. Coordination with CT DEEP may also be required for projects located within areas mapped by the Connecticut Natural Diversity Database. For work within tidal, coastal or navigable waters or in tidal wetlands, permitting will be required with the Connecticut Department of Energy & Environmental Protection (CT DEEP) Office of Long Island Sound Program (OLISP).

- Municipal Conservation Commissions
- Connecticut Department of Energy & Environmental Protection (CT DEEP) Bureau of Water Management, Inland Water Resources Division
- CT DEEP Wildlife Division
- CT DEEP Office of Environmental Review
- CT DEEP Office of Long Island Sound Programs (OLISP)
- United States Army Corps of Engineers (Corps) New England District

The State of Connecticut and the Federal Government define wetlands differently. According to the Inland Wetlands and Watercourses Act, inland wetlands are defined as "land, including submerged land, not regulated pursuant to Sections 22a-28 through 22a-35 of the Connecticut General Statutes, as amended, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soil Survey, as it may be amended from time to time by the United States Department of Agriculture Natural Resource Conservation Service. Such areas may include filled, graded, or excavated sites which possess an aquic (saturated) soil moisture regime as defined by the National Cooperative Soil Survey." State wetland identification is based solely on the presence of these soil types.

"Watercourses" means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon this state or any portion thereof. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation.

The Federal Government defines wetlands as "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Federal wetland identification is based on a three parameter approach, where a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology is used to make a wetland determination.

B.4 Maintenance, Repair, or Emergency Projects

Most regulatory programs contain provisions that allow normal maintenance of existing structures and/or response to emergency situations that require immediate attention.

Prior to commencement of new construction, all jurisdictional wetland areas within the work corridor should be delineated by a qualified wetland and soil scientist. The specialist shall delineate areas in accordance with the General Statutes of Connecticut (revised January 1, 2007) as set forth at Title 22a Chapter 440 "Inland Wetlands and Watercourses Act", the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual, and any local inland wetland regulations, ordinances or bylaws that may exist. Refer to each set of regulations regarding applicable wetland definitions. Wetland areas shall be clearly demarcated using appropriate flagging tape or similar means. It is important to note that certain jurisdictional wetland areas in Connecticut can actually occur in uplands, such as floodplains. In addition, Upland Review Areas generally apply to work activities and vary in each community. This makes consultation with a wetland specialist particularly important.

B.4.1 Maintain, Repair and/or Replace

Exemptions or considerations for maintenance, repair, and/or replacement of existing electrical utility structures exist in some environmental regulations, but not all. The exemptions are limited to work related to existing and lawfully located structures where no change in the original structure or footprint is proposed. It is not for the selected contractor of a particular project to make a determination as to whether an activity is exempt. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

These exemptions/considerations are afforded at:

- CT Inland Wetlands & Watercourses Act (RCSA § 22a-39-4)
- CT General Permit (Section 3)
- CT Coastal Management Act (RCSA § 22a-363b)
- CT GP [33 CFR 323.4(a)(2)]
- CT Water Diversion Policy Act (RCSA § 22a-377(b)1)

B.4.2 Emergency Projects

Emergency provisions are generally afforded to activities that need to abate conditions that pose a threat to public health or safety. These provisions generally do not allow work beyond what is necessary to abate the emergency condition, and will generally require an after-the-fact permit. It is not for the selected contractor of a particular project to make a determination as to whether an activity is an emergency. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

It is important to note that invocation of an emergency provision does not release the project proponent from reporting requirements.

Emergency provisions are afforded at:

- CEPA (RCSA § 22a-1a-3)
- CT Coastal Management Act (RCSA § 22a-29)
- CT GP [33 CFR Part 323.4(a)(2)]

B.5 Municipal Permitting

Work within wetlands, watercourses and designated Upland Review Areas typically requires notification to municipal staff, (Department of Public Works and/or the Inland Wetland and Watercourse Agency staff). In October 1996 the Connecticut Department of Public Utility Control opened a docket (Docket Number 95-08-34) to conduct a generic investigation on the allocation of siting jurisdiction over utility plant facilities. This included an investigation as to whether local authorities (including local Inland Wetlands and Watercourses Agencies) have jurisdiction over public utility projects.

The investigation resulted in several orders which provide guidance on how public utility companies should coordinate with municipalities on the construction of new facilities, upgrades, significant maintenance activities, and routine maintenance activities.

- For the construction of new facilities, alterations to existing facilities (including upgrades) or significant maintenance involving substantial disturbance of soil, water or vegetation which would regularly fall under the review requirements of certain local authorities (ie. Planning and Zoning Authority; Inland Wetlands Commission; Public Works Department; Historic District Commission), the utility shall at least notify and consult with such local authority, or its designated agent or staff, toward the development of mutually agreeable schedules and procedures for the proposed activity.
- For routine maintenance activities or alterations to existing facilities (including upgrades) involving minor disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities, the utility shall make local authorities or their designated agent or staff aware of such ongoing activities.

B.6 CT Department of Energy & Environmental Protection

If the project requires formal permitting with the Corps (Category 2 or Individual Permit), copies of the application should be forwarded to CT DEEP for review under Section 401 of the Clean Water Act. The CT DEEP requires that a GP Addendum form be completed and submitted along with the Corps application. If the project qualifies as Category 1 under the Corps GP, the project also is granted authorization (Water Quality Certification, WQC) with no formal application under Section 401 of the Clean Water Act, provided the project meets the additional WQC general conditions. The general conditions commonly applicable to utility projects include:

- Prohibiting dumping of any quantity of oil, chemicals, or other deleterious material on the ground;

- Immediately informing the CT DEEP Oil and Chemical Spill Response Division at (860) 424-3338 (24 hours) of any adverse impact or hazard to the environment including any discharge or spillage of oil or chemical liquids or solids;

- Separating staging areas at the site from the regulated areas by silt fences or stray/hay bales at all times;

- Prohibiting storage of any fuel and refueling of equipment within 25 feet from any wetland or watercourse;

- Following the document "Connecticut Guidelines for Soil and Erosion Control," inspecting employed controls at least once per week, after each rainfall, and at least daily during prolonged rainfall, and correcting any deficiencies within 48 hours of being found.

- Prohibiting the storage of any materials at the site which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, or which could in the event of a flood be injurious to human, animal or plant life, below the elevation of the 500 year flood. Any other material or equipment stored at the site below this elevation must be firmly anchored, restrained or enclosed to prevent flotation. The quantity of fuel for equipment at the site stored below such elevation shall not exceed the quantity of fuel that is expected to be used by such equipment in one day.

- Immediately informing DEEP at (860) 424-3019 and the Corps at (617) 647-8674 of the occurrence of pollution or other environmental damage in violation of the WQC, and within 48 hours support a written report including information specified in the general conditions.

If the project falls within areas mapped by the Connecticut Natural Diversity Database, or is less than 0.50 miles upstream or downstream of a mapped area, a data request and possible coordination will be required with the Natural Diversity Database.

If a project is located within tidal, coastal or navigable waters of the state or in tidal wetlands, permitting may be required with the CT DEEP OLISP. For the routine maintenance of previously permitted structures or structures that were in place prior to June 24, 1939, no permitting is required. For significant maintenance of previously permitted structures or structures that were in place prior to June 24, 1939, a Certificate of Permission is required. For new projects a Structures, Dredging and Fill Permit and/or a Tidal Wetlands Permit may be required. The CT DEEP OLISP should be consulted prior to preparing permits to conduct a pre-application meeting and determine the appropriate permitting route.

B.7 U.S. Army Corps of Engineers

Work within wetlands and waters of the United States is subject to jurisdiction under Section 404 of the Clean Water Act, which is administered by the Corps. Work within navigable waters is also administered by the Corps under Section 10 of the Rivers and Harbors Act of 1899. The Corps has issued a General Permit (GP) which establishes categories for projects based on their nature of impacts. The current permit was issued on July 15, 2011, and expires on July 15, 2016. The permit will be reissued by July 15, 2016 for another five years. Applications are not required for Category 1 projects, but

submittal of a Category 1 Form before the work occurs and submittal of a Compliance Certification Form within one month after the work is completed is required. The Category 1 Form and Compliance Certification Form entails self-certification by applicants that their project complies with the terms and conditions of Category 1 of the GP. Category 2 projects require the submittal of an application to the Corps, followed by a screening of the application by the Corps, the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, National Marine Fisheries Service and CT DEEP, and consultation with the Connecticut Commission on Culture and Tourism and Tribal Historic Preservation Officers. Category 2 projects may not proceed until written approval from the Corps is received. Written approval is generally provided within 45 days of the multi-agency screening. After written approval is received, a Work-Start Notification Form must be submitted before the work occurs, and a Compliance Certification Form must be submitted within one month after the work is completed.

For work proposed within a FEMA floodway or floodplain, the Corps recommends that the applicant apply for and receive a Flood Management Certification (if required), prior to applying to the Corps. Additionally, applications for Category 2 inland projects that propose fill in Corps jurisdiction must include an Invasive Species Control Plan (ISCP), unless otherwise directed by the Corps.

An Individual Permit requires a formal permit application to be submitted to the Corps. The application is reviewed in detail by both state and federal agencies, and a Public Notice is released for public comment. Projects which trigger an Individual Permit generally result in significant impacts to wetlands and/or watercourses.

Stream and wetland crossings are only subject to jurisdiction under the Corps if there is **a discharge of dredge or fill material into wetlands or waters of the United States**. Equipment access through a stream or wetland with no structural BMP is not regulated by the Corps if there is no discharge of dredge or fill material (note that equipment rutting as a result of not using an appropriate BMP can be considered a "discharge of dredge material"). Similarly, the use of a timber or rail car bridge that extends from bank to bank with no stream impacts is not regulated by the Corps. Additionally, the use of timber mats and stone is considered "fill material" by the Corps, and must be calculated to determine overall impacts. Temporary mats are not counted towards the 1 acre threshold under Category 2 if they are adequately cleaned after previous use, removed immediately after completion of construction and disposed of at an upland site.

Maintenance, including emergency reconstruction of currently serviceable structures, is exempt from Corps jurisdiction and does not require formal permitting. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs to qualify for this exemption.

Stream and wetland crossings that involve the discharge of dredge and fill material may be conducted under Category 1 if the work complies with the general conditions and Category 1 criteria of the GP. The following are Category 1 criteria that are commonly applicable to stream and wetland crossings in utility rights of way. See Section 1.8 for additional criteria for culvert crossings:

- The work results in less than 5,000 square feet of impacts to wetlands or waters of the United States. Replacement of utility line projects with impacts solely

within wetlands greater than 5,000 square feet may be eligible for Category 1 Authorization after consultation with the Corps about the specific project;

- Temporary fill, with the exceptions of swamp and timber mats, discharged to wetlands shall be placed on geotextile fabric laid on the pre-construction wetland grade. Unconfined temporary fill discharged into flowing water (rivers and streams) shall consist only of clean stone. All temporary fill shall be removed as soon as it is no longer needed, and disposed of at an appropriate upland site.
- Any unconfined in-stream work, including construction, installation or removal of sheet pile cofferdam structures, is conducted during the low-flow period between July 1 and September 30. However, installation of cofferdams, other than sheet pile cofferdams, is not restricted to the low-flow period;
- No work will occur in the main stem or tributary streams of the Connecticut River watershed that are being managed for Atlantic salmon (*Salmo salar*). (Work of this nature requires screening for potential impacts to designated Essential Fish Habitat.);
- The work does not result in direct or secondary impacts to Special Wetlands, Threatened, Endangered or Special Concern Species, or Significant Natural Communities identified by the Connecticut Natural Diversity Database. Work within 750 feet of vernal pools shall be minimized;
- The project does not require a Corps permit with associated construction activities within 100 feet of Special Wetlands;
- The project does not result in fill placed within a FEMA established floodway, unless the applicant has a State of Connecticut Flood Management Certification pursuant to Section 25-68d of the Connecticut General Statutes;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands;
- The project is not located in a segment of a National Wild and Scenic River System (includes rivers officially designated by Congress as active study status rivers for possible inclusion) or within 0.25 miles upstream or downstream of the main stem or tributaries to such a system;
- The project has no potential for an effect on a historic property which is listed or eligible for listing in the National Register of Historic Places;
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service;
- Section 106 needs to be taken into account for all work that requires federal permitting – including Category 1;
- The project does not use slip lining, plastic pipes, or High Density Polyethylene Pipes (HDPP).
- Appropriate BMPs are employed in regards to heavy equipment in wetlands (General Condition 16) and sedimentation and erosion controls (General Condition 20).

- Disturbed inland wetland areas are restored in accordance with General Condition 18.

Stream and wetland crossings that involve the discharge of dredge and fill material may be conducted under Category 2 if the work complies with the general conditions and Category 2 criteria of the GP. The following are Category 2 criteria that are commonly applicable to stream and wetland crossings in utility right of ways. See Section 1.8 for additional criteria for culvert crossings:

- The work results in less than one acre of impacts to wetlands or waters of the United States;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands.
- Temporary fill, with the exceptions of swamp and timber mats, discharged to wetlands shall be placed on geotextile fabric laid on the pre-construction wetland grade. Unconfined temporary fill discharged into flowing water (rivers and streams) shall consist only of clean stone. All temporary fill shall be removed as soon as it is no longer needed, and disposed of at an appropriate upland site.
- Appropriate BMPs are employed in regards to heavy equipment in wetlands (General Condition 16) and sedimentation and erosion controls (General Condition 20).
- Disturbed inland wetland areas are restored in accordance with General Condition 18.

Stream and wetland crossings that cannot meet Category 1 or Category 2 criteria may require review under an Individual Permit. The Corps should be consulted before assuming an Individual Permit will be required, as exceptions can be made under certain circumstances.

B.8 Culvert Installation

New culvert installation or existing culvert replacements will require notification or consultation with municipal staffers which might include the Department of Public Works and/or the inland wetlands officer, and may require permitting with the Corps under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899, and the CT DEEP under Section 401 of the Clean Water Act. Coordination with CT DEEP may also be required for projects located within areas mapped by the Connecticut Natural Diversity Database. For work within tidal, coastal or navigable waters or in tidal wetlands, permitting will be required with the CT DEEP Office of Long Island Sound Program (OLISP).

B.8.1 Municipal Permitting

See Section 1.5 for general local permitting guidance.

- For the installation of new culverts and the replacement of culverts that involve substantial disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities (ie.

Planning and Zoning Authority; Inland Wetlands Commission; Public Works Department; Historic District Commission), the utility shall at least notify and consult with such local authority, or its designated agent or staff, toward the development of mutually agreeable schedules and procedures for the proposed activity.

- For the replacement of culverts involving only minor disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities, the utility shall make local authorities or their designated agent or staff aware of such ongoing activities.

B.8.2 CT Department of Energy & Environmental Protection

If the project requires formal permitting with the Corps, copies of the application should be forwarded to CT DEEP for review under Section 401 of the Clean Water Act. The CT DEEP requires that a PGP Addendum form be completed and submitted along with the Corps application.

If a culvert project falls within areas mapped by the Connecticut Natural Diversity Database, or falls within 0.50 miles upstream or downstream of a mapped area, a data request and possible coordination will be required with the Natural Diversity Database.

If a culvert project is located within tidal, coastal or navigable waters of the state or in tidal wetlands, permitting will be required with the CT DEEP OLISP. For new projects a Structures, Dredging and Fill Permit and/or a Tidal Wetlands Permit will be required. For replacement structures which were previously permitted, or which were in place prior to June 24, 1939, a Certificate of Permission may only be required, which entails a shorter permitting process.

B.8.3 U.S. Army Corps of Engineers

See Section 1.7 for general Corps permitting requirements. Open bottom arches, bridge spans or embedded culverts are preferred over traditional culverts and are required for Category 1 projects. However, where site constraints make these approaches impractical, the Corps should be consulted.

New bridge or open-bottom structure crossings may be conducted under Category 1 or Category 2 if the following criteria are met in addition to meeting any applicable general criteria listed in section 1.7 of this manual:

- The work spans at least 1.2 times the watercourse bank full width;
- The structure has an openness ratio equal to or greater than 0.25 meters;
- The structure allows for continuous flow of the 50-year frequency storm flows.

New culvert installations may be conducted under Category 1 if the work complies with the general conditions and Category 1 criteria of the GP. The following are Category 1 criteria that are commonly applicable to new culvert installations in utility right of ways:

- Work is conducted in accordance with the design requirements listed in Section 3.1.3 of the Best Management Practices Manual;
- Plastic and High Density Polyethylene Pipes (HDPE) are not used;

- The work results in less than 5,000 square feet of impacts to wetlands or waters of the United States;
- Any unconfined in-stream work, including construction, installation or removal of sheet pile cofferdam structures, is conducted during the low-flow period between July 1 and September 30, except in instances where a specific written exception has been issued by the Connecticut Department of Energy & Environmental Protection. However, installation of cofferdams, other than sheet pile cofferdams, is not restricted to the low-flow period;
- No open trench excavation is conducted within flowing waters. Work within flowing waters can be avoided by using temporary flume pipes, culverts, cofferdams, etc. to isolate work areas and maintain normal flows;
- The tributary watershed to the culvert does not exceed 1.0 square mile (640 acres);
- The culvert gradient (slope) is not steeper than the streambed gradient immediately upstream or downstream of the culvert;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than 25% of the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The structure does not otherwise impede the passage of fish and other aquatic organisms;
- The structure allows for continuous flow of the 50-year frequency storm flows;
- The work does not result in direct or secondary impacts to Special Wetlands, Threatened, Endangered or Special Concern Species, or Significant Natural Communities identified by the Connecticut Natural Diversity Database. Work within 750 feet of vernal pools shall be minimized;
- The project does not require a Corps permit with associated construction activities within 100 feet of Special Wetlands;
- The project does not result in fill placed within a FEMA established floodway, unless the applicant has a State of Connecticut Flood Management Certification pursuant to section 25-68d of the Connecticut General Statutes;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands;
- The project is not located in a segment of a National Wild and Scenic River System (includes rivers officially designated by Congress as active study status

rivers for possible inclusion) or within 0.25 miles upstream or downstream of the main stem or tributaries to such a system;

- The project has no potential for an effect on a historic property which is listed or eligible for listing in the National Register of Historic Places;
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service.
- Appropriate BMPs are employed in regards to sedimentation and erosion controls (General Condition 20).

New culvert installations may be conducted under Category 2 if the work complies with the general conditions and Category 2 criteria of the GP. The following are Category 2 criteria that are commonly applicable to new culvert installations in utility right of ways:

- Work is conducted in accordance with the design requirements listed in Section 3.1.3 of the Best Management Practices Manual;
- The work results in less than one acre of impacts to wetlands or waters of the United States;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- There is no practicable alternative location for the crossing that would have less environmental impacts;
- The use of a bridge or open-bottom structure is determined to be not practicable;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The culvert has an openness ratio equal to or greater than 0.25 meters;
- The structure does not result in a change in the normal water surface elevation of the upstream waters or wetlands;
- The structure allows for continuous flow of the 50-year frequency storm flows;
- Appropriate BMPs are employed in regards to sedimentation and erosion controls (General Condition 20).

New culvert installations that cannot meet Category 1 or Category 2 criteria may require review under an Individual Permit. The Corps should be consulted before assuming an Individual Permit will be required, as exceptions can be made under certain circumstances.

In-kind replacement of culverts using the same materials is exempt from Section 404 of the Clean Water Act, and does not require permitting with the Corps. The Corps, however, should be consulted before assuming an activity is exempt from their jurisdiction. Consult with Siting and Permitting.

Bridge or open-bottom structure replacements may be conducted under Category 1 if the conditions for a new bridge or open-bottom structure replacement have been met. In addition, bridge or open-bottom structure replacements should not result in a change in the normal surface elevation of the upstream waters or wetland, and the replacement structure should have a riparian bank on one or both sides for wildlife passage. Culvert replacements may be conducted under Category 1 if the conditions for new culvert installation are met.

Bridge or open-bottom structure replacements may be conducted under Category 2 if the conditions for a new bridge or open-bottom structure replacement have been met. Culvert replacements may be conducted under Category 2 if the following conditions are met:

- The work results in 5,000 square feet to less than one acre of impacts to wetlands or waters of the United States;
- The use of a bridge or open-bottom structure is determined to be not practicable;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The culvert has an openness ratio equal to or greater than 0.25 meters;
- The structure does not result in a change in the normal water surface elevation of the upstream waters or wetlands;
- The structure allows for continuous flow of the 50-year frequency storm flows.
- Appropriate BMPs are employed in regards to sedimentation and erosion controls (General Condition 20).

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Appendix C

C.1 Applicable Laws/Regulations

In Massachusetts, there are no fewer than seven potentially pertinent regulatory programs associated with activities proposed in environmentally sensitive areas. The following list of laws and regulations are most likely to apply to electrical utility projects in the Commonwealth.

- Massachusetts Wetlands Protection Act (M.G.L. 131 § 40) (MA WPA)
- Municipal wetland bylaws (varies by town)
- Massachusetts Endangered Species Act (M.G.L. 131A) (MESA)
- "Chapter 91" Public Waterfront Act (M.G.L. c. 91 §§ 1 through 63)
- Massachusetts Environmental Policy Act (M.G.L. c. 30 §§ 61 through 62H) (MEPA)
- Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403)
- Section 401 of the Clean Water Act (33 U.S.C. § 1251)
- Section 404 of the Clean Water Act (33 U.S.C. § 1344)
- Massachusetts Watershed Protection Act (M.G.L. 92A §1/2) (MA WsPA)

C.2 Geographic Areas Subject to Jurisdiction

The following areas are subject to regulatory jurisdiction by at least one of the regulatory programs discussed in this section: It is important to note that more than one jurisdictional resource type may be present at any given location. Further, while coastal wetland resource areas are jurisdictional under the Massachusetts Wetlands Protection Act (MAWPA), Eversource's territory does not extend into these areas at the present time. Therefore, these areas are not discussed in detail below.

- Massachusetts Wetlands Protection Act Resource Areas:
    - (Inland). Bordering Vegetated Wetland; Bank; Land Under Water Bodies and Waterways; Land Subject to Flooding; 200-foot Riverfront Area and associated 100-foot Buffer Zones.
- Areas subject to municipal wetlands bylaws or ordinances. (These vary by town.)
- Estimated and/or Priority Habitat of State-listed Rare Species
- Outstanding Resource Waters (ORWs = certified vernal pools and public surface drinking waters)
- Essential Fish Habitat (EFH)
- Cold Water Fisheries Resources (CFRs)
- Areas of Critical Environmental Concern (ACECs)
- Great Ponds
- Navigable waterways

- Quabbin Reservoir, Ware River and Wachusett Reservoir watersheds

C.2.1 Endangered Species

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) maintains the current list of rare and endangered species and species of special concern in Massachusetts. Publically available data only allows for identification of Priority Habitats for the listed species, not specific species information. Priority Habitat location information is available on the NHESP website.

Species specific information is provided for planned linear maintenance activities which are submitted to NHESP in WMECO's annual O&M Plan. Projects/ activities which are not covered in the O&M Plan must file an independent request for information.

Applicable regulations and agency are listed below:

- Massachusetts Endangered Species Act: 321 CMR 10.00 – Division of Fish and Wildlife – NHESP

C.2.2 Vernal Pools

NHESP maintains a database of certified and potential vernal pools in Massachusetts. These data are available on the NHESP website and MassGIS. Certified vernal pools are considered Outstanding Resource Waters. The Corps' GP modified July 28, 2011 includes provisions for protection of certified vernal pools and potential vernal pools, including the vernal pool depression, the vernal pool envelope (area within 100 feet of the vernal pool depression's edge), and the critical terrestrial habitat (area within 100-750 feet of the vernal pool depression's edge). Temporary impacts associated with timber (construction) mats in previously disturbed areas of existing utility projects rights-of-way are exempt from GP requirements regarding work in the vernal pool envelope or critical terrestrial habitat, provided that a Vegetation Management Plan exists that avoids, minimizes and mitigates impacts to aquatic resources. Applicable regulations and agencies for certified vernal pools are listed below:

- Wetlands Protection Act: 310 CMR 10.00 – MassDEP and local Conservation Commissions

- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP

- Department of the Army General Permit Commonwealth of Massachusetts - Corps

C.2.3 Essential Fish Habitat and Wild & Scenic River Designation

Essential Fish Habitat is a habitat essential for spawning, breeding, feeding, or growth to maturity of federally managed species. This website provides more information: www.greateratlantic.fisheries.noaa.gov/habitat. Consultation with the Corps is recommended to confirm the location of Essential Fish Habitat with respect to a proposed project.

Currently portions of the Westfield River and its tributaries, the Farmington River, West Branch, portions of the Sudbury, Assabet, and Concord Rivers, and the Taunton River are designated as National Wild and Scenic Rivers (www.rivers.gov/wildriverslist.html) in

Massachusetts. The Lower Farmington and Salmon Brook and Nashua Rivers are under study to determine consideration for National Wild and Scenic designation (www.rivers.gov/study.html). The Corps reviews projects for impacts to both Essential Fish Habitat and National Wild & Scenic Rivers.

- Department of the Army General Permit Commonwealth of Massachusetts – Corps

C.2.4 Cold Water Fisheries Resources

The Massachusetts Division of Fisheries and Wildlife maintains a list of waters that are known to have cold water fisheries resources (CFRs). This list is useful in highlighting environmental sensitive areas which could be avoided during project planning. The MassDEP reviews projects for potential impacts to CFRs.

- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP

C.2.5 Outstanding Resource Waters

Outstanding Resource Waters include Certified Vernal Pools (CVPs), surface drinking water supplies and tributaries to surface drinking water supplies. CVPs are determined by NHESP and locations are available through MassGIS. Locations of surface water supplies and other Outstanding Resource Waters are also available through MassGIS. The applicable regulations and agency are listed below:

- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP

C.2.6 Historic and Cultural Resources

The Massachusetts Historic Commission (MHC) is the State Historic Preservation Office (SHPO) and is responsible for protecting the state's historic and cultural resources. In addition, four Native American tribes have interests in Massachusetts, and the Board of Underwater Archaeological Resources (BUAR) protects underwater resources in Massachusetts' lakes, ponds, rivers and coastal waters. Historic and cultural concerns are typically associated with maintenance activities that may require excavation (i.e. new poles, new roads, guy wire installations, etc.).

C.3 Applicable Regulatory Agencies

Activities subject to jurisdiction under the above-referenced programs will generally be subject to review by one or more regulatory agencies (refer to list below). New stream and wetland crossings not related to maintenance will require permitting with municipal Conservation Commissions, and may require permitting with the U.S. Army Corps of Engineers (Corps) and Massachusetts Department of Environmental Protection (MassDEP) under Sections 404 and 401 of the Clean Water Act. Any non-maintenance work within Land Under Water will require permitting with the MassDEP Wetland and Waterways Division. Coordination with the NHESP may also be required for projects located within areas mapped as priority and/or estimated habitat for state-listed rare species. For work within navigable waters, consultation may be required with the Massachusetts Office of Coastal Zone Management (MA CZM).

- Municipal Conservation Commissions
- Massachusetts Department of Environmental Protection (MassDEP) Wetlands and Waterways Program
- Massachusetts Division of Fish and Wildlife: Natural Heritage and Endangered Species Program (NHESP)
- Massachusetts Executive Office of Environmental Affairs (EOEA)
- United States Army Corps of Engineers (Corps) New England District
- Massachusetts Office of Coastal Zone Management (MA CZM)
- Massachusetts Division of Conservation and Recreation (MA DCR)

C.4 Maintenance, Repair, or Emergency Projects

Most regulatory programs contain provisions that allow normal maintenance of existing structures and/or response to emergency situations that require immediate attention.

C.4.1 Maintain, Repair and/or Replace

Exemptions or considerations for maintenance, repair, and/or replacement of existing electrical utility structures exist in some environmental regulations, but not all. The exemptions are limited to work related to existing and lawfully located structures where no change in the original structure or footprint is proposed. It is not for the selected contractor of a particular project to make a determination as to whether an activity is exempt. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

These exemptions/considerations are afforded at:

- MAWPA (M.G.L Chapter 131, § 40, paragraph 1)
- MAWPA regulations for Riverfront Area (310 CMR 10.58(6))
- MEPA regulations (301 CMR 11.01(2)(b)(3))
- 33 CFR Part 323.4(a)(2)
- MA 401 WQC (314 CMR 9.03(1))
- MESA (M.G.L. Chapter 131A, § 3; 321 CMR 10.14(5-7) and (12)
- MAWPA (350 CMR 11.05(11) and (12))
- National Pollutant Discharge Elimination System (NPDES), Construction General Permit (as modified effective February 16, 2012)

However, certain operations and maintenance activities which impact Waters of the United States are subject to Sections 401 and 404 of the Clean Water Act, per Sections 1.6 and 1.7 below.

C.4.2 Emergency Projects

Emergency provisions are generally afforded to activities that need to abate conditions that pose a threat to public health or safety. These provisions generally do not allow work beyond what is necessary to abate the emergency condition, and will generally require an after-the-fact permit. It is not for the selected contractor of a particular

project to make a determination as to whether an activity is an emergency. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

It is important to note that invocation of an emergency provision does not release the project proponent from reporting requirements.

Emergency provisions are afforded at:

- MAWPA regulations (310 CMR 10.06)
- MEPA (301 CMR 11.00)
- MA 401 WQC (314 CMR 9.12)
- Chapter 91 (310 CMR 9.20)
- MESA (321 CMR 10.15)

C.5 Municipal Permitting

Work within wetlands, watercourses and Buffer Zones typically requires permitting with municipal Conservation Commissions. Work that entails "maintaining, repairing or replacing, but not substantially changing or enlarging, an existing and lawfully located structure or facility used in the service of the public and used to provide electric service" is exempt under the Massachusetts Wetlands Protection Act (MA WPA) per MGL Chapter 131 Section 40. However, individual municipalities may establish their own wetlands bylaws under Home Rule authority which could require permitting for operation and maintenance activities. The table below lists communities which have a wetland bylaw in which Eversource Energy operates and maintains infrastructure. Appropriate municipal permitting or notification should be completed in these towns as required prior to conducting operation and maintenance activities.

TABLE C-1
Eversource Energy Communities with Municipal Wetland Bylaws[1]

Community	Date of Bylaw	Utility Maintenance Exemption	Notification Required
Acton	7/8/2003	Yes	No
Amherst	9/27/2006	Yes	Yes
Ashland	5/6/2009	Yes	Yes
Auburn	5/1/2012	Yes	Yes
Bedford	1987/rev. 1995	Yes	Yes
Belchertown	5/3/2006	Yes	No
Bellingham	As of 12/2015	No	Yes
Bolton	5/7/2012	Yes	No
Brookline	12/2009 (regs)	Yes	Yes
Burlington	5/20/2013	Yes	Yes
Canton	4/29/1989	Yes	Yes
Carlisle	2009	Yes	No
Carver	As of 12/2015	Yes	Yes
Chicopee	4/3/2002	Yes	No
Chilmark	10/12/1993	No	Yes
Dedham	11/182013	Yes	Yes
Deerfield	11/6/1989	Yes	Yes
Dover	5/2/1994	Yes	Yes
East Longmeadow	10/1992	Yes	Yes
Framingham	4/26/2005	Yes	Yes
Grafton	5/11/1987	Yes	Yes
Greenfield	11/23/2001	Yes	No
Hadley	5/1/2008	No	Yes
Holden	2011	Yes	Yes
Hopkinton	5/2/1995	Yes	Yes
Hampden	8/5/1992	Yes	Yes
Holyoke	11/2005	Yes	Yes
Kingston	2004	No	Yes
Leicester	11/2015	Yes	Yes
Lexington	5/3/1982	No	Yes
Lincoln	3/24/2007	No	Yes
Longmeadow	10/2000	Yes	No
Ludlow	5/1/2002	Yes	No
Maynard	12/3/2005	Yes	Yes
Medway	7/2014	Yes	Yes
Milford	5/2010	Yes	No
Millis	5/13/1191	Yes	No
Millville	5/13/2013	Yes	Yes

Community	Date of Bylaw	Utility Maintenance Exemption	Notification Required
Natick	4/27/2000	Yes	No
Needham	9/1/1988	Yes	Yes
Norfolk	11/9/2010	Yes	Yes
Northampton	8/17/1989	Yes	Yes
Northborough	5/21/1990	Yes	Yes
Northbridge	5/6/2008	Yes	Yes
Pelham	5/2/1987	Yes	Yes
Pembroke	4/22/2008	Yes	No
Plympton	5/16/2012	Yes	Yes
Richmond	5/2015	Yes	Yes
Rochester	As of 12/2015	Yes	Yes
Sharon	As of 12/2015	Yes	No
Sherborn	2013	Yes	No
Shutesbury	5/2/1987	Yes	Yes
Southborough	4/10/1995	Yes	Yes
South Hadley	12/27/2005	No	Yes
Southwick	6/6/1989	Yes	Yes
Springfield	5/5/1993	Yes	Yes
Stoneham	4/2013	Yes	Yes
Stow	5/21/2003	No	Yes
Sunderland	4/27/1990	Yes	Yes
Sutton	5/11/2015	Yes	Yes
Truro	9/30/2010	No	Yes
Upton	2009	Yes	Yes
Walpole	2002	Yes	Yes
Wayland	5/1/2002	Yes	No
Wendell	3/10/1988	Yes	Yes
West Tisbury	6/3/2004	Yes	Yes
Westborough	10/20/2008	Yes	Yes
Westfield	5/20/2003	Yes	Yes
Westwood	1989	Yes	Yes
Wilbraham	5/27/1997	Yes	Yes
Worcester	7/1/2007	Partial	Yes

[1]According to Massachusetts Association of Conservation Commissions website as of December, 2015 and Town/City websites.
[2]Refer to municipal bylaws prior to conducting work in the community.

C.6 MA Department of Environmental Protection

Review and approval under the Commonwealth's Water Quality Certification Regulations is required for "*discharge of dredged or fill materials, dredging, and dredged material disposal activities in waters of the United States within the Commonwealth which require federal licenses or permits and which are subject to state water quality certification*

under 33 U.S.C. 1251, et seq. The federal agency issuing a permit initially determines the scope of geographic and activity jurisdiction" (314 CMR 9.01(2)). An individual Water Quality Certification is required from the Massachusetts Department of Environmental Protection (MassDEP) for any activity identified at 314 CMR 9.04. In accordance with 314 9.04 (4) activities which are exempt from MGL Chapter 131 Section 40 but are subject to 33 U.S.C. 1251, *et seq*., and will result in any discharge of dredge or fill material to bordering vegetated wetlands or land under water require an individual 401 Water Quality Certification. Temporary fill placed within an Outstanding Resource Water shall require the filing of an Individual WQC and a Variance Request when required pursuant to 314 CMR 9.06(3). Activities which are exempt from Section 404 of the Clean Water Act and any other federal permit or license do not require 401 authorization.

Work within certain Outstanding Resource Waters, such as certified vernal pools, are prohibited unless a variance is obtained under 314 CMR 9.08. However, under 314 CMR 9.06(3)(c), maintenance, repair, replacement and reconstruction but not substantial enlargement of existing and lawfully located structures or facilities including roads and utilities are allowed to occur within ORWs when authorized by a Water Quality Certification.

C.7 U.S. Army Corps of Engineers

Work within wetlands and waters of the United States is subject to jurisdiction under Section 404 of the Clean Water Act, which is administered by the Corps. Work within navigable waters is also administered by the Corps under Section 10 of the Rivers and Harbors Act of 1899. The Corps has issued a General Permits (GPs) for Massachusetts which establishes categories for projects based on their nature of impacts. The General Permits were issued on February 4, 2015, and expire on February 4, 2020. Certain minor activities are eligible for Self-Verification, which requires submittal of a Self-Verification Notification Form (SVNF) before the work occurs. Activities eligible for Self-Verification are authorized under the general permit and may proceed without written verification from the Corps as long as the SVNF has been submitted and the activity meets the terms and conditions of the applicable GPs. Activities requiring Pre-Construction Notification (PCN) require the submittal of an application to the Corps, followed by a screening of the application by the Corps, the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, National Marine Fisheries Service, MassDEP, and consultation with the Massachusetts Historical Commission, Tribal Historic Preservation Officers and the Massachusetts Board of Underwater Archaeological Resources (BUAR). PCN projects may not proceed until written verification from the Corps is received. An Individual Permit requires a formal permit application to be submitted to the Corps. The application is reviewed in detail by both state and federal agencies, and a Public Notice is released for public comment. Projects which trigger an Individual Permit generally result in significant impacts to wetlands and/or watercourses.

Corps permitting does not apply to activities that fall under the maintenance exemption set forth at 33 CFR 323.4(a)(2) – Discharges Not Requiring Permits:

"Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character,

scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption."

Maintenance projects that occurred prior to the Corps jurisdiction over fill activities, or that were properly permitted, can proceed under the maintenance exemption noted above, provided that the same temporary fill areas are used. However, it is recommended that a formal determination be requested from the Corps to confirm these activities are exempt. The repair, rehabilitation or replacement of a previously authorized, currently serviceable structure or fill (with some minor deviations in the structure's configuration or filled area) are regulated under GP1 and subject to Self-Verification or Pre-Construction Notification.

Also, operation and maintenance related activities that do not meet the above exemption may qualify for Self-Verification. In that case, it is recommended that a copy of the SVNF be submitted to MassDEP.

The Massachusetts General Permits are listed below. GPs specifically applicable to utility projects are bolded and italicized:

GP1. Repair, Replacement and Maintenance of Authorized Structures and Fills
GP2. Moorings
GP3. Pile-Supported Structures, Floats and Lifts
GP4. Aids to Navigation, and Temporary Recreational Structures
GP5. Dredging, Disposal of Dredged Material, Beach Nourishment, and Rock Removal and Relocation
GP6. Discharges of Dredged or Fill Material Incidental to the Construction of Bridges
GP7. Bank and Shoreline Stabilization
GP8. Residential, Commercial and Institutional Developments, and Recreational Facilities
GP9. Utility Line Activities
GP10. Linear Transportation Projects Including Stream Crossings
GP11. Mining Activities
GP12. Boat Ramps and Marine Railways
GP13. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
GP14. Temporary Construction, Access, and Dewatering
GP15. Reshaping Existing Drainage Ditches, New Ditches, and Mosquito Management
GP16. Response Operations for Oil and Hazardous Substances
GP17. Cleanup of Hazardous and Toxic Waste
GP18. Scientific Measurement Devices
GP19. Survey Activities
GP20. Agricultural Activities
GP21. Fish and Wildlife Harvesting and Attraction Devices and Activities
GP22. Habitat Restoration, Establishment and Enhancement Activities
GP23. Previously Authorized Activities

In general the following cumulative thresholds apply for determining the level of Corps permitting required:

Table C-2
Corps Permits Limits

Resources	SV Limits (SV Eligible)	PCN Limits (PCN Eligible)	IP Limits (IP Required)
Non-tidal waters of the US	0 to 5,000 sf	5,000 sf to 1 acre	>1 acre
Tidal waters of the US	Not eligible	All discharges ≤1/2 acre	>1/2 acre
SAS in tidal waters of the US excluding vegetated shallows	Not eligible	All discharges ≤1,000 sf	>1,000 sf
SAS in tidal waters of the US consisting of vegetated shallows only	Not eligible	All discharges ≤100 sf (compensatory mitigation is required	>100 sf

*Special Aquatic Sites (SAS) consist of wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230 Subpart E.

Stream and wetland crossings are only subject to jurisdiction under the Corps if there is **a discharge of dredge or fill material into wetlands or waters of the United States**. Equipment access through a stream or wetland with no structural BMP is not regulated by the Corps if there is no discharge of dredge or fill material (note that equipment rutting as a result of not using an appropriate BMP can be considered a "discharge of dredge material"). Similarly, the use of a timber or rail car bridge that extends from bank to bank with no stream impacts is not regulated by the Corps. The use of timber mats, stone, and log corduroy is considered "fill material" by the Corps MA GPs, and must be calculated to determine overall impacts.

Maintenance, including emergency reconstruction of currently serviceable structures, is exempt from Corps jurisdiction and does not require formal permitting. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs to qualify for this exemption.

New culvert installation or existing culvert replacements may require permitting with local Conservation Commissions under the MA WPA, and may also require permitting with the Corps under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899, and the MassDEP under Section 401 of the Clean Water Act.

Stream and wetland crossings (including culvert installations) that involve the discharge of dredge and fill material may be conducted under Self-Verification if the following criteria are met.

- The use of construction mats of any area can be used to conduct activities that were previously authorized, authorized under Self-Verification, or not subject to regulation. Other temporary or permanent fill and associated secondary impacts must meet the SV limits.
- Authorized construction mats must be removed immediately upon work completion, and the wetlands must be restored per the General Conditions.
- The project has no potential for an effect on a historic property within the permit area or any known historic property that may occur outside the permit area.

- Any in-water work is limited to Time of Year windows appropriate for the spawning, breeding and migration of present species specified by the Massachusetts Division of Marine Fisheries. The TOY restriction for any inland stream not specified by MA DMF is October 1 to June 30. Activities within water proposed during these TOY restrictions are ineligible for Self-Verification authorization.
- The work does not result in direct or secondary impacts to Special Aquatic Sites.
- No work occurs in navigable waters of the U.S.
- Span streams or size culverts or pipe arches such that they are wider than bankfull width (BFW). Spans are strongly preferred as they avoid or minimize disruption to the streambed, and avoid entire streambed reconstruction and maintenance inside the culvert or pipe arch, which may be difficult in smaller structures. Footings and abutments for spans and scour protection should be landward of 1.2 times BFW. The width of culverts and arches at bankfull elevation should be ≥1.2 times BFW.
- Embed culverts or pipe arches below the grade of the streambed. This is not required when ledge/bedrock prevents embedment, in which case spans are required. The following depths are recommended to prevent streambed washout, and ensure compliance and long-term success:
    - ≥ 2 feet for box culverts and pipe arches, or
    - ≥ 2 feet and at least 25% for round pipe culverts.
- Match the culvert gradient (slope) with the stream channel profile.
- Construct crossings with a natural bottom substrate within the structure matching the characteristics of the substrate in the natural stream channel and the banks (mobility, slope, stability, confinement, grain and rock size) at the time of construction and over time as the structure has had the opportunity to pass substantial high flow events.
- Construct crossings with appropriate bed forms and streambed characteristics so that water depths and velocities are comparable to those found in the natural channel at a variety of flows at the time of construction and over time. In order to provide appropriate water depths and velocities at a variety of flows and especially low flows, it is usually necessary to reconstruct the streambed (sometimes including a low flow channel), or replicate or preserve the natural channel within the structure. Otherwise, the width of the structure needed to accommodate higher flows will create conditions that are too shallow at low flows. Flows could go subsurface within the structure if only large material is used without smaller material filling the voids.
- Openness, which is the is the cross-sectional area of a structure opening divided by its crossing length when measured in consistent units, is > 0.82 feet (0.25 meters).
- Banks on each side of the stream inside the crossing matching the horizontal profile of the existing stream and banks outside the crossing are recommended. To prevent failure, all constructed banks should have a height to width ratio of no greater than 1:1.5 (vertical:horizontal) unless the stream is naturally incised. Tie these banks into the up and downstream banks and configure them to be stable during expected high flows.

- The project is not located within a vernal pool depression, or vernal pool envelope, and does not individually or cumulatively impact greater than 25% of the vernal pool critical terrestrial habitat. It is feasible for some temporary impacts associated with the use of construction mats in previously disturbed right-of-ways to occur within the vernal pool envelope or critical terrestrial habitat if a Vegetation Management Plan demonstrates avoidance, minimization and mitigation impacts to aquatic resources.
- Culvert extensions do not qualify for Self-Verification.
- Culvert projects using slip lining do not qualify for Self-Verification, either as new work or maintenance activities.
- No open trench excavation in flowing waters. No work in riffles and pools.
- The project does not entail stream relocation.
- Work is not conducted within riffles or pools.
- Normal flows within the stream boundary's confines must be maintained, i.e., temporary flume pipes, culverts, cofferdams, etc.
- Water diversions (i.e., bypass pumping or water withdrawals) may be used immediately up and downstream of the work footprint.
- The project is (a) not located in the designated main stem of, or within 0.25 miles up or downstream of the designated main stem of, or in tributaries within 0.25 miles of the designated main stem of a National Wild and Scenic River System; (b) not in "bordering or contiguous wetlands" that are adjacent to the designated main stem of a National Wild and Scenic River; or (c) does not have the potential to alter flows within a river within the National Wild and Scenic River System.
- The project is not located within areas containing USFWS or National Marine Fisheries Service (NMFS)-listed species or critical habitat. The project is not "likely to adversely affect" listed species or habitat per the federal Endangered Species Act (ESA) or result in a "take" of any federally-listed threatened or endangered species of fish or wildlife.
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service.
- The project is not located on Corps properties and Corps-controlled easements.
- The project does not propose temporary or permanent modification or use of a federal project beyond minor modifications required for normal operation and maintenance.
- The project minimizes use of heavy construction equipment, and, where required, either has low ground pressure (typically less than 3 psi) or it must be placed on construction mats.
- Construction mats must be placed in the wetland from the upland or from equipment positioned on swamp mats if working within a wetland.
- Temporary fill must be stabilized. Unconfined, authorized temporary fill must consist of clean material that minimizes impacts to water quality. Temporary fill

placed during the growing season must be removed before the beginning of the next growing season. If temporary fill is placed during the non-growing season, it may remain throughout the following growing season but must be removed before the beginning of the next growing season.

- Appropriate erosion, sedimentation and turbidity controls are used and maintained during construction.

- Appropriate measures must be taken to minimize flooding to the maximum extent practicable.

Wetland and stream crossings may be authorized under Pre-Construction Notification if the following criteria are met:

- The work results in less than one acre of impacts to inland, non-tidal, wetlands or waters of the United States.

Stream and wetland crossings that cannot meet Self-Verification or Pre-Construction Notification criteria may require review under an Individual Permit. The Corps should be consulted before assuming an Individual Permit will be required, as exceptions can be made under certain circumstances.

C.8 Temporary Stream Crossings

C.8.1 U.S. Army Corps of Engineers

See Section C.7 for general Corps permitting requirements for stream crossings. To qualify for Self-Verification, temporary stream crossings (typically culverts) that are not spans must be designed in accordance with below.

1) Installed outside of the TOY restrictions and must be removed before the beginning of the TOY restriction of that same season. Temporary crossings that must remain into the TOY restriction will require Pre-Construction Notification review.

2) Impacts to the streambed or banks require restoration to their original condition (see "Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings," for stream simulation restoration methods). Use geotextile fabric or other appropriate bedding for stream beds and approaches where practicable to ensure restoration to the original grade. The requirements in GCs 17, 18 and 19 are particularly relevant.

3) Avoid excavating the stream or embedding crossings.

4) For Culverts:

    a. The water height should be no higher than the top of the culvert's inlet and the culvert is large enough to pass debris.

    b. Install energy dissipating devices downstream if necessary to prevent scour.

c. The TOY restrictions in GC 18 and the restrictions in GC 17(f) are particularly relevant.

5) Removed upon the completion of work. Impacts to the streambed or banks requires restoration to their original condition using stream simulation methods.

In-kind repair, replacement and maintenance of currently serviceable, authorized fills are eligible for Self-Verification. However, the conditions of the original authorization apply, and minor deviations in fill design are allowed. In-kind repair and maintenance of culverts that includes an expansion or change in use requires Pre-Construction Notification. Replacement of non-serviceable fills, including an expansion or change in use, also requires Pre-Construction Notification. In-kind replacement using the same materials is exempt from Section 404 of the Clean Water Act, and does not require permitting with the Corps. The Corps, however, should be consulted before assuming an activity is exempt from their jurisdiction.

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APPENDIX D

Horizontal directional drilling (HDD) for subsurface utility installations is considered to be the most effective and least environmentally damaging technique when compared to traditional mechanical dredging and trenching. This method ensures the placement of the pipeline at the target burial depth with no wetland or water body disturbance. HDD installation is the preferred method for crossing sensitive resources–the alternative is open cut trenching.

The HDD procedure uses bentonite slurry, a fine clay material as a drilling lubricant. Directional drilling has the small potential to release bentonite slurry into the surface environment through frac-outs. This term describes the situation caused when the drilling head and its accompanying inert clay lubricant slurry, hits a subterranean fractured substrate. When the pressurized lubricant slurry reaches the fracture it can follow the fracture up or otherwise force itself to the surface or into the water if drilling is occurring under a waterbody. If a "frac-out" occurs under these water features, the potential exists for the inert clay (a non-toxic bentonite-based substance) to be released into the water column. In large quantities, the release of drilling mud into a waterbody could affect fisheries or other aquatic organisms by settling and temporarily inundating the habitats used by these species. Properly monitoring the slurry pressures and amounts significantly decreases risk of significant quantities of drilling fluid being released into the environment.

Frac-out is most likely to occur near the bore entry and exit points where the drill head is shallow. Should a frac-out occur during HDD operations, the following measures will be taken.

- Temporarily suspend forward drilling progress.
- Monitor frac-out for 4 hours to determine if the drilling mud congeals. (Bentonite will usually harden, effectively sealing the frac-out location.)
- If drilling mud congeals, take no other action that would potentially suspend sediments in the water column.
- If drilling mud does not congeal, erect appropriate isolation/containment measures (i.e. turbidity curtains and/or underwater boom and curtain).
- If the fracture becomes excessively large, a spill response team would be called in to contain and clean up excess drilling mud in the water. Phone numbers of spill response teams in the area will be on site.
- Following containment, evaluate the current drilling profile (i.e. drill pressures, pump volume rates, drilling mud consistency) to identify means to prevent further frac-out events.
- If the fracture is mitigated and controlled, forward progress of the drilling may resume.

APPENDIX 5-2 NATIONAL GRID ENVIRONMENTAL GUIDANCE DOCUMENT (EG-303NE)

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PURPOSE/OBJECTIVE:

This document provides National Grid personnel, consultants and contractors with Best Management Practices (BMPs) for conducting work on electric and natural gas transmission and distribution rights-of-ways (ROWs) and substations in New England.

WHO:

These BMPs are to be followed by all personnel conducting work on Company electric and gas ROWs and substations in New England. These BMPs do not apply to Company employees and contractors performing routine vegetation management activities that are not a part of construction or re-construction projects. Employees and contractors maintaining vegetation on Company ROWs and substations must follow the National Grid ROW Vegetation and Substation Vegetation Management Plans.

DEFINITIONS:

Refer to **Glossary** in **Appendix 1** and **Acronyms** in **Appendix 2**.

WHAT TO DO:

1.0 Project Planning

Prior to the start of any project (proposed new facilities or maintenance of existing facilities), the Project Engineer or other project planner shall determine whether any environmental permits or approvals are required, per the state-specific EG-301 environmental checklists. Any questions regarding which activities may be conducted in regulated areas or within environmentally sensitive areas shall be referred to the National Grid Environmental Scientist or Project Environmental Consultant.

