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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

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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).

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[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.

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[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.

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[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."

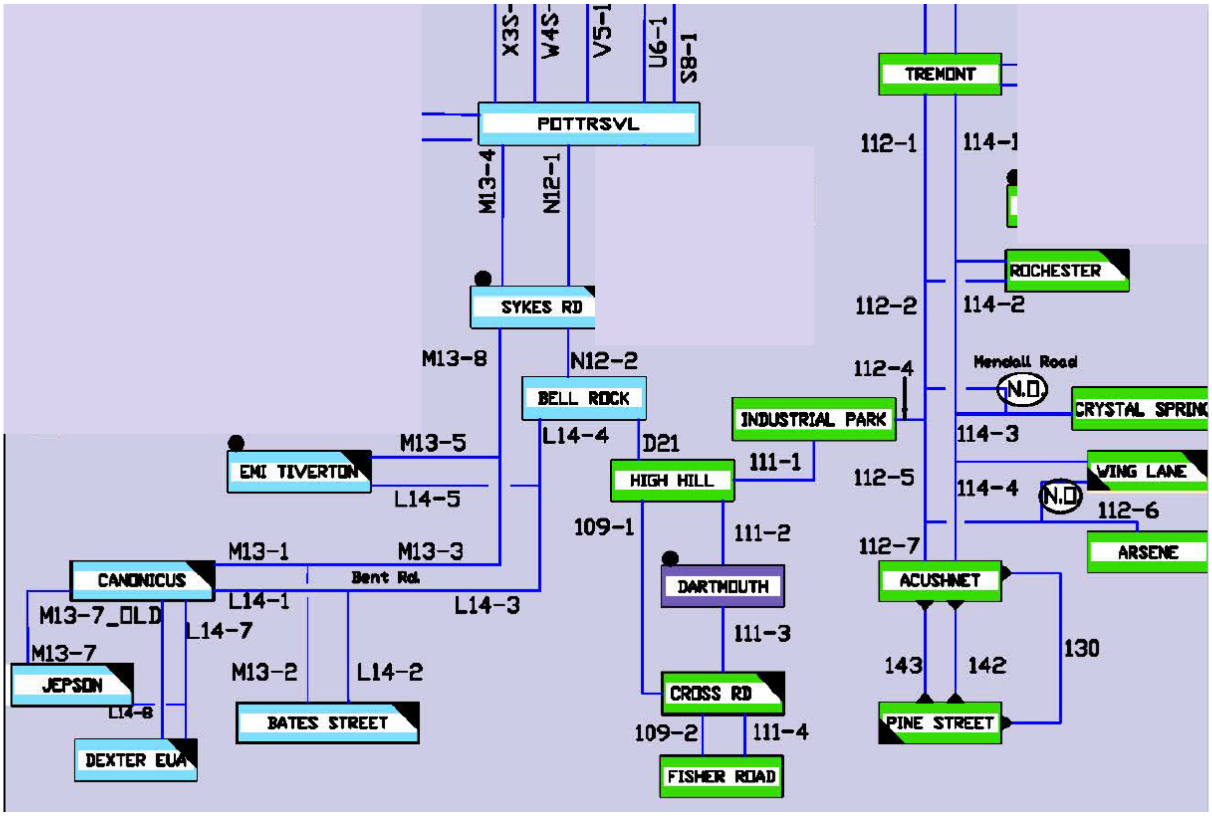
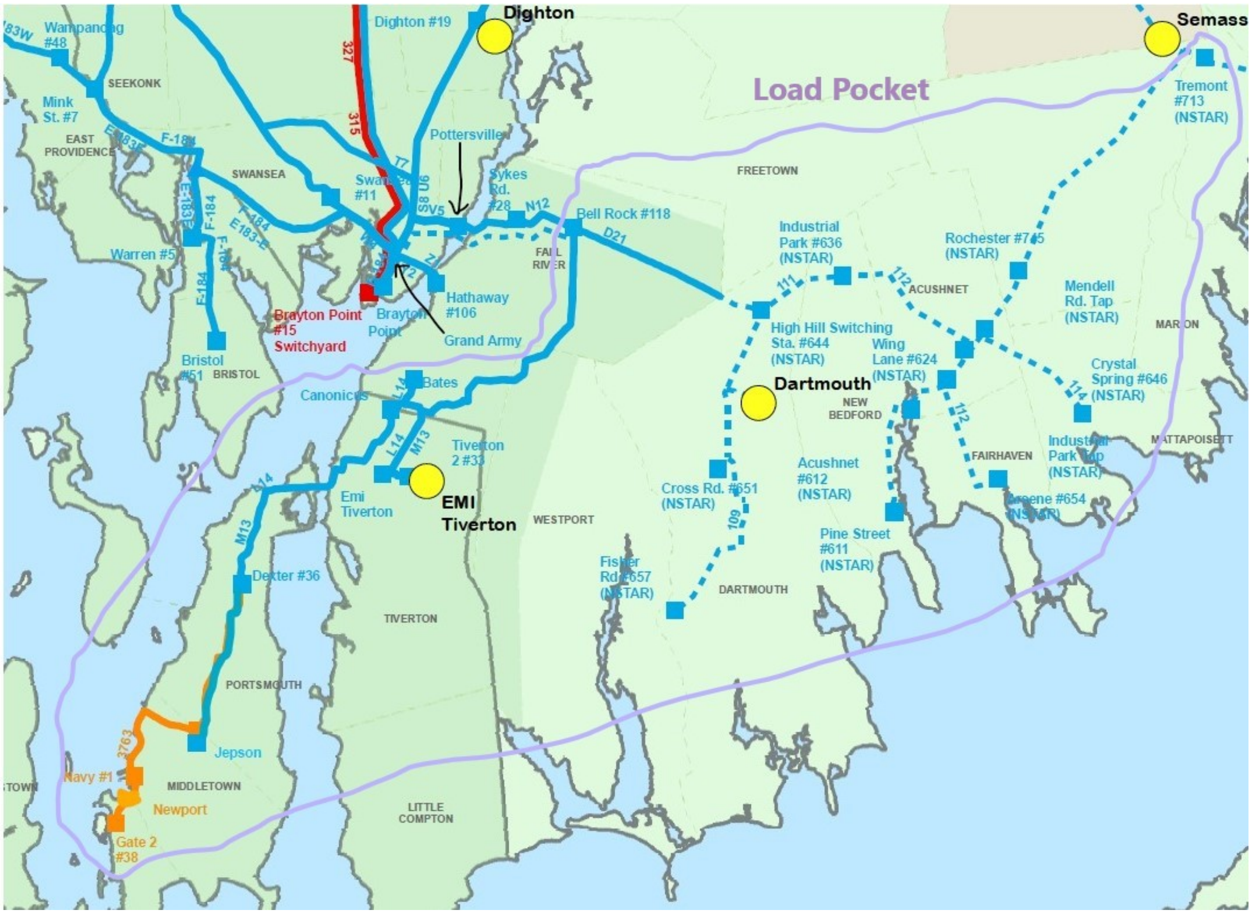


FIGURE 2.1 LOAD POCKET TRANSMISSION SYSTEM ONE-LINE

[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.

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[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