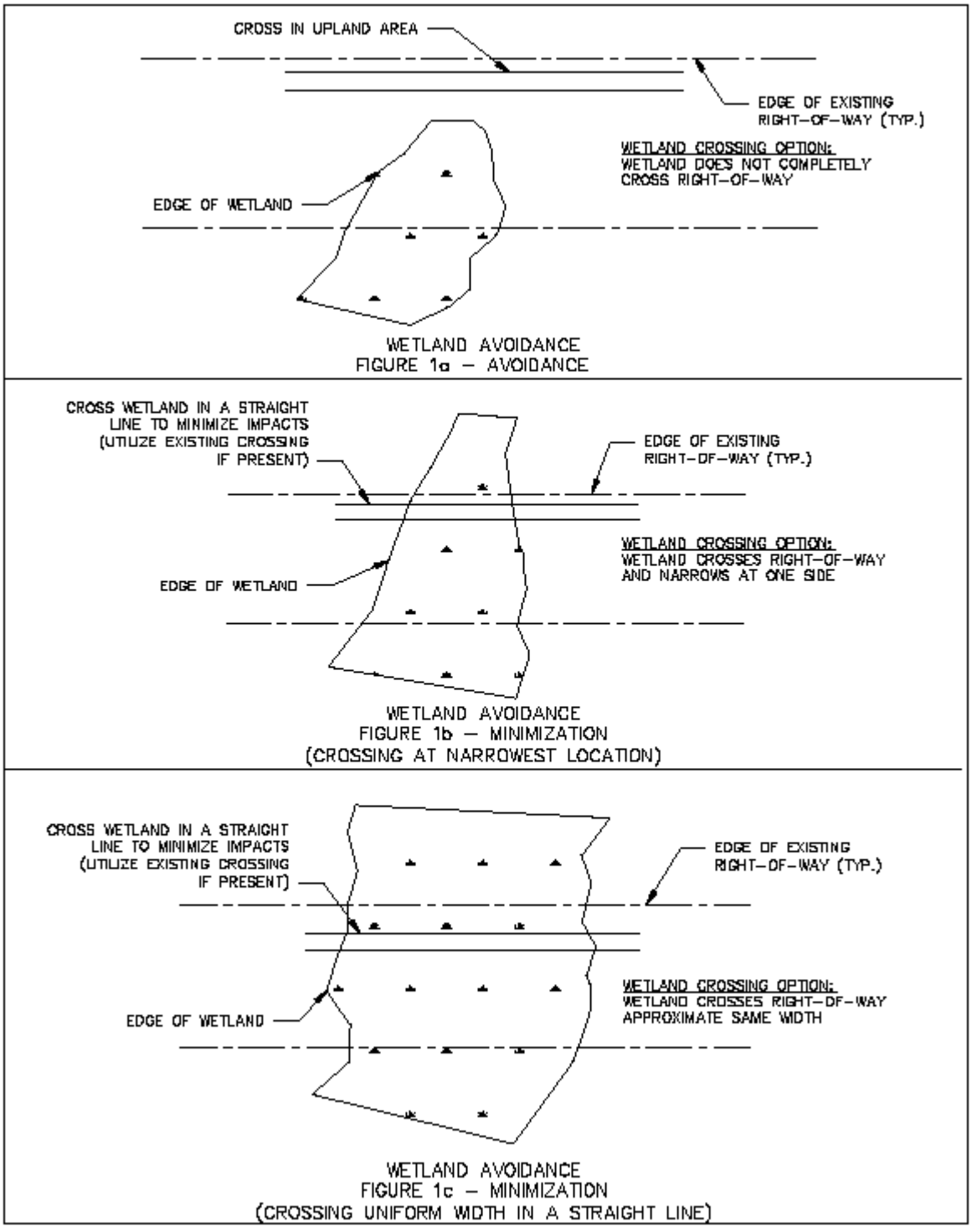
All new construction and maintenance projects shall follow clear and enforceable environmental performance standards, which is the purpose for which these BMPs have been compiled.

1.1 Avoidance and Minimization

Measures shall always be taken to avoid impacts to wetlands, waterways, rare species habitats, known below and above ground historical/archeological resources and other environmentally sensitive areas. If avoidance is not possible, then measures shall be taken to minimize the extent of impacts. Alternate access routes or staging areas shall always be considered. Below is a list of methods that shall be considered where impacts are unavoidable:

- Use existing ROW access where available. Keep to approved routes and roads without deviating from them or making them wider.
- Off-ROW access shall never be assumed and shall be coordinated through National Grid Real Estate before being implemented.
- Where no existing ROW access is present, avoid wetlands and if a wetland crossing is necessary, cross wetlands at the most narrow point possible or at the location of a previously used crossing (if evident). Figure 1 below illustrates this minimization technique.

- Avoid and minimize stream crossings.
- Minimize the width of typical access roads through wetlands to a maximum width of 16 feet.
- Conduct work manually (without using motorized equipment) in wetlands, wherever possible.
- Use construction mats in wetlands to minimize soil disturbance and rutting when crossing or working within wetlands. When not using mats for access, standard vehicles shall not be allowed to drive across wetlands without the prior approval of the National Grid Environmental Scientist. Use of a low ground pressure (LGP) vehicle may be a feasible alternative to mats provided that such LGP vehicle use has been reviewed and approved by the National Grid Environmental Scientist. See Section 7.0.
- Coordinate the timing of work to cause the least impacts during the regulatory low-flow period under normal conditions, when water/ground is frozen, after the spring songbird nesting season, and, outside of the anticipated amphibian migration window (mid-February to mid-June). Refer to the United States Army Corps of Engineers (USACE) state-specific General Permit for the definition of the low-flow period in each state at: http://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/. A summary table is provided in Section 7.0.
- Seek alternative routes or work methods to minimize impact.


CROSS IN UPLAND AREA
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND DOES NOT COMPLETELY CROSS RIGHT-OF-WAY
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1a – AVOIDANCE
CROSS WETLAND IN A STRAIGHT LINE TO MINIMIZE IMPACTS (UTILIZE EXISTING CROSSING IF PRESENT)
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND CROSSES RIGHT-OF-WAY AND NARROWS AT ONE SIDE
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1b – MINIMIZATION
(CROSSING AT NARROWEST LOCATION)
CROSS WETLAND IN A STRAIGHT LINE TO MINIMIZE IMPACTS (UTILIZE EXISTING CROSSING IF PRESENT)
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND CROSSES RIGHT-OF-WAY APPROXIMATE SAME WIDTH
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1c – MINIMIZATION
(CROSSING UNIFORM WIDTH IN A STRAIGHT LINE)

Appı

1.2 Historically Significant Areas

Areas that have been identified as historically and/or culturally significant shall be avoided in accordance with site-specific avoidance plans, as applicable. Refer to the project-specific Environmental Field Issue (EFI) for any applicable avoidance plans or consult with the National Grid Environmental Scientist. Demarcation of these areas to be avoided shall use staked orange snow fencing or an equivalent physical barrier (not just ribbon flagging) and signage. Refer to Section 14.0 for signage guidance.

1.3 Rare Species Habitat

Work within areas that have been identified as mapped rare species habitat shall follow site-specific requirements, as applicable. In Massachusetts, maintenance activities within mapped habitat (known as Priority Habitat of Rare Species) shall follow the BMPs outlined in the Natural Heritage Endangered Species Program (NHESP)-approved National Grid Operation and Maintenance Plan. Work in mapped rare species habitat may require, at a minimum, turtle training for crews and sweeps of work areas for turtles, botanist identification of rare plant locations and avoidance of these locations, and protection of vernal pools, all prior to the start of work. Demarcation of these areas to be avoided (e.g., rare plant populations, overwintering turtles, nests) shall use staked orange snow fencing or an equivalent physical barrier (not just ribbon flagging) and signage. Refer to Section 14.0 for signage guidance.

Where new substations are being constructed or existing substations are undergoing a rebuild or expansion, and the substations are located in mapped rare turtle habitat, project team members should consider fenceline improvements or measures needed to prevent/eliminate turtle entrance into the substation or allow multiple points for easy egress such that turtles are not trapped within the substation fenceline.

Other requirements may apply in NH, VT and RI. Refer to the project-specific EFI for any applicable measures or consult with the National Grid Environmental Scientist.

1.4 Meetings

Pre-permitting meetings shall take place early in the project development process to determine what permits are triggered by the proposed work and the timeline required for permitting. During these meetings, the team shall develop access plans and BMPs to be used during construction of the project.

Field / Constructability review meetings shall take place on-site to evaluate construction site access and job site set-up, to ensure that the project can proceed as permitted. It is at this point in time where work areas, pulling locations, laydown areas, parking areas, and equipment storage areas are evaluated and located. Off-ROW areas under consideration should be included in this discussion.

Prior to submitting permit plans to regulatory authorities, the construction group (contractor or National Grid) shall review the plans for final sign off.

Pre-construction meetings are typically held prior to the commencement of all work to appoint responsible parties, discuss timing of work, and further consider options to avoid and/or minimize impacts to sensitive areas. These meetings can occur on- or off-site and shall include all the willing and available stakeholders (i.e., utility employees, contractors, consultants, inspectors, and/or monitors, and regulatory personnel). Training of crews and supervisors of the EFI, Stormwater Pollution Prevention Plan (SWPPP), rare species, and other permit requirements shall be conducted at a pre-construction meeting.

Pre-job briefings shall be conducted daily or otherwise routinely scheduled meetings shall be conducted on-site with the work crew throughout the duration of the work. These meetings are a way of keeping everyone up to date, confirming there is consensus on work methods and responsibilities, and ensuring that tasks are being fulfilled with as little impact to the environment as possible.

The Project Environmental Scientist/Monitor and Construction Project Manager shall communicate regularly (e.g. weekly or bi-weekly meetings or phone conversations) to discuss the work completed since last communication (i.e. work locations, wetland impacts, equipment used, and unexpected delays or work conditions). These meetings or calls shall include the expected schedule of construction for the upcoming week, the long term construction plans, and planned methods for working near/in wetlands. Both the Project Environmental Scientist/Monitor and Construction Project Manager shall work together so the Project complies with all environmental permits and regulations. When changes to the Project scope or agreed work plan are proposed they shall be done so with the final approval of the National Grid Environmental Scientist.

1.5 Communication of Project Specific Environmental Requirements

Project specific environmental concerns, to include sensitive resources, permits, approved access and time-of-year or other restrictions, shall be communicated to the project team and be included as part of the Pre-Bid and Pre-Construction Meetings. Project specific requirements shall be communicated to the project manager/construction manager/engineering group using the following guidelines:

Environmental Field Issue – The EFI will be a full document consisting of narrative, project permits, access and matting plans. A table summarizing pertinent (but not all) permit conditions and the responsible party for those conditions shall be included in the EFI. Copies of all permits should be included as attachments. This will be prepared for most projects with multiple permits or large, complex projects (siting board, Section 404, 401 WQC, SWPPP). There shall be EFI training at the pre-construction meeting. The National Grid EFI template is located in **EI-303NE**.

Simplified Environmental Field Issue – The Simplified EFI is a memorandum containing environmental resources present, project permit(s), access and matting plans and a table summarizing relevant permit conditions and responsible party for those conditions. Copies of all permits should be included as attachments. The Simplified EFI will be prepared for most projects with 1 or 2 permits (Order of Conditions, S404 Cat 1). The Simplified EFI should also be provided for projects that have environmental resources present, but the scope of the project does not trigger environmental permitting (e.g., the scope of work qualifies for maintenance exemption(s)). The resources present

shall be discussed at the Pre-Bid and Pre-Construction meetings and any changes in scope will require additional review by the National Grid project team.

E-mail delivery of Permit and any Sediment/Erosion control or BMP plan – For those projects with only one permit (eg., MA Order of Conditions, RI DEM permit, RI CRMC permit, NH Utility Notification) or projects with a sediment & erosion control plan (local town requirement or for exempt maintenance work), a copy of the permit and any applicable plan will be emailed to the Project Manager (and the project team where deemed necessary) to be incorporated into the Construction Field Issue.

STORMS work management system input – For STORMS work, no EFI is prepared unless multiple permits are required for the project (see guidance above). If only a MA Order of Conditions, MA Determination of Applicability, RI DEM permit, RI CRMC permit, RI SESC Approval, or NH Utility Notification is required, then the permit is attached in the Documents tab and conditions noted in Remarks/Comments section. Standard STORMS boilerplate language is located in **EI-303NE**.

1.6 Timing of Work

Regulatory authorities may place seasonal or time-of-year restrictions on project construction elements. These time-of-year restrictions may be state or permit-specific, and shall be adhered to.

Work during frozen conditions. Activities conducted once wetland areas are frozen sufficient to minimize rutting and other impacts to the surrounding environment may be authorized by the National Grid Environmental Scientist. Work during this time also generally reduces disturbance of aquatic and terrestrial wildlife movement by avoiding sensitive breeding and nesting seasons. When not using mats for access, vehicles shall not be allowed to drive across wetlands without the prior approval of the National Grid Environmental Scientist.

Work during the regulatory low-flow period. Conducting work during the low-flow period can reduce impacts to surface water and generally avoids spawning and breeding seasons of aquatic organisms. If the water is above normal seasonal levels, adjustments to work activities and methods are required.

1.7 Alternate Access

1.7.1 Manual Access

In some cases such as for smaller projects, work areas can be accessed manually. This includes access on foot through upland and shallow wetland areas, access by boat through open water or ponded areas, and climbing of structures where possible. Smaller projects, such as repair of individual structures, or parts of structures, that do not categorically require the use of heavy machinery, shall be accessed manually to the greatest extent practicable.

1.7.2 Use of Overhead/Aerial Access

Using helicopters can be expensive and is not always feasible, but it may be appropriate in some situations in order to get workers and equipment to a site that otherwise may be very difficult to access. The use of overhead and/or aerial equipment may be beneficial for work in areas where larger water bodies, deep crevices, or mountainous areas hinder ground access. The landing area for

helicopters shall be reviewed for environmentally sensitive resources. Use of helicopters requires Project Manager and Senior Management approval.

2.0 Inspection, Monitoring and Maintenance

All construction practices and controls shall be inspected on a regular basis and in accordance with all applicable permits and local, state, and federal regulations to avoid and correct ANY damage to sensitive areas.

The construction crews shall be responsible for completing daily inspections, and IMMEDIATELY bring any **damage or observed erosion, or failed erosion controls** to the attention of the Person-In-Charge and the National Grid Environmental Scientist. Where applicable and/or as directed by environmental permits issued for the project, the Project Environmental Consultant shall conduct weekly (at a minimum) inspections of the project work areas and shall document their inspection using the Stormwater, Wetlands & Priority Habitat Environmental Compliance Site Inspection / Monitoring Report form found in **Appendix 3** and issue the report within 24 hours. The Person-in-Charge shall work with the National Grid Environmental Scientist and the Project Environmental Consultant to determine when and how the repairs shall be made.

Project-specific Action Logs and Long-Term Restoration Logs are prepared as needed by the National Grid Environmental Scientist or the Project Environmental Consultant to track issues and/or repairs and assign responsible parties.

3.0 Best Management Practices

The BMP sections presented in this EG address access, construction, snow and ice management, structures in wetlands, access road maintenance and repair, clean-up and restoration standards, ROW gates, field refueling and maintenance operations, management of spills/releases, and a summary of key construction BMPs.

Note that BMPs shown on any permit drawings for a specific project may need to be revised and or supplemented during the execution of a project based on unforeseen or unexpected factors such as extreme weather or unknown subsurface conditions. It is the responsibility of the Contractor to work with the National Grid Environmental Scientist and/or the Project Environmental Consultant to identify necessary changes and to ensure that construction-related impacts to wetlands, water bodies and other environmentally sensitive areas are avoided.

Any deviation from the approved BMPs shown in the EFI and/or SWPPP plans shall be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting or could result in a permit violation.

3.1 Wetland Boundary Demarcation

Prior to the start of any activity conducted under an environmental permit, wetland boundaries shall be reviewed. Flagging for wetland boundaries, stream banks and other resource areas shall be

refreshed as needed. This may become particularly important when the original flagging was placed in previous seasons and now may have become obscured.

3.2 Sedimentation and Erosion Controls

Appropriate sedimentation and erosion control devices shall be installed at work sites, in accordance with permit conditions and/or regulatory approvals, and as needed to prevent adverse impacts to water resources and adjacent properties.

The overall purpose of such controls is to prevent and control the movement of disturbed soil and sediment from work sites to adjacent, undisturbed areas, and particularly to water resources, public roads and adjacent properties. All proprietary controls shall be installed per manufacturer's recommendations and specifications.

Appropriate sedimentation and erosion control devices include but are not limited to: silt fencing, straw bales, wood chip bags, straw wattles, compost socks, erosion control blankets, mulch, slope interruption practices, flocculent powder/blocks and storm drain/catch basin inlet protection. Such controls shall be installed between the work area and environmentally sensitive areas such as wetlands, streams, drainage courses, roads and adjacent property when work activities shall disturb soils and result in a potential for causing sedimentation and erosion.

In Massachusetts, use of monofilament-encased wattles shall be avoided in mapped Priority Habitat for snakes and amphibians. For projects with work within mapped Priority Habitat for snakes and amphibians, wattles that are encased in a sock, hemp, fiber, or movable jute netting are required to prevent entrapment. Also, "wildlife gaps" should occur every 50 feet, if possible, given wetland permit conditions. This spacing of the wattles allows snakes and amphibians to move across the ROW. Refer to the Amphibian and Reptile BMPs in **Appendix 4**.

Staked straw bales often serve as the demarcation of the limits of work and/or sensitive areas to be avoided. Work shall never be conducted outside the limit of erosion controls without prior approval from the National Grid Environmental Scientist.

Project plans depict proposed erosion controls, however field conditions may warrant additional practices be implemented (e.g., wet conditions, frozen conditions, poorly drained soils, steep slopes, materials used for work pads, transition areas to construction mats, number of trips across work areas, etc.).

Any deviation from the approved erosion controls shown in the EFI and/or SWPPP plans needs to be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting or result in a permit violation.

Appendix 4 provides typical sketches of common sedimentation and erosion controls. If a SWPPP is required for the project, maintenance and inspection of erosion controls shall follow the SWPPP requirements. Sedimentation and erosion controls shall be properly maintained and inspected on a

periodic basis, until work sites are properly stabilized and restored. Inspections shall be documented using the Inspection Form "Storm Water, Wetlands & Priority Habitat Environmental Compliance Site Inspection/Monitoring Report" (**Appendix 3**).

The sequence and timing of the installation of sedimentation and erosion control measures is critical to their success. Sedimentation and erosion controls shall be installed prior to commencing construction activities that may result in any soil disturbance or cause otherwise polluted site runoff. Inspection of these devices may be required by the National Grid Environmental Scientist or by regulators prior to the start of work. The installation of water bars and other erosion control measures shall be installed shortly thereafter.

3.3 Concrete Wash Outs

Concrete wash outs shall be used for management of concrete waste. Concrete and concrete washout water shall not be deposited or discharged directly on the ground, in wetlands or waterbodies, or in catch basins or other drainage structures. Where possible, concrete washouts shall be located away from wetlands or other sensitive areas. Consult the National Grid Environmental Scientist on proposed concrete wash out locations prior to their use. Following the completion of concrete pouring operations, the wash outs shall be disposed of off-site with other construction debris. Refer to BMPs in **Appendix 4**.

3.4 Construction Activities in Standing Water

The use of silt curtains or turbidity barriers may be required when working in or adjacent to standing water such as ponds, reservoirs, low flowing rivers/streams, or coastal areas. Silt curtains and turbidity barriers prevent sediment from migrating beyond the immediate work area into the resource areas.

Coffer dams constructed using sheet piling or large sandbags (Trade names such as "the Big Bag" or "DamItDams") may be used to temporarily isolate and contain a work area in standing water.

When working in standing water, an oil absorbent boom, in addition to a silt curtain or other temporary barrier, shall be placed around the work area for spill prevention.

Work in drinking water reservoirs or other waters may require extensive regulatory agency review, even for maintenance work, which could result in additional time required for permitting, review and material procurement prior to the start of work.

3.5 Dewatering

Where excavations require the need for dewatering of groundwater or accumulated stormwater, the water shall be treated before discharge. Appropriate controls include dewatering basins, flocculent blocks, filter bags, filter socks, or weir tanks. Schematics of these BMPs are included in **Appendix 4**. Water trucks or fractionation tanks may be utilized if watertight containers are desired for controlled on-site discharge or for off-site discharge into an approved dewatering area when site restrictions make it difficult to utilize other dewatering methods on-site. Dewatering discharge water shall never be directed into wetlands, streams/rivers, other sensitive resource areas, catch basins, other

stormwater devices, or substation Trenwa trenches. Dewatering flow shall be controlled so that it does not cause scouring or erosion through the use of a dewatering basin, filter sock, or equivalent. If it is determined that the chosen controls are not appropriately filtering the fine sediment from the dewatering pumpate then the National Grid Environmental Scientist shall be notified immediately and the controls shall be revised or supplemented.

When establishing a dewatering basin, consideration should be given to the anticipated volume of water and rate of pumping in determining the size of the dewatering basin. Dewatering basins shall be constructed on level ground. Once pumping commences, the basin shall be monitored frequently to assure that the rate of water delivery to the structure is low enough to prevent water from flowing, unfiltered, over the top of the basin walls. The basin shall be monitored throughout the dewatering process because the rate of filtration shall decrease as sediment clogs the filter fabric. If the basin is not appropriately filtering the fine sediment from the dewatering pumpate then the basin may need to be supplemented with a flocculent block. Field conditions shall dictate how often the basin should be inspected.

Distance to sensitive areas, direction of flow (toward or away from protected, or sensitive areas, such as wetlands, ponds, or streams), amount of vegetative ground cover between the basin and nearby sensitive areas, ground conditions (ledge, frozen, etc.), volume of water being pumped, and pump-rate, are some of the factors to be considered when determining an inspection frequency. Clogged filter fabric shall be replaced and accumulated sediment shall be removed as necessary from the basins to maintain efficacy.

Any new dewatering location (not previously reviewed and approved by the National Grid Environmental Scientist during project planning or permitting) shall be reviewed and the discharge location approved by the National Grid Environmental Scientist before use.

Complex projects that require large scale dewatering shall require individual review by the National Grid Environmental Scientist and may trigger additional permitting.

Dewatering in areas of known chemical contamination may require a separate NPDES permit, or other approval, and treatment or containment system. Consult with the National Grid Environmental Scientist.

3.5.1 Overnight Dewatering

Some projects may necessitate 24-hour dewatering for on-site construction activities. Overnight dewatering will be evaluated on a case-by-case basis by the National Grid Environmental Department.

If it is necessary to conduct overnight dewatering on a project, a dewatering plan must be submitted to the Environmental Department for review and approval **5 business days prior to beginning dewatering activities**. Sufficient knowledge of flow, discharge, and re-infiltration rate of water must be obtained and submitted for review. The Environmental Department

may require monitored dewatering for a period of time in order to provide this data in support of a request for 24-hour dewatering. The dewatering plan must include at a minimum:

1. Location of dewatering system, system components (basin, frac tank, etc), and materials.
2. Location of discharge and distance from closest wetland.
3. Location of erosion controls. A secondary perimeter of erosion controls will be required around the dewatering system for overnight dewatering.
4. Peak flow, discharge rate and re-infiltration rates.
5. Visual monitoring plan for discharge. Expected duration of dewatering.
6. Emergency provisions if overnight, unattended dewatering is proposed.

3.5.2 Dewatering Clean Up/Restoration

Basins shall be cleaned and removed as soon as dewatering is complete. Sediment removed from the dewatering basin shall be allowed to dry before being disposed of by evenly spreading it over unvegetated upland areas where erosion is not a concern if clean or removing it from the site for proper disposal. Off-site trucking of wet soils is prohibited. The sediment disposal area shall be approved by the National Grid Environmental Scientist or the Project Environmental Consultant prior to use. Stabilization measures shall also need to implemented and approved by the National Grid Environmental Scientist or the Project Environmental Consultant. Soils/sediments shall be dewatered and dried to the point practicable for either on-Site reuse or off-Site transport.

3.6 Check Dams

Check dams are a porous physical barrier installed perpendicular to concentrated storm water flow. They are used to reduce erosion in a swale by reducing runoff energy (velocity), while filtering storm water, thereby aiding in the removal of suspended solids.

Check dams should only be used in small drainage swales that shall not be overtopped by flow once the dams are constructed. These dams should not be placed in streams. Check dams are typically installed in ROWs or on other construction sites prior to the start of soil disturbing work. Per the Rhode Island Soil Erosion and Sediment Control Handbook, no formal design is required for a check dam if the contributing drainage area is 2 acres or less and its intended use is shorter than 6 months; however, the following criteria should be adhered to when specifying check dams.

- The drainage area of the ditch or swale being protected should not exceed 10 acres.
- The maximum height of the check dam should be 2 feet.
- The center of the check dam must be at least 6 inches lower than the outer edges.
- The maximum spacing between the dams should be such that the toe at the upstream dam is at the same elevation as the top of the downstream dam.

Per the NHDES stormwater manual, the use of check dams should be limited to swales with longitudinal slopes that range between 2 to 5 percent that convey drainage from an area less than 1 acre. Existing conditions that exceed these limitations should be assessed in the field and discussed

with the National Grid Environmental Scientist to determine the viability of this BMP for the specific application. Check dams are often comprised of stone, straw bales, sand bags, or compost/silt socks. Use of check dams should be coordinated with the National Grid Environmental Scientist to ensure that the material selection, spacing and construction method are appropriate for the site. Check dams composed of biodegradable materials (e.g. straw bales or wattles, wood chip bags) may require periodic replacement for continued proper functioning[1]. Refer to BMPs in **Appendix 4**.

3.7 Water Bars

Water bars should be used on sloping ROWs to divert storm water runoff from unstabilized or active access roads when needed to prevent erosion. Surface disturbance and tire compaction promote gully formation by increasing the concentration and velocity of runoff. Water bars are constructed by forming a ridge or ridge and channel diagonally across the sloping ROW. Each outlet should be stable. The height and side slopes of the ridge and channel are designed to divert water and to allow vehicles to cross. When siting water bars, consideration shall be given to the sensitivity of the area receiving the diverted runoff. For example, runoff should not be directed into a wetland, waterbody, other environmentally sensitive areas, or to private property or public roadways. Refer to BMPs in **Appendix 4**.

3.8 Retaining Walls

In some situations, retaining walls comprised of concrete blocks, gabions, boulders or other comparable materials may be required to stabilize the shoulder of existing access roads and/or supplement required erosion controls. Installation of such measures shall not be allowed as a maintenance activity. Should these controls be considered for a project, it shall be reviewed by the National Grid Environmental Scientist, as design and additional permitting may be required.

3.9 Slope Stabilization

Temporary slope stabilization practices help to keep exposed, erodible soils stabilized while vegetation is becoming established. Acceptable temporary slope stabilization practices may include the use of erosion control blankets, or hydraulic erosion control. Erosion control blankets, often comprised of natural fibers (e.g., jute, straw, coconut, or other degradable materials) are a useful slope stabilization, erosion control and vegetation establishment practice for ditches or steep slopes. Blankets are typically installed after final grading and seeding for temporary or permanent seeding applications. Hydraulic erosion control practices, including Bonded Fiber Matrix or hydroseed with a soil stabilizer (e.g., tackifier and/or mulch) may be an acceptable or desirable alternative form of temporary slope stabilization. For all practices, manufacturer's specifications should be followed for installation depending on slope and other field conditions. Consult the National Grid Environmental Scientist prior to selecting and installing any slope stabilization practices. Refer to BMPs in **Appendix 4**.

[1] Grass growth on a biodegradable type check dam is evidence that the material is decomposing. While this doesn't mean it is no longer functioning, it means it may be in a weakened condition and could potentially fail under high flow velocity. It is acceptable for grass to be growing on a stone check dam.

3.10 Maintenance of Sedimentation and Erosion Controls

Sedimentation and erosion controls shall be maintained in good operational condition during the course of the work. This includes, but is not limited to, replacing straw bales that are no longer in good condition, re-staking straw bales, replacing or re-staking silt fence, and removing accumulated sediment. Remove sediment before it has accumulated to one half the height of any exposed silt fence fabric, straw bales, other filter berm, check dams or water bars. Accumulated sediment shall be removed from sedimentation basins to maintain their efficacy. Manage the removed sediment by evenly spreading it over unvegetated upland areas where erosion is not a concern, by stockpiling and stabilizing, or by disposing of off-site. Stabilization measures shall also need to be implemented and approved by the National Grid Environmental Scientist or the Project Environmental Consultant. Where a SWPPP has been prepared for a specific site, the guidelines documented therein shall govern the management of sediment.

4.0 Right-of-Way (ROW) Access

Whenever possible, access shall be gained along existing access routes or roads within the ROW. However, in some cases there is no existing access. In many cases, temporary access can be utilized. The following practices provide general guidance on accessing a ROW. Check with a National Grid Environmental Scientist to determine if any environmental permitting is required before utilizing a temporary access.

Note that the building of new roads or enlargement of existing roads is **prohibited** unless this activity is allowed by a project-specific permit, and the new roads appear on the Site Plans that were authorized in the regulatory approvals.

4.1 Off-ROW Access

Off-ROW access shall be evaluated for wetlands, rare species, cultural resources and other potential sensitive receptors, as applicable. National Grid Real Estate and Stakeholder Relations shall also be contacted as soon as possible once off-ROW access is determined to be needed.

4.2 Stabilized Construction Entrance/Exit for Access to ROWs from Public or Private Roads

A suitable (minimum 15-foot wide by 50-foot long) construction entrance/exit shall be installed at the intersection of the ROW access road/route with public/private paved roads, or other such locations where equipment could track mud or soil onto paved roads. The construction entrance/exit should be comprised of clean stone installed over a geotextile fabric. Geotextile fabric may be omitted for permanent construction entrances/exits on a case-by-case basis with the approval of the National Grid Environmental Scientist. Refer to BMPs in **Appendix 4**.

Construction entrance areas shall be monitored and maintained to ensure that stone or other material is not deposited onto the roadway, causing a safety concern. Where track-out of sediment has occurred onto a roadway, it shall be swept off the road by the end of that same work day.

If a construction entrance/exit is clogged with sediment and no longer functions, the sediment and stone may require removal and replacement with additional clean stone (clean stone refreshment) to ensure this tracking pad is performing its intended function adequately. Heavier traffic use may require this clean stone refreshment multiple times throughout a project. Reinforcement of these stabilized construction entrance/exits with asphalt binder or asphalt millings is not likely to be considered "maintenance" and may trigger additional permitting requirements[2]. In some cases, heavily used construction entrances/exits may benefit from the installation of a 5-15 foot strip of asphalt binder or asphalt millings closest to the paved roadway to capture any stone that is tracked from the stone apron. Such cases shall be evaluated on an individual basis with the National Grid Environmental Scientist.

Once work is complete, the construction entrance/exit shall either be removed or retained, depending upon future maintenance-related access needs, property ownership, and/or project-specific approvals. If removed, the area shall be graded, seeded (if adequate root and seed stock are absent) and mulched. Proper approvals for leaving access roads in place shall be obtained; contact the National Grid Environmental Scientist and Property Legal.

4.3 Maintenance of Existing Access Roads

In many cases, the existing access road may need to be maintained to allow passage of the heavy equipment required for scheduled maintenance work. Access roads cannot deviate from the approved and permitted access plans. Maintenance of these roads may include adding clean gravel or clean crushed stone to fill depressions and eroded areas. This activity shall be conducted only within the width of the existing access road footprint and does not include widening existing access roads

If gravel begins to migrate onto the existing vegetated road shoulder, this gravel shall be removed during the project and/or after the completion of use of the road to ensure the road fill is not spreading into adjacent resource areas, or resulting in the road becoming much wider than its pre-existing or permitted condition. In some areas of mapped rare species habitat or other sensitive areas where project-specific permit conditions require the prevention of the migration of sediments into adjacent resources, an engineered stabilization system (e.g., GeoWeb or similar) may be suitable to prevent sedimentation while allowing for unrestricted wildlife migration.

In Massachusetts, any proposed widening of access roads in turtle Priority Habitat would require individual consultation with NHESP and, depending on the level of impact proposed, may require a Project Review filing. The limited filling of ruts or potholes is compatible with the National Grid Operation and Maintenance Plan approved by NHESP under the Massachusetts Endangered Species Act, however, severely rutted access roads in turtle Priority Habitat that require extensive linear feet of stone for safe passage will require individual consultation with NHESP.

[2] Depending on the road, use of an asphalt binder or asphalt millings as a construction entrance/exit may trigger state or local permit requirements.

Major reconstruction projects may require multiple permits. In all cases, the fill to be used for existing access roads shall be clean and free of construction debris, trash or woody debris. Use of processed gravel may be approved by the Person-In-Charge and the National Grid Environmental Scientist, on a case-by-case basis. If clean stone is used then addition of more erosion controls may not be necessary.

4.5 Maintenance of Existing Culverts

Damaged culverts may not be repaired or replaced without consulting with the National Grid Environmental Scientist to determine if a permit is required. For functioning culverts, care shall be taken to protect adjacent wetlands and watercourses by installing appropriate sedimentation and erosion controls around the downstream end of the culvert. Culverts shall be repaired/replaced in kind and shall not be changed in size unless approval has been obtained from the National Grid Environmental Scientist. In-kind replacement is replacement using the same material, functional inverts, diameter and length as the existing culvert. Changes to any of these characteristics shall require permitting. Installation of any **new** culvert is not allowed without obtaining all necessary permits first. Refer to BMPs in **Appendix 4**.

If, at the time of anticipated replacement, there is heavy flow through the culvert, the Person-In-Charge shall consult with the National Grid Environmental Scientist, to verify whether the culvert shall be replaced at that time. Water may need to be temporarily diverted during culvert repair/replacement. There typically are seasonal restrictions limiting both the replacement of existing culverts as well as installation of new culverts to the low-flow period. The low-flow period can vary from state to state. If any unexpected conditions are encountered during culvert replacement, the National Grid Environmental Scientist shall be contacted immediately prior to the work being completed for additional consultation.

4.6 Temporary Construction Access over Drainage Ditch or Swale

In some situations, construction access from paved roads onto ROWs may require the crossing of drainage ditches or swales along the road shoulder. In these situations, the installation of construction mats, mat bridges or temporary culverts may facilitate construction access over the ditches or swales. These culverts shall be temporary only, sized for peak flow, and shall be removed after construction is complete. Consult with the National Grid Environmental Scientist prior to installation. In addition, if access over existing culverts may require extending the culvert, consult with the National Grid Environmental Scientist. Refer to BMPs in **Appendix 4**.

4.7 Construction Material along ROW

After preparing a site by clearing and/or installing any necessary erosion and sediment controls and prior to the start of construction, material such as poles, cross-arms, cable, insulators, stone and other engineered backfill materials may be placed along the ROW, as part of the project. The stockpiling of stone and other unconsolidated material on construction mats shall be avoided, if determined necessary due to access and work pad constraints, the material must be placed on a geotextile fabric and be properly contained with a sedimentation barrier such as straw wattle. No construction material shall be placed in wetlands or other sensitive resource areas unless authorized by the National Grid Environmental Scientist or Project Environmental Consultant.

5.0 Winter Conditions

5.1 Snow Management

Refer to **Appendix 6** for the current Snow Disposal Guidelines.

5.2 De-Icing

Where allowed, calcium chloride is preferred as a de-icing agent when applied according to manufacturer's guidelines in upland areas. Sand shall be used on construction mats through wetland areas.

Consult with the National Grid Environmental Scientist on de-icing agents when working in a facility or substation close to resource areas. Many municipalities have specific requirements for de-icing agents allowed within 100 feet of wetland resources and other sensitive areas.

5.3 Snow and Ice Management on Construction Mats

Proper snow removal on construction mats shall avoid the formation of ice. To avoid the formation of ice, snow shall be removed from construction mats before applying sand. Prior to their removal from wetlands, sand shall be collected from the construction mats and disposed of in an upland area. A round street sweeping brush mounted on the front of a truck may be an effective way to remove snow from construction mats. Propane heaters may also be suitable solutions for snow removal and/or de-icing of construction mats.

Once construction mats are removed, wetlands shall be inspected for build up of sand that may have fallen through construction mats. Care shall be taken to inspect wetland crossings as each mat is removed to ensure sand is properly removed and disposed of off-site.

6.0 Construction Mats

The use of construction mats allows for heavy equipment access within wetland areas. The use of construction mats minimizes the need to remove vegetation beneath the access way and helps to reduce the degree of soil disturbance and rutting in soft wetland soils. Construction mats most often used by National Grid are wooden timbers bolted together typically into 4-ft by 16-ft sections, wooden lattice mats, or composite mats. In some cases, construction mats or other mats are used for staging or access in upland areas based on site conditions (e.g., agricultural field access). Refer to BMPs in **Appendix 4**.

Typically construction mats may be installed on top of the existing vegetation, however in some instances cutting large woody vegetation may be required. Check with National Grid Environmental Scientist prior to cutting or clearing vegetation for construction mat placement.

Where an extended period of time has lapsed since wetland delineation and start of construction, and new vegetative growth has concealed wetland flagging or flagging is simply no longer obviously visible, wetland boundaries should be re-flagged where necessary prior to the installation of matting.

Follow the approved plans in the EFI for construction mat installation and do not deviate from the plans. **Any deviation from the approved plans needs to be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting, require stopping the project or result in a permit violation or revocation.**

6.1 Construction Mats and Mowing

Close coordination with the mowing contractor shall be required to ensure that access plans are followed, and construction mats are utilized when necessary. Sometimes mowing contractors may have to work off the leading edge of a construction mat to mow in order to lay the next construction mat and continue further into the wetland. Under no circumstances shall trees or shrubs be allowed to be pulled out of the wetland by the root ball. The root ball of trees and shrubs shall remain intact. Chipping debris and excessive amounts of slash shall not be placed in wetlands or other resource areas. In some instances, it may be beneficial to pile a reasonable amount of slash within a nearby upland area to create habitat for wildlife. This activity shall be approved by the National Grid Environmental Scientist.

6.2 Stream Crossings and Stream Bank Stabilization

Stream crossings shall be bridged with construction mats or other temporary minimally-intrusive measures unless fording is acceptable for the site and is authorized by the National Grid Environmental Scientist. Care shall be taken when installing a construction mat bridge to insure that the stream bed and banks are not damaged during installation and removal and that stream flow is not unduly restricted. Where stream width allows, construction mats shall be installed to span the watercourse in its entirety without stringer placement in the water or any restriction of stream flow. Environmental permits may be required to cross or disturb protected waters, depending upon state-specific regulatory requirements. Refer to BMPs in **Appendix 4**. Immediately following construction mat removal, all stream banks shall be stabilized and restored to prevent sedimentation and erosion.

6.3 Cleaning of Construction Mats

Mats shall be certified clean by the vendor prior to installation. The vendor shall use the certification form provided as **Appendix 5** to document compliance. Clean is defined as being free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site. Any equipment or timber mats that have been placed or used within areas containing invasive species within the project site shall be cleaned of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project site to prevent the spread of invasive species from one area to another[3]. **Mats shall be cleaned prior to being removed at the completion of the project: exceptions to this requirement**

[3] On ROW projects where multiple wetlands may be dominated by the same invasive species, cleaning may not be required for movement along the ROW. Check with the National Grid Environmental scientist for guidance.

may be made on a case-by-case basis. Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of construction mats.

6.4 Stone Removal for Construction Mat Placement

For situations where the matting contractor determines that stones or boulders must be removed or relocated within wetland areas in order to install safe and level structure work pads or access roads the boulders shall be moved in a manner which does not result in significant soil disturbance (i.e., pushing with a bull dozer is not allowed). The boulders shall not be placed on any existing vegetated areas within wetlands or within vernal pools. When numerous boulders shall be removed from a wetland area, they shall be deposited in an upland area outside of the flagged wetland limits, outside of any cultural resource areas and outside of any RTE species populations. Any boulders that shall be placed within buffers (In MA, the 100-foot buffer zone, and in RI, the 50-foot Perimeter Wetland, 100-foot or 200-foot Riverbank Wetlands) shall be placed to avoid causing soil disturbance and they shall be within an approved limit of work. When there is a significant number of boulders that need to be removed, the National Grid Environmental Scientist shall be consulted for guidance.

6.5 Transition onto Mats

Erosion controls and stone or wood chip ramps shall be installed to promote a smooth transition to and minimize sediment tracking onto construction mats. Geotextile may be added beneath stone or wood chip transitions to facilitate removal, as necessitated by site or permit conditions. Mat transitions shall be removed once construction mats have been removed and during restoration. Refer to BMPs in **Appendix 4**.

6.6 Construction Material on Mats

The stockpiling of stone, drill spoils and other unconsolidated material on construction mats shall be avoided unless determined necessary due to access and work pad constraints. Additional controls, such as watertight mud boxes and geotextile/filter fabric over or between construction mats shall be considered for stockpile management. If material is placed on construction mats and falls through into wetlands, the material must be removed by hand. Saturated soils shall be allowed to dewater prior to off-site transport for sufficient time to ensure that water/sediment is not deposited onto construction mats or public roads during transport. Heavy machinery shall not be left overnight on mats located within floodplain unless approved by the National Grid Environmental Scientist, the machinery is still in use, and removal of the equipment requires the use of additional equipment to move it and would increase vehicle trips in/ou of wetlands. In these situations and when approved by the National Grid Environmental Scientist, the equipment shall be secured against vandalism and secondary containment measures shall be employed where feasible. Mat anchoring shall be evaluated, see below.

6.7 Mat Anchoring

The National Grid Environmental Scientist and Project environmental consultant shall indicate to the project team when mat anchoring may or shall be necessary. The matting contractor will propose the method of mat anchoring, which will be approved by the National Grid Environmental Scientist and the

National Grid Construction Supervisor. The need for anchoring should be noted in the project EFI, on the project access and matting plans, and in the scope of the bid document (if externally sourced).

Anchoring of construction mats should be considered when any of the following conditions are presented at a project work location:

Location	Considerations
Stream crossings Shorelines of Ponds/Lakes Wetlands Floodplains	When located in a mapped flood area (A). When mapped 100-year flood elevations (AE) are greater than 2 ft above existing grades. Where past flash flood events have occurred. Where steep terrain is present or surrounds the project location. When mats will be in place during hurricane season for greater than 2 weeks.
Tidal areas	When located in a Velocity (V or VE) Zone. When mats will be in place during a moon tide cycle. When mats will be in place during hurricane season for greater than 2 weeks.

Examples of mat anchoring are provided below, but the implementation methods for anchoring mats are not limited to these examples. Where anchoring is determined to be necessary, the matting contractor should propose a method suitable based on field conditions and that takes crew safety, slip/trip/fall hazards, size of matting footprint, and other project and site-specific factors into consideration. Refer to BMPs in **Appendix 4**.

Limited sets of mats

- Cable or rope in chain pockets and run linearly, or
- Linear ropes anchored using helical screws, manta ray anchors, or posts.

Larger sets of mats or those without chain pockets

- Chain link fence posts or other posts driven in along mat edge every 3-4 feet and ropes then laced across mats between opposing posts before storm event, or
- Anchor bolts added to mats, then cable is laced between bolts and tied to helical or manta ray anchor.

6.8 Corduroy Roads

Corduroy roads are a wetland crossing method where logs are cut from the immediate area and used as a road bed to prevent rutting from equipment crossing. This technique is designed to be used in areas of wetland crossings where there is no defined channel or stream flow and should never be used in streams. Corduroy logs shall be placed in the narrowest area practicable for crossing with the logs

placed perpendicular to the direction of travel across wet area. The use of corduroy logs shall only be in emergencies when approved by the National Grid Environmental Scientist or when they have been specifically permitted as part of a project. Refer to BMPs in **Appendix 4**.

6.9 Construction Mat Removal

Once construction mats are removed, wetlands shall be inspected for build up of sand or other materials that may have fallen through construction mats. Care shall be taken to inspect wetland crossings as each mat is removed to ensure any materials are properly removed and disposed of off-site.

6.10 Utility Air Bridging

In ROWs where other utility facilities (including but not limited to gas, oil, fiber optic, electric, water, and sewer) are co-located within the transmission ROW, bridging may be required to cross those facilities. The project team shall coordinate with the respective utility company prior to determining if bridging or permanent crossings are required.

7.0 LGP Equipment Use

Only when approved by the National Grid Environmental Scientist on a case-by-case basis shall equipment with a LGP **psi that meets the state-specific USACE General Permit requirement when loaded** be allowed to access through wetlands. Refer to the state-specific General Permit for the definition of LGP in each state at: http://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/, or to the summary table provided below. The National Grid Environmental Scientist's approval of the use of LGP equipment through wetlands depends on several criteria including:

- Time of year. LGP equipment use may be allowed if weather and field conditions at the time of construction are suitable to eliminate/minimize the concern of rutting or other impacts. Frozen, frozen snow pack, low flow, drought conditions, or unsaturated surface soil conditions are typically acceptable conditions. Spring and fall construction, due to the typical higher precipitation, are not suitable times of year for LGP equipment use.
- Number of trips. Multiple trips through a wetland have shown to increase the potential for damage and require matting. LGP equipment use shall likely only be approved if trips are limited to one trip in and one trip out.
- Type of wetland system. Some wetlands have harder soils/substrate, and may be passable without causing significant damage. Some of the wetlands along National Grid ROWs have existing hard bottom roads that have been vegetated over time and may be traversed with LGP equipment without construction mats.
- Emergencies. LGP equipment use may be allowed during emergency or storm conditions for outage restoration.
- State-specific USACE General Permit Performance Standards. The standard is for no impact to the wetland, which may be obtained by using LGP equipment **when loaded**). "*Where construction requires heavy equipment operation in wetlands, the equipment shall either have low ground*

pressure (as specified in the USACE GP), or shall not be located directly on wetland soils and vegetation; it shall be placed on construction mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation."

- Local bylaws. Municipal wetland bylaws, where applicable, shall be reviewed for prohibitive conditions or applicable performance standards.

LGP equipment is prohibited in the following resources areas:

- Stream crossings
- State listed-species habitat
- Outstanding Resource Waters (ORWs)
- Vernal pools
- Archaeological sensitive areas

Where LGP equipment use is desired in lieu of construction mats, the construction supervisor should identify these areas on marked-up access plans. A site visit with the Project Environmental Monitor should be scheduled to assess if the proposed locations are potential candidates. The Project Environmental Monitor will document potentially suitable locations and dismiss others as unsuitable.

ACOE New England District General Permit Requirements

State	Restrictions	Maximum PSI (when loaded) for Use without Mats	Reference
MA	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Equipment must be operated on adequately dry or frozen conditions such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands.	3 psi	MA General Permit, General Condition 13
NH	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Be operated on frozen wetlands.	4 psi	NH General Permit, General Condition 17
VT	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Be operated on frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Note: Written authorization from the Corps required to waive the use of mats during frozen or dry conditions.	3 psi	Vermont General Permit, General Condition 14
RI	*One of the following must apply:* Equipment operated within wetlands shall: a) Have low ground pressure; b) Be placed on timber mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation; or c) Be operated on frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands.	6 psi	Rhode Island General Permit, General Condition 15

State	Restrictions	Maximum PSI (when loaded) for Use without Mats	Reference
	Note: Written authorization from the Corps required to waive the use of mats during frozen or dry conditions.		

Due to the fact that ground conditions may change between the time of the evaluation and construction, LGP equipment approval is required **at the time of construction for each wetland crossing** and shall be dependent upon the above conditions. In addition, LGP equipment use and approval shall be assessed by the National Grid Environmental Scientist or Project Environmental Monitor during construction on a continuing basis

Once a location is approved for the use of LGP equipment:

- The Construction Supervisor must check-in with the Project Environmental Monitor at least two weeks before construction begins to ensure conditions remain suitable for LGP equipment use, and weather conditions are favorable.
- The Project Environmental Monitor must observe the equipment when in use.
- LGP equipment use shall cease immediately if field conditions are found to be unsuitable (i.e. soil rutting greater than six inches or the destruction of vegetation root systems beyond the capacity of natural revegetation).
- **If wetlands damage occurs, the use of the LGP equipment shall be suspended, and the wetlands be restored.**
- Any LGP equipment used within areas containing invasive species within the project site shall be cleaned of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project site to prevent the spread of invasive species from one area to another.

8.0 Soil Disturbing Activities

8.1 Dust Control

Cutting activities shall be conducted to minimize the impacts of dust on the surrounding areas. Dust suppression is an important consideration. Water or other National Grid approved equivalent in accordance with the manufacturer's guidelines may be used for dust control along ROWs in upland areas. During application of water for dust control, care shall be taken to ensure that water does not create run-off or erosion issues. Refer to BMPs in **Appendix 4.**

8.2 Clearing

Clearing is not allowed without specific permission as it constitutes soil disturbance under several regulatory programs and may trigger permitting by increasing the project's footprint of disturbance. If clearing is required for a project, the limit of clearing shall be established with flagging or construction

fencing and/or erosion controls. Clearing shall be done in accordance with project specific permits. Following the completion of clearing, the limits of work shall be re-established. Refer to BMPs in **Appendix 4**.

8.3 Grubbing

Grubbing is not allowed without specific permission as it constitutes soil disturbance under several regulatory programs and likely triggers permitting by increasing the project's footprint of disturbance. If grubbing is required for a project, the limit of grubbing shall be re-established after clearing has been completed. The area of grubbing shall be identified with flagging or construction fencing and/or erosion controls. Grubbing shall be conducted in accordance with project-specific permits.

8.4 Blasting, Noise and Vibration Control

If blasting is anticipated, the project team, including the National Grid Environmental Scientist, shall be consulted. If possible, plan work in residential areas to avoid noisy activities at night, weekends or during evenings. Emergency work in residential areas should be carried out in such a way as to keep noise to a minimum at night and weekends. Equipment should be maintained as per the manufacturer's guidance to minimize noise and vibration.

Work plans must consider local noise ordinances and provide specific controls to ensure noise levels are maintained within specified limitations.

8.5 Site Grading

The work site shall not be graded other than in accordance with project permits. Any proposed grading shall be reviewed by the National Grid Environmental Scientist for wetlands, rare species habitat, areas of cultural and historical significance, and other environmentally sensitive areas prior to start of work. In some cases, additional testing for cultural or historical resources may be triggered by proposed grading; alternatives to grading may be sought due to protracted time frame of obtaining the permit associated with testing and performing the testing. Grading outside of a regulated area shall be kept to the minimum extent necessary for safe and efficient operations and shall comply with the project permit plans.

Grading shall be performed in a manner which does not increase the erosion potential at the Site (e.g., terraces or slope interruptions shall be utilized). Graded sites shall be promptly stabilized by applying a National Grid approved seed mix (if adequate root and seed stock are absent), and mulching with hay, straw or cellulose (use straw or cellulose hydromulch where the potential introduction of invasive plant species is of concern) to reduce erosion and visual impact, as soon as possible following completion of work at the site. Grading within a regulated area shall be subject to the review and approval of the National Grid Environmental Scientist.

In some municipalities, site grading activities require the prior approval of the Town Engineer, Building and Zoning Official, or Public Works Director. Local ordinances or bylaws should be reviewed for applicable restrictions and permitting thresholds

8.6 Grounding Wells

The installation of grounding wells shall require erosion controls and proper soil management. Due to the typical depth required for grounding wells (typically 50 to 200 feet or more), erosion controls shall be installed around the proposed well location when working in buffer zone, in proximity to sensitive resources or near slopes. Also, dewatering basins may be required for the proper management of groundwater. The National Grid Environmental Scientist shall be consulted for the disposal of any excess soil.

8.7 Counterpoise and Cathodic Protection

The installation of counterpoise or cathodic protection shall require erosion controls and proper soil management. The National Grid Environmental Scientist shall be consulted for the disposal of any excess soil.

8.8 Work Pads

When work pads are being constructed, only clean material shall be used in their construction. Work pads shall only be constructed in areas approved by the National Grid Environmental Scientist and shown on the approved permit access plans.

8.9 Site Staging and Parking

During the project planning and permitting process, locations shall be identified for designated crew parking areas, material storage, and staging areas. Where possible, these areas should be located outside of buffer zones, watershed protection areas, and other environmentally sensitive areas. Any proposed locations shall be evaluated for all sensitive receptors and for new projects requiring permitting, shall be incorporated onto permitting and access plans.

8.10 Soil Stockpiling

Soil stockpiles shall be located in upland areas and, if in close proximity to wetlands and wetland buffers, shall be enclosed by staked straw bales or another erosion control barrier. The stockpiling of stone, drill spoils and other unconsolidated material on construction mats shall be avoided unless determined necessary due to access and work pad constraints. Additional controls, such as watertight mud boxes and geotextile/filter fabric over or between construction mats shall be considered for stockpile management. If material is placed on construction mats and falls through into wetlands, the material must be removed by hand. Saturated soils shall be allowed to dewater prior to off-site transport for sufficient time to ensure that water/sediment is not deposited onto construction mats or public roads during transport.

8.11 Top Soil/High Organic Content Soil

When the work site requires excavation and grading, the top soil shall be stockpiled separately from the material excavated. This top soil shall be spread as a top dressing over the disturbed area during restoration of the site.

In some instances where work is occurring within wetlands, high organic content soil may be displaced. Such high organic content soil shall be segregated from other excavated materials and stockpiled for

use in wetland restoration areas. Care shall be taken to minimize the handling of high organic content soil. Preferably, the soil shall be stockpiled in one location until it is moved to the restoration area.

9.0 Stone Wall Dismantling and Re-building

Removal or alteration of stonewalls shall be avoided, whenever possible. As appropriate, some stonewalls removed or breached by construction activities shall be repaired or rebuilt. Rebuilt stone walls shall be placed on the same alignment that existed prior to temporary removal, to the extent that it shall not interfere with operations. The removal and rebuilding of stone walls requires approval from the National Grid Environmental Scientist and Property Legal, and may require several weeks lead time for coordination. Note that not all states allow this technique and that dismantling may not be allowed at all due to quality or significance of the wall. Once a stone wall has been identified as requiring dismantling, the following procedures shall be followed:

- Identify stone wall that is required to be temporarily dismantled and notify project team that a site visit is warranted to review the stone wall.
- The National Grid Environmental Scientist, with support from Property Legal and/or cultural/historical consultant, shall determine if permitting or additional permissions are required prior to dismantling stone wall.
- Once permit or permissions have been received, full documentation of wall dimensions (measurements and photographs) shall be submitted to the National Grid Environmental Scientist. Documentation of the wall dimensions shall be marked onto a copy of the applicable EFI access plan (or equivalent plan) with a useful reference for future locating such as GPS coordinates and/or measurement from a permanent reference point (closest structure location or closest cross street, etc.). The wall shall be photographed from all sides with a written description of the photograph (i.e. southern side of wall looking north). In addition, documentation of the length of wall to be dismantled shall be recorded. Take special care to note if granite property bounds (or other marker) are located within the wall so additional survey can be accomplished prior to dismantling in cases where the stone wall represents a property boundary. Site visits by project team (which shall include the National Grid Environmental Scientist) are a mandatory requirement prior to dismantling.
- No dismantling shall take place until documentation has been submitted to the National Grid Environmental Scientist and approved as sufficient documentation.
- Stones from the wall shall be removed from the work area and temporarily stored in nearby location, away from wetlands; buffer zones; rare species habitat and other historical/archeological concerns.
- Avoid dismantling via the “bulldozer” method when possible as this method makes it nearly impossible to rebuild the wall in the same alignment due to its uncontrolled nature. Dismantling shall be conducted either by hand, with stones stacked as they are removed, or on less “sensitive” walls to use an excavator with a thumb to grab each stone and build a stockpile. Significant ground disturbance below the wall shall be avoided.

- Once construction and access in the area has been completed, the wall shall be rebuilt to pre-dismantled conditions or better. If rebuilding a stone wall can not be placed on the same alignment that existed prior to temporary removal, approval from the National Grid Environmental Scientist and Property Legal is required. **Note that if the wall represents a legal property boundary or is historically or culturally significant (or was previously determined to be in a very high quality condition), a professional stone masonry company may be required to document wall alignment, and conduct the dismantling and rebuilding.**

10.0 Avian Nest Removal

Avian nest removal shall be done in accordance with EG-304. Consult the National Grid Environmental Scientist prior to removing any nests. There are seasonal restrictions of the removal of avian nests and federal or state permits may be necessary prior to removal.

11.0 Drilling Fluids and Additives

When installing subsurface structures, there may be a need to utilize drilling aids such as slurries, borehole sealants, and other additives. All necessary steps shall be taken by National Grid personnel and contractors to prevent potential adverse effects on drinking water aquifers, groundwater quality, and wetlands when utilizing drilling aids. Efforts should be made to utilize natural bentonite clay-type materials, in place of polymer-based drilling aids. Regardless of the specific product type, the following requirements shall be met:

- Drilling aids must be NSF certified and manufactured to NSF-ANSI 60 standards. https://www.nsf.org/newsroom_pdf/NSF-ANSI_60_watemarked.pdf
- Product use must be in accordance with manufacturer's specifications and instructions.
- National Grid personnel or their contractor shall provide all the necessary information regarding the proposed product to be used to National Grid's Environmental Sustainability, Compliance and Licensing & Permitting Department as early as possible in the project planning phase. If the work is being performed by a contractor, this information must be included as part of their initial bid package.
- If polymer-based products are proposed for use, product information shall be included in all related environmental regulatory filings and frac-out plans, if possible.
- A qualified individual shall be designated who will confirm/verify and document the specific use of a drilling aid at each location. This will include add-mix ratios, surface area treated, volume of water within excavation, volumes/weight of additives used, and any other measurements specified by the manufacturer. No mixing will be allowed in the drilled shaft excavation.
- The Contractor or National Grid crew performing the work is responsible for neutralizing all drilling products, as applicable, in accordance with the manufacturer's specifications. This shall be performed following removal from the excavation and while held in holding tanks. A

qualified person shall be designated by the Contractor who will confirm/verify and document the appropriate neutralization activity at each location, as necessary.

- Waste drilling aids (neutralized or not) or soils that may have come into contact with drilling aids will not be disposed of on National Grid properties, discharged to any ground surface or subsurface, waterbodies, wetlands or placed on 3rd party properties.
- All product use must be completed in strict adherence with the management, storage, mixing, transporting, disposing and any other requirements of state and federal regulatory approvals and permits, as applicable.
- Relevant documentation shall be maintained by the Contractor or National Grid crew performing the work, and shall include volume of material treated and disposed and the location/facility at which it was disposed.
- National Grid will not be identified as the disposal generator for any polymer based slurry waste or additives generated by Contractor activities.
- The Contractor or National Grid crew performing the work assumes full responsibility for the safe storage of all polymers and additives during use and also assumes full responsibility for improper use and application of said polymers and additives that are deemed to have contravened aquifer and/or groundwater quality.
- National Grid reserves the right to refuse and terminate the use of any specific drilling aid at any time.

Regardless of the type of drilling aid utilized, the Contractor or National Grid crew performing the work is responsible for properly treating, containerizing, testing, transporting and disposing of any/all fluids and solids generated during their activities. All wastes must be disposed of in accordance with federal and state regulations. Relevant documentation shall be maintained and shall include volume of material treated and disposed and the location/facility at which it was disposed.

12.0 Water Withdrawal for Geotechnical Investigations

The use of water during geotechnical drilling operations may be required, and is most common during the “drive and wash” drilling technique, where 4- or 6-inch diameter casing is driven into the ground, and the soil inside the casing is washed out using a pump and hollow rods. Soil samples are generally collected at periodic intervals using a split spoon sampler (e.g., every 5 vertical feet).

The National Grid Environmental Scientist and/or Project Environmental Monitor may approve withdrawals from wetlands and waterways on a case-by-case basis should the geotechnical team advise no other options are available. Generally, the amount of water required for withdrawal is between 100 and 200 gallons, and the water is then recycled continuously in the drilling process. Certain scenarios may require additional water usage if water is lost down the boring (e.g., lost due to bedrock fractures during rock coring). The following general guidance should be adhered to when determining whether water withdrawals may be allowed during geotechnical investigations on the ROW. Approval from the National Grid Environmental Scientist and/or Project Environmental Monitor is required prior to initiating water withdrawals during geotechnical investigations.

- Withdrawals from perennial streams, ponds, lakes and large wetlands systems are preferred over small isolated wetlands to ensure the water level, water table, and hydroperiod are not affected. Prior to start of work, the Contractor shall identify which water source they prefer to withdraw from. The National Grid Environmental Scientist and/or the Project Environmental Monitor will confirm whether these sources are appropriate.
- Care should be taken to avoid alteration of wetlands or the beds and banks of surface waters. Examples of alterations include, but are not limited to, the following:

  (a) the changing of pre-existing drainage characteristics, flushing characteristics, salinity distribution, sedimentation patterns, flow patterns and flood retention areas;

  (b) the lowering of the water level or water table;

  (c) the destruction of vegetation; and

  (d) the changing of water temperature, biochemical oxygen demand (BOD), and other physical, biological or chemical characteristics of receiving waters.
- Wetlands and waterways providing habitat for rare species should be avoided unless all other options are exhausted. Under no circumstances should water be withdrawn from a Vernal Pool.
- Withdrawal pipes or stingers should be elevated off the bottom of wetlands and streams during the duration of pumping. Additionally, fabric or screening should be covering the withdrawal pipes to eliminate inadvertent harm to wildlife.
- Withdrawals should be performed in a manner that does not damage vegetation, disturb sediment, or result in the release of temporary or permanent fill material (e.g., sediment, spoils, or turbid water) into the wetland/waterway. Additional detail from geotechnical experts may be required to solidify BMP recommendations.
- Any water used for geotechnical drilling operations (including water withdrawn from surface water, brought on-site, or from other sources) shall be discharged into the open borehole or to an upland area such that the water infiltrates to the ground and is not discharged to a wetland or surface water resource area. Consultation with the National Grid Environmental Scientist and/or the Project Environmental Monitor is required if this is not feasible. At no time should water withdrawals result in a temporary or permanent fill/discharge of material (e.g. sediment, spoils, or turbid water) into the wetland or waterway.
- If water sourcing options is not determined prior to mobilization, necessary water shall be brought in by tank truck. Should withdrawal from surface water sources become necessary during soil boring work, the National Grid Environmental Scientist and/or the Project Environmental Monitor shall be notified prior to beginning withdrawal. If initial withdrawal from surface water is approved by the National Grid Environmental Scientist and/or the Project Environmental Monitor, the driller may withdraw from the surface water, as long as the above criteria are met.
- If excessive water withdrawal is necessary, the National Grid Environmental Scientist and/or the Project Environmental Monitor shall be consulted to determine whether the water source is appropriate for withdrawal.
- In New Hampshire, withdrawals made from state-owned property require written permission from

the agency with primary responsibility for monitoring and/or maintaining the site.

13.0 Gates

When not in use, gates shall be locked with a company-approved lock or double locked with the property owner's lock. New gates may be installed during a project, however, installation of a gate requires permission from the property owner, and may require environmental permitting. Consult with National Grid Real Estate and the National Grid Environmental Scientist prior to installing a new gate, as well as with the appropriate engineering department for the current company gate specifications. Refer to BMPs in **Appendix 4**. Installation of ROW access restrictions (e.g., stone, bollards, other) at road crossings also require consultation with the National Grid Environmental Scientist and Property Legal.

14.0 Signage

Specific signage may be required by permits or be specified in the EFI to limit access in certain sensitive areas. Signs shall be used to clarify allowed access and sensitive areas, such as:

- "No snow stockpiling beyond this point";
- "Approved access (to structures A-F)";
- "Do not cross this area until construction mats are in place";
- "No vehicle crossing";
- "Areas to avoid"; and
- "Environmentally Sensitive Area – Keep Out."

Signs shall be used in conjunction with snow fencing or other physical barriers as demarcation for sensitive areas (e.g., rare species areas, sensitive archeological locations, etc.) that need to be protected and avoided by construction activities. In addition, permit signs required by the regulatory agencies shall be present (i.e. MADEP, RIDEM, EPA (SWPPP), ACOE, etc) at construction sites and/or ROW access points. Construction signage shall be installed and maintained by the contractor performing the work during the project. Absence of signage does not eliminate the need to comply with access plans, permit conditions, and other regulatory requirements. Refer to BMPs in **Appendix 4**.

15.0 Refueling and Maintenance Operations

15.1 Spill Prevention and Response Plan

Spill controls shall be provided on every field vehicle. Bulk storage of fuels (55 gallons or greater) shall be approved by the National Grid Environmental Scientist prior to being brought on site. The need for a field spill plan shall be evaluated specific to the project for regulatory requirements under SPCC regulations or local ordinances. A field spill plan would include information on fuels and oils being used, approximate amounts in each container or type of equipment, location, fueling location, secondary containment, response and notification procedures, including contact phone numbers, etc. All

personnel shall be briefed on spill prevention and response prior to the commencement of construction. The state-specific EI-501 and EG-502 shall be followed in the event of a spill.

Typical construction activities do not require the use or storage of large quantities of oil or hazardous materials (i.e., greater than 55 gallons). However, oil and/or hazardous materials (OHM) may be required in limited quantities to support construction or vehicle operations. Best practices shall be followed in the use and storage of OHM which include but are not limited to: storage and refueling greater than 100 feet from resource areas; maintenance of spill response equipment at work locations sufficient to handle incidental releases from operating equipment; general training for on-site personnel for spill clean up response for incidental releases of OHM; and contracting with an on-call spill response contractor that is capable of managing incidental and significant releases of OHM. There may situations that additional precautions shall be required for the storage or use of OHM (i.e., within wellhead protection areas, GA/GAA areas, Zone IIs). Storage of OHM shall be done in accordance with any applicable regulatory requirements.

15.2 Field Refueling

Small equipment such as pumps and generators shall be placed in small swimming pools or on absorbent blankets/pads, to contain any accidental fuel spills. Small swimming pools with absorbent blankets/pads, and/or other secondary containment, shall be used for refueling of fixed equipment in wetlands and should be maintained to prevent accumulation of precipitation.

15.3 Grease, Oil, and Filter Changes

Routine vehicle maintenance shall not be conducted on project sites.

15.4 Other Field Maintenance Operations

When other vehicle or equipment maintenance operations (such as emergency repairs) occur, company personnel or contractors at field locations shall bring vehicles or equipment to an access location a minimum of 100 feet away from environmentally sensitive areas (e.g., wetlands or drinking water sources). A paved area, such as a parking lot or roadway, is a preferred field maintenance location to minimize the possibility of spills or releases to the environment.

Crews shall take all usual and reasonable environmental precautions during repair or maintenance operations. Occasionally, it is infeasible to move the affected vehicle or equipment from an environmentally sensitive area to a suitable access area. When this situation occurs, precautions shall be taken to prevent oil or hazardous material release to the environment. These precautions include (but are not limited to) deployment of portable basins or similar secondary containment devices, use of ground covers, such as plastic tarpaulins, and precautionary placement of floating booms on nearby surface water bodies.

15.5 Tools and Equipment

Cleaning of tools and equipment shall be conducted away from environmentally sensitive areas (such as wetlands, buffer zones or drinking water sources) to the maximum extent possible. A paved area such

as a parking lot or roadway is preferred, to minimize the possibility of spill or release to the environment. Crews shall wipe up all minor drips or spills of grease and oil at field locations.

16.0 Stabilization Deadlines for Projects Subject to EPA Construction General Permit

16.1 Deadlines to Initiate Stabilization Activities (Permanent and Temporary)

Soil stabilization measures shall be implemented immediately whenever earth-disturbing activities have permanently or temporarily ceased on any portion of the project. The following are some examples of activities that constitute initiation of stabilization:

- Preparing the soil for vegetative or non-vegetative stabilization;
- Applying mulch or other non-vegetative product to the exposed area;
- Seeding or planting the exposed area;
- Finalizing the arrangements to have stabilization product fully installed in compliance with the deadlines to complete stabilization in Section 15.2 below.

16.2 Deadlines to Complete Stabilization Activities (Permanent and Temporary)

As soon as practicable, but no later than 14 calendar days or 7 calendar days (for areas discharging to a sensitive water) after the initiation of soil stabilization measures commence the following should be completed:

- For vegetative stabilization, all activities necessary to initially seed or plant the area to be stabilized; and
- For non-vegetative stabilization, the installation or application of all such non-vegetative measures.

16.3 Vegetative Stabilization (all except for arid, semi-arid, or on agricultural lands)

- Provide established uniform vegetation (e.g., evenly distributed without large bare areas), which provides 70% or more of the density of coverage that was provided by vegetation prior to commencing earth-disturbing activities. Avoid the use of invasive species as cover.
- For final stabilization, vegetative cover must be perennial; and
- Immediately after seeding or planting a disturbed area to be vegetatively stabilized, a non-vegetative erosion control must be implemented to the area while the vegetation is becoming established. Examples include; mulch and rolled erosion control products.

16.4 Vegetative Stabilization (Agricultural Lands)

- Disturbed areas on land used for agricultural purposes that are restored to their pre-construction agricultural use are not subject to vegetative stabilization standards.

16.5 Non-Vegetative Stabilization

If using non-vegetative controls to stabilize exposed portions of your site, or if you are using such controls to temporarily protect areas that are being vegetatively stabilized, you must provide effective

non-vegetative cover to stabilize any such exposed portions of the site. Examples of non-vegetative stabilization techniques include, but are not limited to, rip-rap, gabions, and geotextiles.

17.0 Clean-up and Restoration Standards

The following steps shall be taken once construction has been completed at each location along the ROW or within the project site. The following are minimum guidelines for clean-up and stabilization standards. Please refer to permit conditions for project-specific related standards. Refer to the EFI for applicable permit requirements and to determine if the site needs to be reviewed and approved by the permitting authorities prior to removal of erosion controls.

17.1 Removal of Sedimentation and Erosion Controls

After all work has been satisfactorily completed and vegetation has been re-established to a minimum of 75% cover, and upon approval by the National Grid Environmental Scientist, all non-biodegradable materials (e.g., siltation fencing, straw bale strings, stakes, straw wattle mesh casing, etc.) shall be disposed of properly off-site.

Dependent on permit requirements, sedimentation and erosion controls may not be allowed to be removed until after inspection and approval by one or more permitting authority. In most cases, removed straw bales may be used to mulch disturbed areas. Remaining straw bales that do not block the flow of water may be left in place unless they are required to be removed pursuant to permit conditions. Straw bales that block the flow of water shall be removed.

Prior to project construction being completed, the project team will develop post-construction inspection intervals to ensure timely removal of temporary BMPs. BMPs will be removed when the area is stabilized, which typically occurs when the area has either naturally stabilized (75% cover), or seed and mulch that was installed has achieved 75% cover.

17.2 In-Situ Restoration

Unless otherwise specified in permits or prescribed by the National Grid Environmental Scientist or the Project Environmental Consultant, all disturbed areas, including stream banks, wetlands and access routes, shall be restored following the completion of work. When the work is completed and construction mats have been removed, the National Grid Environmental Scientist or Project Environmental Consultant shall conduct an inspection. Wetlands shall be inspected for build up of sand or other materials that may have fallen through construction mats. Care shall be taken to inspect wetland crossings carefully after construction mat removal to ensure any materials are properly removed and disposed of off-site.

Restoration of Soil Compaction. If rutting or soil compaction following construction mat removal is observed, the area shall be returned to pre-existing conditions, and comparable to the surrounding area, by light hand raking or by back-blading with machinery. Restoration shall be overseen by the Project Environmental Consultant or National Grid Environmental Scientist. Deep ruts (>12”) shall be filled in using available, loose soil from the work area.

Seeding and Mulching. If adequate root and seed stock are absent and have been stripped from the area, graded sites shall be promptly stabilized by applying an approved seed mix and mulching with straw to reduce erosion and visual impact. Seeding and mulching shall be completed as soon as possible following completion of work at the site. For some wetland areas, natural re-vegetation may be more appropriate than seeding disturbed sites. Wetland areas where adequate root and seed stock are absent will be seeded using an approved wetland native seed mix. For some wetland areas, natural re-vegetation may be more appropriate than seeding disturbed sites. Refer to BMPs in **Appendix 4** for seed mix tables and mulch ratio tables.

If needed, the import of quality topsoil onto the ROW will be required. Topsoil should be tested, and approved by the Project Environmental Consultant or National Grid Environmental Scientist to determine its suitability for site conditions. Fertilizers will be approved on a case-by-case basis.

For upland areas, the disturbed vegetation and soil shall be restored and stabilized[4] by regrading the area to pre-existing conditions, if needed, seeding (if adequate root and seed stock are absent) and mulching the exposed soil, and removing strings and stakes from straw bales and using broken up straw bales for the mulch. Siltation fencing, strings and stakes shall be removed for disposal as ordinary waste. Refer to BMPs in **Appendix 4** for seed mix tables and mulch ratio tables.

For sites with excess boulders, additional boulders could be used at proposed and existing gate locations to use on either side of the gates as a deterrent for unauthorized vehicle access or be placed along the edges of work pads where steep slopes are present for safety purposes. The final placement of boulders should be reviewed prior to installation with Real Estate and the National Grid Environmental Scientist or Project Environmental Consultant.

Unless otherwise specified in Project-specific permit conditions, the National Grid Environmental Scientist or Project Environmental Consultant shall develop an inspection frequency to monitor restored areas for stabilization, germination and successful revegetation.

17.3 Invasive Species

All equipment shall be certified clean[5] utilizing the attached form (**Appendix 5**) or equivalent as approved by the vendor prior to mobilization to the work site. The vendor shall use the certification from provided as **Appendix 5** to document compliance with invasive species management BMPs. Clean is defined as being free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site. Any equipment that has been placed or used within areas containing invasive species within the project site shall be cleaned of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project

[4] For projects subject to the 2012 CGP, stabilization is required within 14 days, or within 7 days for sensitive areas.

[5] The **Appendix 5** certification form (or equivalent as approved by National Grid Environmental Scientist) shall be used to document the clean certification

site to prevent the spread of invasive species from one area to another[6]. **Equipment shall be cleaned prior to being removed at the completion of the project: exceptions to this requirement shall be determined on a case-by-case basis.** Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of equipment.

17.4 Cleaning of Equipment

At the completion of the project, equipment shall be cleaned prior to being de-mobilized to prevent tracking of material onto roads and causing safety issues. Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of equipment.

17.5 Access Roads

Constructed gravel roads shall be left in place following project completion unless permit conditions require their removal. Refer to the specific permit conditions for these provisions. If the road is to be removed, the crushed stone and geotextile fabric shall be removed from the work site. Seeding and/or mulching of gravel roads is generally not required, unless necessary to prevent erosion. Pre-existing sandy soils within mapped rare turtle habitat shall not be seeded unless directed by the National Grid Environmental Scientist so as to not alter nesting habitat.

17.6 Stone Work Pads

Unless permit conditions or property owner's require the removal of constructed stone work pads following project completion, constructed work pads shall be left in place. Refer to the specific permit conditions for these provisions.

17.7 Construction Materials on ROWs

As soon as the structure work has been completed, all used parts and trash are to be picked up and removed from the project site. Retired poles shall be removed in accordance with National Grid Engineering Standard SP.06.01.301. In some cases, the used material from structure work may be temporarily stored at the work area by placing it out of the wetlands or other sensitive resource area until work in the adjacent areas has been completed. However, treated wood poles shall never be stored in standing water or in wetlands. If the project is cancelled, all material shall be removed from the project site. Excess material brought to the project site shall be removed upon project completion. Consult with the National Grid Environmental Scientist on whether the work site shall be restored in addition to the measures outlined above

17.8 Improved Areas

Yards, lawns, agricultural areas, and other improved areas shall be returned to a condition at least equal to that which existed at the start of the project. Off-ROW access shall never be assumed and shall be coordinated through Real Estate before being implemented. Depending on the access point, construction matting or other BMPs may be required to prevent ruts, lawn damage, or other property damage.

[6] On ROW projects where multiple wetlands may be dominated by the same invasive species, cleaning may not be required for movement along the ROW. Check with the National Grid Environmental Scientist for guidance.

Restoration following the completion of work and any use of improved areas shall be conducted in accordance with the measures outlined above.

17.9 Property Damage

All damage to property occurring as a result of a project shall be immediately repaired or replaced. In some locations, it may be desirable to document pre-existing damage prior to work commencing in that area in order to demonstrate afterwards that the damage did not result from the project. Work crews, the Project Environmental Consultant or the National Grid Environmental Scientist shall document repairs that were performed in response to damage from unauthorized vehicle use.

17.10 Overall Work Site

Upon satisfactory completion of work, the construction personnel shall remove all work-related trailers, buildings, rubbish, waste soil, temporary structures, and unused materials belonging to them or used under their direction during construction, or waste materials from previous construction and maintenance operations. All areas shall be left clean, without any litter or equipment (wire, pole butts, anchors, insulators, cross-arms, cardboard, coffee cups, water bottles, etc.) and restored to a stable condition and as near as possible to its original condition, where feasible. Debris and spent equipment shall be returned to the operating facility or contractor staging area for disposal or recycling (cardboard) as appropriate in accordance with EI-111.

17.11 Material Storage/Staging and Parking Areas

Upon completion of all work, all material storage yards, staging areas, and parking areas shall be completely cleared of all waste and debris. Unless otherwise directed or unless other arrangements have been made with an off ROW or off-property owner, material storage yards and staging areas shall be returned to the condition that existed prior to the installation of the material storage yard or staging area. Regardless of arrangements made with a landowner, all areas shall be restored to their pre-construction condition or better. Also any temporary structures erected by the construction personnel, including fences, shall be removed by the construction personnel and the area restored as near as possible to its original condition, including seeding and mulching as needed.

18.0 Notification of Emergency Work

Because it is sometimes difficult to identify wetlands and other sensitive environmental areas, the National Grid Environmental Scientist shall be notified within 24 hours or by the next working day whenever emergency off-road repair work takes place. Although the routine maintenance and emergency repair work is generally allowed, due to site conditions or the scope of the project, notification to the regulating agencies may be required.

19.0 Appendices

APPENDIX 1: Glossary
APPENDIX 2: Acronyms

APPENDIX 3:	Storm Water, Wetlands & Priority Habitat Environmental Compliance Site Inspection / Monitoring Report Form
APPENDIX 4:	BMP Drawings and Guidelines
APPENDIX 5:	Certification Sheet for Invasive Species Control
APPENDIX 6:	Snow Disposal Guidelines

Appendix 1 – Glossary

Access Road – An existing, periodically maintained road often consisting of gravel and/or exposed soils or vegetated with grasses but devoid of woody vegetation, that is visible on aerial photography and shown on ROW T-sheets. May include newly permitted permanent roads (i.e., roads to be constructed in accordance with a project-specific permit).

Access Route - A pathway previously used or proposed to be used by crews for access along the ROW. Routes may be shown on ROW T-sheets or previous project access plans but are not improved as maintained gravel/exposed soil roads. Access routes may be mown and can consist of trails utilized by recreational vehicles.

Action Logs – Project-specific log used to document action items required for permit compliance. The log identifies timeframes for completion and responsible parties. The log is typically updated by the Project Environmental Consultant or the National Grid Environment Scientist and circulated to the project team on a weekly, or more frequent, basis.

Bank – The transitional slope immediately adjacent to the edge of a surface water body, the upper limit of which is usually defined by a break in slope, or, for a wetland, where a line delineated in accordance with applicable state and federal regulations that indicates a change from wetland to upland.

BMP – Best Management Practice. Individual engineered constructions or operating procedures intended to minimize and mitigate soil disturbance, erosion, sedimentation, turbid discharges, and/or impacts to sensitive receptors.

Clean - Free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site.

Clean Gravel – Gravel is a type of coarse-grained soil that consists of small stones and other mineral particles. Clean Gravel shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001) Clean Gravel will not have fine materials that could lead to a turbid discharge.

Clean Stone (Crushed Stone) – Clean Stone (Crushed Stone) shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001). Clean Stone will not have fine materials that could lead to a turbid discharge.

Clearing – The cutting of trees and large bushes by hand and/or mechanical means.

Compost Socks – Tubular devices comprised of non-degradable, photodegradable, or biodegradable mesh tubing containing organic compost matrix. Compost socks are effective for intercepting site runoff, trapping

sediment, and treating for soluble pollutants by filtering stormwater runoff. . Compost socks are a useful sedimentation control device along construction site perimeters, as check dams in drainage channels, as a slope interruption practice on long and/or steep slopes, and around drain or street curb inlets.

Construction Mats - **C**onstruction, swamp, and timber mats ("construction mats") are generic terms used to describe structures that distribute equipment weight to minimize disturbance to wetland soil and vegetation while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes.

Corduroy Road – Corduroy roads are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another.

Dewatering Basin – An established containment area for saturated materials and pumped discharges. This measure is used for the purpose of de-watering soils prior to transport off site or for use in another location on site, and for allowing suspended sediment to settle out of pumped discharges.

Detention/Retention Basin – A detention/retention basin is designed for the purpose of detaining or retaining water. A dewatering basin is a form of detention basin

Dewatering – Use of a system of pumps, pipes and temporary holding dams to drain or divert waterways or wetlands, or lower the groundwater table before and during excavation activities.

Drainage Ditch or Swale – A clearly noticeable channel that is typically dry, except after precipitation events. Intermittent and perennial streams and rivers are not included in this definition.

Dredge – To dig, excavate, or otherwise disturb the contour or integrity of sediments in the bank or bed of a wetland, a surface water body, or other area within the regulating bodies' jurisdiction.

Dredge Spoils – Material removed as the result of dredging.

Embankment – A protective bank constructed of mounded earth or fill materials located between a roadway (or rail bed) and a seasonal stream or other wetland.

Environmental Field Issue – Document that contains copies of all project-specific environmental permits and summarizes all environmental permit conditions. The EFI is prepared by the Project Environmental Consultant or the National Grid Environment Scientist and copies are provided to the Project Manager, Construction Supervisor(s), and other team members as appropriate.

Environmental Monitoring Records – Examples of checklists and/or monitoring reports suggested for use by the Company Environmental Engineer to document conformance of the project with this Environmental Guidance and or project specific permit/license conditions.

Environmental Scientist – Formerly Environmental Engineer. The National Grid Environmental Department representative for the project or the territory where the work is located. For a map of Environmental Department staff territories, refer to the Environmental page of the National Grid infonet.

Environmentally Sensitive Areas – Examples of environmentally sensitive areas that may be found on National Grid properties are rivers, streams, ponds, lakes, wetlands, bogs, swamps, salt marshes, rare species habitat, wellhead protection areas, cultural sites, parks, preserves, schools and as otherwise defined by Federal, State or local regulations. Refer to EG-301.

Erosion Controls – The utilization of methods to prevent soil detachment and minimize displacement or washing down slopes by rainfall or run-off. Common practices include, but are not limited to:

(a) Temporary and Permanent Seeding.

(b) Mulching, Soil Binders, Tackifiers.

(c) Erosion Control Blankets.

(d) Hydraulic Erosion Control.

Excavate/Excavation – To dig, remove, or form a cavity or a hole in an area within the department's jurisdiction.

Fill (n.) – Any rock, soil, gravel, sand or other such material that has been deposited or caused to be deposited by human activity.

Fill (v.) – To place or deposit materials in or on a wetland, surface water body, bank or otherwise in or on an area within the jurisdiction of the department.

Flats – Relatively level landforms composed of unconsolidated mineral and organic sediments usually mud or sand, that are alternately flooded and exposed by the tides and that usually are continuous with the shore.

Frozen Condition – Field conditions when the upper portion of the ground surface freezes or when areas of standing water freeze solid such that vehicle passage over these areas is supported without any resulting soil disturbance. The frozen conditions must have been affected by severe cold (maximum daily temperatures less than 32 degrees F) for a continuous 2-week period.

GAA – Rhode Island groundwater classification, groundwater resources that are known, or presumed to be suitable for drinking water use without treatment, and are located in one of the three areas described below.

a) The state's major stratified drift aquifers that are capable of serving as a significant source for a public water supply ("groundwater reservoirs") and the critical portion of their recharge area as delineated by DEM;

b) The wellhead protection area for each public water system community water supply well. Community water supply wells are those that serve resident populations and have at least 15 service

connections or serve at least 25 individuals, e. g. municipal wells and wells serving nursing homes, condominiums, mobile home parks, etc.; and

c) Groundwater dependent areas that are physically isolated from reasonable alternative water supplies and where existing groundwater warrants the highest level of protection. At present only Block Island has been designated as meeting this criterion.

GA – Rhode Island groundwater classification, groundwater resources that are known, or presumed to be suitable for drinking water use without treatment. However, groundwater classified by GA does not fall within any of the three priority areas described under the GAA classification.

Grade/Grading – The movement of soil and fill material to change the elevation of the land. The term refers to the combined actions of excavating and filling to change elevation or shape.

Grubbing – The removal of stumps/roots by mechanical means during site preparation activities.

Immediately - As soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased.

In-kind Replacement - Replacement using the same material, functional inverts, diameter and length as the existing item. In-kind replacement includes the substitution of a structure with a similar structure in approximately the same location as is practicable, and is approximately the same in design. The design may be altered to meet applicable utility standards, and may include alternate materials designed to prolong the life of that service.

Intermittent Stream – A stream that flows for sufficient time to develop and maintain a defined channel, but which might not flow during dry portions of the year.

In the Dry – Work done either during periods of low water or behind temporary diversions, such as Earth Dike / Drainage Swale and Lined Ditches designed and installed in accordance with best management practices.

Limit of Work/Disturbance – The approved project limits within regulated areas. All project related activities in regulated areas must be conducted within the approved limit of work/disturbance. The limit of work/disturbance shall be depicted on the approved permit site plans and in the EFI plans. Where it is warranted National Grid may require that these limits be identified in the field by flagging, construction fencing, and/or perimeter erosion controls.

Long-Term Restoration Logs - Project-specific log used to document restoration required following the completion of construction or as areas of the project have been completed (i.e., segments of ROW for a multi-mile project). The log is typically updated by the Project Environmental Consultant or the National Grid Environment Scientist and circulated to the project team on a weekly basis.

Low Flow Conditions – Low water flow that generally occurs during the summer, as a result of decreased precipitation and the removal of water by increased evaporation and evapotranspiration by vegetation. Work done under low-flow conditions minimizes the potential for environmental damage. The USACE defines the calendar dates for low flow conditions in its New England state-specific Programmatic General Permits.

Low Ground Pressure – Equipment that meets the USACE GP state-specific defined Pounds per Square Inch (PSI) ground pressure when loaded. Use of LGP equipment ***requires approval*** from the National Grid Environmental Scientist.

Marsh – A wetland:

a) That is distinguished by the absence of trees and shrubs;

b) Dominated by soft-stemmed herbaceous plants such as grasses, reeds, and sedges; and

c) Where the water table is at or above the surface throughout the year, but can fluctuate seasonally.

Methods – Are the construction practices and procedures that take place through choosing the proper equipment, trucks and labor to execute the earth moving activities based on the existing conditions and implementing creative and sensitive scheduling for the daily activities.

NHESP - Natural Heritage Endangered Species Program; a department within the Massachusetts Division of Fisheries and Wildlife that is responsible for protecting the 176 species of vertebrate and invertebrate animals and 259 species of native plants that are officially listed as Endangered, Threatened or of Special Concern in Massachusetts.

Perennial – A stream that contains water at all times except during extreme drought.

Permanently Ceased – Is applicable to earth disturbance activities when clearing and excavation within any area of the Project that will not include permanent structures has been completed.

Person-in-Charge – A National Grid Project Engineer, Manager, Supervisor, Field Construction Coordinator or equivalent Contractor personnel assigned to oversee and coordinate work activities.

Processed Gravel – Processed Gravel shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001). Processed Gravel will not have fine materials that could lead to a turbid discharge. Gravel consisting of inert material that is hard, durable stone and is free from loam and clay, surface coatings and deleterious materials.

Regulating Body – Federal, State, or local authority that has jurisdiction over resource areas that may be impacted by company operations

Regulated Wetland Area – Those areas that are subject to federal, state or local wetland regulation, including certain buffer or adjacent areas.

Repair – The restoring of an existing legal structure by partial replacement of work, or broken, or unsound parts (Env-Wt 101.73).

Replacement – The substitution of a new structure for an existing legal structure with no change in size, dimensions, location, configuration, construction, or which conforms in all material aspects to the original structure

Right-of-Way – A corridor of land where National Grid has legal rights (either fee ownership, lease or easement) to construct, operate, and maintain an electric power line and/or natural gas pipeline and may include work on customer owned properties.

River – A watercourse that is larger than a perennial stream and flows all year long.

Routine Utility Rights-of-Way Maintenance Activity – Includes but is not limited to vegetation management and repair or replacement of existing utility structures.

Sedimentation Controls – Silt fences, straw bales, compost socks/berms and other barrier devices strategically placed to intercept and treat sediment-laden site runoff.

Sensitive Water - Includes any sediment or nutrient impaired water or a water that is identified by the state, tribe or EPA as Tier 2, 2.5 or Tier 3 for antidegradation purposes.

Siltation Curtain – An impervious barrier erected to prevent silt and sand and/or fines from being washed into a wetland, surface water body or other area of concern.

Surface Water Body or Surface Waters – Those portions of waters which have standing or flowing water at or on the surface of the ground.

Spill Prevention, Control and Countermeasure Plans – Required for site operations that involve the storage of 1,320 gallons or greater of fuel and oils, both in storage containers and stored in equipment. Response actions to spills and releases are specified in these plans.

Stormwater Pollution Prevention Plan – A site-specific, written document that, among other things: (1) identifies potential sources of stormwater pollution at a construction site; (2) describes stormwater control measures to reduce or eliminate pollutants in stormwater discharge from a construction site; and (3) identifies procedures the operator will implement to comply with the terms and conditions of EPA NPDES Construction General Permit (CGP). SWPPPs must be prepared, maintained on-site, and amended as necessary in order to obtain NPDES permit coverage for specific construction site stormwater discharges under the EPA NPDES CGP.

Temporarily Ceased - Is applicable when there are earth disturbance activities such as clearing, grading, and/or excavation that are not complete, but will be idle in one area for a period of up to 14 or more calendar days, and which will resume in the future. The 14 calendar day timeframe begins as soon as you now that construction work on a portion of the Project will be left incomplete and idle. In circumstances where there are unanticipated delays and you do not know at first how long the work stoppage will continue, the requirement to immediately initiate stabilization is triggered as soon as you know with reasonable certainty that work will be stopped for 14 or more additional calendar days.

Tidal Wetlands – A wetland whose vegetation, hydrology or soils are influenced by periodic inundation or tidal waters.

Topsoil – The uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils and ranging in depth from 2 to 10 inches.

Turbidity – The condition in which solid particles suspended in water make the water cloudy or even opaque in extreme cases.

United States Geological Survey Topographic Map – A map that uses contour lines to represent the three-dimensional features of a landscape on a two-dimensional surface. These maps use a line and symbol representation of natural and artificially created features in an area.

Wetland – An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation (more than 50 percent) typically adapted for life in saturated soil conditions (hydric soils). Wetlands include but are not limited to swamps, marshes, bogs, and similar areas.

Work Site – An area where work is performed.

Worker – Company employee, contractor, consultant working on site.

Zone II - Massachusetts - That area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). It is bounded by the groundwater divides which result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone IIs shall extend up gradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedrock , or a recharge boundary).

Appendix 2 – Acronyms

ASTM	American Society for Testing and Materials
BMP	Best Management Practices
EFI	Environmental Field Issue
EG	Environmental Guidance
EPA	Environmental Protection Agency
GA/GAA	Rhode Island Groundwater Classifications – see glossary
LGP	Low Ground Pressure
MA	Massachusetts
MA DEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
NE	New England
NH	New Hampshire
NH DES	New Hampshire Department of Environmental Services
NHESP	Natural Heritage Endangered Species Program
NPDES	National Pollutant Discharge Elimination System
OHM	Oil and/or Hazardous Materials
PSI	Pounds per square inch
RI	Rhode Island
RI DEM	Rhode Island Department of Environmental Management
RI CRMC	Rhode Island Coastal Resources Management Council
RI SESC	Rhode Island soil erosion and sediment control
ROW	Right-of-Way
RTE	Rare, Threatened or Endangered
SPCC	Spill Prevention, Control and Countermeasure
SWPPP	Storm Water Pollution Prevention Plan
TOY	Time-of-Year
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VT	Vermont

VT DEC	Vermont Department of Environmental Conservation
Zone II	Massachusetts Groundwater Protection district – see glossary

Appendix 3

See EG303NE_Appendix3_Reporting Form published separately

National Grid
Storm Water, Wetlands & Priority Habitat Environmental Compliance
Site Inspection / Monitoring Report

Project Name:		**Date:**	
City / Town:		**Time:**	
WO / WR #			

IHC or Contractor? (Company Name):

Current Weather Conditions:

Precipitation Since Last Inspection (Date, Est. Duration and Est. Amount from Each Storm):

Activities / Structures / Locations Inspected:

Identify Locations / Activities / Structures within Designated Priority Habitat (Identify Rare species Observations, if any) and Mitigation / Restoration Measures Implemented:

Any Significant Discharges of Sediment to Water Bodies or Wetlands? (If "yes", state locations):

National Grid
Storm Water, Wetlands & Priority Habitat Environmental Compliance
Site Inspection / Monitoring Report

Compliance with SWPPP Storm Water Controls, O&M Plan, Order of Conditions or Other Applicable Environmental Requirements? (Explain if "no" for any feature inspected):

Additional BMPs or Other Corrective Action Needed and, if so, Where?

Compliance with Previous Observations?

National Grid
Storm Water, Wetlands & Priority Habitat Environmental Compliance
Site Inspection / Monitoring Report

Are Spill Control Supplies Available	**Yes**	**No**
Are Oil and / or Hazardous Materials Stored On Site?	**Yes**	**No**
If So, Are they Properly Labeled and Managed?	**Yes**	**No**
Are Wastes Stored On Site?	**Yes**	**No**
If So, Are they Properly Managed?	**Yes**	**No**

Miscellaneous (e.g., dumping?):

Comments:

Inspection Completed by (Name, Title, Company):

Inspector's Signature for Certification:

National Grid Environmental Dept. Representative - Signature for Certification:

Date:

Appendix 4 – BMPs

See EG303NE_Form1 for a list of BMPS

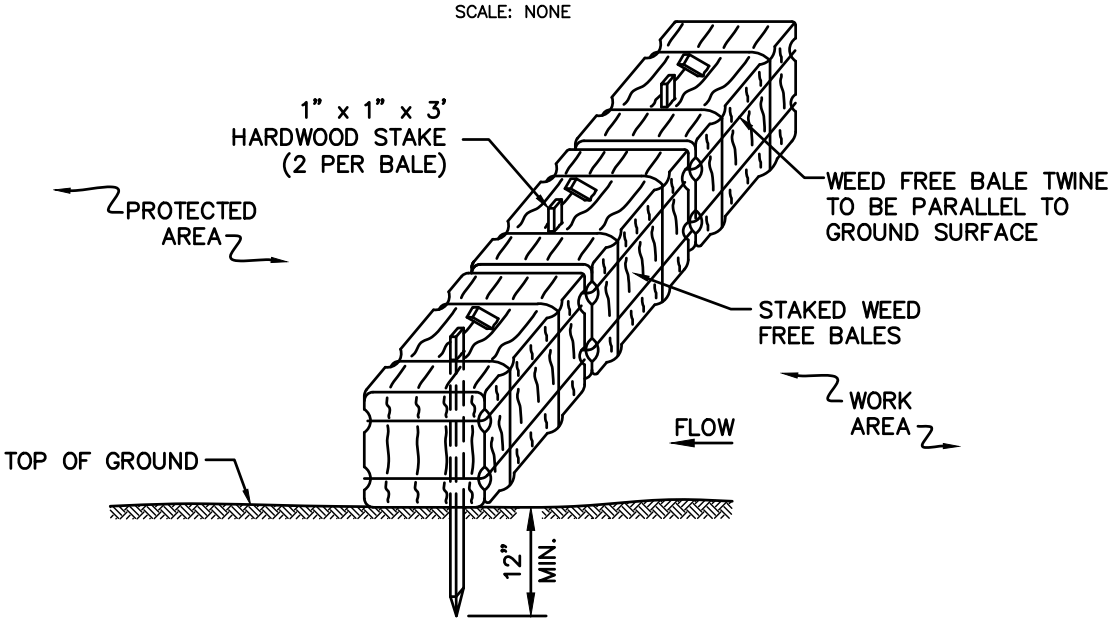
See EG303NE_Form2 for BMP details

	BMP #	Measure
Sediment & Erosion Controls	SEC-1	Weed free bale barrier
	SEC-2	Sediment control fence
	SEC-3	Silt fence / weed free barrier
	SEC-4	Silt Soxx
	SEC-5	Straw Wattle
	SEC-6	Erosion Control Blanket - Ditch
	SEC-7	Erosion Control Blanket - Slope
	SEC-8	Hydroseeding with Tackifier (slope stabilization)
	SEC-9	Mulch materials, rates and uses (from NY)
	SEC-10	Seeding options - Upland Seed Mixes
	SEC-11	Seeding options - Wetland Seed Mix
	SEC-12	Distribution Pole Erosion Control
Crossing Measures	CM-1	Prefabricated mats
	CM-2	Construction mat bridge
	CM-3	Construction mat layout (with transition)
	CM-4	Construction mat layout (with transition & BMPs)
	CM-5	Construction mat - Air Bridge
	CM-6	Corduroy road
	CM-7	Rock Ford
	CM-8	Temporary construction entrance / exit
	CM-9	Temporary construction culvert
	CM-10	Access way stabilization
	CM-11	Construction signage
	CM-12	Construction Mat Anchoring
Advanced Applications	AA-1	Reinforced silt fence
	AA-2	Sediment filter
	AA-3	Stone check dams
	AA-4	Straw / haybale check dam
	AA-5	Waterbar
	AA-6	Sandbag check dam
	AA-7	Earth dike
	AA-8	Drainage swale and lined ditch
	AA-9	Sedimentation basin
	AA-10	Dewatering basin - Small scale
	AA-11	Dewatering basin - Large scale
	AA-12	Dirtbag
	AA-13	Concrete waste sump

	AA-14	Outpak concrete washout
Advanced Applications	AA-15	Barrier fence (construction fence)
	AA-16	ROW gates / fences
	AA-17	Bollard
	AA-18	Dust control
	AA-19	Catch Basin Inlet Protection
	AA-20	Silt Sack
	AA-21	Turbidity Curtain
	AA-22	Siltsoxx Amphibian & Reptile Crossing #1
	AA-23	Siltsoxx Amphibian & Reptile Crossing #2
	AA-24	Siltsoxx Amphibian & Reptile Crossing #3
	AA-25	Cultural Avoidance

BMP DETAIL

SCALE: NONE



NOTES:

1. THE GROUND SHALL BE PREPARED TO PROVIDE COMPLETE CONTACT WITH THE BALES.

BMP PICTURE



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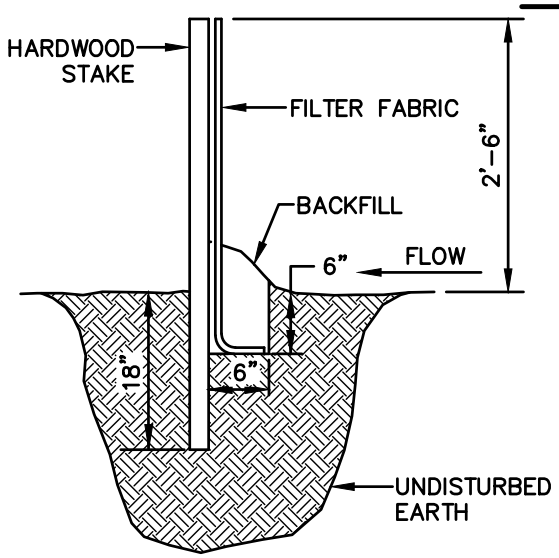
SEC-1
WEED FREE BALE BARRIER

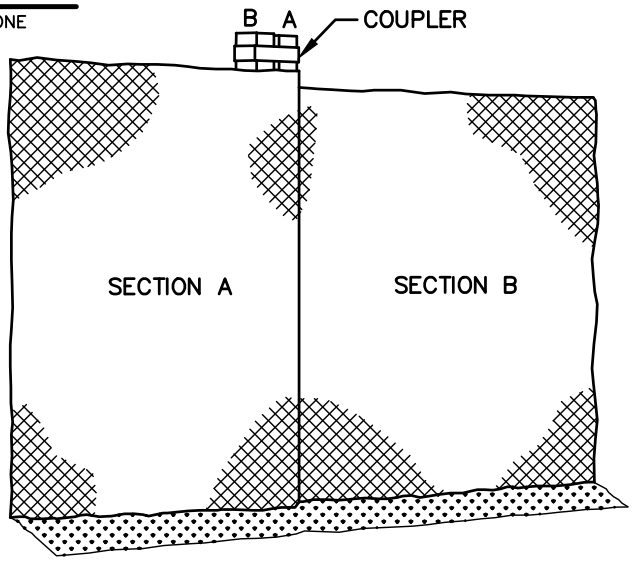
File: BALE_BARRIER.DWG

BMP DETAIL

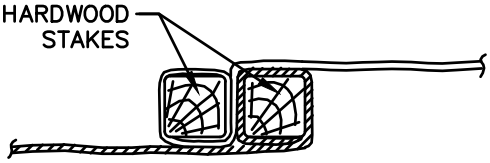
SCALE: NONE



PROFILE



SECTION



PLAN

BMP PICTURE

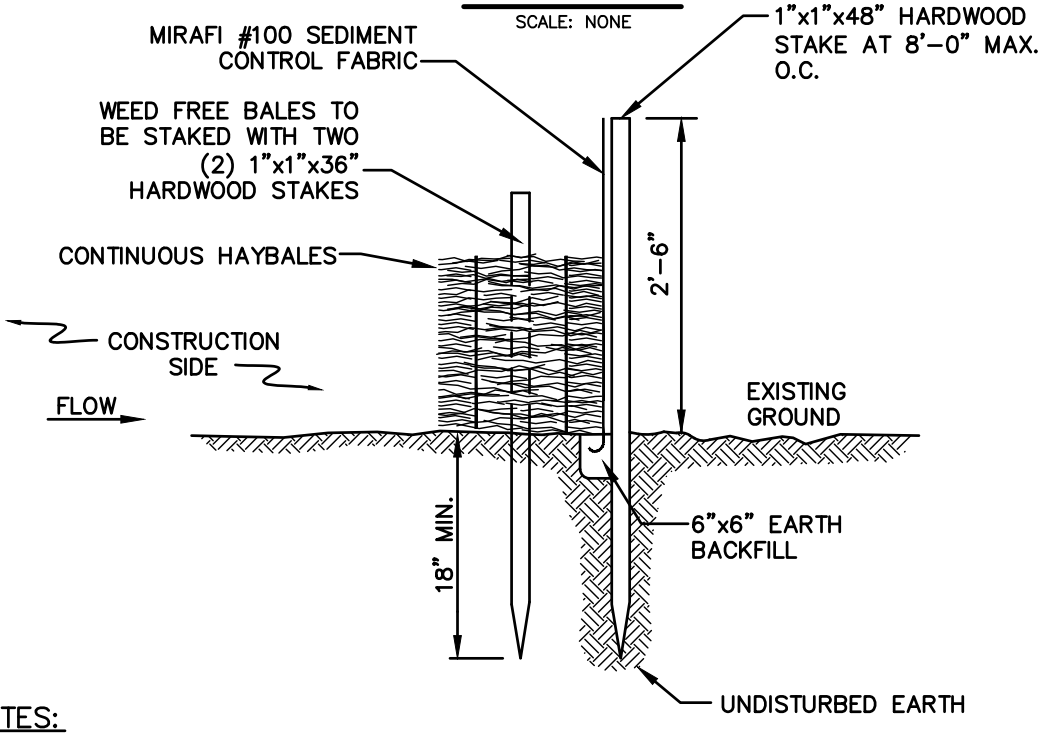


SEC-2
SEDIMENT CONTROL FENCE

File: Sediment_Fence.dwg

BMP DETAIL

SCALE: NONE



NOTES:

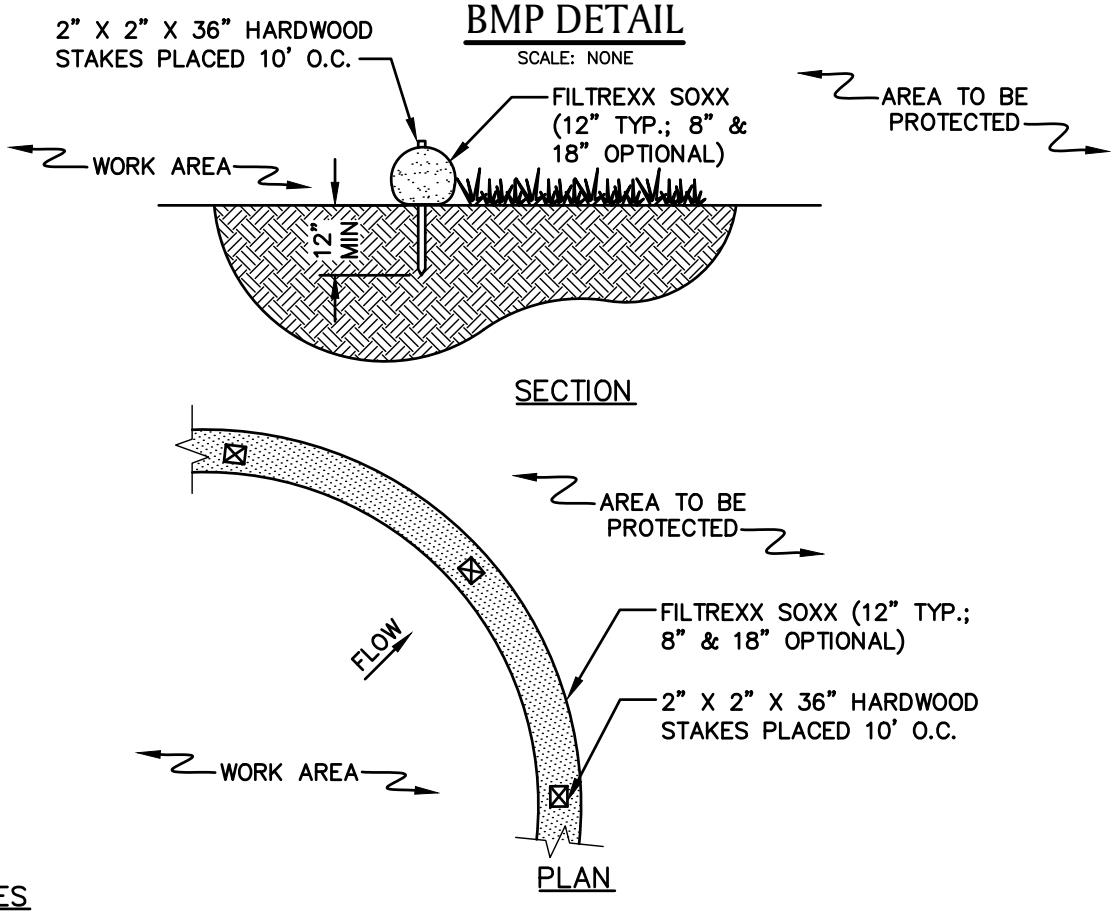
1. BALES SHALL BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY TWO (2) 1"X1"X36" HARDWOOD STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. BALES SHALL BE REMOVED AND REPLACED WHEN THEY BECOME FILLED WITH SEDIMENT AND BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. BALES SHALL BE REMOVED WHEN THE EMBANKMENTS STABILIZE.
6. BALES TO BE TWINE BOUND.

BMP PICTURE



BMP DETAIL

SCALE: NONE



NOTES

1. PRODUCT TO BE FILTREXX SILT SOXX OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
4. MESH CONTAINMENT MATERIAL SHOULD BE KNITTED PHOTODEGRADABLE OR BIODEGRADABLE MATERIAL, WITH OPENING SIZES BETWEEN 1/8" – 3/8".
5. COMPOST MEDIA SHOULD HAVE PARTICLE SIZE WHERE 99% < 2", 50% > 1/2".
6. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



*** PICTURE AND DETAIL PROVIDED BY FILTREXX LAND IMPROVEMENT SYSTEMS**

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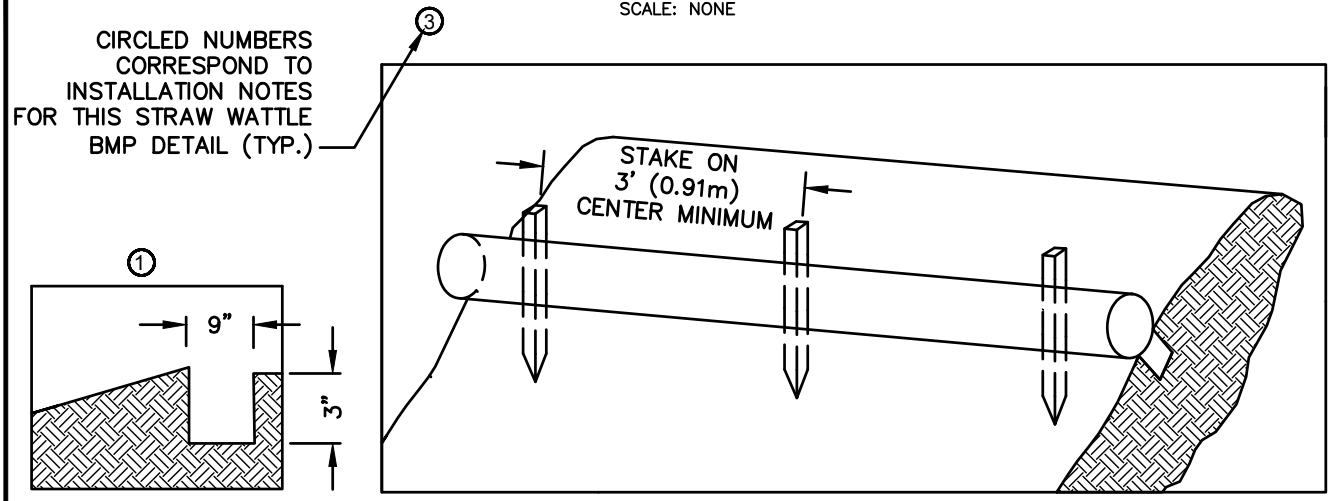
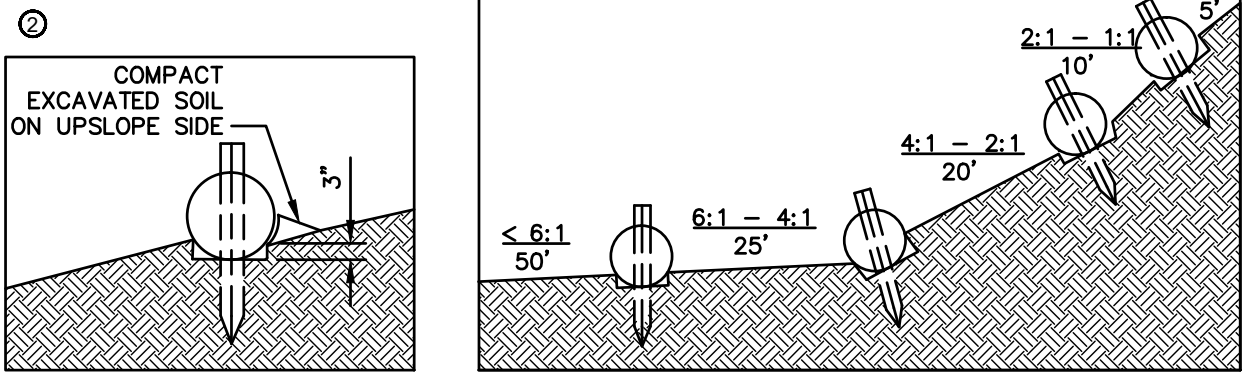
SEC-4
SILT SOXX *

File: SiltSOXX.dwg

BMP DETAIL

SCALE: NONE





TYPICAL WATTLE SPACING DETAIL

NOTES:

1. PRODUCT TO BE TENSAR NORTH AMERICAN GREEN STRAW WATTLE OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. TYPICAL WATTLE SPACING BASED ON SLOPE GRADIENT. COORDINATE SPACING AND LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
3. MINIMUM 12" DIAMETER WATTLES SHOULD BE USED FOR HIGHLY DISTURBED AREAS (I.E., HEAVILY USED ACCESS ROAD WITH ADJACENT WETLAND) AND MINIMUM 9–10" WATTLES SHOULD BE USED FOR LESS DISTURBED SOILS.

INSTALLATION NOTES:

1. BEGIN AT THE LOCATION WHERE THE WATTLE IS TO BE INSTALLED BY EXCAVATING A 2–3" DEEP X 9" WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UPSLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE WATTLE IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE EXCAVATED TRENCH AGAINST THE WATTLE ON THE UPHILL SIDE. ADJACENT WATTLES SHOULD TIGHTLY ABUT.
3. SECURE THE WATTLE WITH 18–24" HARDWOOD STAKES EVERY 3–4' AND WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE LEAVING AT LEAST 2–3" OF STAKE EXTENDING ABOVE THE WATTLE. STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.

*** DETAIL AND PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN**

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SEC-5

STRAW WATTLE * (1 OF 2)

File: Straw_Wattle.dwg

BMP PICTURE



STRAW WATTLE – SHALLOW SLOPE (≤4:1)
(ALTERNATE STAKING)

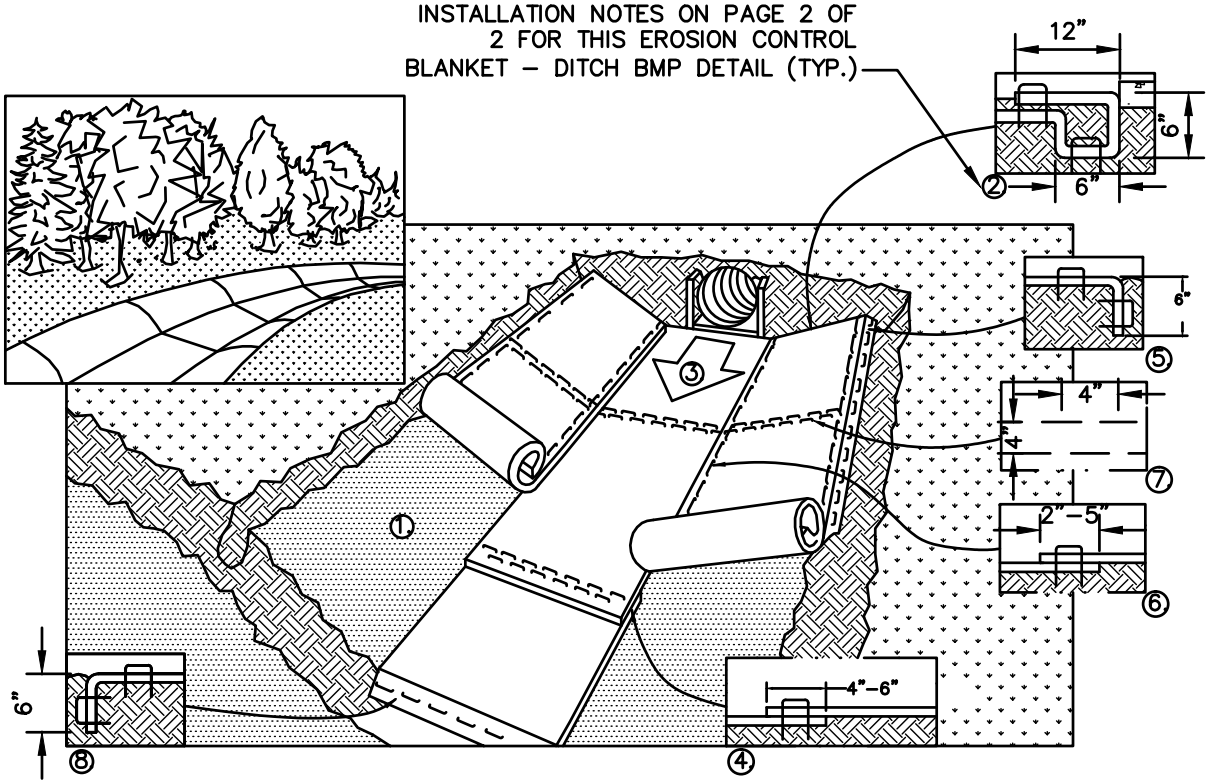
ALTERNATE STAKING INSTALLATION NOTES:

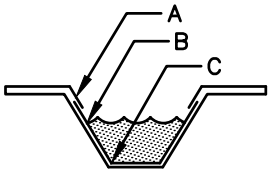
1. ON SHALLOW SLOPES (≤4:1), STRAW WATTLE MAY BE SECURED WITH 18–24" HARDWOOD STAKES DRIVEN AGAINST THE SIDES OF THE WATTLE INSTEAD OF THROUGH. STAKES SHALL ALTERNATE SIDES, AND BE SPACED 3–4' MAX.
2. TWINE SHALL BE TIED FROM STAKE TO STAKE, CRISS–CROSSING THE STRAW WATTLE. TIE TWINE TO STAKES BELOW THE HEIGHT OF THE WATTLE.

BMP DETAIL

SCALE: NONE

CIRCLED NUMBERS CORRESPOND TO INSTALLATION NOTES ON PAGE 2 OF 2 FOR THIS EROSION CONTROL BLANKET – DITCH BMP DETAIL (TYP.)





CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTES:

1. PRODUCT TO BE NORTH AMERICAN GREEN EROSION CONTROL BLANKET OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.
3. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE ROLLED EROSION CONTROL PRODUCTS (RECP's).

BMP DETAIL

INSTALLATION NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP's EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMAPCT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) ACROSS THE WIDTH OF THE RECP's.
3. ROLL CENTER RECP's IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. ™ WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE RECP's END OVER END (SHINGLE STYLE) WITH A 4" – 6" (10 CM –15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER TO SECURE RECP's.
5. FULL LENGTH EDGE OF RECP's AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT RECP's MUST BE OVERLAPPED APPROXIMATELY 2" – 5" (5 CM –12.5 CM) (DEPENDING ON RECP's TYPE) AND STAPLED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 M – 12 M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE RECP's MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

BMP PICTURE



*** PICTURE AND DETAIL PROVIDED BY TENSAR NORTH AMERICAN GREEN**
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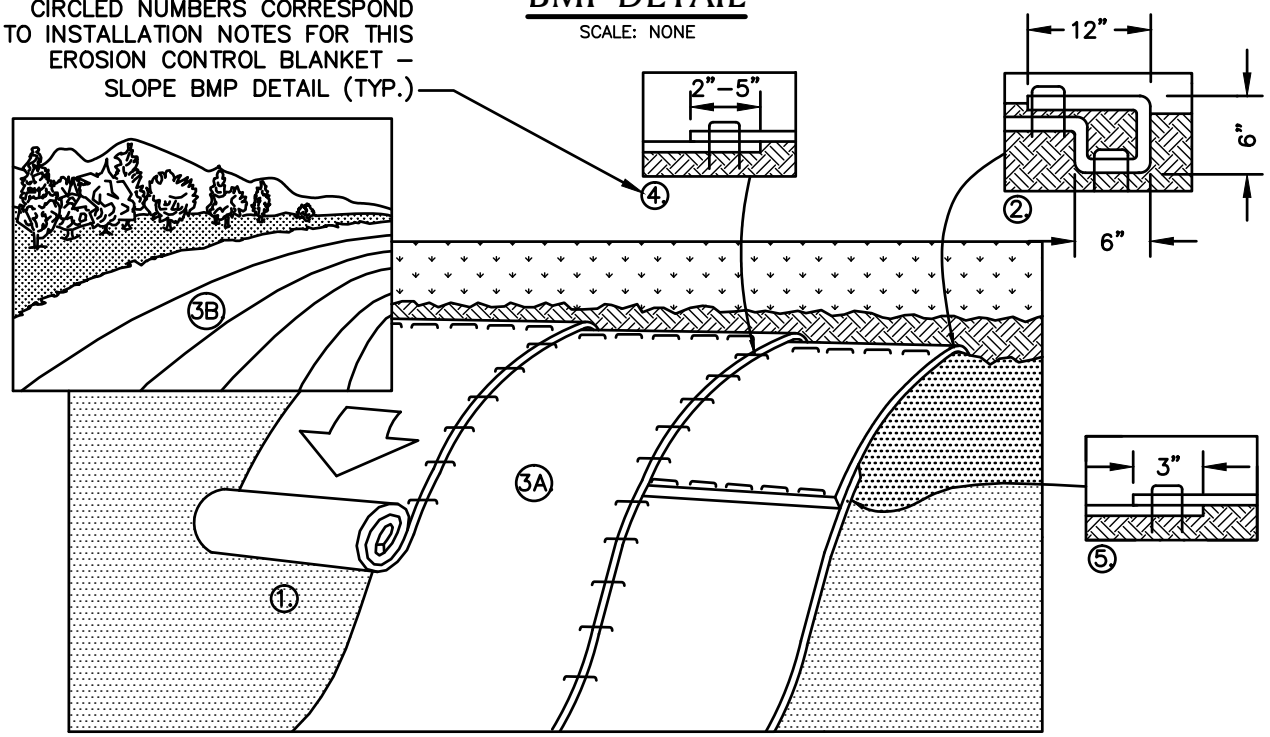
SEC-6
EROSION CONTROL BLANKET - DITCH * (2 OF 2)

File: Erosion_Blanket_Ditch.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. PRODUCT TO BE NORTH AMERICAN GREEN EROSION CONTROL BLANKET OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLES OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE RECP's.

INSTALLATION NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL–O–SEED DO NOT SEED PREPARED AREA. CELL–O–SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP's EXTENDED BEYOND THE UP–SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECP's.
3. ROLL THE RECP's (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP's MUST BE STAPLED WITH APPROXIMATELY 2" – 5" (5 CM – 12.5 CM) OVERLAP DEPENDING ON RECP's TYPE.
5. CONSECUTIVE RECP's SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE RECP's WIDTH.

*** PICTURE AND DETAIL PROVIDED BY TENSAR NORTH AMERICAN GREEN**

SEC-7
EROSION CONTROL BLANKET - SLOPE * (1 OF 2)

File: Erosion_Blanket_Slope.dwg

BMP PICTURE



File: Erosion_Blanket_Slope.dwg

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SEC-7
EROSION CONTROL BLANKET - SLOPE * (2 OF 2)

BMP PICTURE



NOTES:

1. COORDINATE MIXTURE TYPE AND APPLICATION AREAS WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.
2. A MINIMUM OF 1500 LBS. PER ACRE OF A PAPER/CORN FIBER OR EQUIVALENT WITH NATURAL TACKIFIERS WILL BE USED ON SLOPES LESS THAN 3:1.
3. A BFM (BONDED FIBER MATRIX) WILL BE USED ON SLOPES GREATER THAN 2:1.
4. A FGM (FLEXIBLE GROWTH MATRIX) OR ESM (EXTREME SLOPE MATRIX) WILL BE USED ON SLOPES GREATER THAN 1:1.
5. REFER TO BMP #10 FOR SEED MIXTURE OPTIONS.

*** PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN**
*** TACKIFIER INFORMATION PROVIDED BY FILTREXX LAND IMPROVEMENT SYSTEMS AND TENSAR NORTH AMERICAN GREEN**

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SEC-8
HYDROSEEDING WITH TACKIFIER
(SLOPE STABILIZATION) *

File: Hydroseeding.dwg

BMP

Definition

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface.

Purpose

The primary purpose is to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch is also used alone for temporary stabilization in non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.



NOTE:

1. PICTURE DEPICTS STRAW MULCH APPLICATION (FROM MULCH SPREADER) ON STEEP SLOPE WITH AN IMPROVED DRAINAGE SWALE.
2. COORDINATE MULCH MATERIALS AND RATES WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

* BMP INFORMATION FROM "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (AUGUST, 2005)." INFORMATION OBTAINED VIA WEBSITE: http://www.dec.ny.gov/chemical/29066.html

SEC-9
MULCH MATERIALS, RATES AND USES (FROM NY) *

File: Mulch_Materials.dwg

UPLAND ROW RESTORATION MIX – GENERAL

Species Composition Options:

- Andropogon gerardii; Niagra Big Bluestem
- Schizachyrium scoparium; Little Bluestem
- Elymus Canadensis; Canada Wild Rye
- Elymus virginicus; Virginia Wildrye
- Lolium multiflorum; Annual Ryegrass
- Sorghastrum nutans; Indiangrass
- Chamaecrista fasciculate; Partridge Pea
- Desmodium canadense; Showy Tick Trefoil
- Helioposis helianthoides; Ox–Eye Sunflower
- Panicum virgatum; Switchgrass
- Rudbeckia hirta; Black Eyed Susan
- Poa palustris; Fowl Bluegrass
- Agrostis perennans; Upland Bentgrass
- Agrostis alba; Redtop
- Festuca rubra; Red Fescue
- Lotus corniculatus; Birds–Foot Trefoil
- Chrysanthemum leucanthem; Ox–Eye Daisy
- Aster novae–angliae; New England Aster

Example Seed Mixes:

1. Native Upland wildlife forage and Cover Meadow Mix – Ernst Conservation Seeds (ERNMX–123)
2. Eastern Ecotype Native Grass Mix– Ernst Conservation Seeds (ERNMX–177)
3. New England Native Warm Season Grass Mix – New England Wetland Plants, Inc.
4. New England Logging Road Mix – New England Wetland Plants, Inc.
5. Northeast Upland Wildflower/Restoration Erosion Mix – Southern Tier Consulting (STCMX–2)

UPLAND ROW RESTORATION MIX – DRY/ROCKY SITES

Species Composition Options:

- Festuca rubra; Red Fescue
- Schizachyrium scoparium; Little Bluestem
- Elymus Canadensis; Canada Wild Rye
- Bouteloua gracillis; Blue Grama
- Lolium multiflorum; Annual Ryegrass
- Lolium perenne; Perennial Ryegrass
- Agrostics scabra; Rough Bentgrass
- Agrostis perennans; Upland Bentgrass
- Sorghastrum nutans; Indiangrass

Example Seed Mixes:

1. New England Erosion Control/ Restoration Mix for Dry Sites – New England Wetland Plants, Inc.
2. Ernst Conservation Seeds and similar companies can create a custom seed mix matching the composition above (with site specific additions if necessary).

WETLAND ROW RESTORATION MIX

Species Composition Options:

- Agrostis stolonifera; Creeping Bentgrass
- Poa trivialis; Rough Bluegrass
- Alopecurus arundinaceus; Creeping Meadow Foxtail
- Lolium multiflorum; Annual Ryegrass
- Festuca rubra; Creeping Red Fescue
- Elymus virginicus; Virginia Wildrye
- Schizachyrium scoparium; Little Bluestem
- Andropogon gerardii; Niagra Big Bluestem
- Carex vulpinoidea; Fox sedge
- Panicum virgatum; Switchgrass
- Agrostis scabra; Rough Bentgrass
- Aster novae–angliae; New England Aster
- Eupatorium perfoliatum; Boneset
- Euthamia graminifolia; Grass Leaved Goldenrod
- Scirpus atrovirens; Green Bulrush
- Verbene hastate; Blue Vervain
- Juncus effusus; Soft Rush
- Scirpus cyperinus; Wool Grass
- Panicum clandestinum; Deertongue

Example Seed Mixes

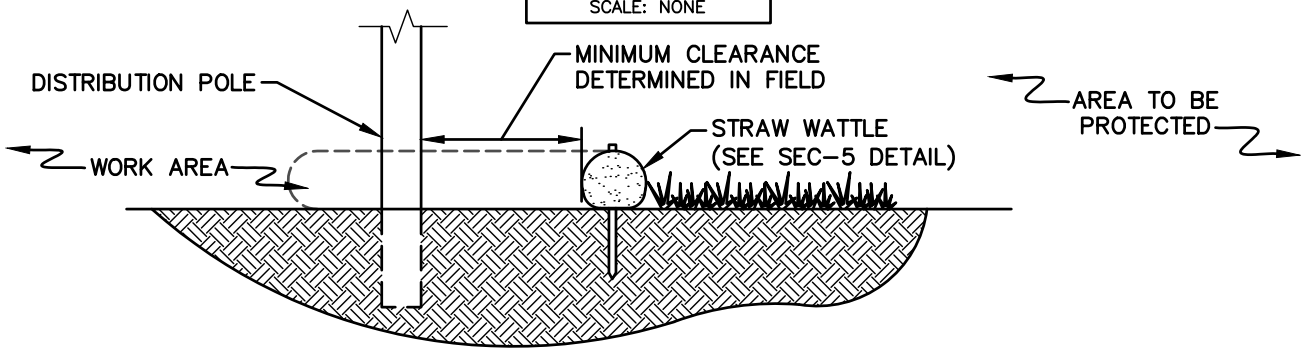
1. New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites – New England Wetland Plants, Inc.
2. Northeast Wetland Grass Seed Mix – Southern Tier Consulting (STCMX–7)
3. Ernst Conservation Seeds and similar companies can create a custom seed mix matching the composition above (with site specific additions if necessary).

GERNERAL NOTES:

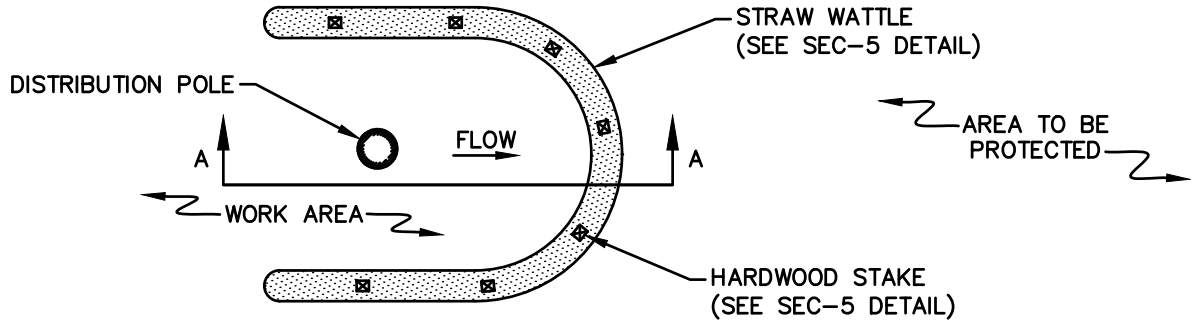
1. Seed mixes described herein are intended to cover a variety of typical new england landscapes. However, site specific seed mixes will need to be evaluated in coastal or mountainous regions.
2. Seed mixes described herein are intended for general ROW restoration. Site specific wetland seed mixes may be required by local, state and/or federal regulators for certain impacts to wetlands.
3. All seed mixes are to be approved by National Grid Environmental Scientist prior to construction and must conform with all project permits.
4. Seedbed preparation and maintenance as well as temporary erosion and sediment controls are crucial to the establishment of newly seeded areas. Coordinate with National Grid Environmental Scientist on seed bed preparation and maintenance as well as temporary erosion and sediment controls prior to construction.

BMP DETAIL

SCALE: NONE



SECTION A–A



PLAN

NOTES

1. PRODUCT TO BE STRAW WATTLE OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST (SEE SEC–5 BMP DETAIL).
2. STRAW BALE BARRIER PER SEC–1 BMP DETAIL TO BE AN AVAILABLE ALTERNATE DEPENDING ON SITE CONDITIONS AT THE DIRECTION OF NATIONAL GRID ENVIRONMENTAL SCIENTIST (SEE FIGURE 2).
3. MINIMUM CLEARANCE BETWEEN POLE AND EROSION CONTROL TO BE DETERMINED BY CONDITIONS OF POLE INSTALLATION/REPLACEMENT WORK AND ASSOCIATED DISTURBANCE.

BMP PICTURE



FIGURE 1: TYP. STRAW WATTLE APPLICATION



FIGURE 2: ALT. STRAW BALE APPLICATION

BMP PICTURE

SCALE: NONE

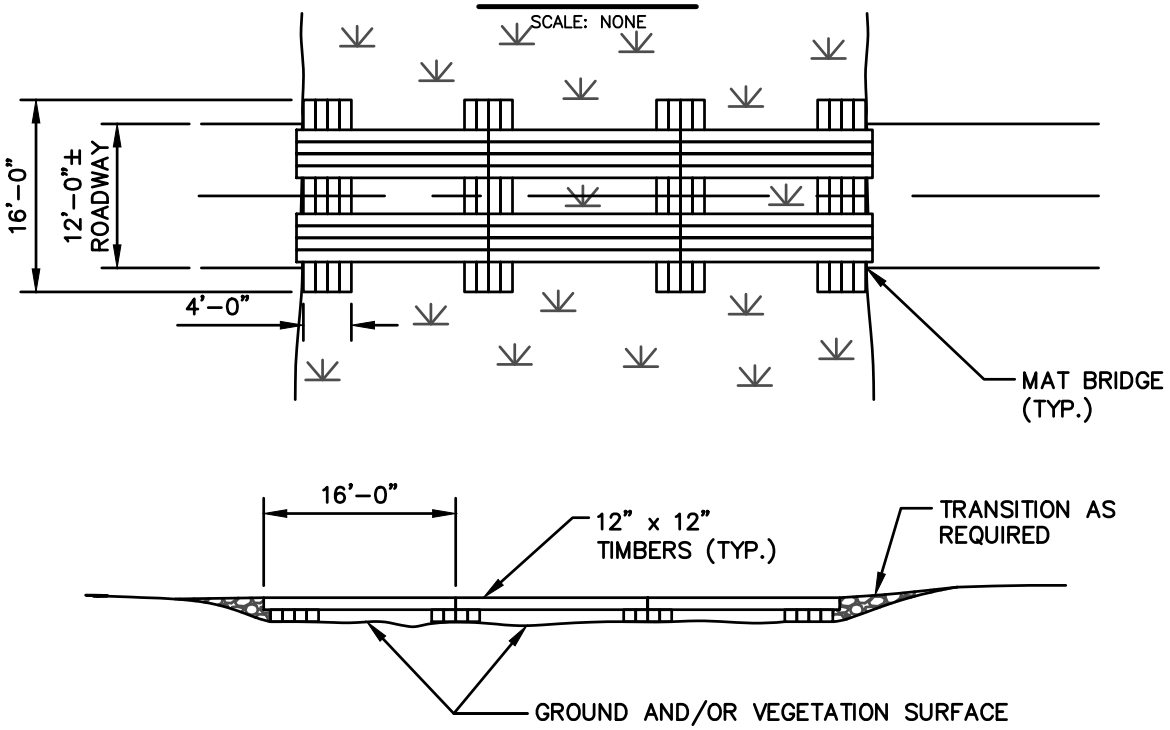


NOTES:

1. PRODUCT TO BE ALTURNAMATS' PREFABRICATED MATS OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. PRODUCT AVAILABLE IN 4X8' UNITS.
3. IF MATS ARE INSTALLED IN A WETLAND AREA, INSTALL EROSION CONTROLS TO CONTAIN MATERIAL UTILIZED IN THE MAT TRANSITIONS.

BMP DETAIL

SCALE: NONE



NOTES:

1. IF MATS ARE INSTALLED IN A WETLAND AREA, INSTALL EROSION CONTROLS TO CONTAIN MATERIAL UTILIZED IN THE MAT TRANSITIONS.

BMP PICTURE



CM-2
CONSTRUCTION MAT BRIDGE
(1 OF 2)

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File: Mat_Bridge.dwg

BMP PICTURE - SINGLE SPAN

SCALE: NONE





NOTES:

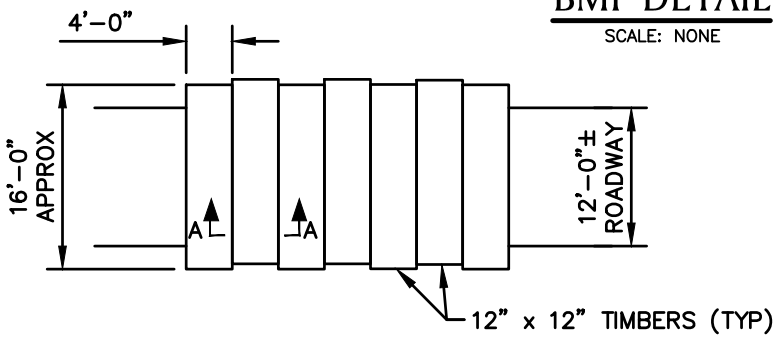
1. WHERE STREAM WIDTH ALLOWS, INSTALL CONSTRUCTION MATS TO SPAN THE WATERCOURSE IN ITS ENTIRETY WITHOUT STRINGER PLACEMENT IN THE WATER OR ANY RESTRICTION OF STREAM FLOW.

2. INSTALLATION OF THE CONSTRUCTION MAT BRIDGE SHALL NOT DAMAGE THE STREAM BED AND BANKS. WHERE POSSIBLE, FOOTERS SHALL BE PLACED PARALLEL TO THE TOP OF THE STREAM BANKS, WITH ACCESS MATTING PLACED ACROSS THE TOP OF THE STRINGERS DISTRIBUTING THE WEIGHT OF THE CONSTRUCTION EQUIPMENT.

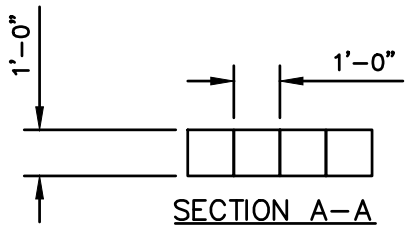
3. AT STREAM CROSSINGS THAT CANNOT BE SPANNED BY A SINGLE SECTION OF CONSTRUCTION MATTING, AND WHERE PERMITS ALLOW, STRINGERS SHALL BE PLACED ATOP THE STREAM BED PARALLEL TO THE FLOW OF WATER.

BMP DETAIL

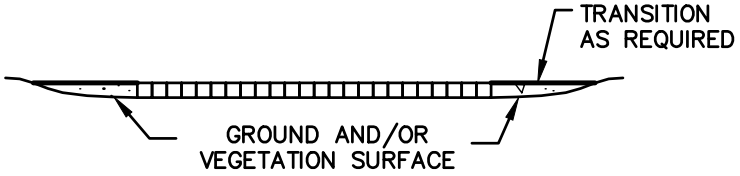
SCALE: NONE



TYPICAL PLAN VIEW



SECTION A–A
TYPICAL MAT SECTION
BOLTED TOGETHER



TYPICAL SECTION VIEW

NOTES:

1. TO BE INSTALLED IF NECESSARY TO PREVENT RUTTING, TO ACCESS STRUCTURES.
2. THIS DETAIL SHOWS TYPICAL DIMENSIONS. SOME CONTRACTOR'S CONSTRUCTION MATS ARE DIMENSIONALLY DIFFERENT FROM WHAT IS SHOWN HERE.
3. DEPENDENT ON SITE CONDITIONS, MULTIPLE LAYERS OF CONSTRUCTION MATS MAY BE INSTALLED.

BMP PICTURE



CM-3
CONSTRUCTION MAT LAYOUT
(WITH TRANSITION)

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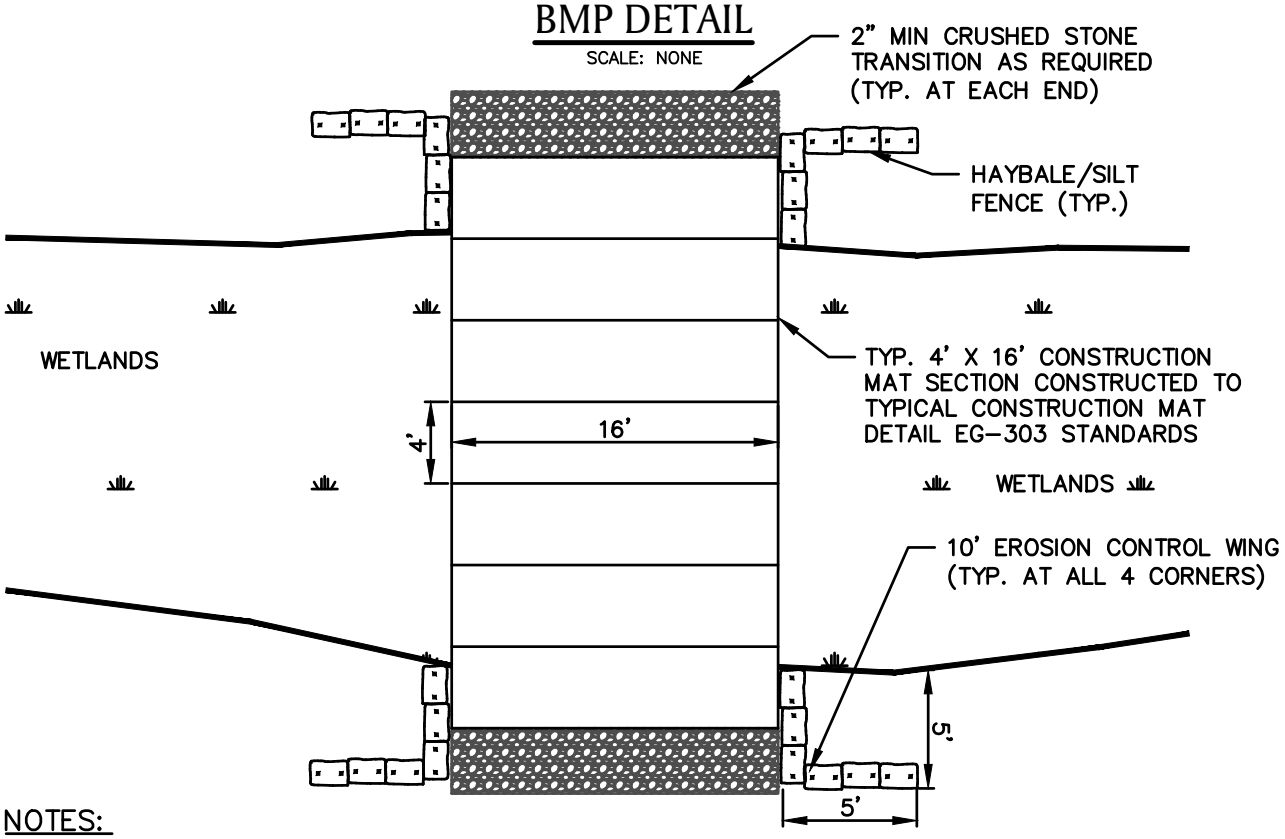
File: Swamp_Mat_Layout.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. ADD FILTER FABRIC AS NEEDED UNDER STONE TRANSITION RAMPS.
2. ALL MEASUREMENTS AND LOCATIONS ARE APPROXIMATE.

BMP PICTURE



CM-4
CONSTRUCTION MAT LAYOUT
(WITH TRANSITION AND BMPs)

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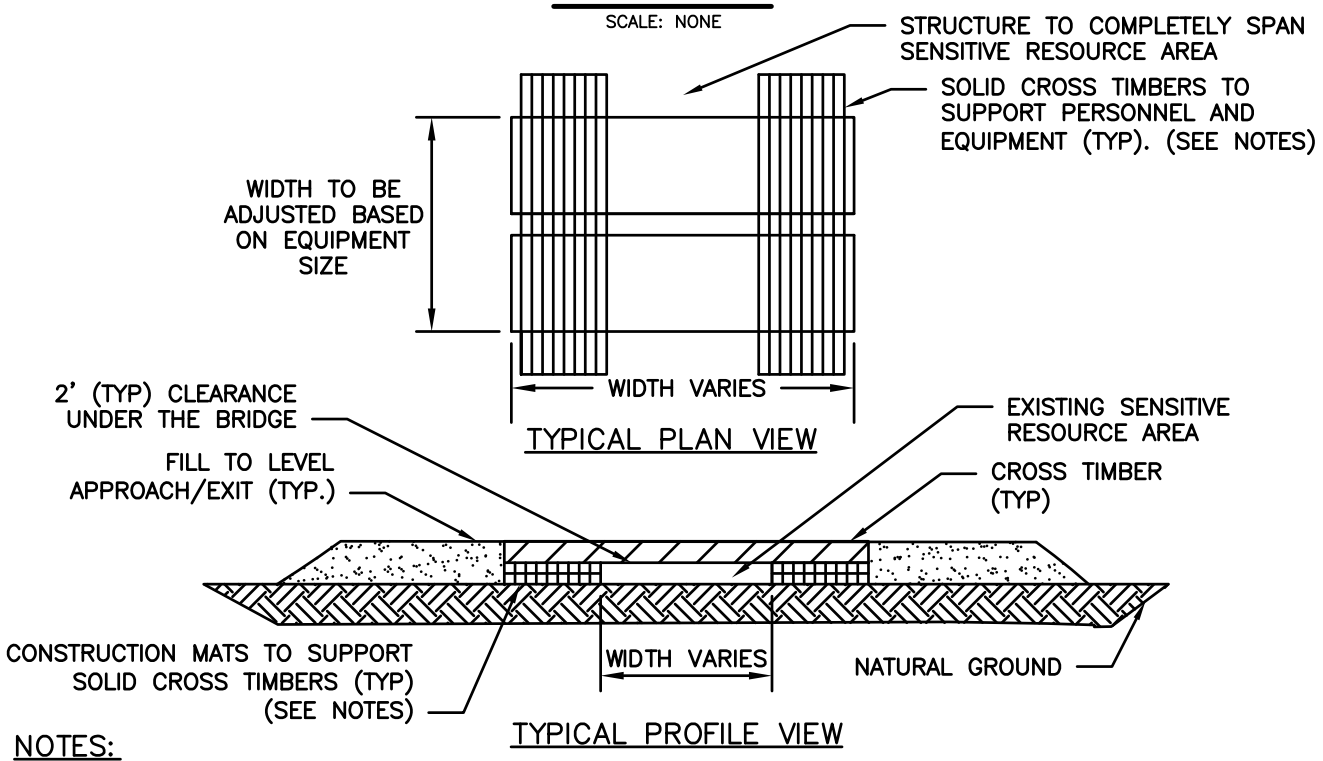
File: Swamp_Mat_Transition and BMPs.dwg

BMP DETAIL

SCALE: NONE



NOTES:

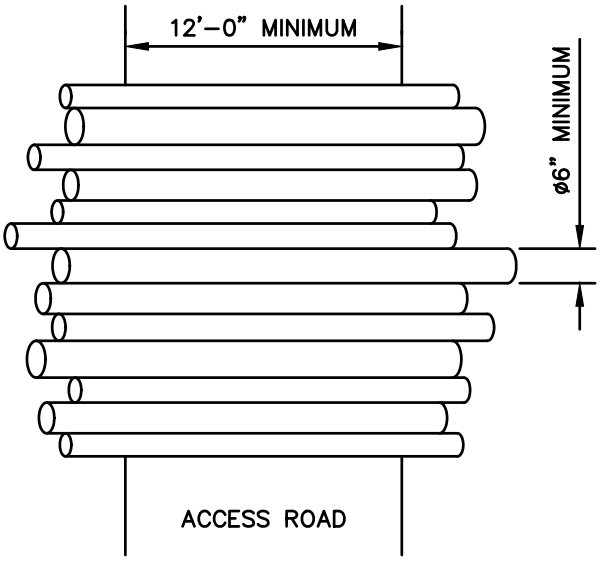
1. THE DETAIL SHOWN IS CONCEPTUAL. CONSTRUCTION MATS AND CROSS TIMBERS SHALL BE SIZED AND SELECTED BASED ON SPAN WIDTH, CROSSING EQUIPMENT AND FIELD CONDITIONS.
2. THE NUMBER OF CONSTRUCTION MATS MAY VARY DEPENDING ON THE CLEARANCE HEIGHT.
3. EQUIPMENT AND PERSONNEL LOAD SHALL BE DISTRIBUTED ON ALL TIMBERS.
4. EACH EQUIPMENT OPERATOR AND USER OF THE FIELD BRIDGE SHALL BE FAMILIAR WITH THE DESIGN AND THE MAXIMUM EQUIPMENT AND PERSONNEL LOADS.
5. THIS DETAIL MAY NOT BE APPLICABLE IN ALL FIELD CONDITIONS.
6. INSTALL EROSION CONTROLS ADJACENT TO THE CULVERT ENDS TO PROTECT THE WATERWAY FROM ROADWAY DEBRIS.

BMP PICTURE



BMP DETAIL

SCALE: NONE



RANDOM LENGTH AND DIAMETER LOGS PLACED ACROSS AN ACCESS ROAD

NOTE:

1. A SIMILAR BRUSH MAT INSTALLATION CONSISTING OF SMALLER DIAMETER STEMS AND LOGS CAN BE USED.
2. CORDUROY ROADS SHALL ONLY BE USED IN EMERGENCIES OR AFTER APPROVAL FROM THE PROJECT ENVIRONMENTAL CONSULTANT OR NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

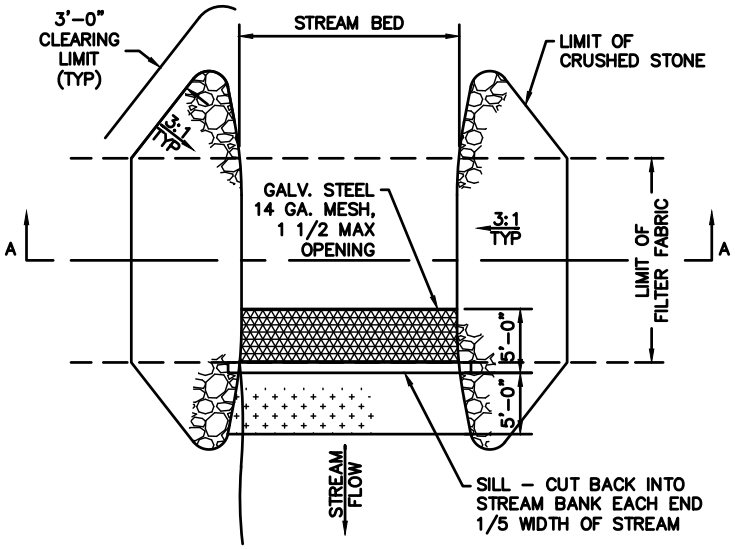


CM-6
CORDUROY ROAD

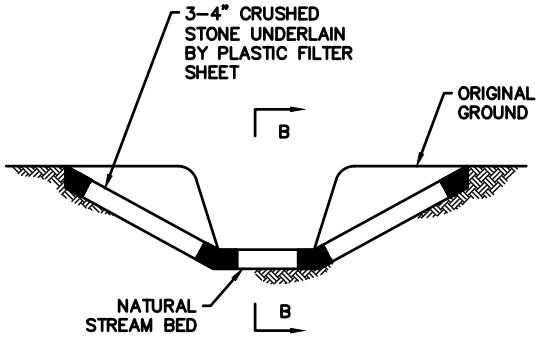
File: Corduroy_Road.dwg

BMP DETAIL

SCALE: NONE



PLAN VIEW



SECTION 'A-A'

BMP PICTURE





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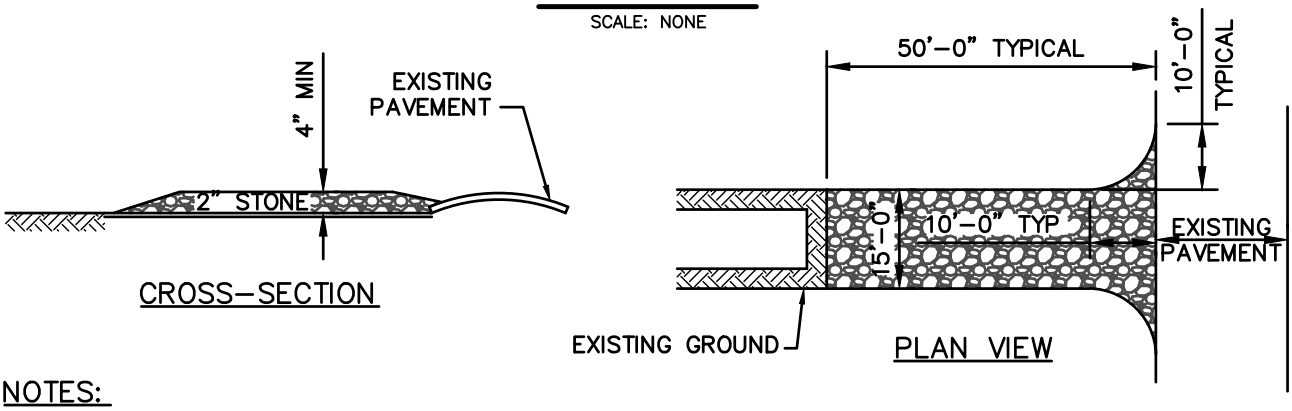
CM-7
ROCK FORD

File: Rock_Ford.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. STONE SIZE – USE 2" STONE (MINIMUM) TO 6" STONE (MAXIMUM)
2. LENGTH – GREATER THAN OR EQUAL TO 50 FEET
3. THICKNESS – 4"
4. WIDTH – FIFTEEN (15) FOOT TYP., BUT NOT LESS THAN FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS ENTRANCE. IF PIPING IS IMPRACTICAL, MOUNTABLE BERM SHALL BE PERMITTED.
6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
7. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED.
8. THE CLEAN STONE SHOULD BE INSTALLED OVER A GEOTEXTILE FABRIC. GEOTEXTILE FABRIC MAY BE OMITTED FOR PERMANENT CONSTRUCTION ENTRANCES/EXITS ON A CASE–BY–CASE BASIS WITH THE APPROVAL OF THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.
9. FOLLOWING CONSTRUCTION, THE CONSTRUCTION ENTRANCE/EXIT SHALL BE REMOVED AND THE AREA GRADED, SEEDED, AND MULCHED AS NEEDED. ENTRANCE/EXITS MAY REMAIN DEPENDING UPON FUTURE ACCESS NEEDS AND/OR PROJECT–SPECIFIC APPROVALS BUT REQUIRES APPROVALS FROM THE NATIONAL GRID ENVIRONMENTAL SCIENTIST AND PROPERTY LEGAL.

BMP PICTURE

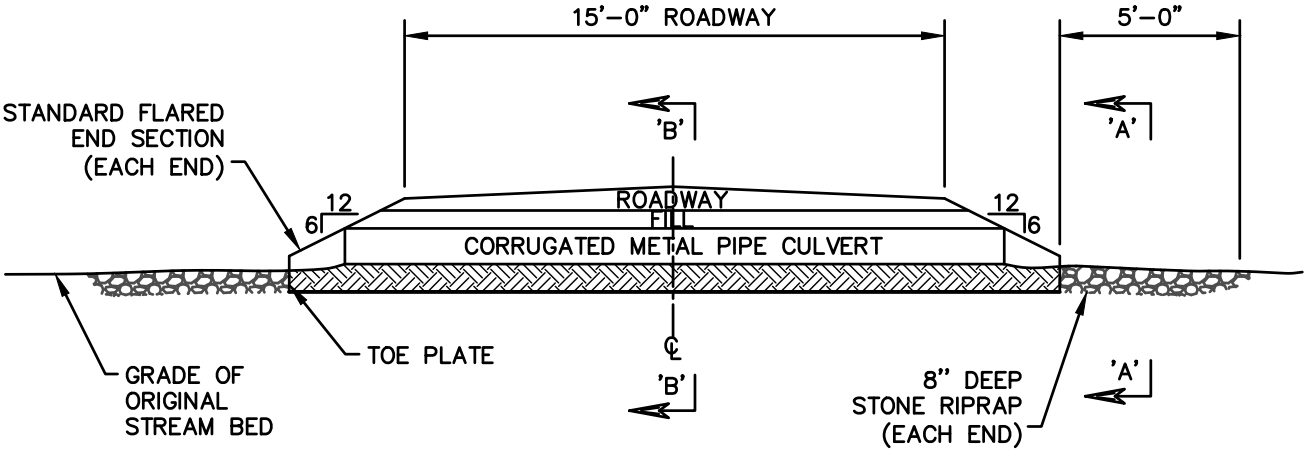


CM-8
TEMPORARY CONSTRUCTION ENTRANCE/ EXIT

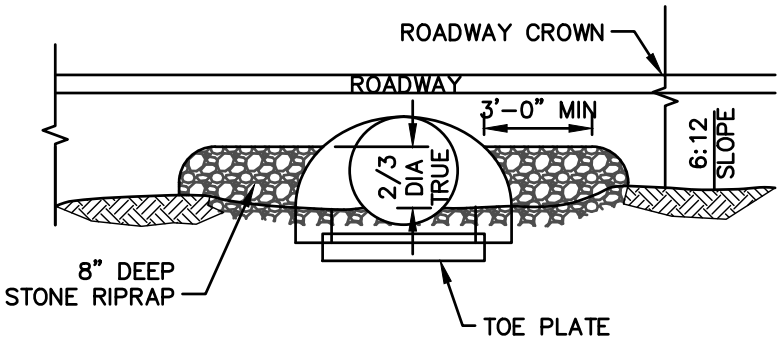
File: Temp_Construction_Ent.dwg

BMP DETAIL

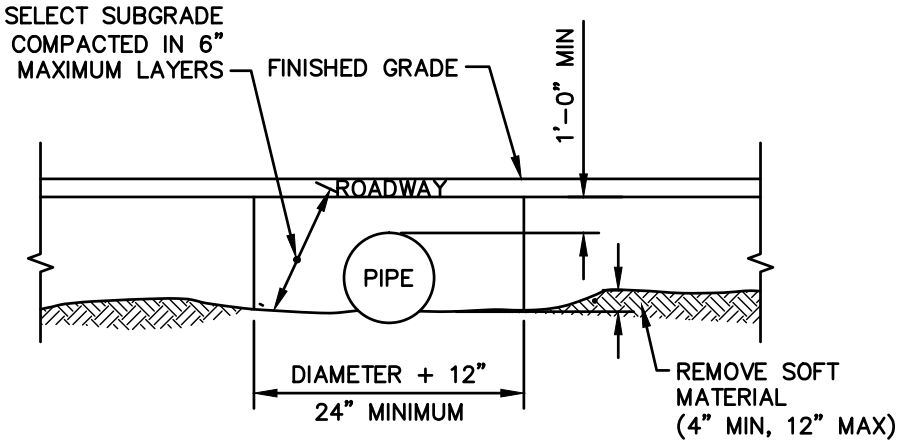
SCALE: NONE



CROSS SECTION



SECTION 'A–A'
(SAME BOTH ENDS)



SECTION 'B–B'

CM-9
TEMPORARY CONSTRUCTION
CULVERT (1 OF 2)

File: Temp_Constr_Culvert.dwg

BMP DETAIL

SCALE: NONE

NOTES:

1. CULVERT DESIGN AND LAYOUT SHALL BE COORDINATED WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST (NGES).
2. CROWN ROADWAY 1/2 INCH PER FOOT.
3. LAY THE CULVERT STRAIGHT AND AS NEARLY AS POSSIBLE ALONG THE EXISTING STREAM BED AND WITH THE INVERTS AT OR SLIGHTLY BELOW BED ELEVATION.
4. CORRUGATED METAL PIPE IS TO BE GALVANIZED STEEL, OR ALUMINIZED STEEL (TYPE 2), WITH BOLTED CONNECTORS.
5. DIAMETERS SHALL BE AS PER THE PROJECT DRAWINGS AND THE SPECIFICATION. THE PIPE GAGE SHALL BE AS FOLLOWS:

DIAMETER (INCHES)	GAGE
12" – 15"	.004"
18" – 24"	.079"
30" – 36"	.109"

6. INSTALLATION OF CULVERTS LARGER THAN 36 INCH DIAMETER SHALL REQUIRE SPECIAL ENGINEERING DESIGN.
7. SELECT SUBGRADE SHALL BE A GRANULAR MATERIAL AS DESCRIBED IN NYSDOT SPECIFICATION ITEM 203–2.02C, OR AS APPROVED BY A NGES.
8. STONE RIPRAP SHALL BE AS DESCRIBED IN NYSDOT SPECIFICATION ITEM 203–2.02D, WITH 8 INCH MAXIMUM SIZE, OR AS APPROVED BY A NGES. EXCEPT WHERE PROTECTED BY STONE, ALL EMBANKMENT SLOPES ARE TO BE STABILIZED, MULCHED AND SEEDED AS PER PROJECT SPECIFICATIONS.
9. OUTLET SHOULD BE CONFIGURED NOT TO CREATE HYDRAULIC JUMP OR PLUNGE POOL.
10. INSTALL EROSION CONTROLS ADJACENT TO THE CULVERT ENDS TO PROTECT THE WATERWAY FROM ROADWAY DEBRIS.

BMP PICTURE



BMP PICTURE



NOTE:

1. PICTURE SHOWS VIEW OF ACCESS WAY STABILIZATION ADJACENT TO A WETLAND.
2. COORDINATE STABILIZATION DESIGN AND PRODUCT WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE




NO ACCESS – WETLAND/STREAM CROSSING MATS REQUIRED







NO ACCESS – A.) PROJECT LIMITS E.G. ROW LIMITS
B.) HISTORICAL/CULTURAL
C.) ENVIRONMENTALLY SENSITIVE E.G. THREATENED & ENDANGERED
D.) OTHER

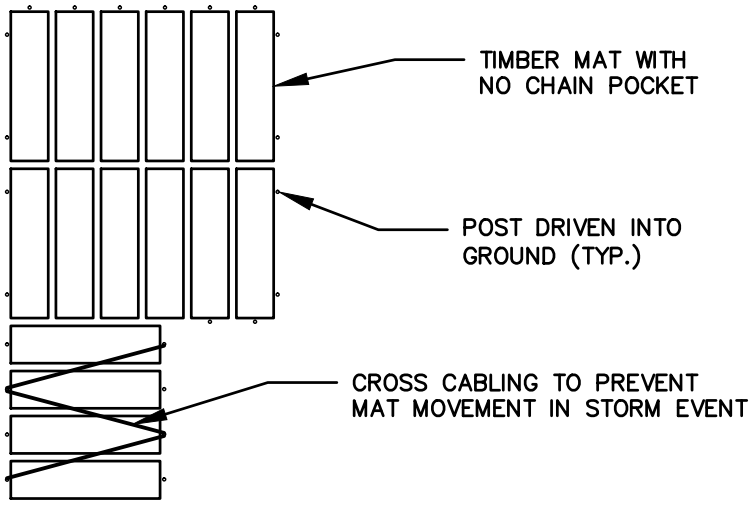




APPROVED ACCESS

BMP DETAIL 1

SCALE: NONE



TYPICAL PLAN VIEW

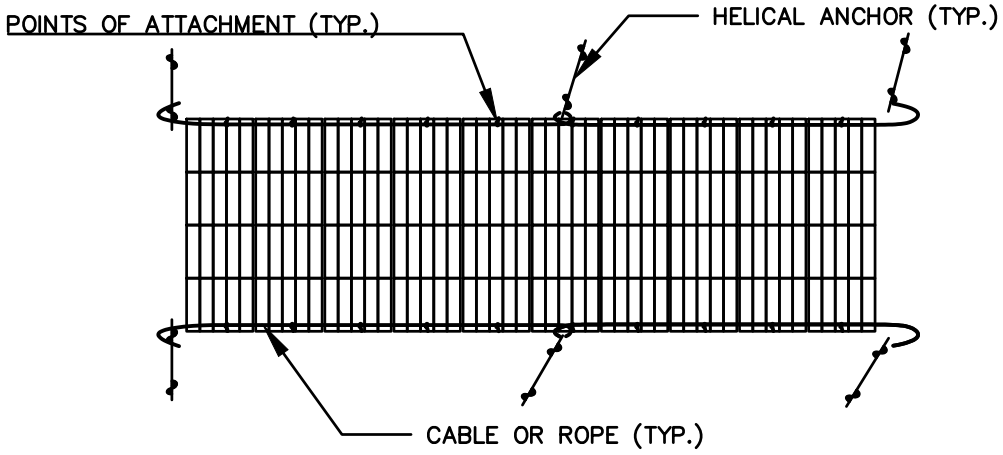
NOTES:

1. EXAMPLES OF ANCHORING ONLY. MATTING CONTRACTOR SHALL PROPOSE THE METHOD OF ANCHORING BASED ON FIELD CONDITIONS.
2. ANCHORING METHOD TO BE APPROVED BY THE NATIONAL GRID ENVIRONMENTAL SCIENTIST AND TRANSMISSION LINE CONSTRUCTION SUPERVISOR.

BMP DETAIL 2

NOTES:

1. TYPICAL HELICAL ANCHOR AND CABLE CONFIGURATION FOR MAT CONTAINMENT IN FLOODPLAINS/LAND SUBJECT TO FLOODING.
2. TYPICAL POINTS OF ATTACHMENT HEAVY STAPLES, EYE BOLTS OR OTHER SUITABLE HARDWARE TO SECURE ATTACHMENT OF MAT TO LINEAR CABLE. IF CHAIN POCKETS ARE PRESENT IN THE MATS CABLE OR ROPE CAN BE LOOPED THROUGH RODS.



BMP PICTURE 1



BMP PICTURE 2



CM-12
EXAMPLE OF CONSTRUCTION MAT ANCHORING (2 OF 2)

File: Const_Mat_Anchoring.dwg

BMP DETAIL

SCALE: NONE

WIRE BACKED SILT FENCE



MUTUAL INDUSTRIES WIRE BACKED SILT FENCE
PART # 1776-14-24
36" X 100'
36" MISF 1776 FABRIC
24" 14GA WIRE MESH
OPENING OF MESH 2" X 4"
FABRIC HOG RINGED EVERY 12"-18" ALONG THE TOP OF THE FENCE

ROLL WEIGHT 40 LBS

32 ROLLS PER PALLET

NOTES:

1. PRODUCT TO BE MUTUAL INDUSTRIES' WIRE BACKED SILT FENCE OR APPROVED EQUAL BY NATIONAL ENVIRONMENTAL SCIENTIST.
2. COORDINATE INSTALLATION METHOD AND LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

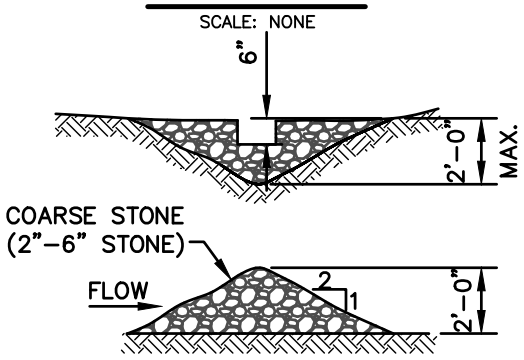
BMP PICTURE



NOTE:

1. PICTURE SHOWS SEDIMENT FILTER WITHIN A WETLAND.

BMP DETAIL



STONE CHECK DAM

NOTES:

1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. THE CENTER OF THE CHECK DAM MUST BE AT LEAST 6" LOWER THAN THE OUTER EDGES.
4. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
5. MAX. SPACING: TOE OF THE UPSTREAM DAM IS SAME ELEVATION AS TOP OF DOWNSTREAM DAM.
6. STONE SHALL BE FREE OF FINE PARTICLES TO PREVENT TURBID DISCHARGES.

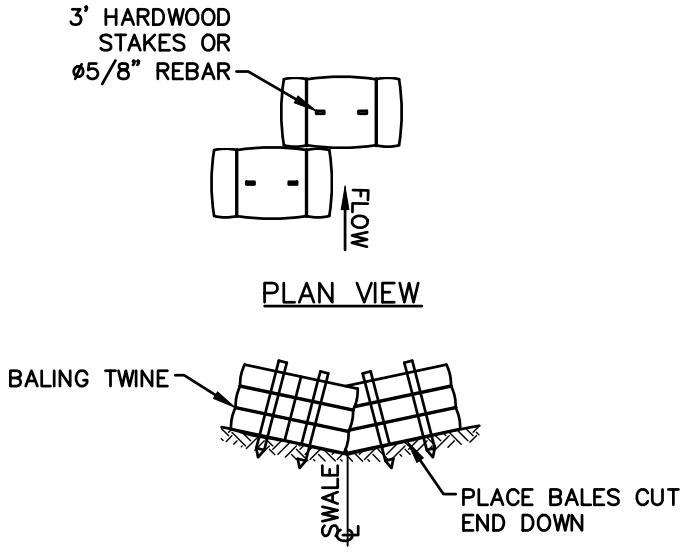
BMP PICTURE



NOTE: A SMALLER STONE SIZE IS SHOWN IN THIS PICTURE.

BMP DETAIL

SCALE: NONE



NOTES:

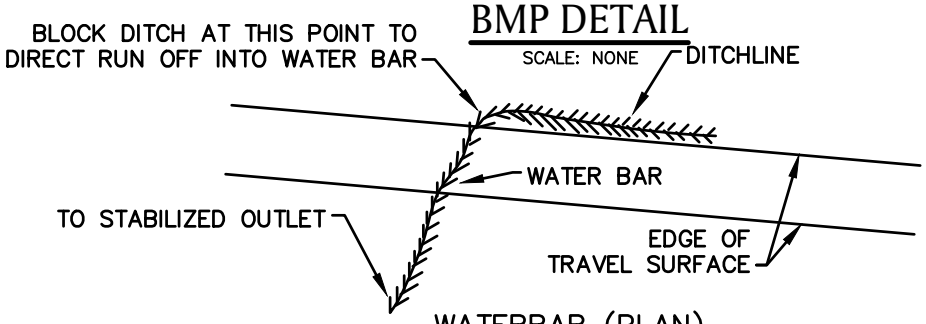
1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

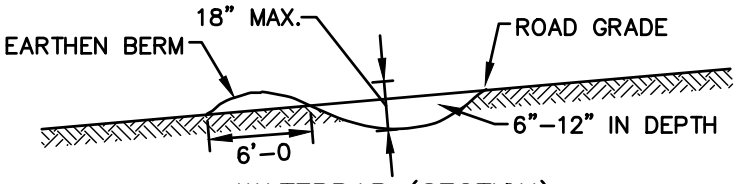


BMP DETAIL

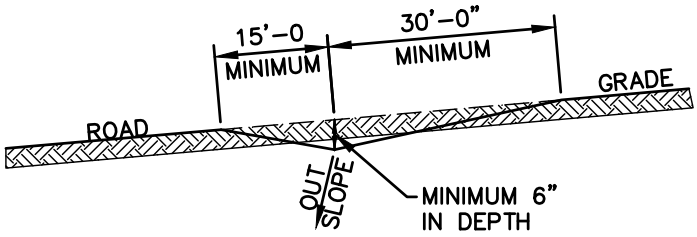
SCALE: NONE



WATERBAR (PLAN)



WATERBAR (SECTION)



DISCHARGE (SECTION)

NOTE:

1. LINE WITH 2"–6" STONE UNDERLAIN BY GEOTEXTILE FILTER FABRIC, KEYED INTO ROAD SURFACE AT LEAST 10 FEET EACH SIDE OF WATERBAR.
2. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

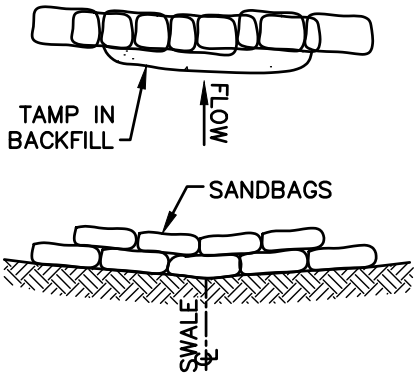
BMP PICTURE





BMP DETAIL

SCALE: NONE



SANDBAG
CHECK DAM

NOTES:

1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



NOTE:

1. PICTURE DOES NOT DEPICT "TAMP IN BACKFILL"

BMP PICTURE

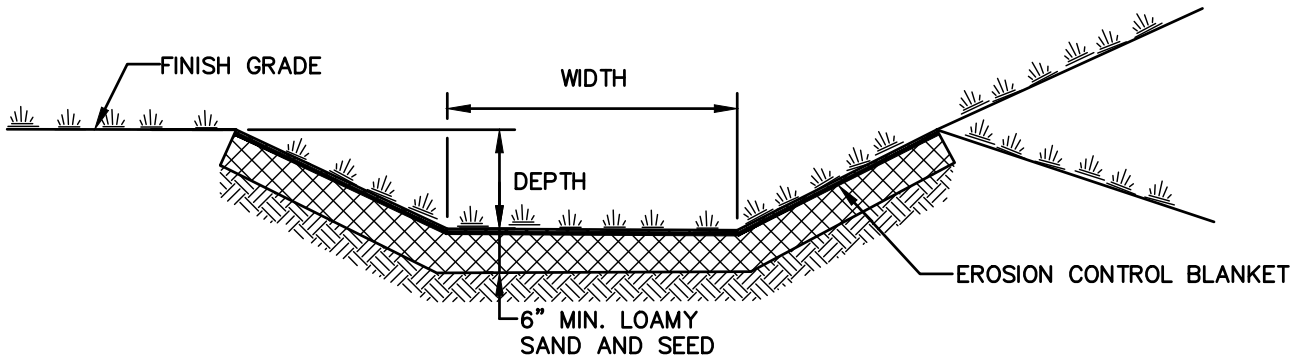


NOTE:

1. EXACT SIZE, LOCATION AND DESIGN IS DEPENDANT ON SITE CONDITIONS, AND LOCAL AND STATE REGULATIONS. COORDINATE THIS BMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.

BMP DETAIL

SCALE: NONE



NOTES:

1. WIDTH AND DEPTH OF SWALE, AND EROSION CONTROL BLANKET TYPE TO BE COORDINATED WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. REFER TO DETAILS SEC–10 AND SEC–11 FOR SEED MIXTURE OPTIONS.

BMP PICTURE

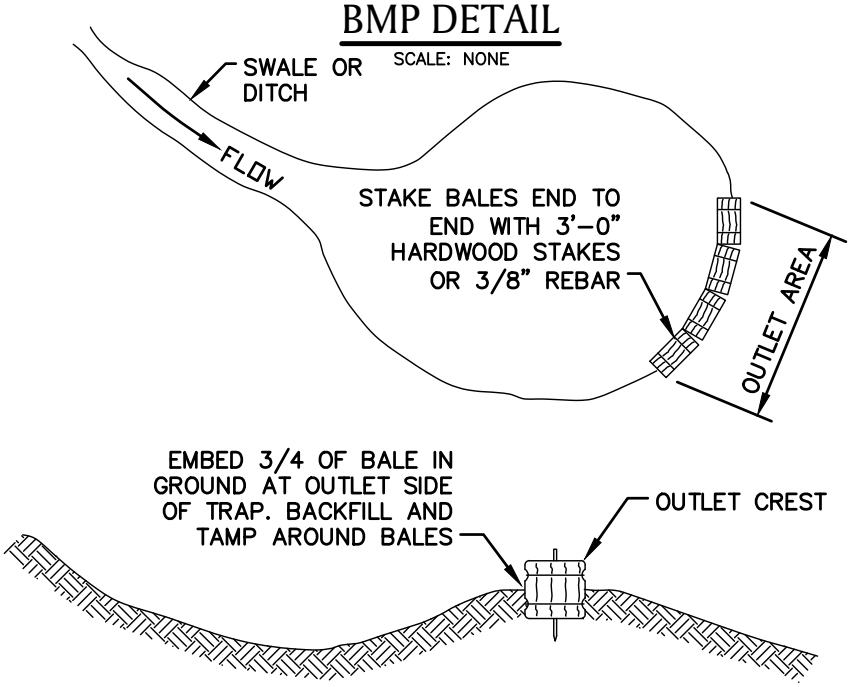


AA-8
DRAINAGE SWALE AND
LINED DITCH

File: Lined_Drainage_Swale.dwg

BMP DETAIL

SCALE: NONE



TYPICAL PROFILE

NOTES

1. SIZE, SHAPE AND PROFILE OF SEDIMENT WILL VARY ACCORDING TO ANTICIPATED FLOW VOLUME AND SURROUNDING TERRAIN AND SHALL BE COORDIANTED WITH THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE BASIN SHALL BE CUT BELOW THE GROUNDLINE. FILL SHALL NOT BE USED TO HOLD WATER UNLESS ROLLED AND COMPACTED.
3. OUTLET AREA IS TO REMAIN FREE OF EXCAVATION SPOILS.
4. OUTLET CREST ELEVATION SHALL BE LOWER THAN INLET ELEVATION AND AT LEAST 1'–0" BELOW THE TOP OF THE BASIN.ARMOUR SLOPES >8% IN OUTLET AREA WITH STONE OF APPROPRIATE SIZE TO PREVENT SCOUR.
5. ARMOUR SLOPES >8% IN OUTLET AREA WITH STONE OF APPROPRIATE SIZE TO PREVENT SCOUR.

BMP PICTURE

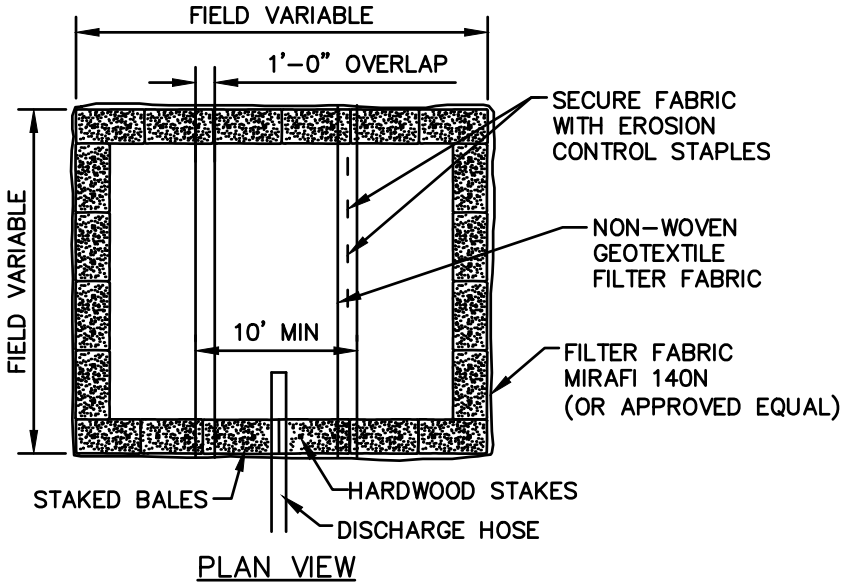


AA-9
SEDIMENTATION BASIN

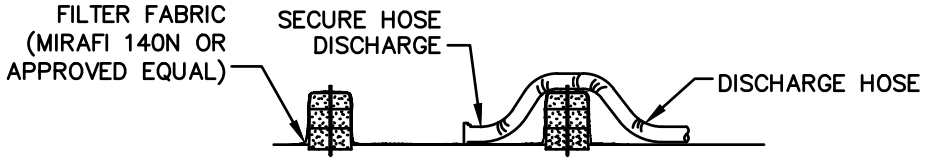
File: Sedimentation_Basin.dwg

BMP DETAIL

SCALE: NONE



PLAN VIEW



CROSS–SECTION

NOTES:

1. NUMBER OF BALES MAY VARY DEPENDING ON SITE CONDITIONS,
2. THE BASIN TO BE SIZED TO PREVENT DISCHARGE WATER FROM OVERTOPPING BASIN.
3. KEEP AS FAR FROM WETLANDS AS PRACTICAL.
4. CLEAN AND REMOVE AS SOON AS DEWATERING IS COMPLETE.

BMP PICTURE



AA-10
DEWATERING BASIN
(SMALL SCALE)

File: Dewat_Bas_Small.dwg

BMP PICTURE

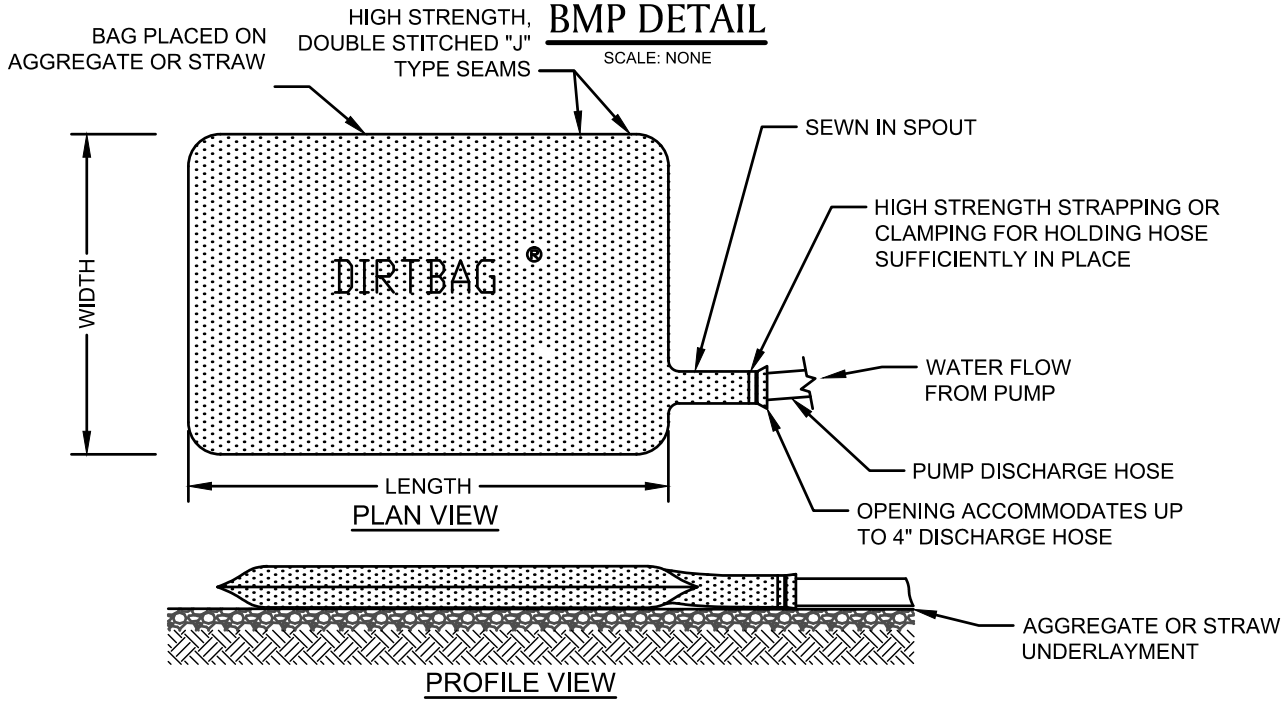


NOTE:

1. EXACT SIZE, LOCATION AND DESIGN IS DEPENDANT ON SITE CONDITIONS, AND LOCAL AND STATE REGULATIONS. COORDINATE THIS BMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.

BMP DETAIL

SCALE: NONE



NOTE:
ONCE PUMPING COMMENCES, THE DIRT BAG SHALL BE MONITORED FREQUENTLY TO ASSURE THAT THE CONNECTIONS ARE SECURELY FASTENED AND THE RATE OF WATER DELIVERY TO THE STRUCTURE IS LOW ENOUGH TO PREVENT UNFILTERED WATER FROM FLOWING FROM THE HOSE CONNECTIONS OR BAG.

BMP PICTURE



* PICTURE AND DETAIL PROVIDED BY ACF ENVIRONMENTAL

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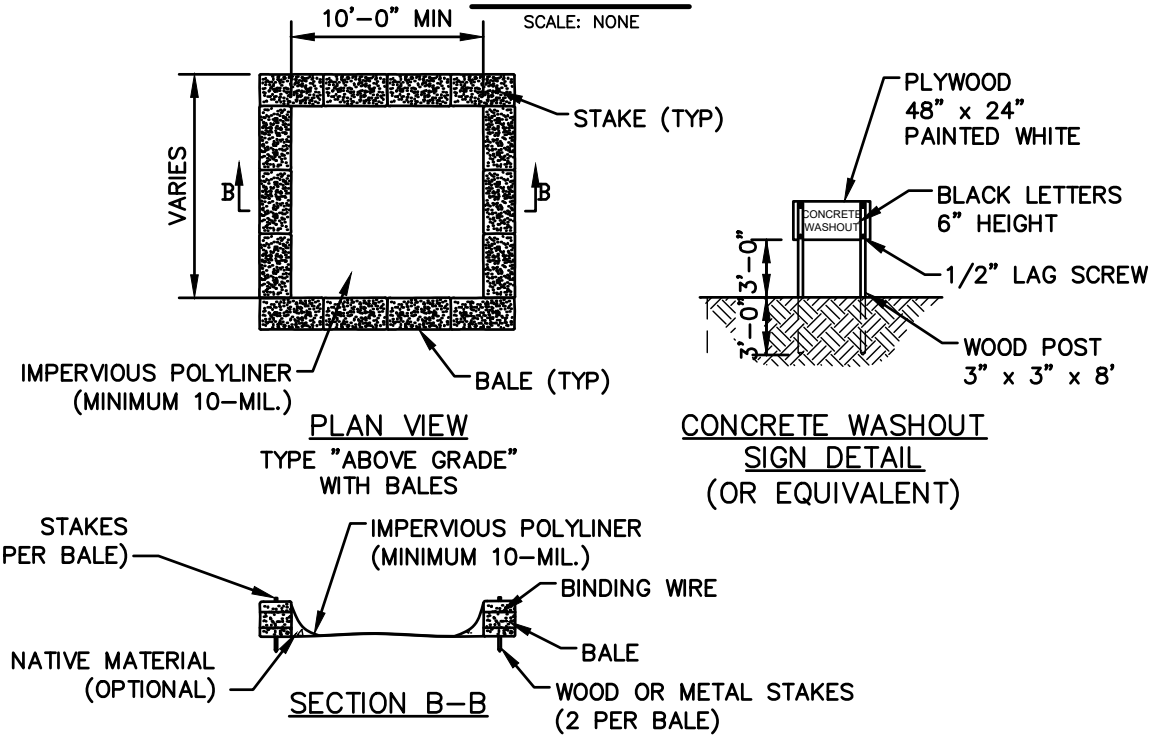
AA-12
DIRTBAG *

File: Dirtbag.dwg

BMP DETAIL



NOTES:

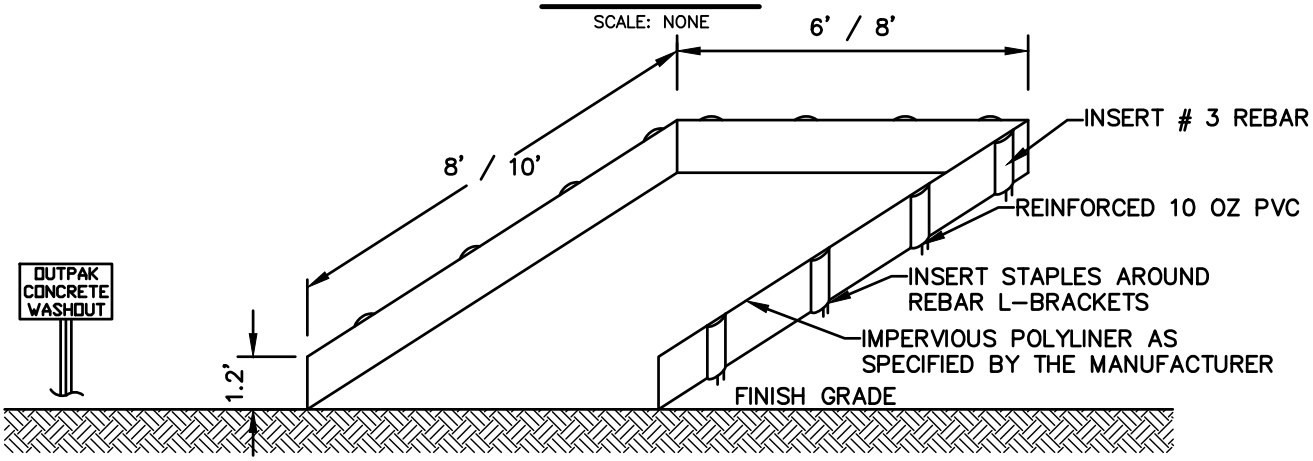
1. NUMBER OF BALES MAY VARY DEPENDING ON SITE CONDITIONS. COORDINATE SIZE AND LOCATION OF CONCRETE WASTE SUMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. KEEP AS FAR FROM DRAINAGE CHANNELS AND WETLAND AREAS AS PRACTICAL.
3. SUMPS TO BE CLEANED AND WASTE CONCRETE REMOVED AND PROPERLY DISPOSED OF UPON COMPLETION OF WORK.
4. SEE ADDITIONAL NOTES ON DETAIL AA–14.

BMP PICTURE



BMP DETAIL

SCALE: NONE



CROSS SECTION

NOTES:

1. PRODUCT TO BE OUTPAK PVC CONCRETE WASHOUT OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT.
3. SIGNS SHALL BE PLACED AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT.
4. THE CONCRETE WASHOUT AREA WILL BE REPLACED AS NECESSARY TO MAINTAIN CAPACITY FOR WASTE CONCRETE AND OTHER LIQUID WASTE.
5. WASHOUT RESIDUE SHALL BE REMOVED FROM THE SITE AND DISPENSED OF AT AN APPROVED WASTE SITE.
6. DO NOT MIX EXCESS AMOUNTS OF FRESH CONCRETE OR CEMENT ON-SITE.
7. DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS.
8. AVOID DUMPING EXCESS CONCRETE IN NON-DESIGNATED DUMPING AREAS.
9. LOCATE WASHOUT AREA AT LEAST 50' FROM STORM DRAIN, OPEN DITCHES, OR WATERBODIES. COORDINATE LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
10. WASH OUT WASTES INTO THE OUTPAK WASHOUT WHERE THE CONCRETE CAN SET, BE BROKEN UP, AND THEN DISPOSED OF PROPERLY.
11. A SECURE, NON-COLLAPSING, NON-WATER COLLECTING COVER MUST BE PLACED OVER CONCRETE WASHOUT PRIOR TO PREDICTED WET WEATHER TO PREVENT ACCUMULATION AND OVERFLOW OF PRECIPITATION.

BMP PICTURE



*** PICTURE AND DETAIL PROVIDED BY OUTPAK WASHOUT**

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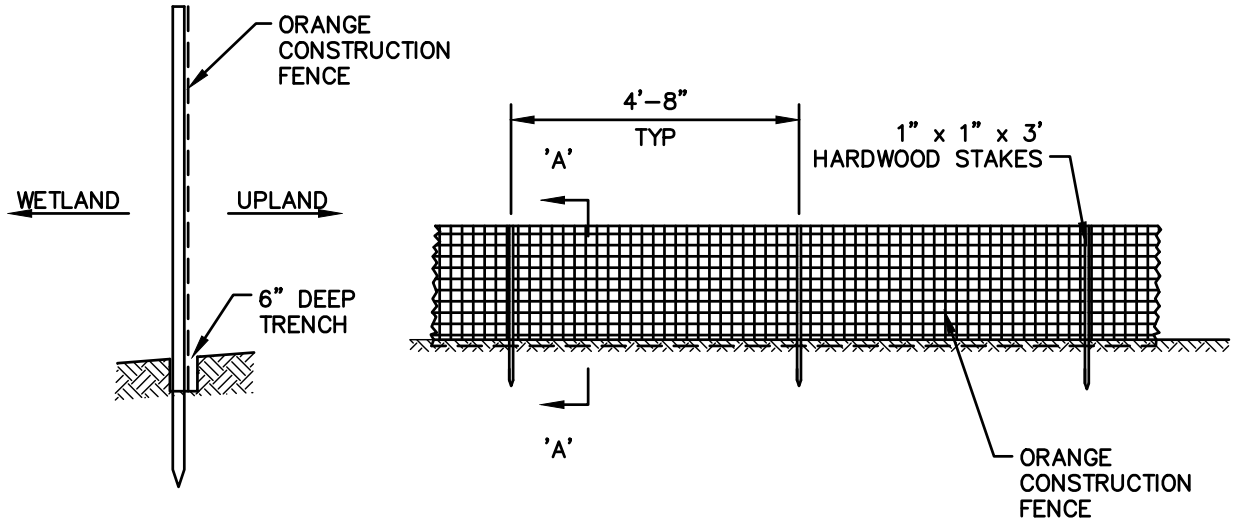
AA-14

OUTPAK CONCRETE WASHOUT *

File: Outpak_Washout.dwg

BMP DETAIL

SCALE: NONE



SECTION A-A

BMP PICTURE



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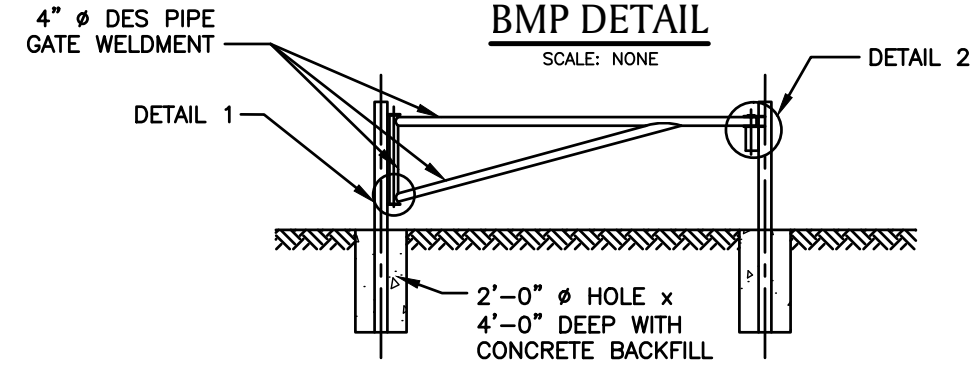
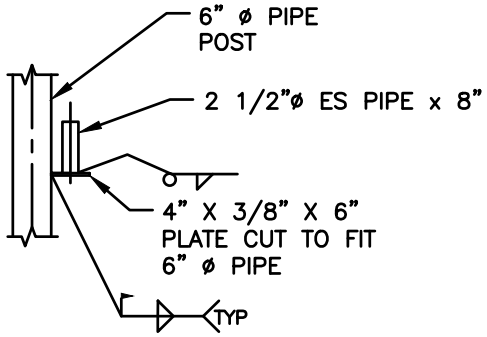
AA-15
BARRIER FENCE
(CONSTRUCTION FENCE)

File: Barrier_Fence.dwg

BMP DETAIL

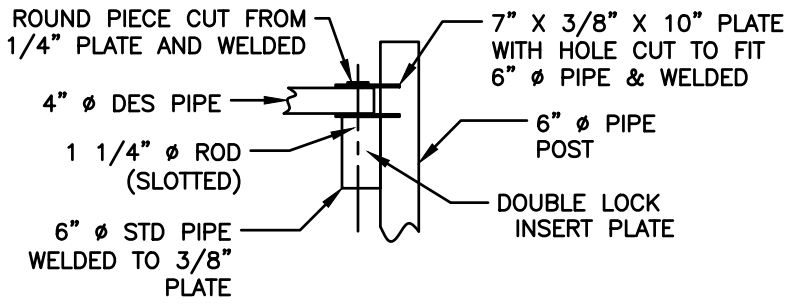
SCALE: NONE





DETAIL 1

SIMILAR DETAIL AT TOP



DETAIL 2

NOTES:

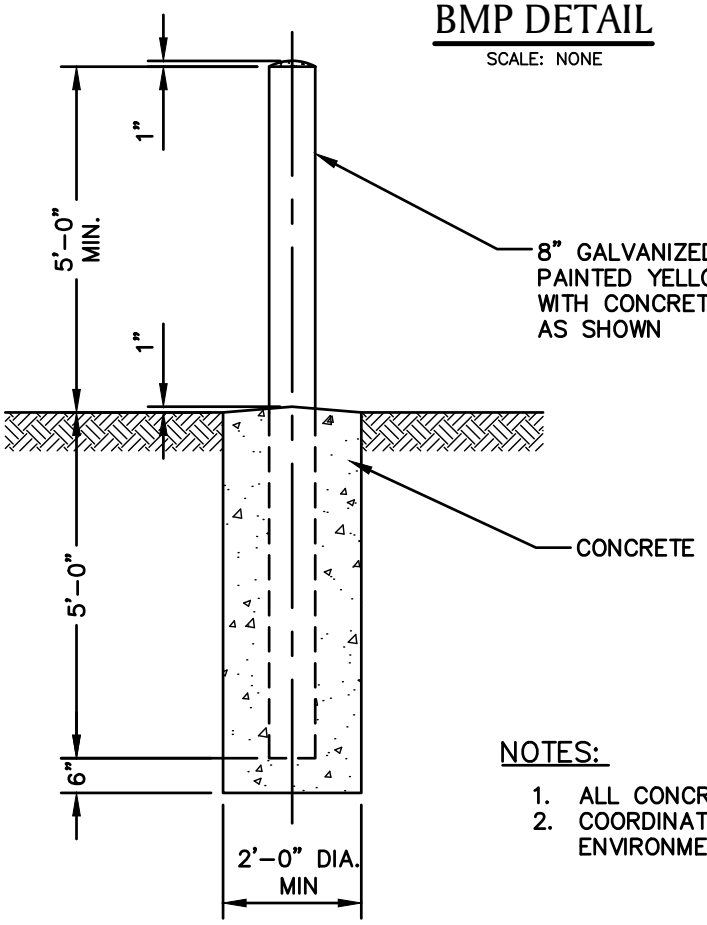
1. ALL GATE STEEL PIPES SHALL BE IN ACCORDANCE WITH ASTM A–501, PLATES SHALL BE ASTM A–36.
2. ALL STEEL PIPES SHALL BE PRIMED WITH ZINC–CHROMATE PRIMER AND FINISHED WITH AN APPROVED OSHA "SAFETY YELLOW" TOP COAT COMPATIBLE WITH THE PRIMER AND FOR EXTERIOR EXPOSURE.
3. REFLECTORS SHALL BE SPACED AT 3 FEET ALONG THE LENGTH OF THE CROSSBAR AND BRACE
4. BACKFILL AT POSTS TO BE COMPACTED.

BMP PICTURE



BMP DETAIL

SCALE: NONE



NOTES:

1. ALL CONCRETE TO BE 2500 P.S.I. MINIMUM.
2. COORDINATE LOCATIONS WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



BMP



Definition

The control of dust resulting from land-disturbing activities.

Purpose

To prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

Design Criteria

Construction operations should be scheduled to minimize the amount of area disturbed at one time. Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria is given; see construction specifications below for common methods of dust control.

Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the local permitting authority.

Construction Specifications

A. Non-driving Areas – These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

Mulch (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

Spray adhesives – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B. Driving Areas – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access routes.

Polymer Additives – These polymers are mixed with water and applied to the driving surface by a water truck with a gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

Barriers – Woven geotextiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

* BMP INFORMATION FROM "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (AUGUST, 2005)." INFORMATION OBTAINED VIA WEBSITE: http://www.dec.ny.gov/chemical/29066.html

AA-18
DUST CONTROL (FROM NY) *

File: Dust_Control.dwg

BMP DETAIL

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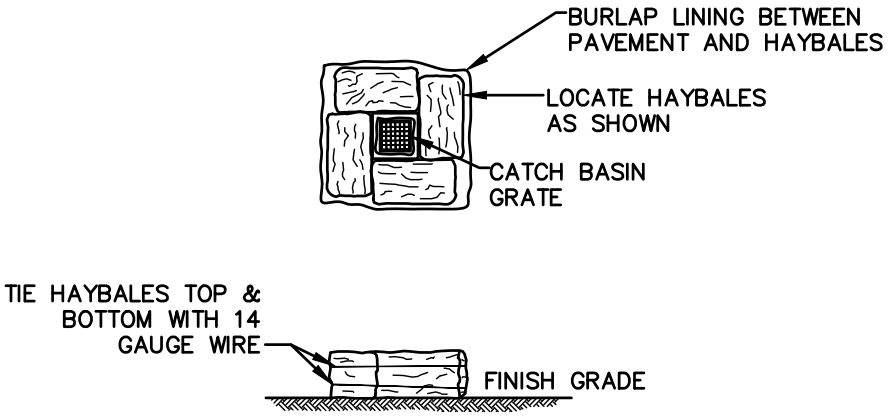


NOTES:

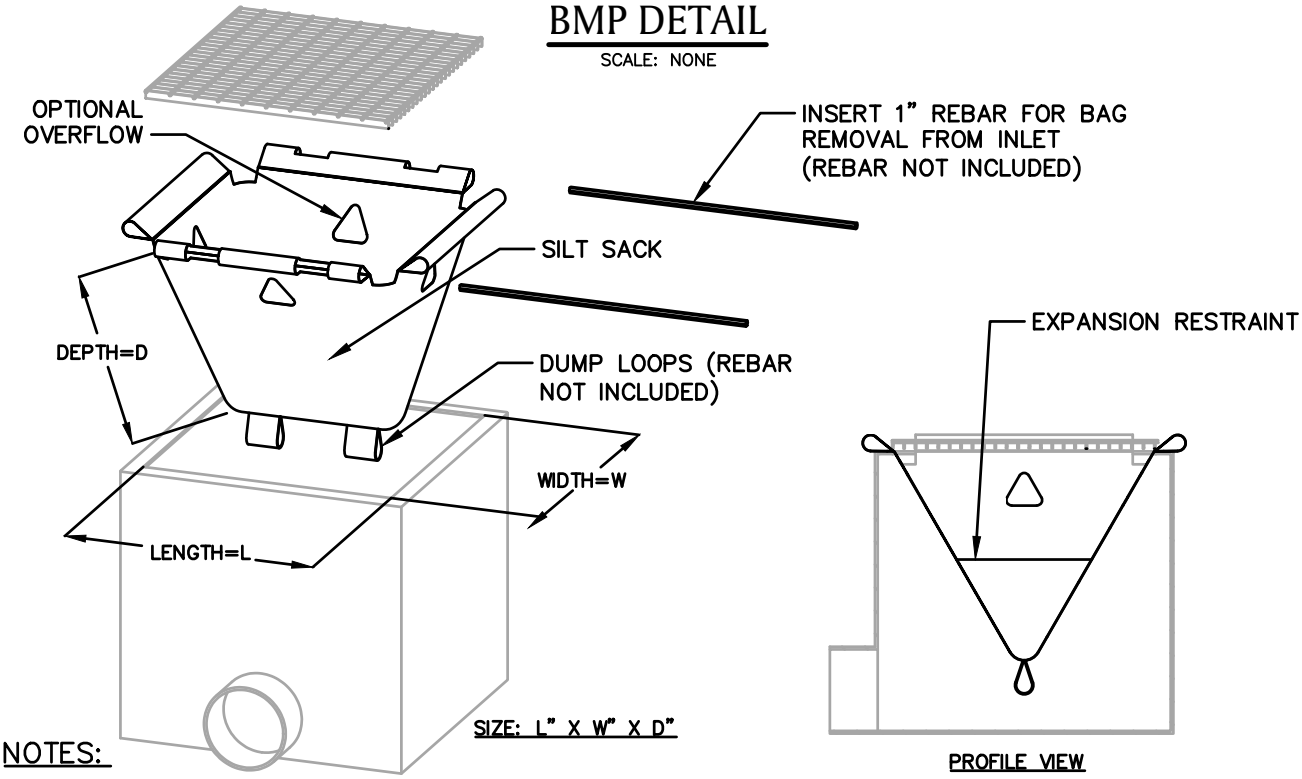
1. SURROUND STREET DRAINAGE STRUCTURE INLET WITH HAY BALES PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED. ACCUMULATED SEDIMENTS SHALL BE REMOVED.
2. HAYBALES PLACED ON PAVEMENT SHALL HAVE BURLAP PLACED BETWEEN PAVEMENT AND HAYBALE

BMP PICTURE



BMP DETAIL

SCALE: NONE



NOTES:

1. PRODUCT TO BE SILT SACK OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE USE OF A SILT SACK OPTIONAL OVERFLOW AND OVERALL DIMENSIONS ARE TO BE COORDINATED WITH A NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE



*** DETAIL PROVIDED BY ACF ENVIRONMENTAL**

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AA-20
SILT SACK *

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BMP DETAIL

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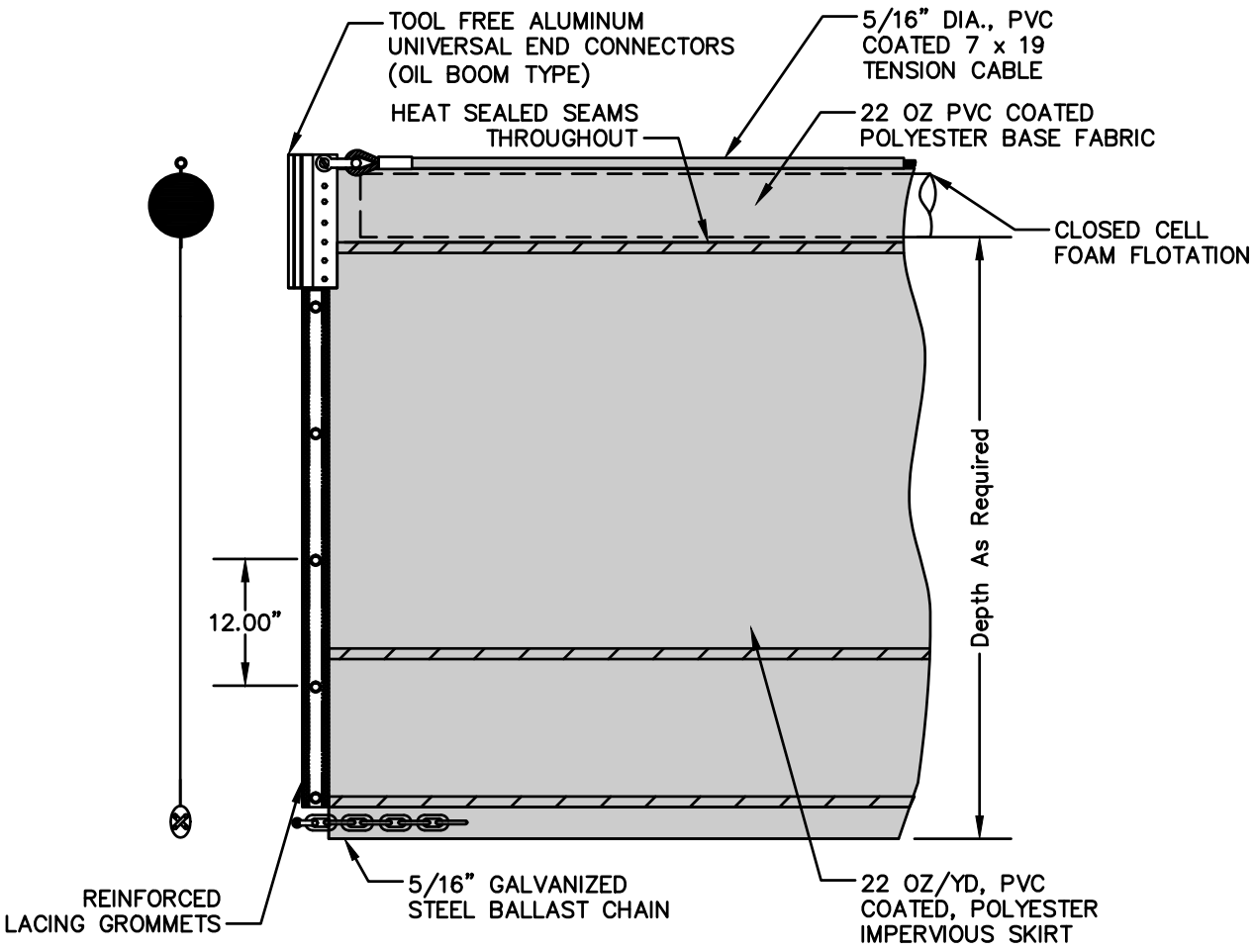

BMP PICTURE



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AA-21
TURBIDITY CURTAIN *

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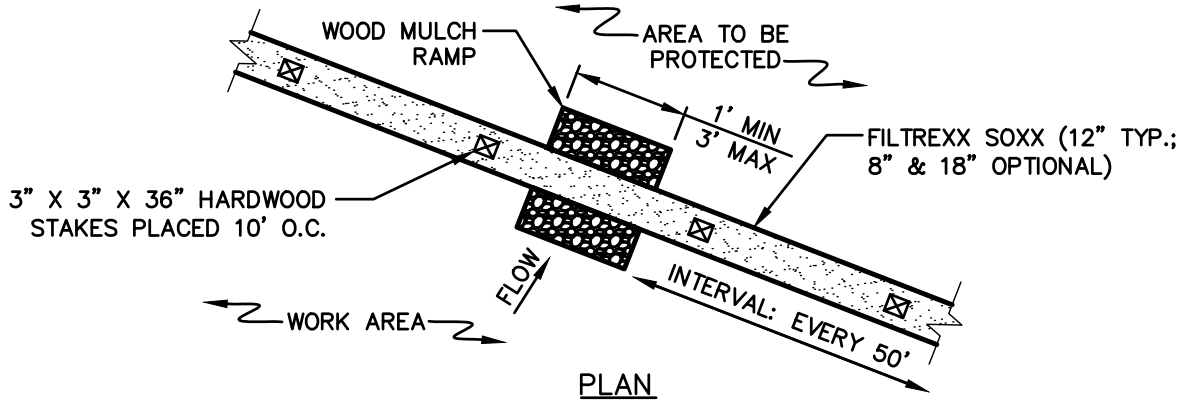
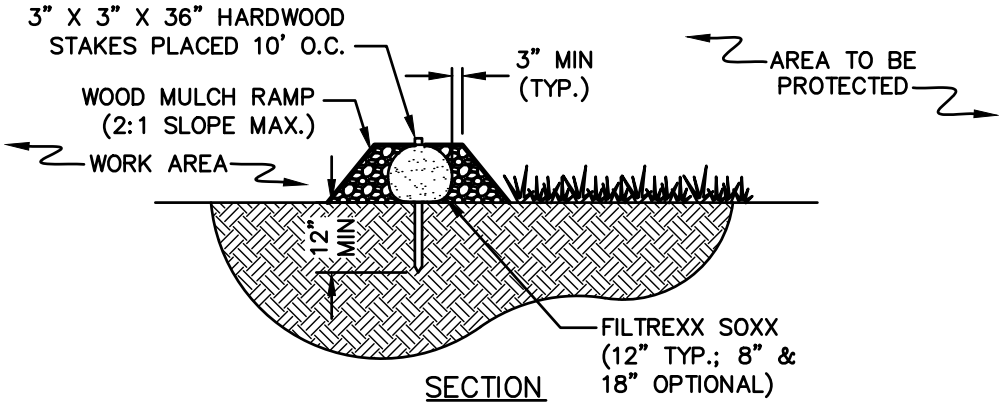
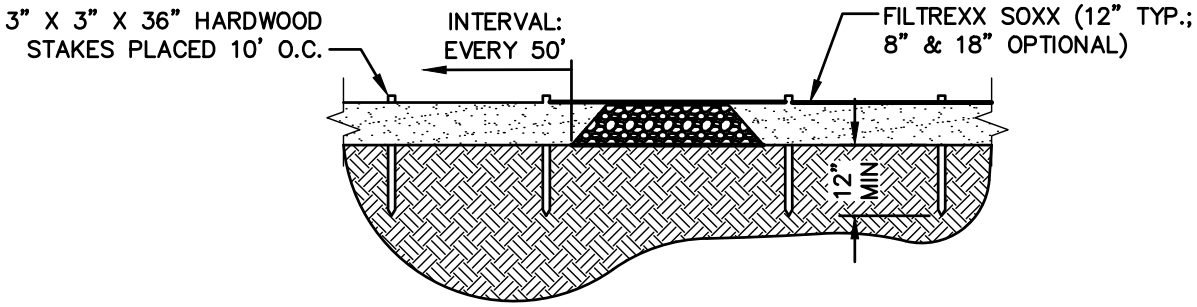


PLAN



SECTION



PROFILE

NOTES

1. PRODUCT TO BE FILTREXX SILT SOXX OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
4. NON-MONOFILAMENT CONTAINMENT MATERIAL SHOULD BE KNITTED PHOTODEGRADABLE OR BIODEGRADABLE MATERIAL, WITH OPENING SIZES BETWEEN 1/8" – 1/4".
5. COMPOST MEDIA SHOULD HAVE PARTICLE SIZE WHERE 99% < 2", 50% > 1/2".
6. COMPOST MATERIAL TO BE DISPOSED OF ON-SITE, OR IN ACCORDANCE WITH ENVIRONMENTAL PERMITS AS APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
7. WOOD MULCH RAMP IS OPTIONAL DEPENDING ON SUBSTRATE/SITE CONDITIONS, AND TO BE APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP # AA-22
SILTSOXX AMPHIBIAN & REPTILE CROSSING #1 (1 OF 2)

File: Alternate_Mulch_Ramp_Siltsoxx.dwg

BMP PICTURE



SALAMANDER AND SNAKE CROSSING #1

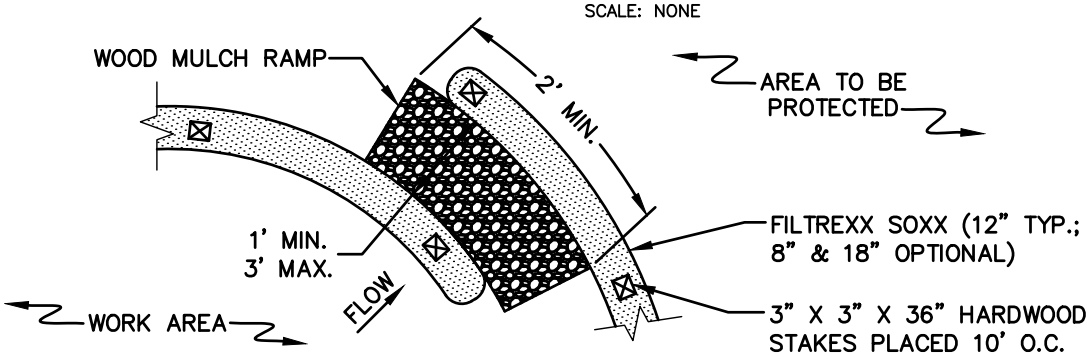
ALTERNATE WOOD MULCH RAMP SILTSOXX NOTES:

1. SILTSOXX, BY FILTREX INTERNATIONAL, OR APPROVED EQUAL PRODUCT SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.

2. BMP SHOULD ONLY BE UTILIZED IN AREAS WHERE RARE SALAMANDER AND SNAKE HABITAT OCCURS, OR AT THE DIRECTION OF THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP DETAIL

SCALE: NONE



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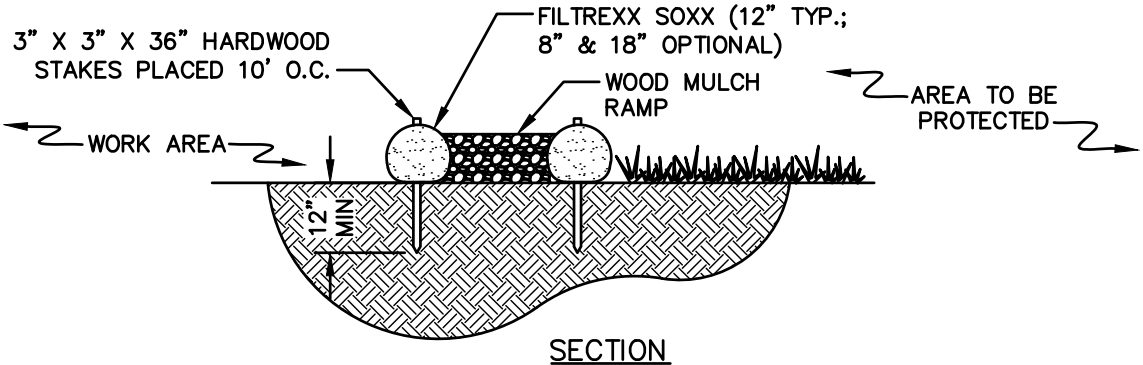

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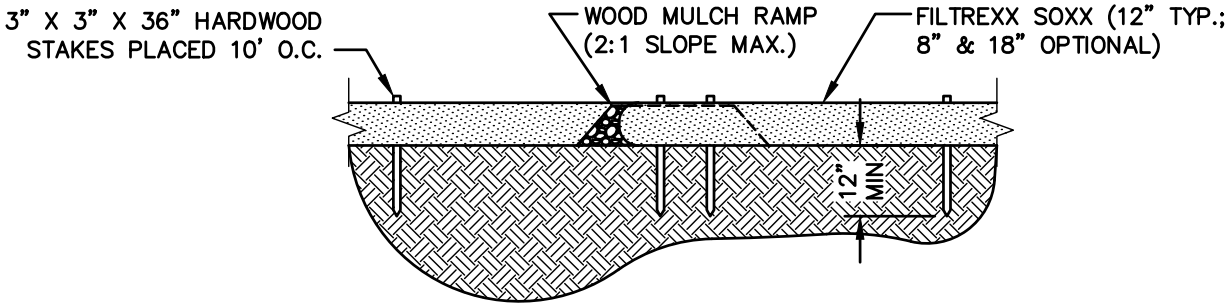


PROFILE

NOTES

1. PRODUCT TO BE FILTREXX SILT SOXX OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
4. NON-MONOFILAMENT CONTAINMENT MATERIAL SHOULD BE KNITTED PHOTODEGRADABLE OR BIODEGRADABLE MATERIAL, WITH OPENING SIZES BETWEEN 1/8" – 1/4".
5. COMPOST MEDIA SHOULD HAVE PARTICLE SIZE WHERE 99% < 2", 50% > 1/2".
6. COMPOST MATERIAL TO BE DISPOSED OF ON-SITE, OR IN ACCORDANCE WITH ENVIRONMENTAL PERMITS AS APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
7. WOOD MULCH RAMP IS OPTIONAL DEPENDING ON SUBSTRATE/SITE CONDITIONS, AND TO BE APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
8. GAPS TO BE SPACED EVERY 50 FT, IF POSSIBLE GIVEN WETLAND PERMIT CONDITIONS.

BMP # AA-23
SILTSOXX AMPHIBIAN & REPTILE CROSSING #2 (1 OF 2)

File: Alternate_Siltsoxx.dwg

BMP PICTURE



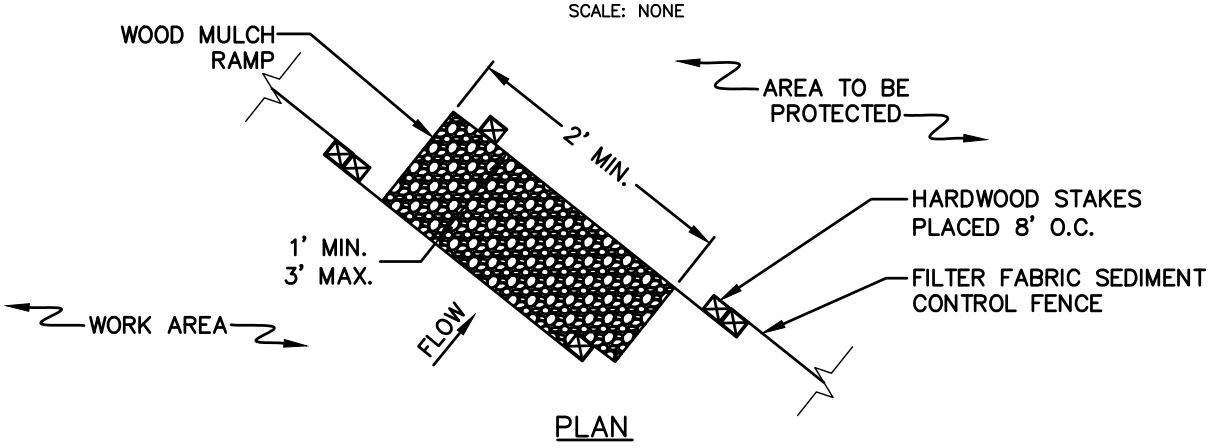
SILTSOXX AMPHIBIAN & REPTILE CROSSING #2

ALTERNATE WOOD MULCH RAMP SILTSOXX NOTES:

1. SILTSOXX, BY FILTREX INTERNATIONAL, OR APPROVED EQUAL PRODUCT SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.
2. BMP SHOULD ONLY BE UTILIZED IN AREAS WHERE RARE SALAMANDER AND SNAKE HABITAT OCCURS OR AT THE DIRECTION OF THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP DETAIL

SCALE: NONE



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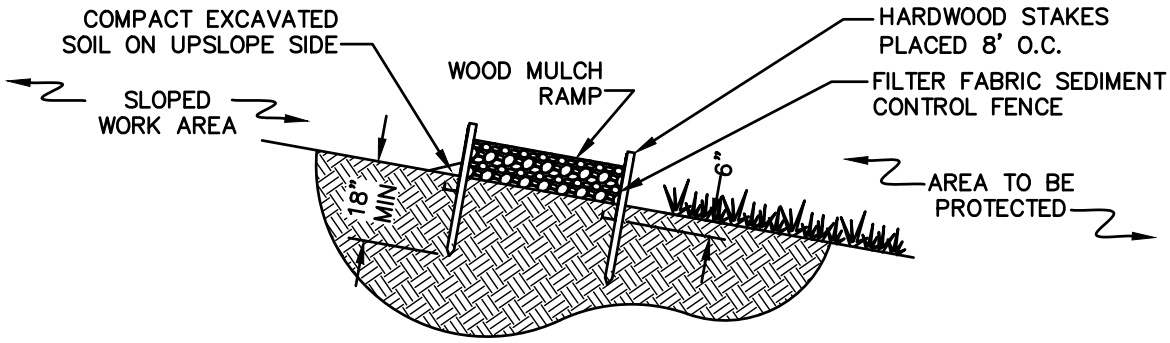

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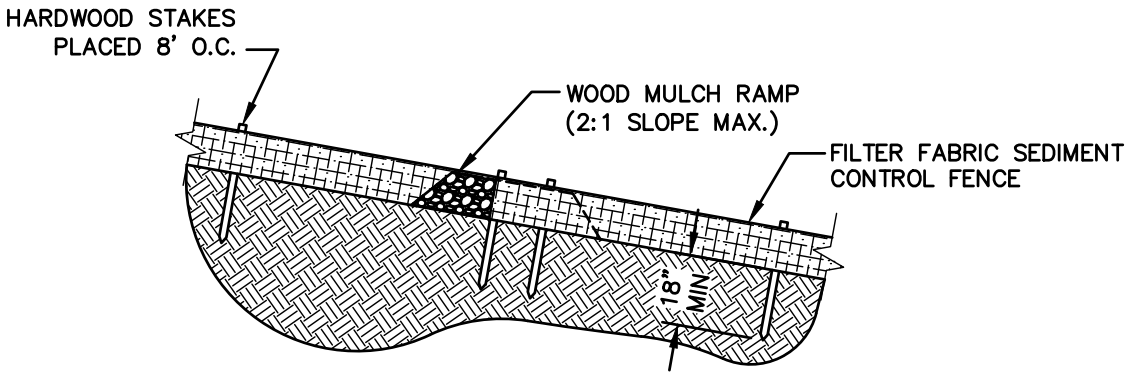


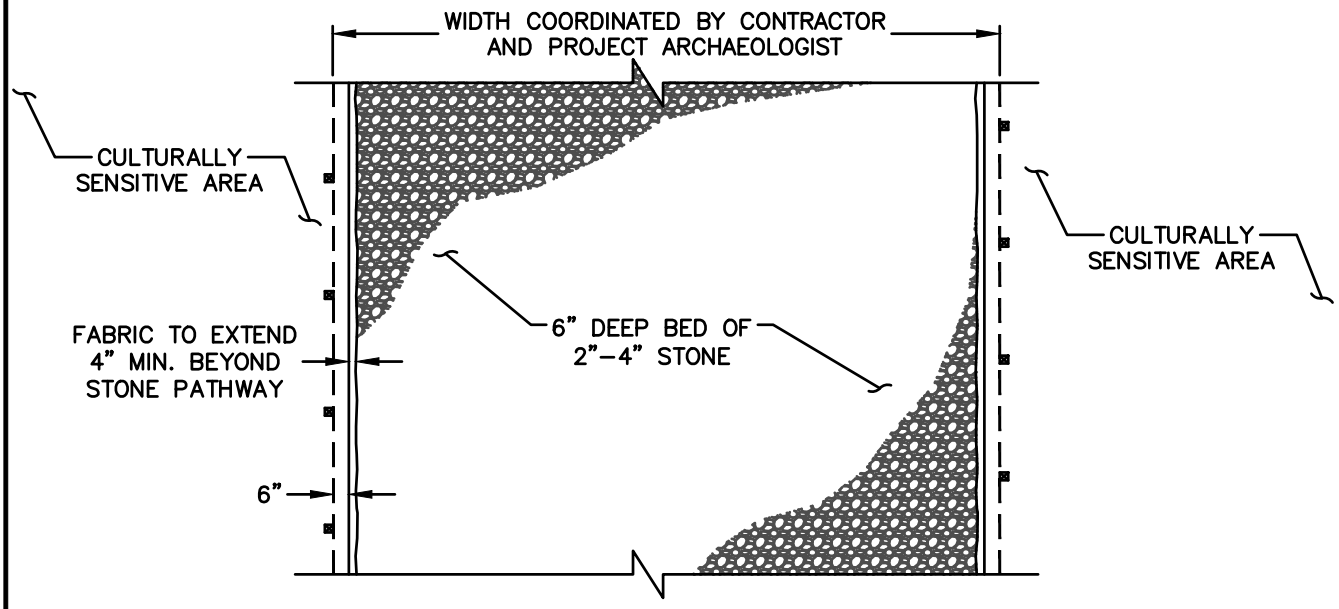
PROFILE

NOTES

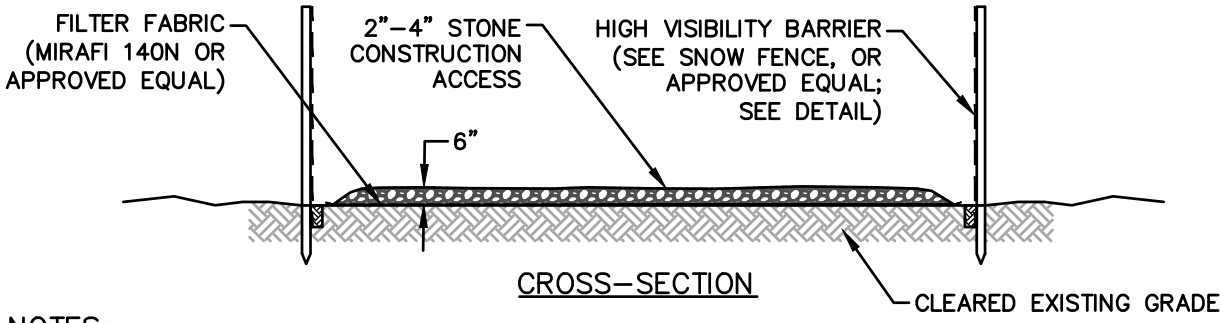
1. IN AREAS WHERE SLOPES OR RUN-OFF VOLUME PROHIBIT USE OF SILTSOXX, CROSSINGS CAN BE PROVIDED THROUGH TRENCHED SILT FENCE.
2. INTALL SILT FENCE TO SPECIFICATIONS IN EG303 APPENDIX 7 "SEC-2 SEDIMENT CONTROL FENCE."
3. WOOD MULCH RAMP IS OPTIONAL DEPENDING ON SUBSTRATE/SITE CONDITIONS, AND TO BE APPROVED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
4. GAPS TO BE SPACED EVERY 50 FT, IF POSSIBLE GIVEN WETLAND PERMIT CONDITIONS.

BMP DETAIL

SCALE: NONE



PLAN VIEW



CROSS–SECTION

NOTES:

1. ARCHAEOLOGICAL SITE BOUNDARIES, AS DEFINED BY INTENSIVE ARCHAEOLOGICAL SURVEY AND SITE AVOIDANCE AND PROTECTION PLANS, WILL BE DEMARCATED BY STAKING BY THE PROJECT ARCHAEOLOGIST.
2. GEOTEXTILE AND STONE MAY REMAIN IN PLACE FOLLOWING CONSTRUCTION IF PERMANENT PROTECTION IS NECESSARY AND DEPENDENT ON EASEMENT RIGHTS.
3. WHERE APPROVED BY THE PROJECT–SPECIFIC SAPP, CONSTRUCTION MATTING MAY BE ADDED OVER, OR IN PLACE OF, THE FABRIC AND STONE.
4. INSTALLATION AND REMOVAL OF FABRIC AND STONE, EROSION CONTROLS, AND/OR CONSTRUCTION MATTING WILL BE MONITORED BY THE PROJECT ARCHAEOLOGIST AT EACH LOCATION(S).
5. INSTALLATION OF THESE MEASURES WILL BE CONDUCTED WITH LOW–GROUND PRESSURE VEHICLES WHERE FEASIBLE.
6. WHERE REQUIRED BY THE PROJECT–SPECIFIC SAPP, TEMPORARY, HIGH VISIBILITY PROTECTIVE FENCING (E.G., SNOW FENCE OR PLASTIC FENCE) WILL BE ERECTED ALONG THE SITE BOUNDARIES OUTSIDE OF THE WORKSPACE WITHIN THE ROW IN ORDER TO PREVENT VEHICLES FROM TRAVELING THROUGH THOSE SITE AREAS DURING CONSTRUCTION. THE PROTECTIVE FENCE WILL BE POSTED WITH "NO TRESPASSING" SIGNS, SO THAT THE SITES CAN BE AVOIDED BY ALL CONSTRUCTION RELATED ACTIVITIES. THE FENCING WILL BE REMOVED UPON COMPLETION OF THE PROJECT. THE INSTALLATION AND REMOVAL OF FENCING WILL BE MONITORED BY THE PROJECT ARCHAEOLOGIST.

BMP PICTURES





APPENDIX 5
CERTIFICATION FORM FOR INVASIVE SPECIES CONTROL

Certain permit conditions, therefore a Condition of Contracts for the Prime Contractor, any Subcontractors, and any equipment or mat vendors for ***National Grid Projects*** shall be required to Certify their equipment[7] {each piece of equipment used on site} as 'clean'[8].

_____ (*name of firm*) hereby Certifies that

_____ (*make, model, and/or type*)

_____ (*equipment ID tag or #)* meets the following

1. before entry on to the job site, has been sufficiently cleaned to remove all accumulated mud, debris, plant fragments, and detritus that could harbor seeds, roots, or plant fragments of so-called invasive plant species; and

2. that the above piece of equipment has neither been off-loaded nor operated in the interval between cleaning and delivery to the jobsite.

3. that equipment deployed in areas of invasive species (as identified in project plans) shall be cleaned prior to redeployment.

_____ (*signed*) _____ (*dated*)

_____ (*printed name*) _____ (*title*)

_____ (*Firm*)

The signed original of this form {one for each piece of equipment (or lot[9] of mats)} is to be given to the NG Construction Supervisor assigned to the project.

---

7 Equipment may include, but is not limited to bulldozers, excavators, backhoes, bucket trucks (tracked or wheeled), pulling equipment, concrete trucks, compressors, drilling equipment, and mats (composite, wood, or other materials).

8 With regard to invasive species, the definition of clean means free of accumulated mud, debris, plant fragments, and detritus that could harbor seeds, roots, or plant fragments of so-called invasive plant species.

9 Lot of mats is the number of mats that may be transported by one forwarder/truck at a time.

Appendix 6 – Snow Disposal Guidelines

See EG303NE_App6 published separately

APPENDIX 6
SNOW DISPOSAL GUIDELINES

Finding a place to dispose of collected snow poses a challenge. While we are all aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into water bodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that should be taken to minimize the impacts of snow disposal on public health and the environment.

- **DO NOT** dump snow into any water body, including rivers, the ocean, reservoirs, ponds, or wetlands. In fact, a buffer of at least 50 feet between any snow disposal area and any the high-water mark of any surface water should be kept. A silt fence or equivalent barrier should be securely placed between the snow storage area and the high-water mark. In addition to water quality impacts and flooding, snow disposed in surface waters can cause navigational hazards when it freezes into ice blocks.
- **DO NOT** dump snow within a wellhead protection area (e.g., a Zone II), in a high or medium-yield aquifer, or within 75 feet of a private well, where road salt may contaminate water supplies**. Ask an Environmental Department representative for guidance in determining if a proposed disposal area is located within one of these sensitive areas.**
- Avoid disposing of snow on top of storm drain catch basins or in storm water drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.
- All debris in a snow storage area should be cleared from the site and properly disposed of no later than May 15 of each year the area is used for snow storage.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, disposal of snow that is not obviously contaminated with road salt, sand, and other pollutants may be allowed near (within 50 feet) or even in certain water bodies under certain conditions.

In these dire situations, **notify the Environmental Department** so that the local Conservation Commission and the appropriate MassDEP Regional Service Center (in MA), RI DEM Office of Water Resources – RIPDES

Program (in RI), NH Department of Environmental Services – NHDES (in NH) and VT Department of Environmental Conservation - VT DEC (in VT) can be contacted before disposing of snow in a water body.

In emergency situations and after consulting an Environmental Department representative the following guidance should be followed:

- Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
- Do not dispose of snow in saltmarshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, wellhead protection areas, or other environmentally sensitive areas.
- Do not dispose of snow where trucks may cause shoreline or stream bank damage or erosion.

APPENDIX 5-3 LINE 114 EXTENSION: ACUSHNET TO FALL RIVER RELIABILITY PROJECT: ELECTRIC AND MAGNETIC FIELD ASSESSMENT

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Electrical Engineering and Computer Science Practice

Exponent®

Line 114 Extension: Acushnet to Fall River Reliability Project

Electric- and Magnetic-Field Assessment

Line 114 Extension: Acushnet to Fall River Reliability Project

Electric- and Magnetic-Field Assessment

Prepared for

NSTAR Electric Company d/b/a
Eversource Energy
247 Station Drive
Westwood, Massachusetts 02090

and

National Grid
40 Sylvan Road
Waltham, MA 02451

Prepared by

Exponent
17000 Science Drive, Suite 200
Bowie, MD 20715

November, 2021

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Appendix A Summary Tables of Calculated EMF
Appendix B Profiles of Calculated EMF Levels
Appendix C Summary of Line Loadings, and Structure Configurations
Appendix D Modeling Scenarios and Methods
Appendix E Calculated EMF for Peak Loading and Design-Minimum Conductor Heights

Acronyms and Abbreviations

BPA	Bonneville Power Administration
EFSB	Energy Facilities Siting Board
EMF	Electric and magnetic fields
Eversource	Eversource Energy
Hz	Hertz
ICES	International Committee on Electromagnetic Safety
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
kV	Kilovolt
kV/m	Kilovolt per meter
mG	Milligauss
NEP	New England Power Company
Project	Acushnet to Fall River Line 114 Project
ROW	Right-of-way
WHO	World Health Organization
V/m	Volt per meter

Limitations

At the request of the NSTAR Electric Company, d/b/a Eversource Energy (Eversource), and the New England Power Company (NEP), d/b/a National Grid, Exponent modeled the levels of electric fields and magnetic fields associated with the existing and proposed transmission lines along the route of the proposed Line 114. This report summarizes work performed to date and presents the findings resulting from that work. In the analysis, we have relied on geometry, material data, usage conditions, specifications, and various other types of information provided by the client. We cannot verify the correctness of this input data and rely on the client for the data's accuracy. NEP and Eversource have confirmed to Exponent that the data contained herein are not subject to Critical Energy Infrastructure Information restrictions. Although Exponent has exercised usual and customary care in the conduct of this analysis, the responsibility for the design and operation of the project remains fully with the client.

The results presented herein are made to a reasonable degree of engineering and scientific certainty. Exponent reserves the right to supplement this report and to expand or modify opinions based on review of additional material as it becomes available, through any additional work, or review of additional work performed by others.

The scope of services performed during this investigation may not adequately address the needs of other users of this report outside of the Energy Facilities Siting Board's review of the Acushnet to Fall River Line 114 Project, and any re-use of this report or its findings, conclusions, or recommendations presented herein are at the sole risk of the user. The opinions and comments formulated during this assessment are based on observations and information available at the time of the investigation. No guarantee or warranty as to future life or performance of any reviewed condition is expressed or implied.

Executive Summary

The proposed Acushnet to Fall River Line 114 Project (Project) involves the construction of a new 115-kilovolt transmission line (designated as Line 114) that is planned to run for approximately 12.1 miles from Eversource's Industrial Park Tap in Acushnet, Massachusetts, to New England Power's Bell Rock Substation in Fall River, Massachusetts.

Existing and proposed transmission and distribution lines along the route are sources of 60-Hertz electric and magnetic fields (EMF). Exponent modeled the EMF levels for six sections of the right-of-way (ROW) along the proposed route under existing and proposed configurations and at average and peak loading to characterize the Project-related changes to EMF levels.

Consistent with Massachusetts Energy Facilities Siting Board precedent and World Health Organization (WHO, 2007) recommendations, the proposed Project includes several features designed to reduce magnetic-field levels. In all portions of the route, Line 114 is proposed to be constructed on existing ROWs, and where possible, also placed near the center of the ROW. The phasing of the conductors has been selected to reduce magnetic-field levels at the ROW edge, and the conductor heights exceed National Electrical Safety Code® standards (NESC, 2017).

In addition, calculated EMF levels were compared to standards and guidelines developed by the International Commission on Non-Ionizing Radiation Protection and International Committee for Electromagnetic Safety and were found to be below public exposure guidelines (ICES, 2019; ICNIRP, 2010).

Note that this Executive Summary does not contain all of Exponent's technical evaluations, analyses, conclusions, and recommendations. Hence, the main body of this report is at all times the controlling document.

Introduction

The Acushnet to Fall River Project (Project) calls for the construction of a 115-kilovolt (kV) transmission line (designated Line 114), which is proposed to be jointly constructed by the New England Power Company (NEP), d/b/a National Grid, and NSTAR Electric Company, d/b/a Eversource Energy (Eversource). The Project is proposed to be constructed entirely on existing rights-of-way (ROW) and run approximately 12.1 miles from the Eversource Industrial Park Tap in the Town of Acushnet, Massachusetts, to the NEP Bell Rock Substation in the City of Fall River, Massachusetts (7.9 miles in Eversource service territory and 4.2 miles in NEP service territory). Along the route, the proposed line also will pass through portions of the towns of New Bedford and Dartmouth, Massachusetts.

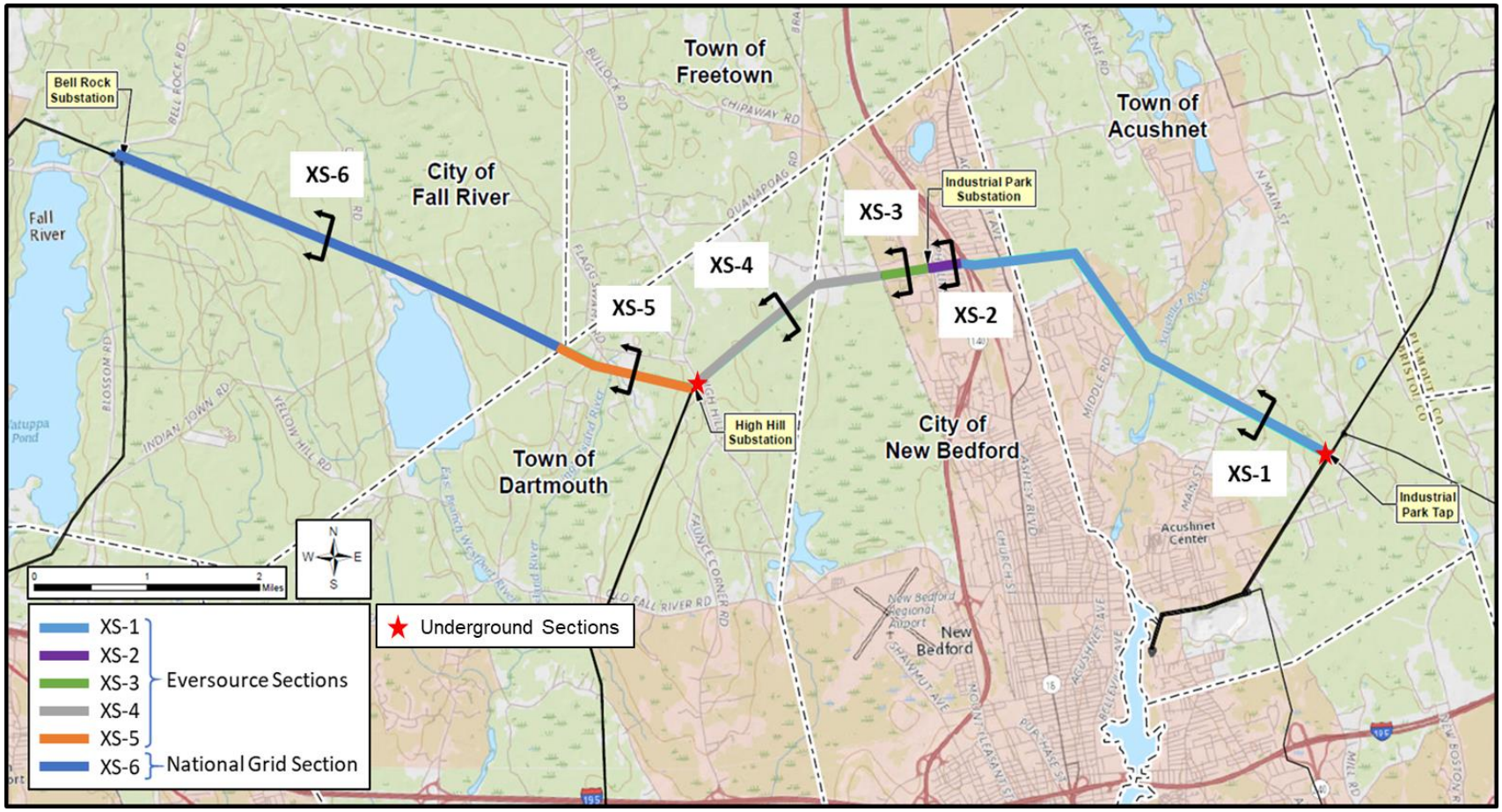
For purposes of this report, the Project is divided into six sections (five in Eversource service territory and one in NEP service territory) representing unique configurations of the proposed 114 Line and parallel existing transmission or distribution lines. In addition, magnetic-field levels from two underground configurations were modeled.[1] Along various portions of the route, the proposed Line 114 will parallel existing 115-kV transmission lines (Lines 111, 112 and D21), as well as 13.2-kV distribution lines (Lines 106, and 107).

In cross section XS-1 the new Line 114 is proposed to be constructed on new H-frame structures near the center of the ROW, between an existing distribution line (approximately 45 feet to the south) and the existing Line 112 (approximately 60 feet to the north). In cross sections XS-2 and XS-3 the new Line 114 line is proposed to be constructed near the center of the ROW, between an existing distribution line to the south (approximately 35 to 50 feet to the south) and existing Line 111 (approximately 40 feet to the north). In cross section XS-4 the new Line 114 is proposed to be constructed on vertical structures, approximately 35 feet from the southern ROW edge on the same ROW as an existing distribution line and Line 111. Finally, in cross sections XS-5 and XS-6, the new Line 114 is proposed to be constructed on H-frame structures

[1] These underground duct banks will be constructed on the project ROW, more than 75 feet from the nearest adjacent property.

approximately 60 feet to the south of the existing Line D21. Figure 1 depicts the proposed route of the Project.

This report provides an overview of the electrical environment surrounding the route of the transmission lines, assessment criteria for evaluating EMF levels, and modeling methods, configurations, and calculations. In addition, Appendices A and B provide tabular and graphical summaries of calculations, respectively. Additional information regarding details of the various transmission and distribution lines is summarized in Appendix C. Table C-1 provides a summary of the loading for each of the power lines in the different ROW sections and Figure C-1 depicts the new structures proposed for use in various voltages and in various portions of the route. Appendix D provides details regarding the modeling configurations and methods. Appendix E provides a summary of peak loading modeling results at a design-minimum conductor height of 23-feet.



e

Figure 1. Proposed route of Project showing the locations of modeling cross sections XS-1 through XS-6 and locations of modeled underground lines (UG-1 and UG-2).

Electrical Environment

Both the existing transmission and distribution lines and the proposed Line 114 are sources of 60 Hertz (Hz) EMF. To characterize the potential effect of the proposed construction on the existing levels of EMF, Exponent modeled the EMF levels under existing and proposed conditions.

Any source of electricity, such as transmission lines, distribution lines, or any device that uses electricity, such as household appliances and equipment in our homes and workplaces, produces both electric fields and magnetic fields. Most electricity in North America is transmitted as alternating current (AC) at a frequency of 60 Hz (i.e., it changes direction and magnitude in a continuous cycle that repeats 60 times per second). The fields from these AC sources are commonly referred to as power-frequency or extremely low frequency EMF.

Electric Fields

Electric fields are created by the voltage on the conductors of transmission lines. The strength of Project-related electric fields in this report is expressed in units of kilovolts per meter (kV/m), which is equal to 1,000 volts per meter (V/m). In general, the intensity of an electric field diminishes with increasing distance from the source, and in the case of transmission lines the decrease is typically in proportion to the square of the distance from the conductors, so the electric-field level decreases rapidly with distance. In addition, conductive objects—including fences, shrubbery, and buildings—block electric fields.

Magnetic Fields

Magnetic fields are created by current that flows in transmission line conductors. The strength of Project-related magnetic fields in this report is expressed as magnetic flux density in units of milligauss (mG), where 1 Gauss = 1,000 mG. Magnetic fields, unlike electric fields, are not blocked by conductive objects; however, similar to electric fields, the intensity of magnetic fields diminishes with increasing distance from the source. In the case of transmission lines,

magnetic fields also generally decrease with distance from the conductors in proportion to the square of that distance.

Magnetic fields differ from electric fields because they depend on the current flowing in a conductor, rather than voltage. Since current—expressed in units of amperes—varies over time depending on the demand for electricity, measurements of magnetic fields around transmission-line conductors present only a snapshot of the magnetic field at one moment of time. The demand for electricity can vary during the day, throughout a week, or over the course of months and years, so the magnetic-field level produced by transmission lines can also vary. Therefore, the level of current flow on transmission lines is often expressed as an annual average (a good predictor of the magnetic field on any randomly selected day of the year) and annual peak load (the highest magnetic-field level that might occur for a few hours or days during the year). Both forecasted annual average and peak current flows are were used for modeling magnetic fields in this report.

Assessment Criteria

While the federal government has no regulations regarding EMF, including levels from transmission lines, the Massachusetts Energy Facilities Siting Board (EFSB) assesses EMF levels from transmission lines on a case-by-case basis with a focus on practical options to reduce magnetic fields along transmission line ROWs. This practice is also consistent with the recommendations of the World Health Organization (WHO) (WHO, 2007).

Levels of EMF also can be assessed in the context of standards and guidelines developed by scientific and health agencies. Two international agencies have published limits of exposure to EMF: the International Committee on Electromagnetic Safety (ICES) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The reference levels set by these organizations are summarized Table 1 below.

The reference levels listed in Table 1 were used as criteria for the evaluation of potential line designs and their potential effects on the electrical environment around transmission lines. These are not exposure limits, and exposures to higher EMF levels are allowed if the underlying basic restrictions on fields in the body are not exceeded.

Table 1. Reference levels for whole body exposure to 60-Hz fields: general public.

Organization	Magnetic Fields	Electric Fields
ICNIRP	2,000 mG	4.2 kV/m
ICES	9,040 mG	5 kV/m 10 kV/m*

* This is an exception for persons within transmission line ROWs.

Methods

Based on information provided by Eversource and NEP, Exponent calculated EMF levels using computer algorithms developed for AC transmission lines by the Bonneville Power Administration (BPA), an agency of the U.S. Department of Energy (BPA, 1991). The inputs to the program include data regarding voltage, current flow, phasing, and conductor configurations.

In the model, assumptions were made to simplify the calculations and to yield conservative values, ensuring that the model will tend to overestimate, not underestimate, EMF levels. For overhead lines, each conductor (phase) is modeled as infinite in length at a fixed height above a flat earth and is assumed to be parallel to all other conductors with equal currents on each conductor. The conductor height above ground was taken at the point of lowest sag to ensure that the presented values are representative of the highest field levels that may be encountered beneath the line.[2] Although these assumptions simplify the calculations, they do not decrease the accuracy of the model and have been shown to accurately predict EMF levels measured near transmission lines (Chartier and Dickson, 1990; Perrin et al., 1991).

For underground lines, all conductors were modeled as straight, parallel to one another, and infinite in extent. The conductors were assumed to rest at the bottom of the conduit.[3] Both electric fields (from overhead lines) and magnetic fields (from overhead and underground lines) are calculated at a height of 1 meter (3.28 feet) above ground and are reported as the root mean square value of the field in accordance with IEEE Std. C95.3.1-2010 and IEEE Std. 644-2019. Additional details regarding the modeling configurations of overhead and underground lines are provided in Appendix D.

[2] There are variations in the transmission line clearance height above ground due to the sag of the transmission lines over variable-height terrain, but EMF levels beneath the transmission lines will be lower where the clearance of the lines above ground is higher.

[3] Magnetic-field effects due to current imbalance and cable materials surrounding the aluminum conductor, including ferromagnetic shielding effects and eddy currents, were not modeled, and it was assumed there would be no attenuation of magnetic fields by any surrounding materials (e.g., duct bank, earth, etc.).

Transmission Line Loading

The current flows used to model the magnetic field of the transmission line are summarized in Appendix C, Table C-1. The flow of electrical current on conductors is commonly referred to as "load" or "loading". Line loadings vary based on demand, so will be different at different times of day, and throughout the course of the year. The scenario most likely to represent transmission line loading on any randomly-selected day of the year is referred to as the "average loading scenario"; results for this scenario are summarized in the body of this report.

In addition to the average loading scenario, the utilities have provided line loading data based on 2025 ISO-NE peak load flow cases. This scenario is referred to as the "peak loading scenario". Results for the peak loading scenario are summarized in Appendix A. Further scenarios evaluating magnetic-field levels at peak loading and minimum conductor height are summarized in Appendix E.

Phase optimization

Where two AC transmission line circuits are located on the same ROW, the specific arrangement of the conductors in each circuit will influence the calculated EMF levels. In a phase optimization analysis, all possible phasing configurations of the new AC lines for a cross section are analyzed to identify the particular phasing of new Line 114 that reduces the magnetic-field level at both ROW edges to a minimum level considering the magnetic-field contributions of all the lines on the ROW. Phase optimization is one way to minimize EMF levels consistent with recommendations to apply low cost measures (WHO, 2007). This optimization analysis was then used by Eversource and NEP in conjunction with their evaluations of the constructability of various phasing options and was incorporated into their design of the transmission lines. Where Line 114 is proposed to be constructed on H-frame structures (a horizontal configuration in XS-1, XS-5, and XS-6) the optimal phasing is A-B-C (from south to north). Where Line 114 is constructed on vertical monopoles, the optimal phasing is C-B-A (from top to bottom).

Modeling Results

As described in the introduction, the new Line 114 is proposed to be constructed on either H-frame or vertical structures adjacent transmission lines (Lines 111, 112 and D21), as well as 13.2-kV distribution lines (Lines 106, and 107). Changes in the ROW-edge EMF levels as a result of the Project' additions to the existing ROW were calculated to be small and the Project generally reduces EMF levels on the Project route. This relatively small change in ROW-edge EMF levels is due to a combination of location, structure-type, and optimal phasing in the various sections. The discussion below focuses on changes in EMF levels as a result of the Project operating at average loading conditions rather than peak loading conditions that might apply only for a few hours or days in a year. Graphs of EMF levels for the overhead configurations at average loading conditions are provided in Appendix B, for the electric field (Figures B-1 through B-6), and magnetic field (Figures B-7 through B-12). Tabular summaries of EMF levels at specific locations on the ROW are presented in Appendix A, Tables A-1 through A-5.

Electric Fields

The Project is calculated to produce small changes in the electric field because the voltage of the added lines will be the same as that of the existing transmission lines. The electric-field level at average loading (average conductor height) at the edge of the ROW is calculated to increase from 0.1 kV/m to 0.6 kV/m on the south ROW edge in cross section XS-5 and from 0.1 kV/m to 0.5 kV/m on the south ROW edge in cross section XS-6. For the remaining cross sections, the electric-field level is calculated to change by less than 0.1 kV/m on either ROW edge. The highest calculated electric field on the ROW at average conductor heights increases from approximately 1.4 kV/m in the existing configuration to approximately 1.9 kV/m in the proposed configuration (XS-6). Graphs showing calculated electric-field levels for all cross sections are included in Appendix B, Figures B-1 to B-6, and are summarized in Table A-3 Appendix A. The underground duct banks will not generate above-ground electric-fields (UG-1 and UG-2).

Magnetic Fields

Magnetic-field levels were calculated to generally decrease as a result of the Project, with ROW-edge magnetic-field levels decreasing on the northern ROW edge in all sections and decreasing or changing by <1 mG on the southern ROW edge in three of the six cross sections. The largest ROW-edge increase in magnetic-field levels would occur on the south side of XS-5 where the new Line 114 is constructed nearest to the ROW edge. In these locations, the magnetic-field level at the edge of the ROW is calculated to increase from approximately 7.1 mG to 15 mG as a result of the Project. The highest existing magnetic-field level at the ROW edge (northern edge of XS-6) is 36 mG and is calculated to decrease to 24 mG as a result of the Project. Calculated magnetic-field values for all sections are summarized in Appendix A, Table A-1 and A-2 for both average and peak loading with illustrative graphs in Appendix B, Figures B-7 to B-12.

The underground configurations of Line 114 are proposed to be constructed on the ROW, more than 60 feet from the nearest ROW-edge and hundreds of feet from the nearest structure or residence. Over the majority of the underground portion (represented by UG-1), the maximum calculated magnetic-field level, immediately above the duct bank is 7.6 mG, decreasing to 1 mG or less within 50 feet. In the small area where the underground duct bank approaches the riser pole (represented by UG-2) magnetic-field levels are higher but decrease rapidly with distance. Magnetic-field levels from the two underground models are summarized in Tables A-4 and A-5 for average and peak loading, respectively. Graphical results are provided in Appendix B, Figures B-13 and B-14.

Discussion

The Massachusetts EFSB assesses EMF levels from transmission lines on a case-by-case basis with a focus on practical options to reduce magnetic fields along a transmission line ROW, a practice that also is consistent with the recommendations of the WHO (WHO, 2007). Consistent with this approach, Eversource and NEP have proposed the construction of Line 114 with several features designed to reduce magnetic-field levels. In all portions of the route, Line 114 is proposed to be constructed on an existing ROW, and where possible, also placed near the center of the ROW. The phasing of the conductors has been selected to reduce magnetic-field levels at the ROW edge and the conductor heights exceed National Electrical Safety Code® standards (NESC, 2017).

Levels of EMF also can be assessed in terms of standards and guidelines developed by scientific and health agencies to protect health and safety that are based on reviews and evaluations of relevant health research. The calculated EMF values of all post-Project scenarios are far below reference levels published by ICNIRP and ICES. The highest calculated AC magnetic-field level at the ROW-edge along any portion of the route at average loading is 24 mG, more than 80 times lower than the ICNIRP or ICES reference levels. Electric-field levels at the ROW-edge are similarly low, approximately 0.6 kV/m or less.[4]

[4] Under peak loading conditions and minimum conductor height, the highest electric-field and magnetic-field levels at the ROW-edge were calculated to be0.7 kV/m or less and 25 mG, respectively, also well below ICNIRP and ICES reference levels.

Summary

This report has summarized calculations of the EMF associated with existing and proposed transmission lines on the proposed 12.1-mile route of Line 114 between the Eversource Industrial Park Tap in the Town of Acushnet and NEP Bell Rock Substation in the city of Fall River. These calculations have been performed using methods that are accepted within the scientific and engineering community and that have previously been found to match well with measurements. These calculations have been compared to applicable standards or guidelines and found to be below recommended limits used to assess adverse impacts to environmental and public health.

The Project incorporates several design features consistent with the EFSB and WHO recommendations of implementing practical options to reduce magnetic-field levels along a transmission line ROW. In addition, changes in the EMF levels as a result of the Project are calculated to be small and generally reduce EMF levels on the Project route. The highest ROW-edge electric-field and magnetic-field levels after construction (0.6 kV/m and 24 mG, respectively) were calculated to be the same or lower than existing electric-field and magnetic-field levels (0.6 kV/m and 36 mG, respectively) and far below the guidelines of international scientific and health agencies for electric fields (4.2 kV/m) and magnetic fields (2,000 mG).

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NESC 2017

Perrin, N, Aggarwal, RP, Bracken, TD, Rankin, Survey of Magnetic Fields near BPA 230-kV and 500-kV Transmission Lines. Portland, Oregon: Portland State University, 1991.

World Health Organization (WHO). Environmental Health Criteria 238: Extremely Low Frequency (ELF) Fields. Geneva, Switzerland: World Health Organization, 2007.

Appendix A

Summary Tables of Calculated EMF

Electric-field levels were calculated for four scenarios:

1. Pre-Project configuration at average height (corresponding to average loading).
2. Post-Project configuration at average height (corresponding to average loading).
3. Pre-Project configuration at minimum height (corresponding to peak loading).
4. Post-Project configuration at minimum height (corresponding to peak loading).

Magnetic-field levels were calculated for four scenarios:

1. Pre-Project configuration at average height and existing average loading.
2. Post-Project configuration at average height and proposed average loading.
3. Pre-Project configuration at minimum height and existing peak loading.
4. Post-Project configuration at minimum height and proposed peak loading.

Table A-1. Magnetic-field levels (mG) for overhead sections at average loading

Segment Number	Configuration	100 feet beyond –ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-1	Existing	1.6	13	46	7.0	1.4
	Proposed	0.9	9.0	65	1.1	0.2
XS-2	Existing	1.8	14	46	15	2.1
	Proposed	1.9	15	46	7.9	1.6
XS-3	Existing	0.9	14	68	21	2.4
	Proposed	1.7	13	37	13	1.9
XS-4	Existing	1.0	3.6	71	20	2.3
	Proposed	1.8	10	48	12	1.7
XS-5	Existing	2.0	7.1	103	35	4.1
	Proposed	1.0	15	89	24	1.9
XS-6	Existing	2.0	7.6	135	36	4.0
	Proposed	0.6	12	110	24	2.1

Table A-2. Magnetic-field levels (mG) for overhead sections at peak loading

Segment Number	Configuration	100 feet beyond –ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-1	Existing	1.2	12	30	3.3	0.7
	Proposed	0.8	9.4	47	1.1	0.4
XS-2	Existing	1.3	13	30	7.5	1.1
	Proposed	1.4	14	43	3.8	0.9
XS-3	Existing	0.8	15	48	14	1.6
	Proposed	1.3	13	26	9.0	1.3
XS-4	Existing	0.7	2.5	51	14	1.5
	Proposed	1.3	7.8	41	8.5	1.2
XS-5	Existing	1.7	6.0	86	30	3.5
	Proposed	0.4	9.9	76	22	1.9
XS-6	Existing	1.7	6.4	113	30	3.4
	Proposed	0.3	8.0	96	22	2.0

Table A-3. Electric-field levels (kV/m) for overhead sections at average conductor height

Segment Number	Configuration	100 feet beyond –ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-1	Existing	<0.1	0.1	1.0	0.2	<0.1
	Proposed	<0.1	0.1	1.8	0.2	<0.1
XS-2	Existing	<0.1	0.1	1.0	0.5	<0.1
	Proposed	<0.1	0.1	1.0	0.5	<0.1
XS-3	Existing	<0.1	0.1	1.0	0.5	<0.1
	Proposed	<0.1	0.1	1.1	0.5	<0.1
XS-4	Existing	<0.1	<0.1	1.0	0.5	<0.1
	Proposed	<0.1	0.1	1.2	0.5	<0.1
XS-5	Existing	<0.1	0.1	1.1	0.6	<0.1
	Proposed	<0.1	0.6	1.8	0.6	<0.1
XS-6	Existing	<0.1	0.1	1.4	0.6	<0.1
	Proposed	<0.1	0.5	1.9	0.6	<0.1

Table A-4. Proposed magnetic-field levels (mG) for underground sections at average loading

Segment Number	-100 feet	-50 feet	-25 feet	0 feet	25 feet	50 feet	100 feet	Max
UG-1	0.5	1.0	1.9	7.6	1.9	1.0	0.5	7.6
UG-2	9.6	33	121	173	109	24	5.1	176

Table A-5. Proposed magnetic-field levels (mG) for underground sections at peak loading

Segment Number	-100 feet	-50 feet	-25 feet	0 feet	25 feet	50 feet	100 feet	Max
UG-1	0.4	0.7	1.4	5.4	1.4	0.7	0.4	5.6
UG-2	4.9	20	81	128	79	19	4.3	128

Appendix B

Profiles of Calculated EMF Levels

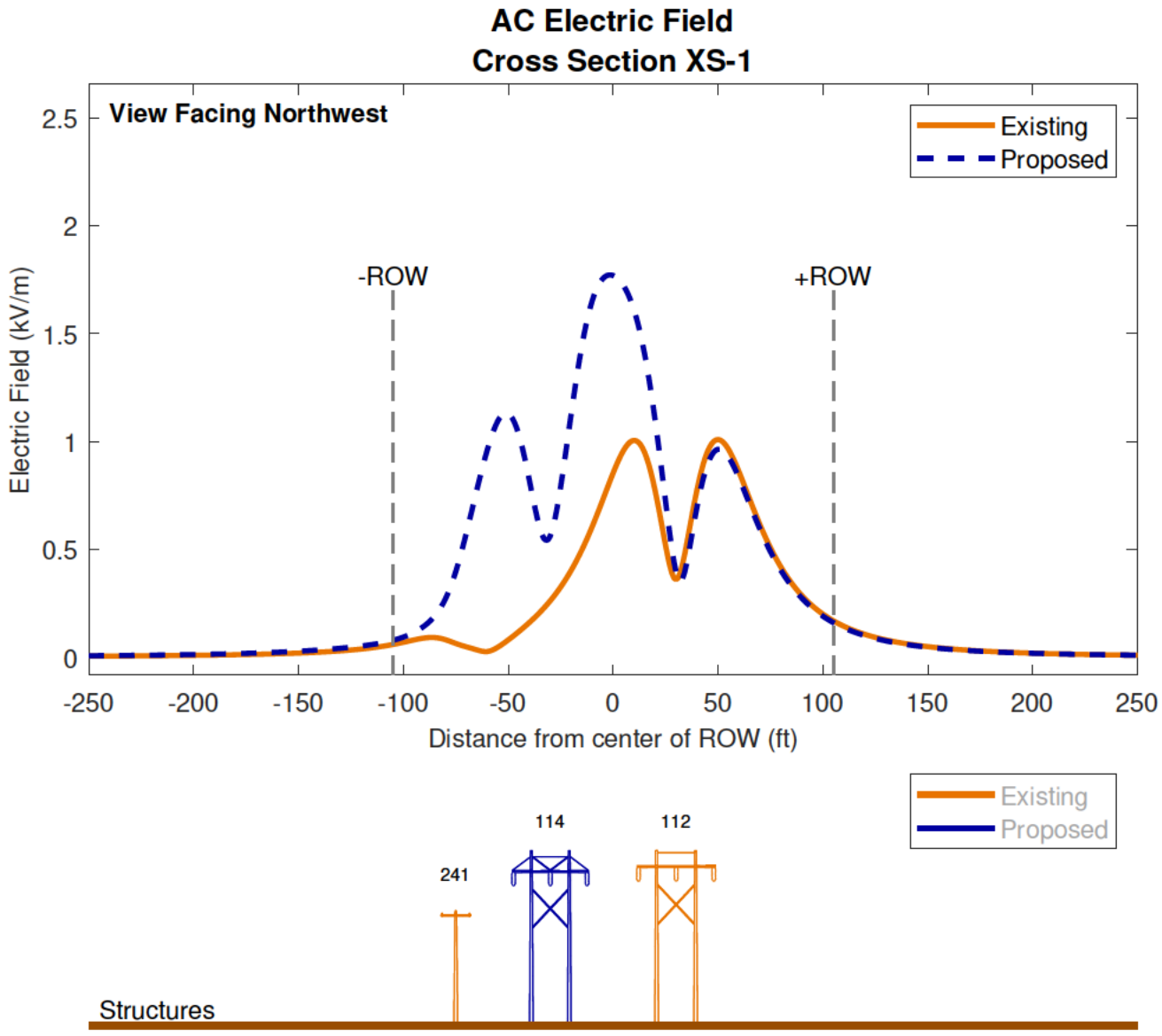

Figure B-1. Calculated AC electric-field profile along 1 (XS-1)

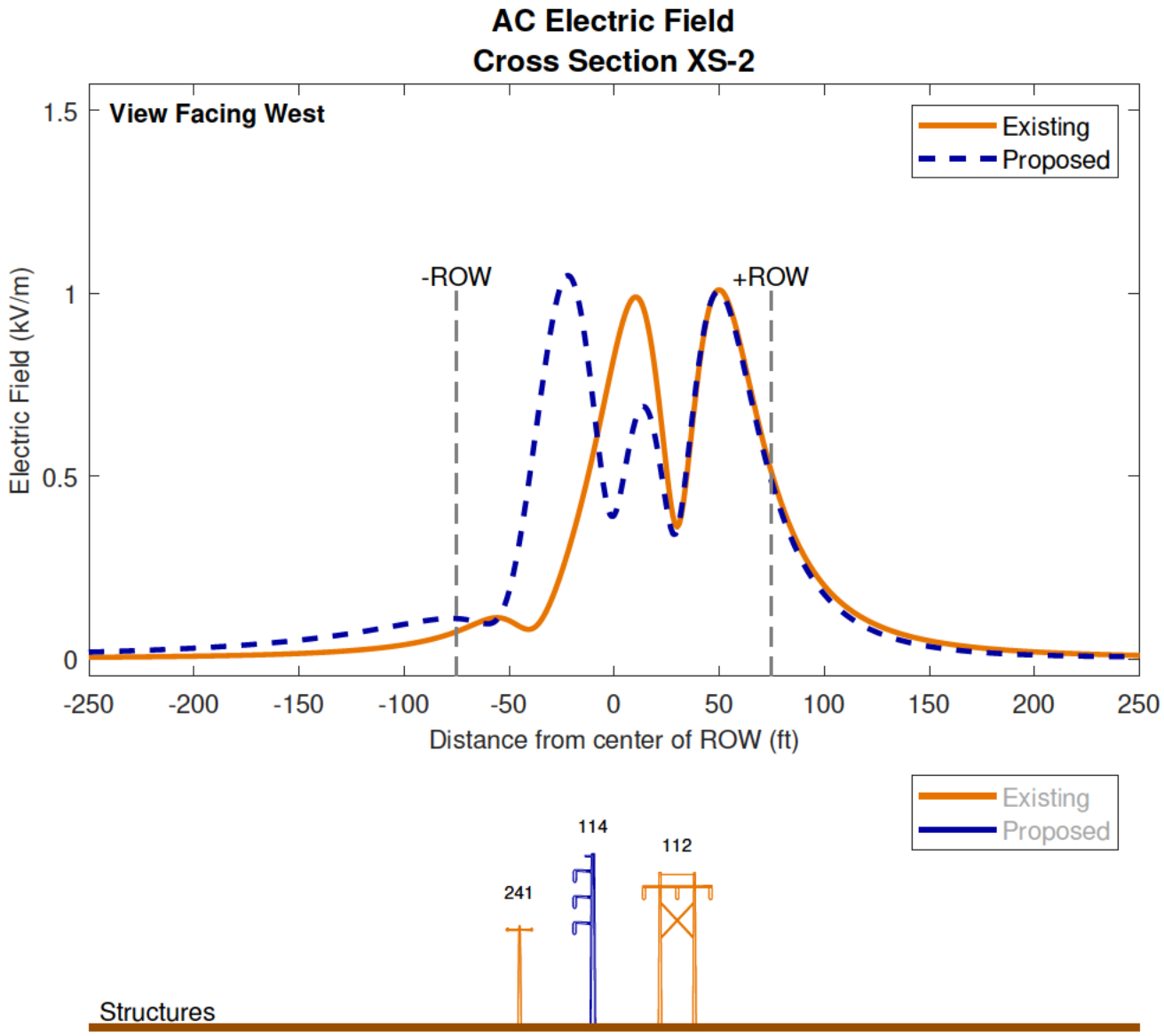

Figure B-2. Calculated AC electric-field profile along 2 (XS-2)

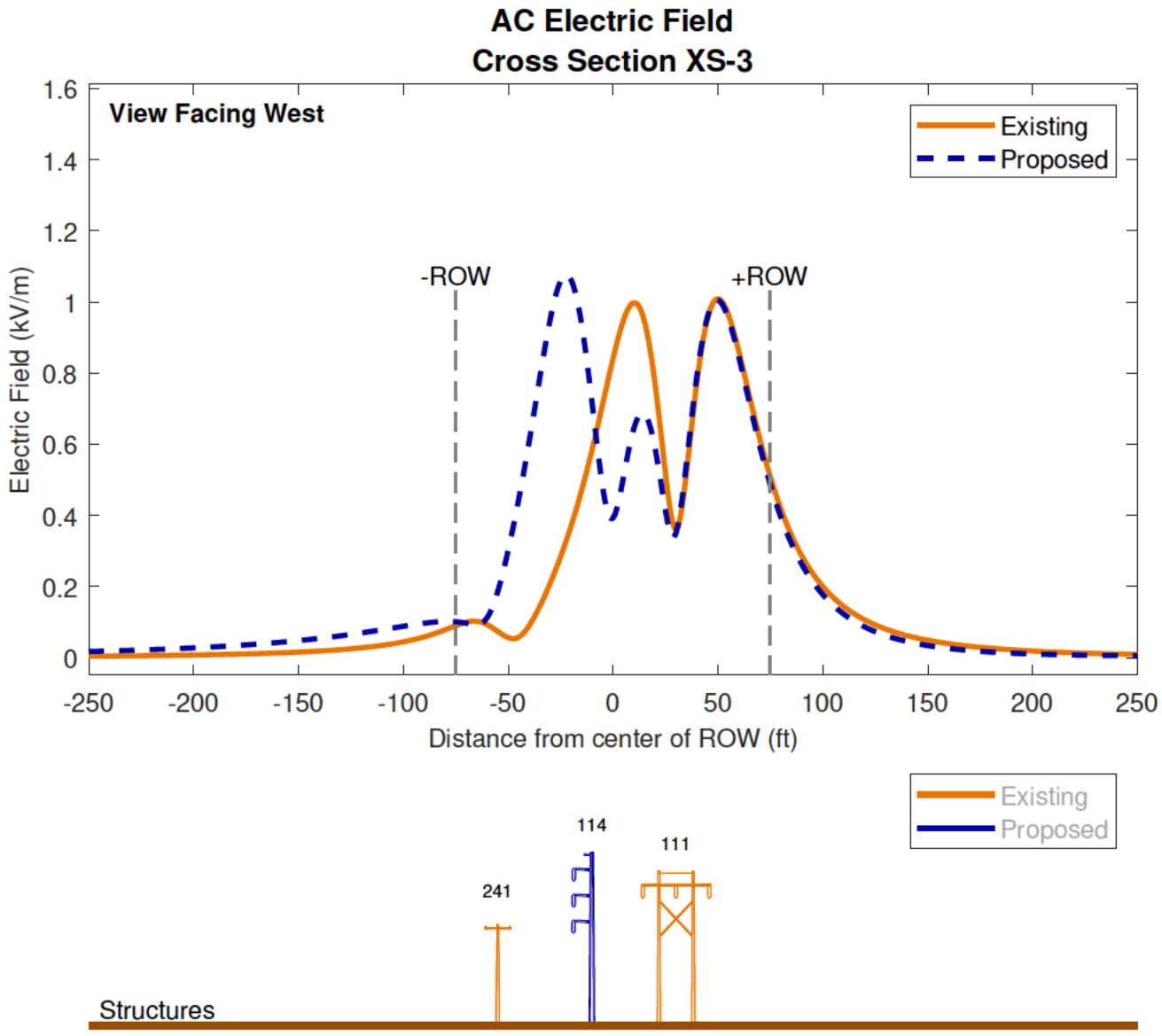

Figure B-3. Calculated AC electric-field profile along 3 (XS-3)

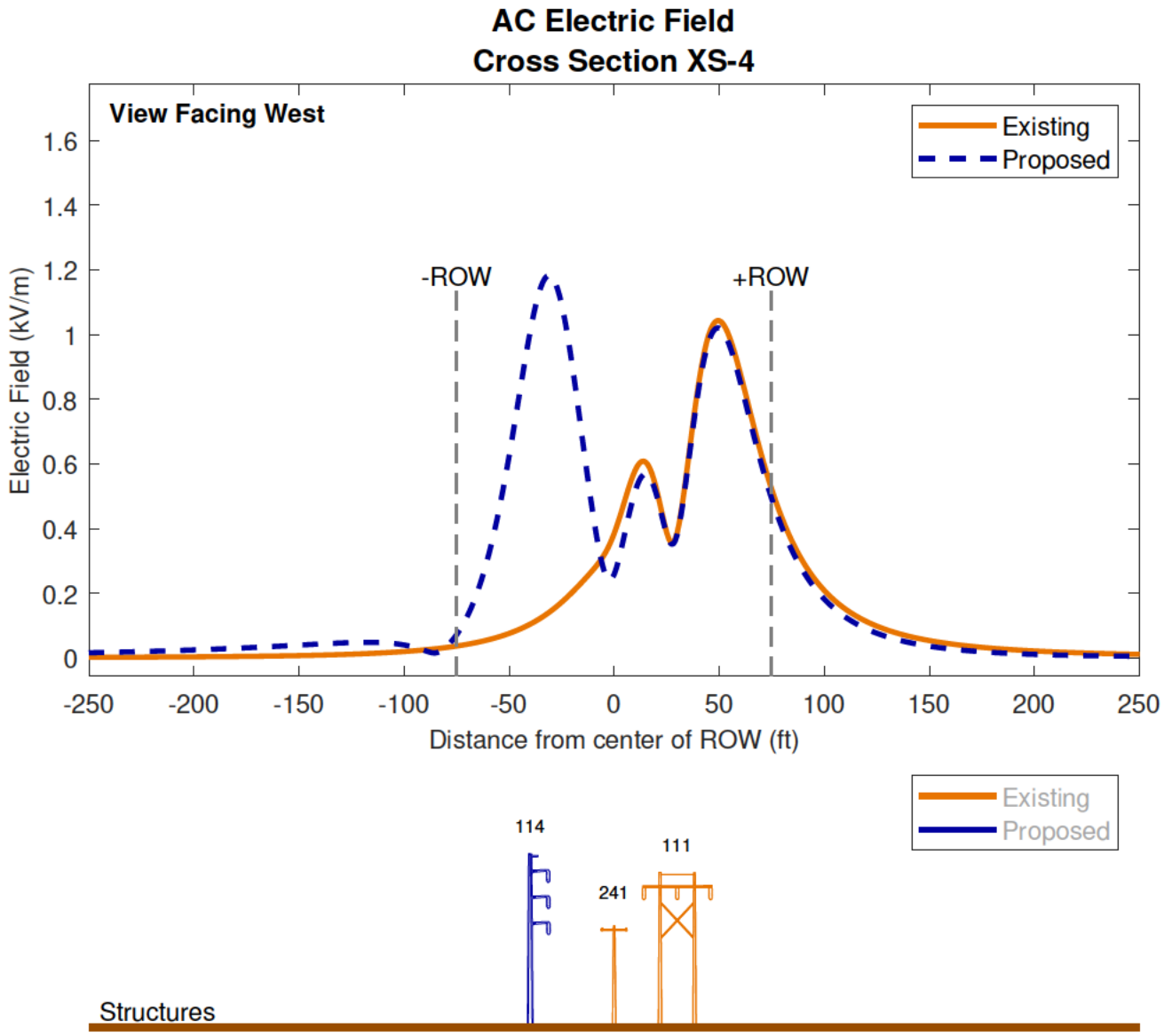

Figure B-4. Calculated AC electric-field profile along 4 (XS-4)

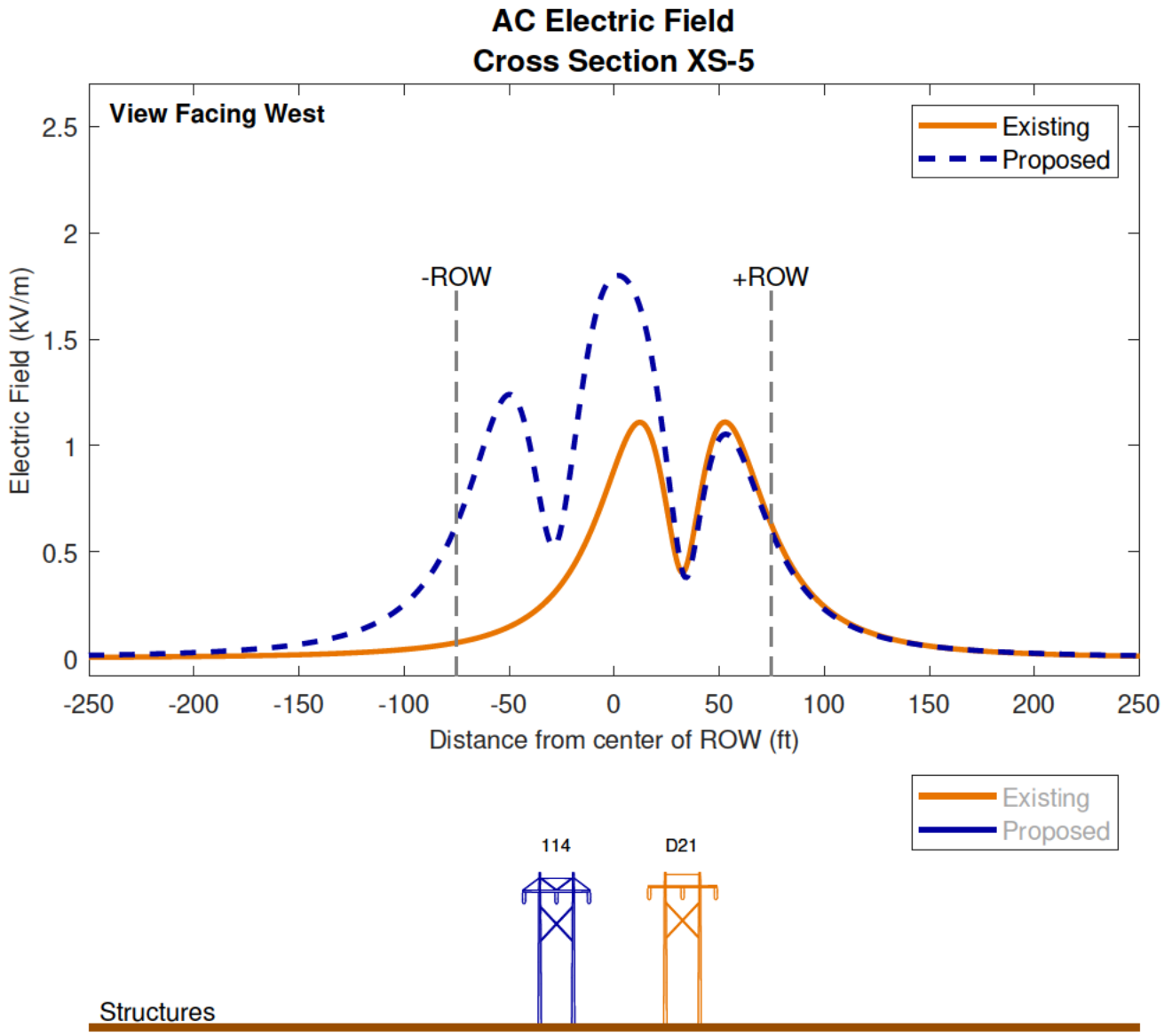

Figure B-5. Calculated AC electric-field profile along 5 (XS-5)

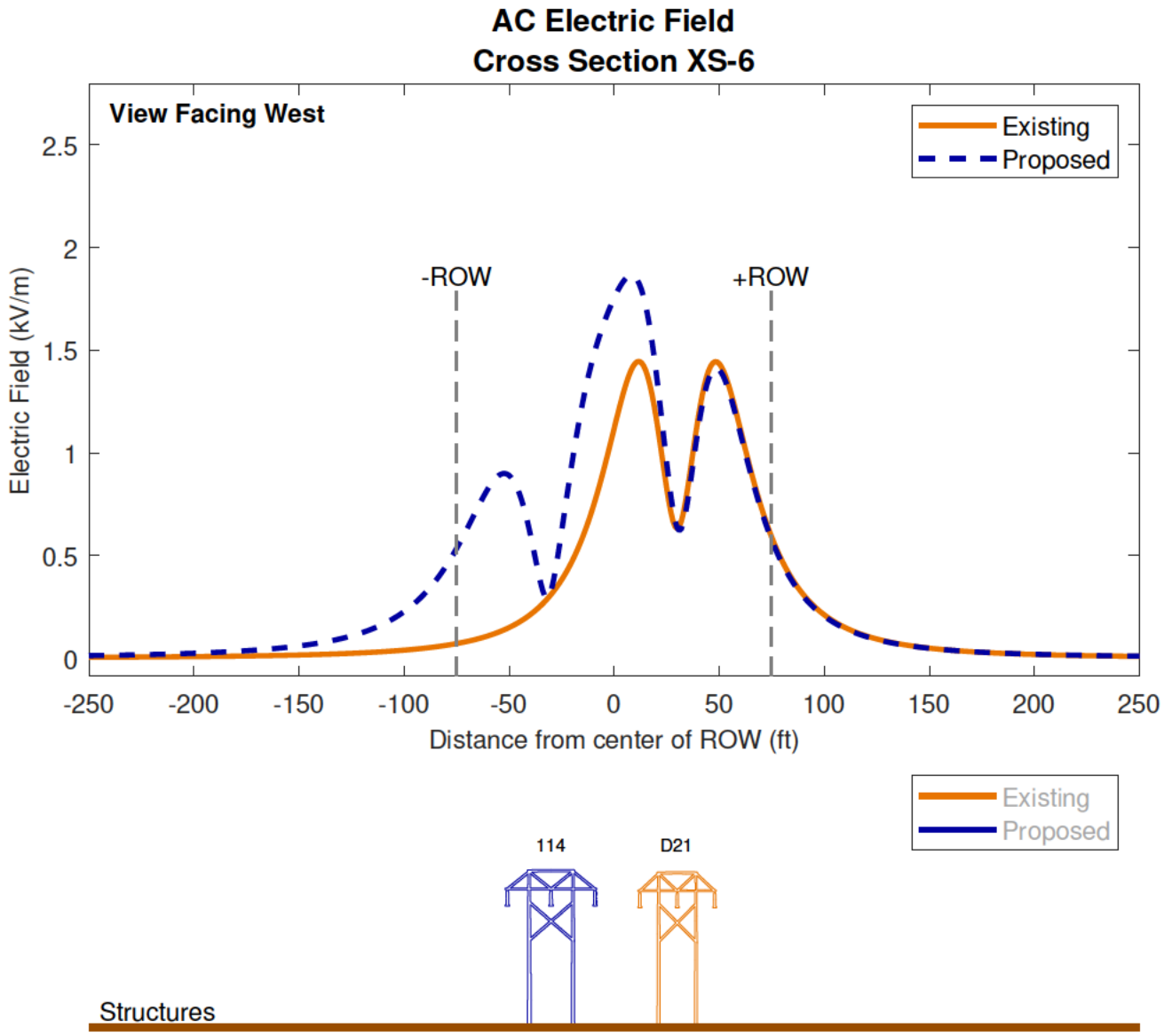

Figure B-6. Calculated AC electric-field profile along 6 (XS-6)

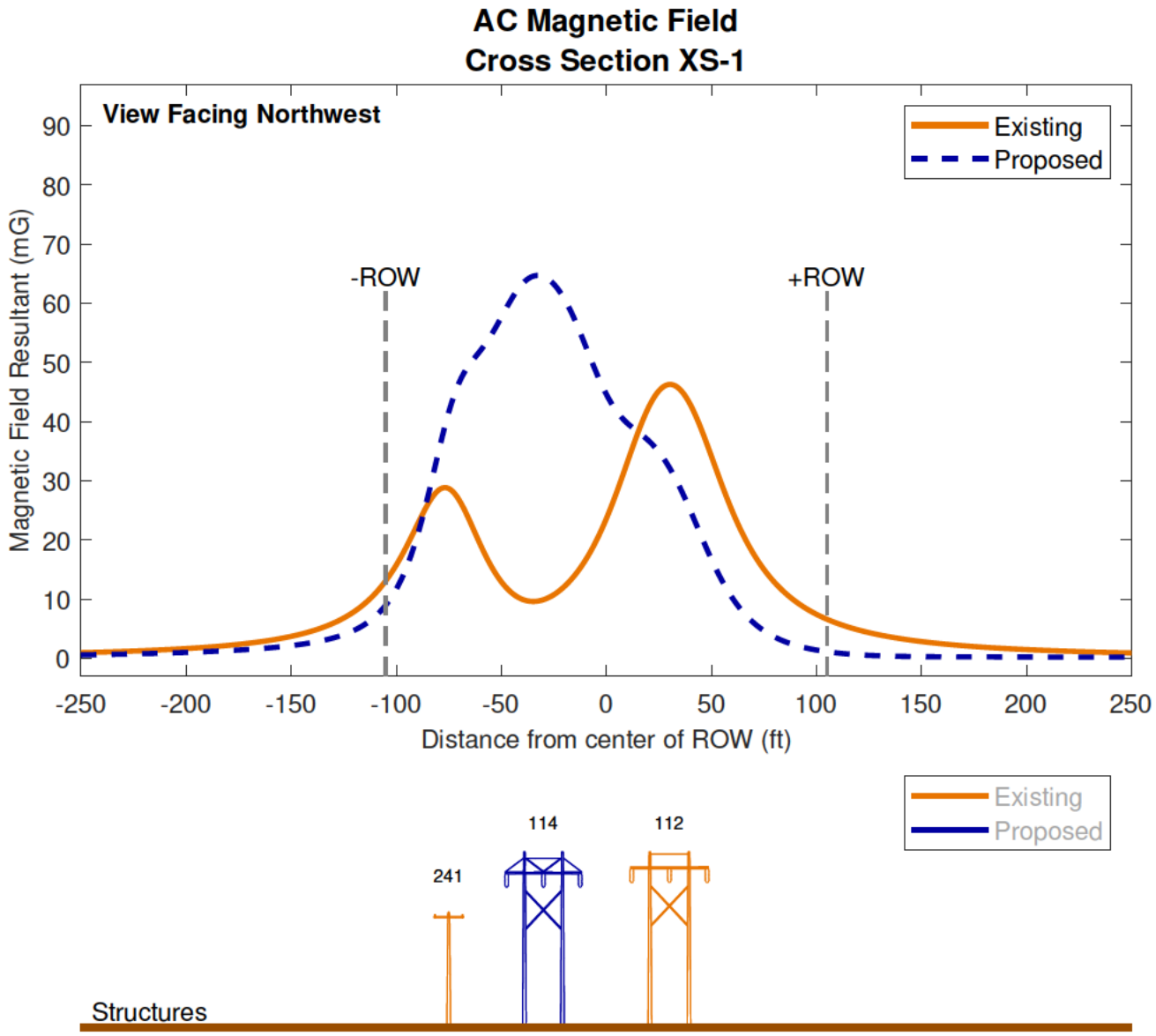

Figure B-7. Calculated AC magnetic-field profile (average load) along 1 (XS-1)

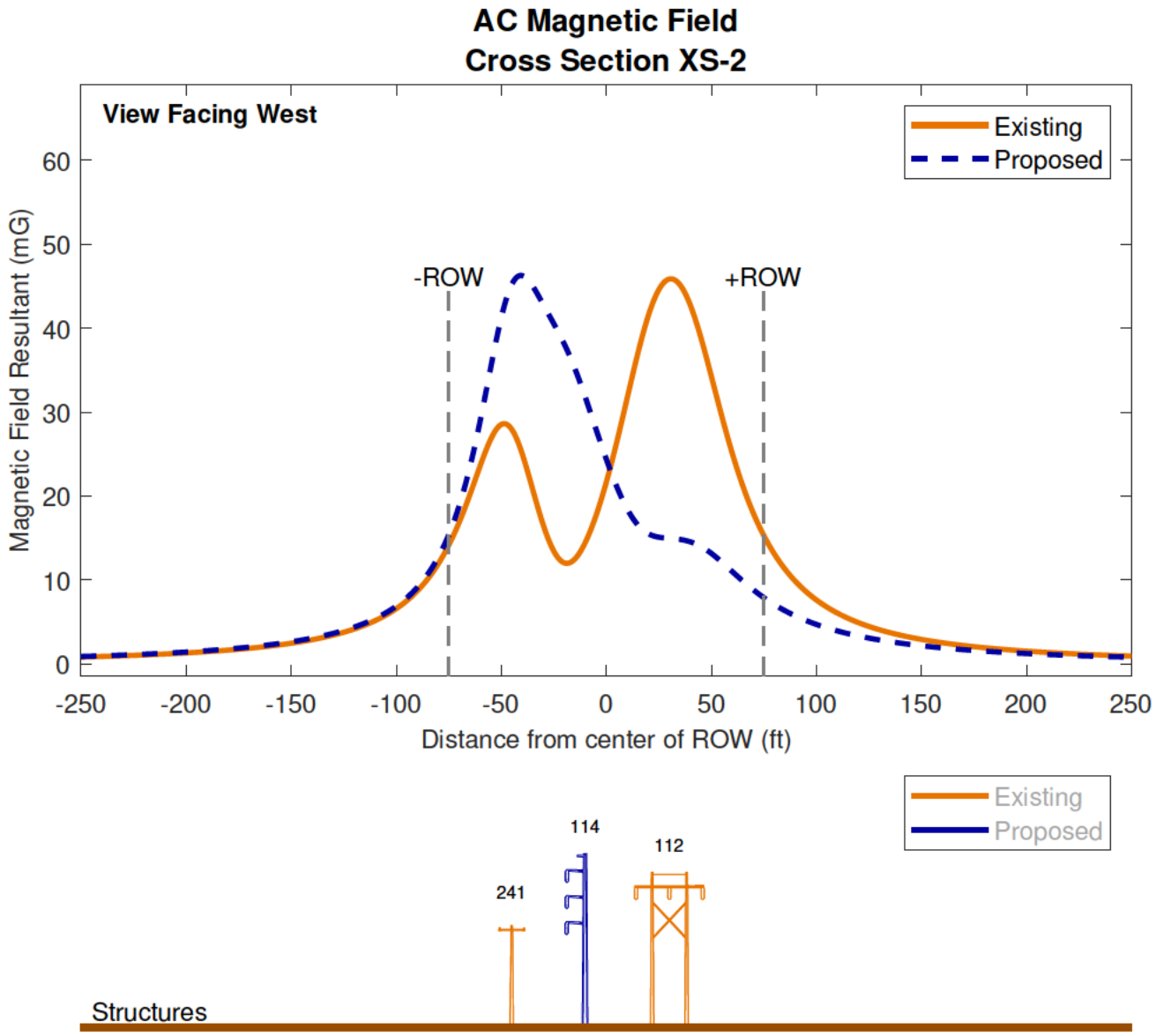

Figure B-8. Calculated AC magnetic-field profile (average load) along 2 (XS-2)

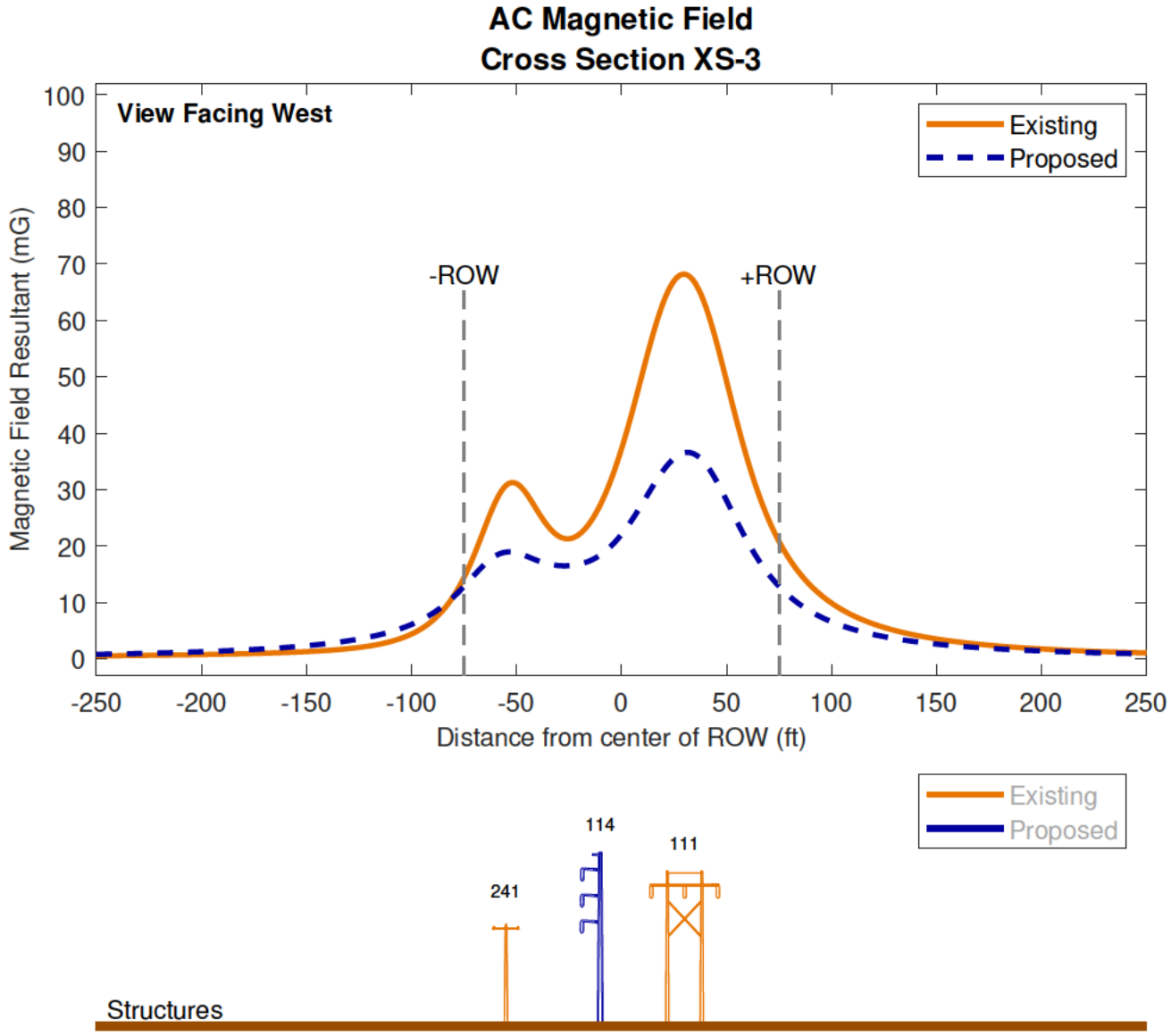

Figure B-9. Calculated AC magnetic-field profile (average load) along 3 (XS-3)

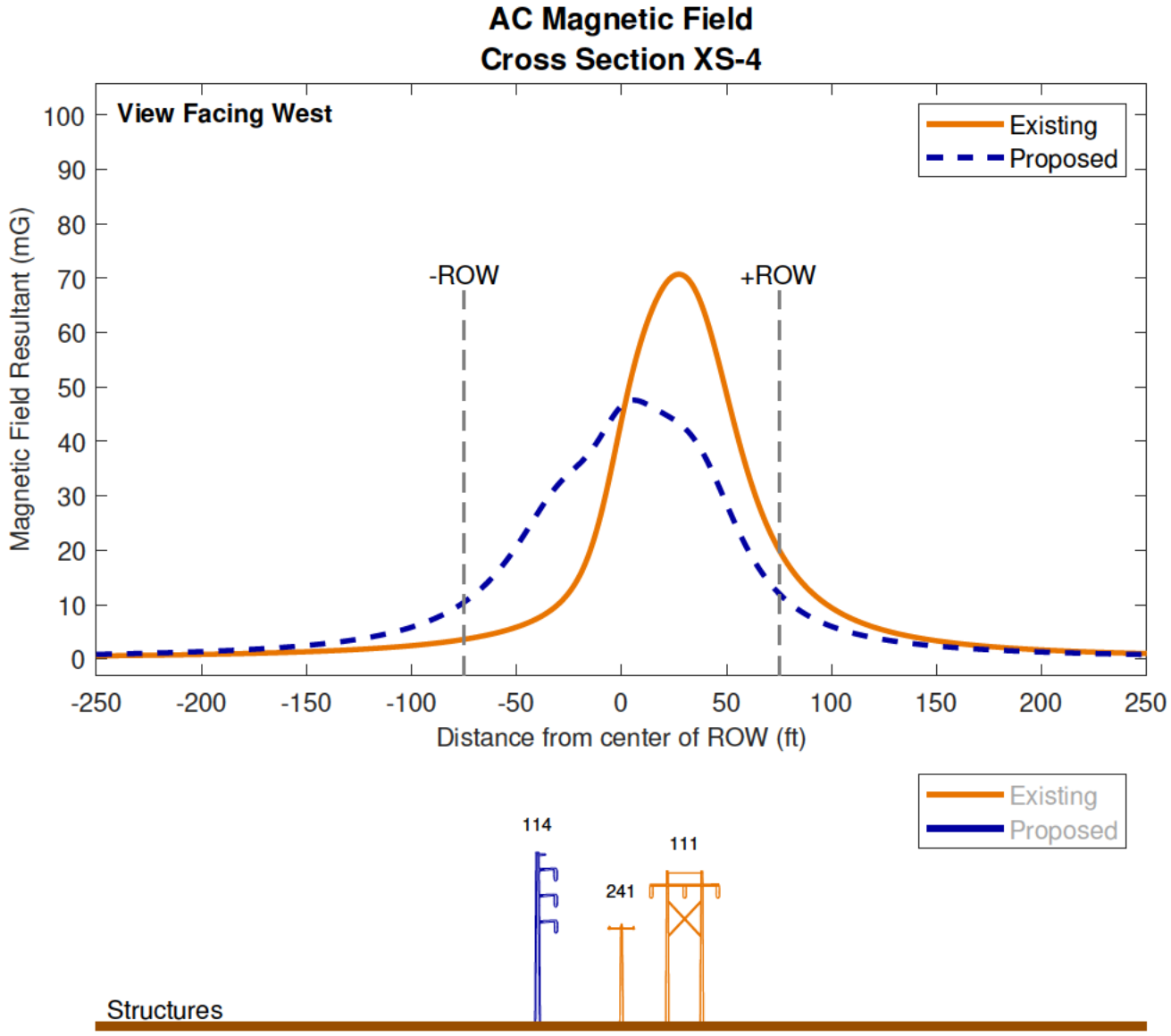

Figure B-10. Calculated AC magnetic-field profile (average load) along 4 (XS-4)

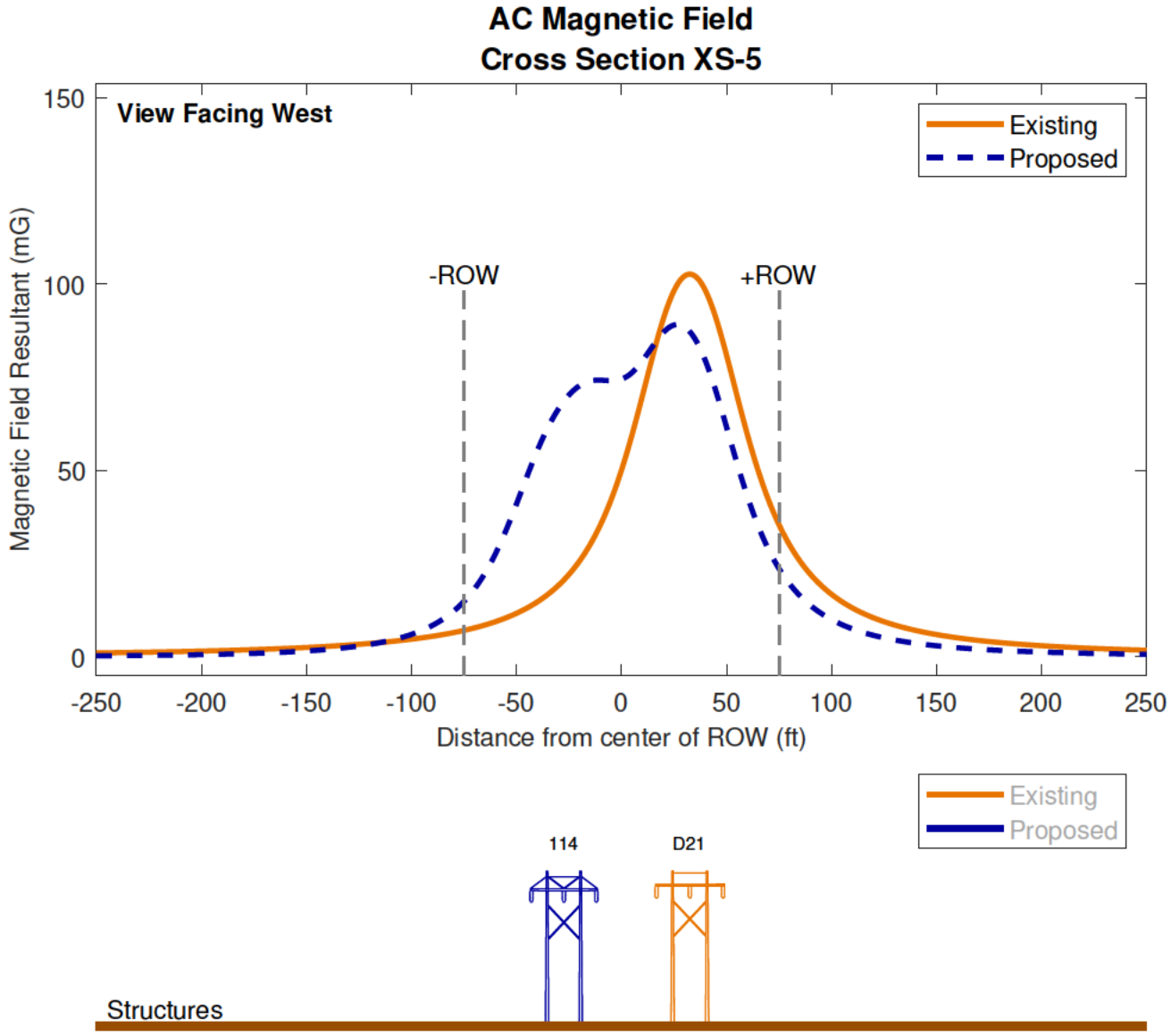

Figure B-11. Calculated AC magnetic-field profile (average load) along 5 (XS-5)

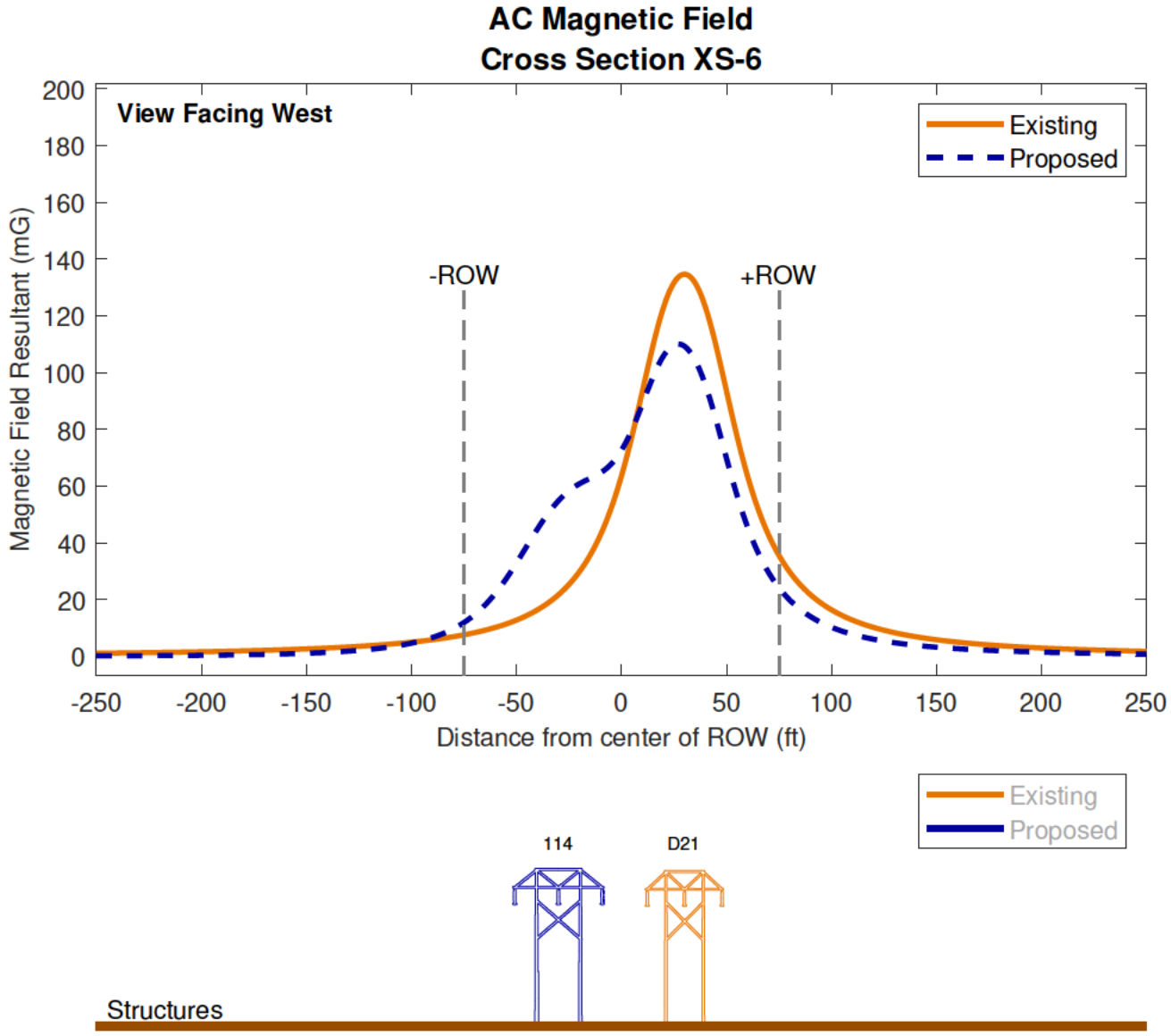

Figure B-12. Calculated AC magnetic-field profile (average load) along 6 (XS-6)

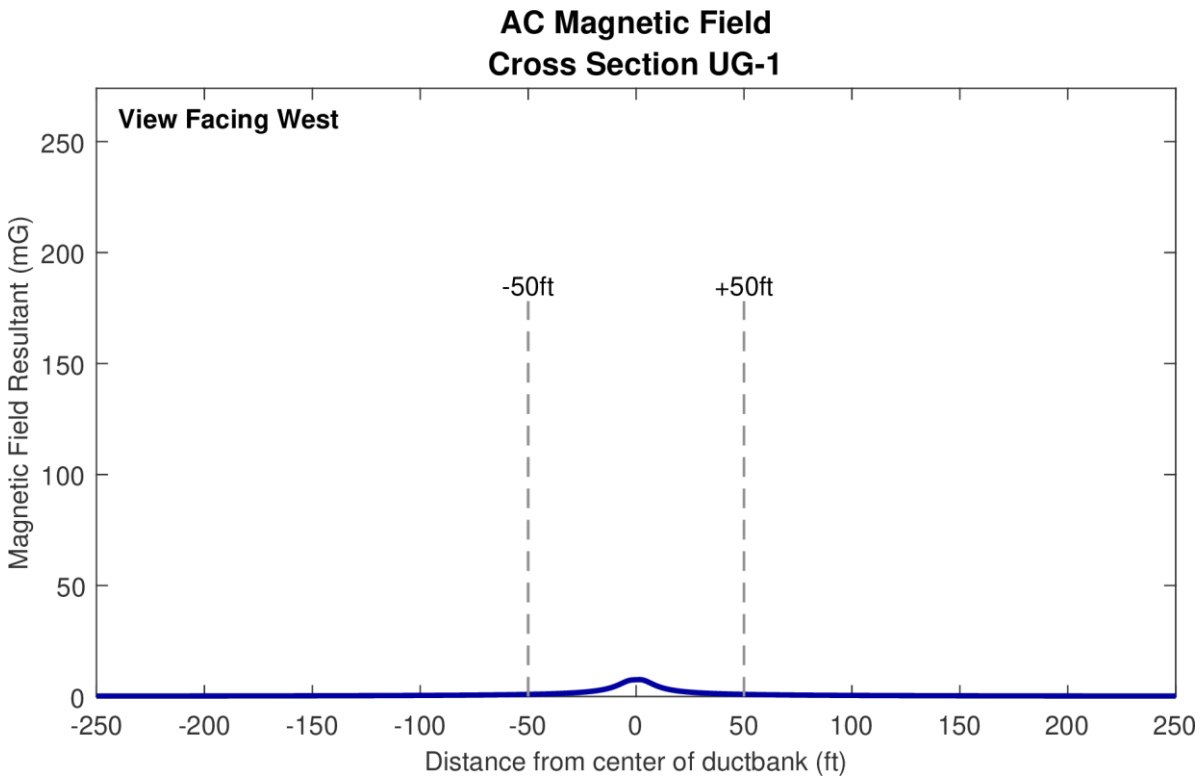

Figure B-13. Calculated proposed magnetic-field profile (average loading) along UG-1.

Note the different vertical scale compared to results from overhead lines.

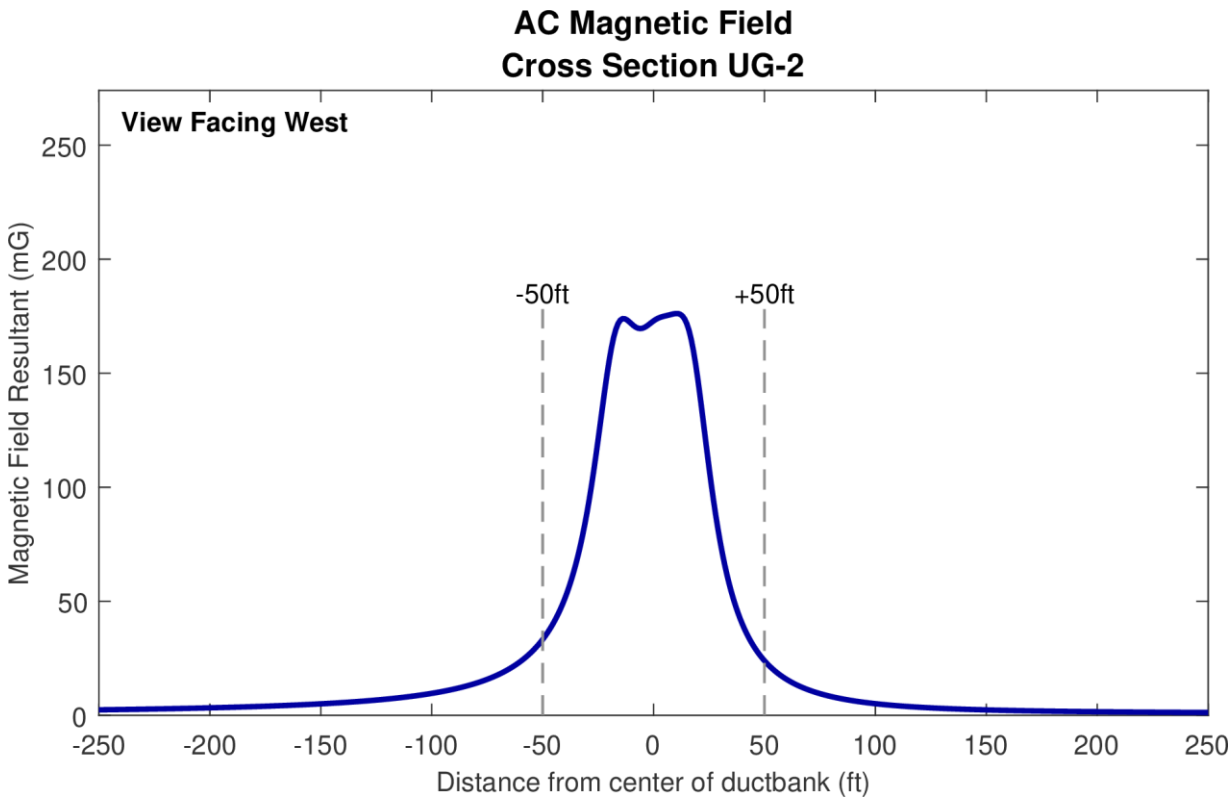

Figure B-14. Calculated proposed magnetic-field profile (average loading) along UG-2.

Note the different vertical scale compared to results from overhead lines.

Appendix C

Summary of Line Loadings, and Structure Configurations

Table C-1. Loading summary of transmission lines

LINE NAME	CROSS SECTION	Voltage (kV)	PRE-PROJECT				POST-PROJECT			
			Average		Peak		Average		Peak	
			MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR
114	1-5	115	n/a	n/a	n/a	n/a	60.6	-13.3	42.8	-8.0
114	6	115	n/a	n/a	n/a	n/a	60.6	-12.9	42.8	-8.0
112	1-2	115	57.1	-15.3	25.6	-9.4	28.7	-8.8	5.5	-5.8
111	3-4	115	84.6	-5.3	58.2	4.3	56.1	0.7	38.1	7.7
D21	5-6	115	120.6	-33	102.6	-21.5	91.9	-28.6	82.4	-19.2
106	1-2	13.2	-6.5	-2.6	-6.5	-2.6	-6.5	-2.6	-6.5	-2.6
107	3-4	13.2	5.5	1.8	5.5	1.8	5.5	1.8	5.5	1.8

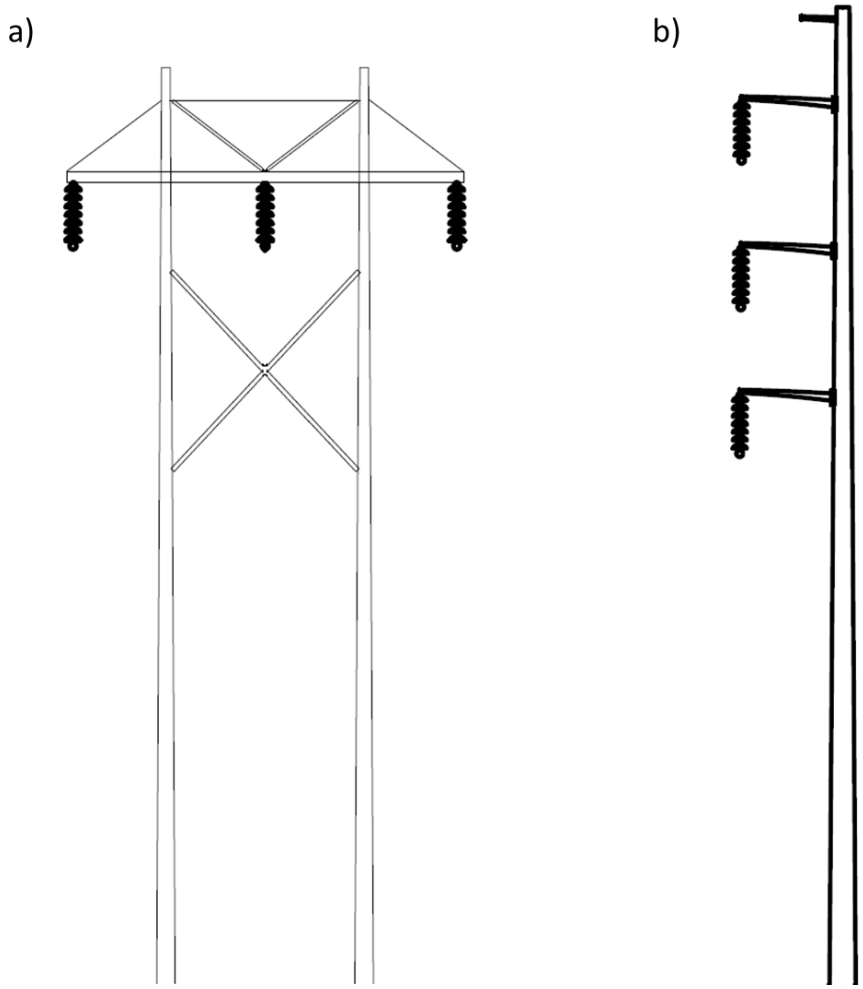

Figure C-1. Schematic of proposed structures: a) H-frame structure, b) vertical monopole structure.

(Structures not to scale relative to one another)

Appendix D

Modeling Scenarios and Methods

Modeling Configurations for Overhead Lines

Conductor Height

As described above, the modeling was performed assuming that the conductor is straight and flat at a fixed height above ground. This height above ground, however, changes with electrical current; as the current increases the temperature of the conductors also increases. This increased temperature leads to increased sag of the transmission lines, the minimum conductor height (the height used for modeling) above ground decreases, and the calculated fields increase near the lines. It is important to note that the conductors of the new transmission line (and other existing lines) have been selected such that their ampacity (current-carrying capacity) is far higher than what is expected during peak loading. To describe field levels over a range of loadings on the transmission lines, the height of lines above ground was modeled at two heights. First, average height was used for modeling fields at both average and peak line loadings.[5] Second, minimum height was used for modeling fields at peak loading only.[6] Modeling results at a design-minimum conductor height are summarized in Appendix E.

Magnetic-Field Modeling Scenarios

The magnitude of the magnetic field is proportional to the loading of the transmission lines and so was modeled for four separate scenarios:

1. Pre-Project at average loading with conductors at average conductor height;
2. Pre-Project peak loading, with conductors at minimum conductor height;
3. Post-Project at average loading with conductors at average conductor height; and
4. Post-Project peak loading, with conductors at minimum conductor height.

The loading of each modeled transmission line under each of the above loading scenarios is shown in Appendix C, Table C-1. The loading will vary based upon demand and so will vary throughout the course of the year, and even during different times of the day. For the

[5] Average height is equivalent to average sag and therefore average conductor height above ground.

[6] Minimum height is equivalent to maximum sag and therefore minimum conductor height above ground.

transmission lines within the Project's ROW, the load flow for average loading conditions is higher than at peak loading conditions.[7] Both average and peak loading conditions (existing and proposed) were modelled at average conductor height.[8] The scenario most likely to represent the transmission lines (either in their pre-Project or post-Project configuration) on any randomly-selected day of the year is the average loading scenario.

Electric-Field Modeling Scenarios

The electric-field level is determined primarily by the voltage, conductor spacing, and height above ground; not current flow. The transmission line voltage level is quite constant but, as described above, the conductor height above ground may vary with loading and thus indirectly affect the electric-field level. To evaluate this potential variation, electric-field calculations were performed for the same modeling heights as for magnetic-field calculations. Electric-field levels (assuming a 5% overvoltage condition for all AC conductors) were therefore reported for four scenarios:

1. Pre-Project configuration at average conductor height;
2. Pre-Project configuration at minimum conductor height;
3. Post-Project configuration at average conductor height; and
4. Post-Project configuration at minimum conductor height.

Similar to the magnetic-field calculations, the calculations of greatest interest are those that are likely to apply on any particular day of the year. The scenario most likely to represent the transmission lines (either in their pre-Project or post-Project configuration) is the average height scenario.

---

[7] Transmission planning indicates that the Project transmission lines will carry slightly less load during system peak conditions than system average. Additional details are provided in Appendix C.

[8] The current for both average and peak loading conditions is far below the ampacity of the transmission line conductors.

Modeling Configurations for Underground Duct Banks

For a short portion of the route, Line 114 will be installed in underground duct banks.[9] The underground portion of the route will consist of six 5000-kcmil aluminum phase conductor cables installed in six 8-inch polyvinyl chloride (PVC) ducts and two 500-kcmil copper ground continuity conductors (GCC) in 2-inch PVC ducts. For the majority of the underground route, the ducts will be installed in a 2x3 double-circuit duct bank, as shown in Figure D-1. For a short portion of the route, the transmission line will be installed in three separate 1x2 duct banks, as shown in Figure D-2, enabling the transition to riser poles to overhead lines.

The burial depth of the underground duct banks will vary along the route, but both configurations were modeled at a conservative minimum burial depth. The double-circuit duct bank is modeled with the minimum burial depth of 30 inches from the ground to the top of the duct bank. The riser transition duct bank is modeled with the burial depth of 7.1 feet from the ground to the top of the duct bank.[10] In a rise transition duct bank, the distance between the duct banks also varies, but the duct bank is modeled at the maximum separation of 18 feet between the centerlines of two adjacent duct banks to conservatively overestimate magnetic-field levels.

The underground duct banks will not be a direct source of any electric field above ground due to the cable construction, duct bank, and burial underground.

[9] These underground duct banks will be constructed on the project ROW, more than 75 feet from the nearest adjacent property.

[10] The burial depth is estimated at 10 feet from the riser poles. The burial depth will decrease in the immediate vicinity of the riser pole to allow transition to the overhead structure. However, at this close distance, the cables are not parallel to the ground as required for accurate modeling using 2-dimensional calculation methods.

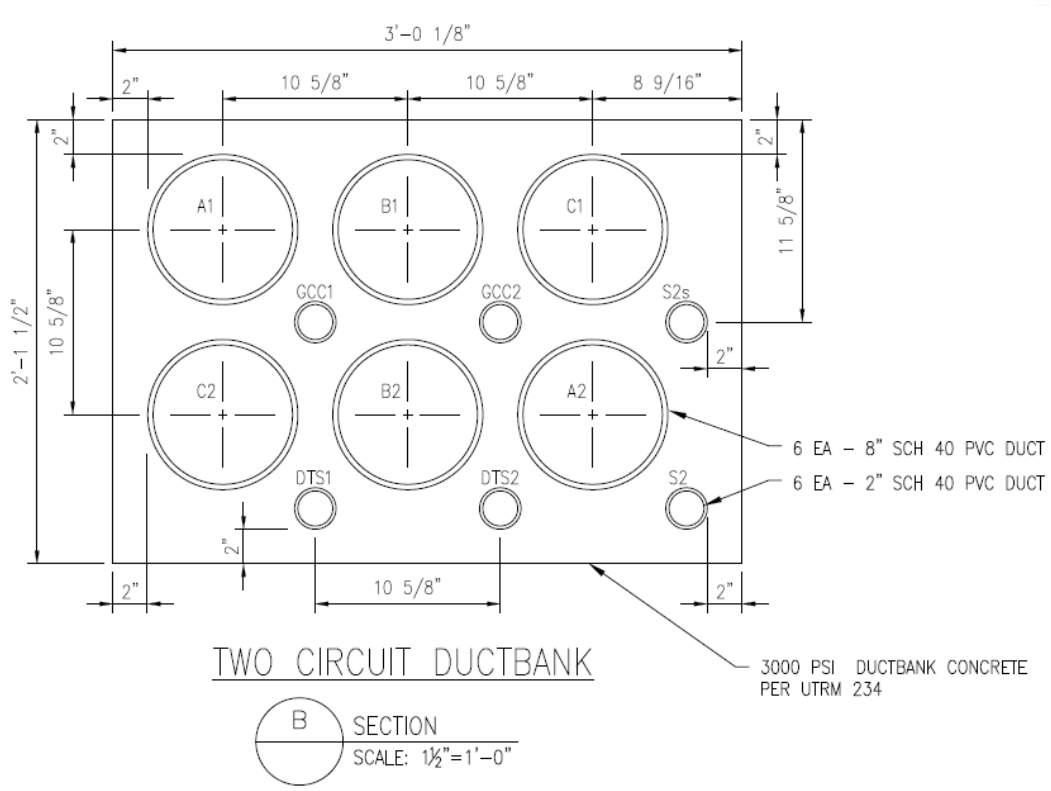

Figure D-1. Two circuit duct bank.

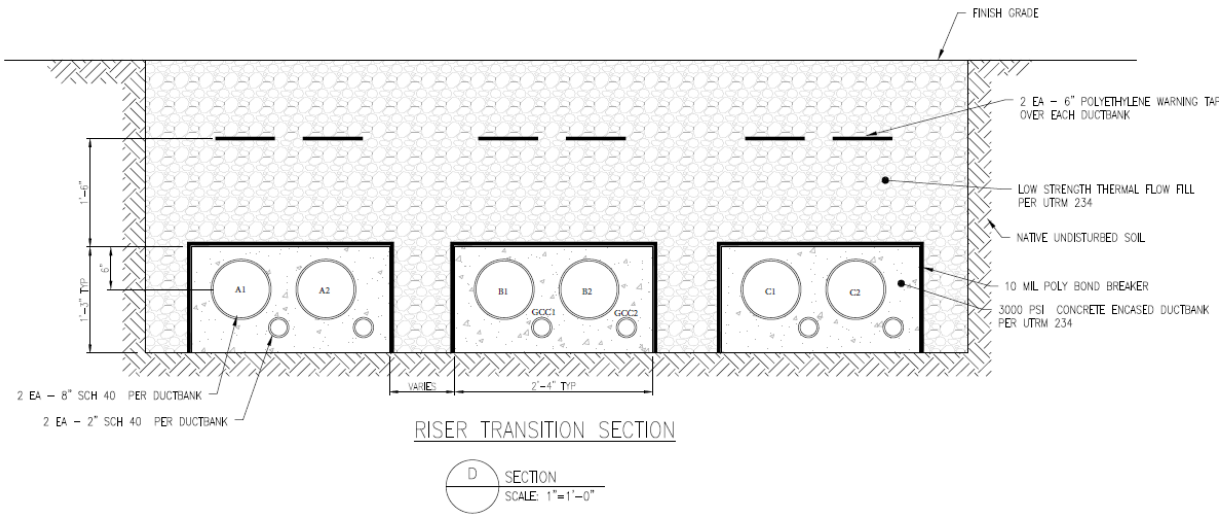

Figure D-2. Riser transition duct bank.

Conductor Burial Depth

All conductors were modeled as straight, parallel to one another, and infinite in extent. The conductor locations were determined with the assumption that each cable rests at the bottom of the conduit below a flat ground. Magnetic-field effects due to cable materials surrounding the aluminum conductor, including ferromagnetic shielding effects and eddy currents, were not modeled, and it was assumed there would be no attenuation of magnetic fields by any surrounding materials (e.g., duct bank, earth, etc.).

GCC Current Calculation

The proximity of the GCC to the phase conductors results in an induced current flowing on the GCC, which in turn will result in a magnetic field. GCC currents were calculated using the commercial software package COMSOL MultiPhysics Version 5.5, which is a finite element analysis, solver, and simulation software suite.

Magnetic-field Calculation

Similar to overhead lines, magnetic-field levels for underground duct banks were calculated using computer algorithms developed for AC transmission lines by the BPA (BPA, 1991). Similar to overhead lines, the inputs to the program include data regarding voltage, balanced current flow, phasing, and conductor configurations. In addition, the inputs also included the conductor configuration and currents for the two GCCs.

Appendix E

Calculated EMF for Peak Loading and Design-Minimum Conductor Heights

Table E-1. Magnetic-field levels (mG) at peak loading, and design-minimum conductor height[11]

Segment Number	Configuration	100 feet beyond –ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-1	Existing	1.3	15	61	3.5	0.8
	Proposed	0.8	11	76	1.1	0.4
XS-2	Existing	1.3	16	60	8.6	1.1
	Proposed	1.4	16	77	4.2	1.0
XS-3	Existing	0.8	20	78	17	1.7
	Proposed	1.4	20	46	11	1.3
XS-4	Existing	0.7	2.5	84	16	1.6
	Proposed	1.3	9.1	76	10	1.2
XS-5	Existing	1.7	6.2	142	35	3.5
	Proposed	0.4	11	122	25	1.9
XS-6	Existing	1.7	6.5	142	32	3.4
	Proposed	0.2	9.2	121	23	2.0

[11] Design-minimum conductor height for the 115-kV lines is 23 feet.

Table E-2. Electric-field levels (kV/m) for peak loading, and design-minimum conductor height

Segment Number	Configuration	100 feet beyond –ROW edge	-ROW edge	Max on ROW	+ROW edge	100 feet beyond +ROW edge
XS-1	Existing	<0.1	0.1	1.7	0.1	<0.1
	Proposed	<0.1	0.1	2.5	0.1	<0.1
XS-2	Existing	<0.1	0.1	1.7	0.5	<0.1
	Proposed	<0.1	0.2	1.7	0.5	<0.1
XS-3	Existing	<0.1	0.1	1.7	0.5	<0.1
	Proposed	<0.1	0.2	1.8	0.5	<0.1
XS-4	Existing	<0.1	<0.1	1.7	0.5	<0.1
	Proposed	<0.1	<0.1	1.9	0.5	<0.1
XS-5	Existing	<0.1	0.1	1.8	0.7	<0.1
	Proposed	<0.1	0.7	2.5	0.6	<0.1
XS-6	Existing	<0.1	0.1	1.8	0.6	<0.1
	Proposed	<0.1	0.6	2.3	0.6	<0.1

APPENDIX 5-4 LINE 114 EXTENSION PROJECT: CURRENT STATUS OF EPIDEMIOLOGIC RESEARCH ON ELECTRIC AND MAGNETIC FIELDS

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Health Practice

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Line 114 Extension Project

Current Status of Epidemiologic Research on Electric and Magnetic Fields

Line 114 Extension Project

Current Status of Epidemiologic Research on Electric and Magnetic Fields

Prepared for

Commonwealth of Massachusetts
Energy Facilities Siting Board
One South Station, Fifth Floor
Boston, MA 02110

On behalf of

National Grid
40 Sylvan Road
Waltham, MA 02451

Eversource Energy
247 Station Drive
Westwood, MA 02090

Prepared by

Exponent, Inc.
17000 Science Drive
Suite 200
Bowie, MD 20715

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Acronyms and Abbreviations

μT	Microtesla
AC	Alternating current
ADHD	Attention-deficit/hyperactivity disorder
ALS	Amyotrophic lateral sclerosis
AMI	Acute myocardial infarction
CNS	Central nervous system
ELF	Extremely low frequency
EMF	Electric and magnetic fields
Exponent	Exponent, Inc.
Hz	Hertz
IARC	International Agency for Research on Cancer
ICES	International Committee on Electromagnetic Safety
ICNIRP	International Commission on Non-Ionizing Radiation Protection
kV/m	Kilovolt per meter
mG	Milligauss
SCENIHR	Scientific Committee on Emerging and Newly Identified Health Risks
SCHEER	Scientific Committee on Health, Environmental and Emerging Risks
WHO	World Health Organization

Limitations

At the request of National Grid and Eversource Energy, Exponent, Inc. (Exponent) prepared this summary report on the status of research related to power-frequency electric- and magnetic-field exposure and health, for submission of a joint Petition to the Commonwealth of Massachusetts Electric Facilities Siting Board for the extension of Eversource Energy's Line 114 transmission line from the Industrial Park Tap in Acushnet, Massachusetts, to National Grid's Bell Rock Substation in Fall River, Massachusetts. The findings presented herein are made to a reasonable degree of scientific certainty. This report is limited to the papers reviewed and may not include all information in the public domain. Exponent reserves the right to supplement this report and to expand or modify opinions based on review of additional material as it becomes available, through any additional work, or review of additional work performed by others.

The scope of services performed during this investigation may not adequately address the needs of other users of this report, and any re-use of this report or its findings, conclusions, or recommendations presented herein other than for permitting of this project are at the sole risk of the user. The opinions and comments formulated during this assessment are based on observations and information available at the time of the investigation. No guarantee or warranty as to future life or performance of any reviewed condition is expressed or implied.

Introduction

Electric and magnetic fields (EMF) are produced by both natural and man-made sources that surround us in our daily lives. Natural sources of EMF include the earth's static magnetic field and the electric fields created by the normal functioning of our nervous and cardiovascular system. Man-made EMF are found wherever electricity is generated, transmitted, or used; sources include electrical appliances, power tools, the wiring in homes and buildings, and transmission and distribution lines. Most electricity in North America is transmitted as alternating current (AC) at a frequency of 60 Hertz [Hz] (i.e., it changes direction and magnitude in a continuous cycle that repeats 60 times per second).[1] The fields from these AC sources are commonly referred to as power-frequency or extremely low frequency (ELF) EMF, which are in the ELF range of the electromagnetic spectrum that includes frequencies up to 300 Hz (ICNIRP, 1998).

Since electricity is such an integral part of our infrastructure and everyday life, people living in modern communities are constantly exposed to EMF. While the intensity of EMF levels diminishes with increasing distance from the source, any buildings in our communities (e.g., homes, schools, offices) tend to have a background EMF level as a result of the combined effect of the numerous EMF sources. Over the past 40 years, researchers have been examining whether exposure to ELF EMF from these man-made sources can cause short- or long-term health effects in humans.

Exponent was requested by National Grid and Eversource Energy to summarize the current research on ELF EMF and human health. The purpose of this report is to provide a short summary of the epidemiologic research relevant to ELF EMF exposure and health that has been evaluated by national and international health agencies and to assess the impact of recent research on the conclusions reached by these agencies. The report also includes a brief discussion of the regulatory standards and exposure guidelines established for EMF. Since the focus of this report is on power-frequency EMF, only studies of ELF EMF are included, as they are directly relevant to assessing the potential biological and health effects of power-frequency

[1] Electrical power systems in many countries outside North America operate at a frequency of 50 Hz.

fields.[2] Although health and scientific agencies draw conclusions about potential health risks based upon assessments of both epidemiologic and experimental research, this report has focused on epidemiologic studies, which in the past have reported associations with magnetic-field exposures and various health conditions in some studies.

[2] The major focus of the review is magnetic-field exposure. Research has focused on magnetic fields because, among other reasons, conductive objects effectively shield electric fields, and power lines have little effect on the potential long-term, average electric-field exposure of nearby residents.

Current Scientific Consensus

Research on ELF EMF and human health has considered many aspects of physiology and diseases, including cancers in children and adults, neurodegenerative diseases, reproductive effects, and cardiovascular disease. Numerous national and international scientific and health agencies have reviewed the research and evaluated potential health risks of exposure to ELF EMF. Overall, the published conclusions of scientific reviews have been consistent. None of the reviews concluded that either electric fields or magnetic fields are a known or likely cause of any adverse health effect at the long-term, low exposure levels found in the environment.

The most comprehensive review of ELF EMF research was published by the World Health Organization (WHO) in 2007. The WHO's Task Group critically reviewed the cumulative epidemiologic and laboratory research through 2005, taking into account the strength and quality of the individual research studies they evaluated. The WHO report concluded that ELF EMF was *possibly carcinogenic to humans*,[3] confirming the classification previously assigned by the International Agency for Research on Cancer (IARC) in their 2002 review (IARC, 2002).

Much additional research has been published since the 2007 WHO evaluation. These more recent research results have been regularly and repeatedly reviewed by scientific organizations (e.g., ICNIRP, 2010; EFHRAN, 2012; SCENIHR, 2015; SSM, 2016, 2018, 2019, 2020, 2021). The main conclusions of the more recent reviews of these scientific organizations continue to be that the scientific evidence does not establish that exposure to low level ELF EMF is the cause of any cancer (including childhood leukemia) or non-cancer adverse health effects in adults or children (WHO, 2007; HMG, 2009; ICNIRP, 2010; EFHRAN, 2012; SCENIHR, 2015; SSM, 2016, 2018, 2019, 2020, 2021). The following sub-sections of this report summarize the results

[3] The category *possibly carcinogenic to humans* denotes exposures for which there is *limited evidence of carcinogenicity* in epidemiologic studies and less than sufficient evidence of carcinogenicity in studies of experimental animals. *Limited evidence of carcinogenicity* describes a body of epidemiologic research where the findings are inconsistent or there are outstanding questions about study design or other methodological issues that preclude making a conclusion. The category *possibly carcinogenic to humans* is the lowest category used by WHO that denotes some evidence of carcinogenicity; categories are intentionally meant to err on the side of caution, giving more weight to the possibility that the exposure is truly carcinogenic and less weight to the possibility that the exposure is not carcinogenic.

of recent epidemiologic research[4] on specific health conditions investigated in relation to ELF EMF and discuss whether the findings of these recent studies alter the conclusions of the 2007 WHO report. As discussed below, neither the reviews conducted by scientific and health agencies nor recent studies have provided support for an adverse effect of ELF EMF on health that would alter the 2007 assessment of the scientific evidence by the WHO.

Childhood Leukemia

Since the late 1970s, numerous epidemiologic studies have evaluated the relationship between exposure to ELF EMF and childhood leukemia. In their 2002 review of research related to ELF EMF, the IARC classified EMF as *possibly carcinogenic* largely as a result of two combined analyses of epidemiologic studies that reported an association between childhood leukemia and estimates of exposure to daily average magnetic-field levels greater than 3-4 milligauss [mG]) (Ahlbom et al., 2000; Greenland et al., 2000). The classification of *possibly carcinogenic* was confirmed by the WHO in their 2007 review, in which the WHO concluded that the *"evidence for a causal relationship [between ELF magnetic-field exposure and childhood leukemia] is limited"* (WHO, 2007, p. 355).

Since the 2007 WHO review, childhood leukemia continues to be a main focus of ELF EMF epidemiologic research. In recent years, several large epidemiologic studies from multiple countries, including France (Sermage-Faure et al., 2013), Denmark (Pedersen et al., 2014a, 2014b, 2015), the United Kingdom (Bunch et al., 2014, 2015, 2016), the United States (Crespi et al., 2016, 2019; Kheifets et al., 2017; Amoon et al., 2018a, 2019, 2020), and Canada (Auger et al., 2019a), have assessed the potential risk of childhood leukemia in relation to residential proximity to high-voltage power lines. None of these studies reported consistent overall associations between the development of childhood leukemia and distance to transmission or distribution or lines. One of the largest of these studies (Bunch et al., 2014) included over 53,000 childhood cancer cases diagnosed between 1962 and 2008 and served as an update to an earlier analysis of the same study population (Draper et al., 2005). The authors in Bunch et al. (2014) noted that a previous association between childhood leukemia and proximity to power

[4] Relevant peer-reviewed epidemiologic research studies are included that were published on or before May 25, 2021.

lines observed in the earlier study (Draper et al., 2005) was no longer apparent in the 2014 updated analysis. This led the authors to conclude that the observed declining risk "*almost certainly cannot be produced by powerline-generated magnetic fields*" (Bunch et al., 2014, p. 1407). Another large study, conducted by Auger et al. (2019a), examined the relationship between maternal distance to the nearest high-voltage transmission line or transformer station during pregnancy and childhood cancer development in a cohort of 784,000 children born in Québec and followed for one decade after birth. The authors reported "*borderline*" associations between residential distance to transformer stations and any cancer, hematopoietic cancer, and solid tumors; no associations were reported with distance to transmission lines (Auger et al., 2019a). The authors concluded that *"[t]hese contradictory findings suggest an absence of a causal link between [EMF] from high voltage power sources and the risk of cancer in children"* (Auger et al., 2019a, p. 6). An important limitation of these studies, and of many of the studies discussed throughout this report, is the use of residential distance to power lines as the main exposure metric, which is considered to be a poor predictor of actual residential magnetic-field exposure (e.g., Bonnet-Belfais et al., 2013; Clavel et al., 2013; Chang et al., 2014).

Several pooled analyses and meta-analyses of research related to EMF and childhood leukemia have also been conducted in recent years.[5] Kheifets et al. (2010a) provided an update to the analyses conducted by Ahlbom et al. (2000) and Greenland et al. (2000) by reporting the results of a pooled analysis of seven epidemiologic studies of childhood leukemia and measured and calculated ELF magnetic fields published between 2000 and 2010. The study by Kheifets et al. (2010a) reported a moderate and statistically not significant association[6] for the highest exposure category, which was weaker than the association reported in the previous analyses (Ahlbom et al., 2000; Greenland et al., 2000). Amoon et al. (2018b) combined data from 11

[5] Pooled analyses combined the raw, individual-level data from original epidemiologic studies and analyze the data altogether, therefore increasing the number of individuals in the analysis and allowing for a more robust and stable estimate of association. Meta-analysis is an analytic technique that combines the published summary results from a group of studies into one summary result. Similar to pooled analyses, it is an important tool for qualitatively synthesizing the results of a large group of studies.

[6] The terms statistically significant or statistically significant association are used in epidemiologic studies to describe the tendency of the level of exposure and the occurrence of disease to be linked, with chance as an unlikely explanation. Statistically significant associations, however, are not necessarily an indication of cause-and-effect because the interpretation of statistically significant associations depends on many other factors associated with the design and conduct of the study besides sampling error, including the number of study participants, systematic bias and error, how the data were collected and analyzed, and confounding factors.

epidemiologic studies of residential distance to power lines and childhood leukemia. The authors reported no association between childhood leukemia and distance to the nearest transmission lines and concluded that they found "*virtually no increase in risk of leukaemia among children who lived within any distance … to power lines*" (Amoon et al., 2018b, p. 6). Talibov et al. (2019) conducted a pooled analysis of 11 case-control studies examining the relationship between parental occupational exposure to ELF magnetic fields and childhood leukemia. Cases in the included studies were diagnosed between 1989 and 2011. No statistically significant association was found for paternal or maternal exposure by leukemia sub-type or the overall grouping of subtypes, and no association was observed when additional exposure categories were used. The authors concluded that their study "*suggests that parental ELF-EMF exposure plays no relevant role in the aetiology of childhood leukemia*" (Talibov et al., 2019, p. 7). Swanson et al. (2019) conducted a meta-analysis of 41 epidemiologic studies, published between 1979 and 2017, to observe the trends in childhood leukemia risk over time. The authors reported a statistically non-significant decline in risk from the mid-1990s until the present, which they stated was "*unlikely to be solely explained by improving study quality but may be due to chance*" (Swanson et al., 2019, p. 470). The authors concluded, however, that the current body of studies on EMF "*argue against health effects of MFs [magnetic fields] at these exposure levels*" (Swanson et al., 2019, p. 485). Seomun et al. (2021) performed a meta-analysis of 30 case-control studies investigating the potential relationship between ELF magnetic fields and childhood cancer. Cases in the included studies were diagnosed between 1960 and 2009. The authors reported statistically significant associations between childhood leukemia and magnetic-field exposures of 0.2 microtesla (μT) (2 mG) and 0.4 μT (4 mG), while the relationship to magnetic-field exposures of 0.3 μT (3 mG) was not statistically significant. In addition to differences in how EMF exposure was estimated in the studies reviewed by Swanson et al. (2019) and Seomun et al. (2021), the two studies also used different exposure cut-points in their analyses, which can impact the resulting associations. Further, the statistically significant associations observed at the 0.2 μT (2 mG) and 0.4 μT (4 mG) exposure levels in Seomun et al. (2021) are likely driven by the small number studies that reported large (i.e., 3.0 to 6.0), non-statistically significant associations, even though the majority of the included studies reported small (i.e., close to 1.0) or no associations. The observed differences in

statistical significance by exposure level are also likely due to the differences in the number and size of studies included for each exposure cut-point.

In summary, most of the recently published large and methodologically advanced studies showed no statistically significant associations between estimates of exposure from power lines and childhood leukemia. However, the association observed in some earlier studies remains unexplained. Thus, the recent literature does not alter the previous conclusions of the WHO report and other reviews that the epidemiologic evidence on magnetic fields and childhood leukemia is *limited*, and is weak, inconsistent, and includes outstanding questions about study design or other methodological issues (Kheifets and Oksuzyan, 2008; Pelissari et al., 2009; Schüz and Ahlbom, 2008; Calvente et al., 2010; Eden, 2010; Schüz, 2011). Conclusions from several scientific organizations, including the European Union's Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR),[7] Health Council of the Netherlands, the European Health Risk Assessment Network on Electromagnetic Fields Exposure, and the Swedish Radiation Safety Authority, support this position (HCN 2009; EFHRAN 2012; SSM 2013, 2014, 2015, 2016, 2018, 2019, 2020, 2021; SCENIHR 2015). The most recent weight-of-evidence review released in 2015 by SCENIHR concluded that the epidemiologic data on childhood leukemia and EMF exposure continued to "*prevent a causal interpretation*" (SCENIHR, 2015).

Childhood Brain Cancer

Compared to the research on magnetic fields and childhood leukemia, there have been fewer studies of childhood brain cancer, and the epidemiologic evidence reviewed by IARC and WHO was classified as inadequate. In their 2007 review, the WHO recommended that a pooled analysis of childhood brain cancer studies be conducted to "*provide a greater and improved insight into the existing data*" (WHO, 2007, p. 18). Addressing these recommendations, researchers conducted both a meta-analysis (Mezei et al., 2008) and a pooled analysis (Kheifets et al., 2010b) of available studies. The meta-analysis by Mezei et al. (2008) reported no overall

[7] On July 8, 2015, SCENIHR was renamed the Scientific Committee on Health, Environment, and Emerging Risks (SCHEER). Since any publications by this body referenced in this report were published before the name was changed, all citations to their publications will note SCENIHR rather than SCHEER.

association, but reported a statistically non-significant weak association with calculated or measured magnetic fields above 3 to 4 mG based on a sub-analysis of five studies. The pooled analysis by Kheifets et al. (2010b) included data from 10 studies of childhood brain cancer or central nervous system (CNS) cancer published from 1979 to 2010; cases were diagnosed between 1960 and 2001. None of the analyses in Kheifets et al. (2010b) showed statistically significant increases, and the authors concluded that their results provide little evidence for an association between magnetic fields and childhood brain tumors.

Several of the epidemiologic studies of childhood leukemia discussed above also investigated the potential relationship between residential proximity to overhead and underground transmission lines and childhood brain cancer (Bunch et al., 2014, 2015, 2016; Pedersen et al., 2015; Crespi et al., 2016; Auger et al., 2019a; Seomun et al., 2021). None of these studies reported any consistent association between distance to power lines and development of childhood brain cancer. In Bunch et al. (2015), the authors reported a statistical association for childhood brain cancer and an intermediate category of distance (20 to 49.9 meters) but noted that "*such an elevation does not form part of a coherent pattern with other studies*" and thus they were "*therefore inclined to regard this as a chance result*" (Bunch et al., 2015, p. 695). In Auger et al. (2019a), the authors reported a statistically non-significant association between a residential distance of 80 meters from a transformer station and CNS tumors; when stratified by gender, an association was observed for males only. No associations were observed with distance to transmission lines. The meta-analysis performed by Seomun et al. (2021) reported non-statistically significant associations between childhood brain tumors and ELF magnetic fields at both of the exposure levels examined: 0.2 μT (2 mG) and 0.4 μT (4 mG).

In addition, Su et al. (2018) conducted a meta-analysis of 22 epidemiologic studies that investigated the association between parental occupational exposure to ELF magnetic fields and childhood nervous system tumors; the included studies were conducted between the periods of 1942 and 2006. The authors reported a weak statistically significant association between maternal exposure to ELF magnetic fields and childhood CNS tumors, but concluded that the results "*provide limited evidence*" for an association, "*which should be explained with cautions*" (Su et al., 2018, p. 1413).

In summary, the weight-of-evidence does not support an association between EMF and the development of childhood brain cancer. The results of recent studies do not alter the WHO's conclusion that "*the evidence for other childhood cancers [besides leukemia] remains inadequate*," as they did not report any consistent and convincing evidence for an association (WHO, 2007, p. 307). This conclusion is consistent with that of previous and recent assessments (IARC, 2002; EFHRAN, 2012; SCENIHR, 2015).

Breast Cancer

In their 2007 report, the WHO reviewed studies of breast cancer and residential and occupational magnetic-field exposure, as well as electric blanket usage. The WHO noted that these studies, which did not report consistent associations between magnetic-field exposure and breast cancer, were less susceptible to bias compared with earlier studies published prior to the 2002 IARC review, and as a result, "*the evidence for an association between ELF exposure and the risk of breast cancer [was] weakened considerably*" (WHO, 2007, p. 307).

Subsequent research has provided additional support for the WHO's conclusion that there is no association between exposure to ELF EMF and breast cancer development. A large epidemiologic study that investigated the risk of several types of adult cancers and residential distance to high-voltage power lines reported no association between female breast cancer and distance to power lines or estimated exposure to magnetic fields (Elliott et al., 2013). Several occupational epidemiologic studies of female and male breast cancers also provided no support for an association between ELF EMF exposure and breast cancer development (Sorahan, 2012, 2019; Li et al., 2013; Koeman et al., 2014; Grundy et al., 2016). The most recent of these studies[8] (Grundy et al., 2016), reported no statistically significant associations between occupational exposure to EMF and male breast cancer. Together, these studies add to the growing body of evidence against a role for magnetic-field exposure in breast cancer development in either residential or occupational settings. This is supported by the recent

[8] No published epidemiologic studies examining the potential relationship between ELF EMF exposure and breast cancer development have been identified since the Grundy et al. (2016) publication.

review by SCENIHR (2015), which concluded that overall studies on "*adult cancers show no consistent associations*" (p. 158).

Adult Brain Cancer

The 2007 WHO report noted that the findings for adult brain cancer, which was studied in many of the occupational studies of ELF EMF, were inconsistent, although a small association could not be ruled out. The WHO classified the epidemiologic data on adult brain cancer as *inadequate* (WHO, 2007). Subsequent epidemiologic studies of ELF EMF and adult brain cancer predominantly support no association, but remain limited due to weaknesses in exposure assessment methods and insufficient data available on specific brain cancer subtypes.

Several recent studies of occupational exposure to ELF EMF observed no overall association between exposure and the development of glioma (Carlberg et al., 2017), meningioma (Carlberg et al., 2018), or acoustic neuroma (Carlberg et al., 2020). In the glioma study by Carlberg et al. (2017), the authors conducted several sub-group analyses,[9] including analyses by tumor type and exposure time period. An association was reported for a specific subtype of glioma (grade IV astrocytoma) when the analysis was restricted to exposure experienced during the more recent time period (1 to 14 years prior to diagnosis); however, the authors reported no association with more distant exposure periods (15 to 20+ years) and observed no associations for other tumor grades (Carlberg et al., 2017). The authors hypothesized that the observed association for grade IV astrocytoma in the recent exposure periods was the result of a potential effect on cancer promotion, but there is no supporting evidence from other epidemiologic studies or experimental studies.

[9] In addition to the main analyses, researchers may also conduct sub-group analyses of the data, in which subsets, or groups, of the study population are analyzed separately based on one or more shared characteristics (e.g., tumor sub-type, length of exposure duration, gender, age, etc.). The goal of sub-group analyses is to examine if and how the relationship between the exposure and outcome of interest varies across different subsets of the population, and sub-group analyses can sometimes lead to additional research questions that should be explored in future studies. However, sub-group analyses are generally considered secondary to the main analyses and should always be interpreted with caution, as they typically include fewer study participants per group and may represent *post hoc* attempts by researchers to identify any statistically significant associations in the data when none were observed in the main analyses (Fletcher, 2007; Wang et al., 2007).

In addition, Carles et al. (2020) investigated the association between residential proximity to power lines and brain tumor development among adults in France. Several statistically significant associations were reported; however, the associations were not consistent across brain tumor types or exposure metrics, and no clear exposure-response trend was observed. Khan et al. (2021) examined the relationship between magnetic-field exposure and brain tumor development among Finnish residents living in buildings with indoor transformer stations. Exposure to magnetic fields was assessed using the location of the participants' apartment in relation to the location of the transformer station. The authors reported no association between magnetic-field exposure and meningioma based on residential location, and a non-statistically significant association with glioma. No association was reported between brain tumors and duration of residence near transformers. As discussed previously, the use of distance as a proxy for magnetic-field exposure should be considered a limitation of these studies.

In summary, these recent studies do not provide support for a causal association between exposure to magnetic fields and brain cancer development and, as with breast cancer, are consistent with the conclusions of the most recent review by SCENIHR (2015).

Adult Leukemia and Lymphoma

There is vast literature on ELF EMF and adult leukemia, most of which is related to occupational exposure. Overall, the findings of these studies are inconsistent—some studies report a positive association between measures of ELF EMF and leukemia and other studies show no association. In their 2007 review, the WHO classified the epidemiologic evidence for adult leukemia as *inadequate*.

Recent studies do not provide substantial evidence for an association between ELF EMF and leukemia (overall or sub-types) or lymphoma in adults. Talibov et al. (2015) conducted a study of acute myeloid leukemia and occupational exposure to ELF magnetic fields and electric shocks. The authors reported no associations between leukemia and exposure to ELF magnetic fields or electric shocks among either men or women, and the authors concluded that "*the evidence base linking ELF-MF [magnetic fields] with AML [acute myeloid leukemia] risk remains weak*" (Talibov et al., 2015, p. 1084).

Huss et al. (2018a) conducted a study examining occupational exposure to ELF magnetic fields and death from several types of hematopoietic malignancies (leukemias and lymphomas) among adults who participated in Switzerland's 1990 or 2000 census, or both. None of the hematopoietic cancer types included in the main analyses was statistically associated with magnetic-field exposure. The authors hypothesized that the associations observed in some of the sub-analyses may be due to the lack of information on lifestyle factors, such as smoking, which is a well-established cause of leukemias and lymphomas. In the same study, the authors also conducted a meta-analysis of 28 epidemiologic studies of occupational exposure to ELF magnetic fields and acute myeloid leukemia, which resulted in a weak overall association. The authors concluded that the study's findings "*provided no convincing evidence for an increased risk of death*" from hematopoietic cancers in workers occupationally exposed to ELF magnetic fields (Huss et al., 2018a, p. 467). The study by Khan et al. (2021), previously described in the section on adult brain cancer, also examined an association between magnetic-field exposures (based on residential distance from the nearest transformer stations) and hematological neoplasms, including lymphoma and leukemia. A statistically significant association was reported for acute lymphocytic leukemia, based on only four exposed cases. No associations were reported for other leukemia subtypes or for lymphoma or multiple myeloma. The authors concluded that the results *"suggested decreased rather than increased risk of most hematological neoplasms"* (Khan et al., 2021, p. 1).

In summary, the previous conclusion that the evidence for adult leukemia is *inadequate* remains appropriate. While some scientific uncertainty remains on a potential relationship between adult lymphohematopoietic malignancies and magnetic-field exposure because of continued deficiencies in study methods, the current database of studies does not provide sufficient evidence for an association (EFHRAN, 2012; SCENIHR, 2015).

Reproductive and Developmental Effects

In 2002, prior to the WHO report, two studies received considerable attention because of a reported association between peak magnetic-field exposure greater than approximately 16 mG and miscarriage: a prospective cohort study of women in early pregnancy (Li et al., 2002) and a nested case-control study of women who miscarried compared to their late-pregnancy

counterparts (Lee et al., 2002). However, limitations of these studies prevented scientific panels, including the WHO, from making any conclusions about the effect of magnetic fields on miscarriage (NRPB, 2004; FPTRPC, 2005; WHO, 2007). In their 2007 report, the WHO concluded, "*[t]here is some evidence for increased risk of miscarriage associated with measured maternal magnetic-field exposure, but this evidence is inadequate*" (WHO, 2007, p. 254).

Recent research on ELF EMF exposure and reproductive or development effects include studies focusing on female infertility (Esmailzadeh et al., 2019), miscarriage, stillbirth, or pre-term birth (Auger et al., 2012; Wang et al., 2013; Shamsi Mahmoudabadi et al., 2013; Li et al., 2017; Sadeghi et al., 2017) and birth outcomes or defects (Mahram and Ghazavi, 2013; de Vocht et al., 2014; Eskelinen et al., 2016; Sudan et al., 2017; Migault et al. 2018; Auger et al., 2019b; Ren et al., 2019; Ingle et al., 2020; Li et al., 2020). Overall, these additional studies do not provide substantial new evidence in support of an associated between EMF and reproductive or developmental outcomes. Li et al. (2017) examined the association between magnetic-field exposure and miscarriage using 24-hour personal magnetic-field measurements collected on a single day during pregnancy. The authors reported an increased risk of miscarriage in women with high magnetic-field exposure (i.e., the 99th percentile value during the 24-hour measurement of ≥2.5 mG) compared to women with low magnetic-field exposure (<2.5 mG) when measurements were collected on a subject-reported typical day of pregnancy. They reported no association, however, among those women whose exposure was measured on a non-typical day, and no trend was observed for miscarriage risk with increasing magnetic-field exposures >2.5 mG. While personal exposure measurements are an improvement over some of the earlier studies, the collection of only one measurement over a single 24-hour period during pregnancy is a limitation of the Li et al. (2017) study, as day-to-day changes in exposure cannot be captured. Additional limitations include the absence of information on whether the measurements were taken before or after the occurrence of miscarriage and the failure to measure mobility during the measurement day, which is expected vary between women with healthy pregnancies and women who have a miscarriage (Savitz, 2002; Mezei et al., 2006; Savitz et al., 2006).

In a subsequent study on the same population, Li et al. (2020a) assessed whether maternal exposure to magnetic fields was associated with the development of attention-deficit/hyperactivity disorder (ADHD) in their offspring. For this analysis, the authors selected the 90th percentile value observed during the 24-hour measurement period as the exposure of interest, rather than the 99th percentile value previously used in Li et al. (2017). The authors reported a statistically significant association between mothers exposed to high levels of magnetic fields (defined as ≥1.3 mG) and a diagnosis of ADHD in their offspring; a stronger association was observed for children with a diagnosis persisting into adolescence. As noted above, the collection of only one measurement over a single 24-hour period during pregnancy is a limitation of this exposure assessment approach. Further, the specific exposure metrics and cut-points used in both studies are unconventional and have not typically been used in previous epidemiologic studies investigating potential health effects of EMF. The authors' unorthodox decision to use a cut-point of 1.3 mG or higher to define a high maternal exposure level in Li et al. (2020a) was recently called into question by others in the research community for being poorly defined and explained by the authors. As a result, in February 2021, the primary author of the paper issued a notice of retraction and replacement for the study, based on "*errors in the statistical analyses*," and re-analyzed the study data using continuous and categorial exposure levels (Li, 2021). In the revised study, which was published as Supplement 3 to the original 2020 article, the authors concluded that the revised associations *"were inconsistent and nonlinear"* and thus *"the results should be interpreted with caution"* (Li et al., 2020b, p. 10).[10]

Migault et al. (2020) conducted a pooled analysis of two French studies (Vandentorren et al., 2009; Ancel et al., 2014) to examine the relationship between maternal cumulative exposure to magnetic fields during pregnancy and the risk of prematurity or small for gestational age. The authors reported no association between cumulative magnetic-field exposure and prematurity for the two highest exposure categories; conversely, an increased risk of prematurity was observed for the lower exposure category. No consistent associations were observed between cumulative magnetic-field exposure and small for gestational age. The authors concluded that

[10] The replacement article (Li et al., 2020b) is the original article with corrections that are highlighted.

"*due to the heterogeneity of the results regarding exposure levels, the associations observed cannot be definitely explained by ELF-EMF exposure*" (Migault et al., 2020, p. 27).

In summary, recent publications provide little new insight on pregnancy and reproductive outcomes and do not change the classification of the data from earlier assessments as *inadequate*. Studies in this research area continue to suffer from limitations in study design, sample size, and exposure assessment method, which may explain the inconsistent findings (Lewis et al., 2016). The most recent review by SCENIHR concluded that "*recent results do not show an effect of ELF MF [magnetic field] exposure on reproductive function in humans*" (SCENIHR, 2015).

Neurodegenerative Diseases

Research into the possible effect of magnetic fields on the development of neurodegenerative diseases began in 1995; the majority of research since then has focused on Alzheimer's disease and a specific type of motor neuron disease called amyotrophic lateral sclerosis (ALS), which is also known as Lou Gehrig's disease. The majority of the studies reviewed by the WHO reported statistically significant associations between occupational magnetic-field exposure and mortality from Alzheimer's disease and ALS, although the design and methods of these studies were relatively weak. Furthermore, there were no biological data to support an association between magnetic fields and neurodegenerative diseases. The WHO concluded that there are inadequate data to support of an association between magnetic fields and Alzheimer's disease or ALS, stating that "*[w]hen evaluated across all the studies, there is only very limited evidence of an association between estimated ELF exposure and [Alzheimer's] disease risk*" (WHO 2007, p. 194).

Recent studies have examined the potential relationship between EMF, electric shocks, and multiple neurodegenerative diseases, including non-vascular dementia (Koeman et al., 2015; Huang et al., 2020), ALS (Capozzella et al., 2014; Yu et al., 2014; Fischer et al., 2015; Koeman et al., 2017; Vinceti et al., 2017; Gunnarsson and Bodin, 2018; Huss et al., 2018b; Röösli and Jalilian, 2018; Peters et al., 2019, Chen et al., 2020; Filippinni et al., 2020), Parkinson's disease (Brouwer et al., 2015; Pedersen et al., 2017; Checkoway et al., 2018; Gervasi et al., 2019;

Gunnarsson and Bodin, 2019), and Alzheimer's disease (Jalilian et al., 2018; Gervasi et al., 2019; Gunnarsson and Bodin, 2019). Many of these studies included methodological improvements (e.g., increased sample size, improved exposure assessment, inclusion of incidence cases) compared to previous studies. In spite of these improvements, however, the overall evidence from these studies provided no consistent or convincing support for a causal association between ELF EMF exposure and neurodegenerative diseases. The most recent SCENIHR report (2015) concluded that the reviewed studies "*do not provide convincing evidence of an increased risk of neurodegenerative diseases, including dementia, related to ELF MF [magnetic field] exposure*" (SCENIHR, 2015, p. 186).

Several studies have examined the potential role of electric shocks in occupational environments as a possible explanation for the weak and inconsistent association between ELF EMF and ALS. The studies that addressed the issue of electric shocks in the development of neurodegenerative and neurological diseases presented no convincing evidence for an association (Das et al., 2012; Grell et al., 2012; van der Mark et al., 2014; Fischer et al., 2015; Vergara et al., 2015; Peters et al., 2019; Chen et al., 2020).

Cardiovascular Disease

An early hypothesis asserted that magnetic-field exposure may reduce heart rate variability, which in turn is a hypothesized risk for acute myocardial infarction (AMI). In a large cohort of utility workers, Savitz et al. (1999) reported an association with arrhythmia-related deaths and deaths due to AMI among workers with higher magnetic-field exposure. Subsequent studies of similar design did not report a statistically significant increase in cardiovascular disease mortality or incidence of AMI related to occupational magnetic-field exposure, and the WHO concluded that "*[o]verall, the evidence does not support an association between ELF exposure and cardiovascular disease*" (WHO, 2007, p. 220).

The conclusion that there is no support for an association between magnetic fields and cardiovascular diseases has not changed. In the most recent study related to cardiovascular

disease,[11] Elmas (2016) summarized some of the existing literature examining the effects of both long-term and short-term EMF exposure on the heart. The author concluded that "*despite these studies, the effects of EMFs on the heart remain unclear*" and that there is "*not yet any consensus in these works about possible mechanisms by which effects of EMF exposure may occur*" (Elmas, 2016, p. 80).

[11] No published epidemiologic studies examining the potential relationship between ELF EMF exposure and cardiovascular disease have been identified since the Elmas et al. (2016) publication.

Standards and Guidelines

The only confirmed effects of exposure to EMF are acute or short-term effects (such as nerve and muscle stimulation) that can occur at very high field levels.[12] Several scientific organizations have published guidelines for exposure to ELF EMF based on these acute health effects. These organizations completed a thorough review of the health research to identify the lowest exposure level below which no health hazards have been found (i.e., a threshold). Exposure limits are then set well below the threshold level to account for any individual variability or sensitivities that may exist.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) reviewed the epidemiologic and experimental research and concluded that there was insufficient evidence to warrant the development of standards or guidelines on the basis of hypothesized long-term adverse health effects such as cancer; rather, the guidelines put forth in their 2010 document set limits to protect against known acute health effects. ICNIRP recommends a screening value of 2,000 mG for the public and an occupational exposure screening value of 10,000 mG for exposure to magnetic fields (ICNIRP, 2010). The IEEE's International Committee on Electromagnetic Safety (ICES) also recommends limiting magnetic-field exposures at high levels because of the risk of acute effects, although their guidelines are higher than ICNIRP's guidelines; ICES recommends an exposure limit of 9,040 mG for the public and an occupational exposure limit of 27,100 mG (ICES, 2019). The ICNIRP screening value for general public exposure to electric fields is 4.2 kilovolts per meter (kV/m), and the ICES screening value for general public exposure to electric fields is 5 kV/m.[13] All guidelines incorporate large safety factors. The ICNIRP and ICES guidelines provide guidance to national agencies and only become legally binding if a country adopts them into legislation. The WHO strongly recommends that countries adopt the ICNIRP guidelines or use a scientifically sound framework for formulating any new guidelines (WHO, 2006).

[12] These acute and shock-like effects generally cause no long-term damage or health consequences. Limits for the general public and workplace have been set to prevent these effects.

[13] ICES also set a 10 kV/m limit on a transmission line right-of-way.

There are no national recommendations, guidelines, or standards in the United States to regulate EMF or to reduce public exposures. New York and Florida have enacted standards to limit magnetic fields produced by new transmission lines (NYPSC, 1978, 1990; FDER, 1989; FDEP, 1996). However, these standards were set to limit fields from new transmission lines to levels accepted for existing transmission lines.

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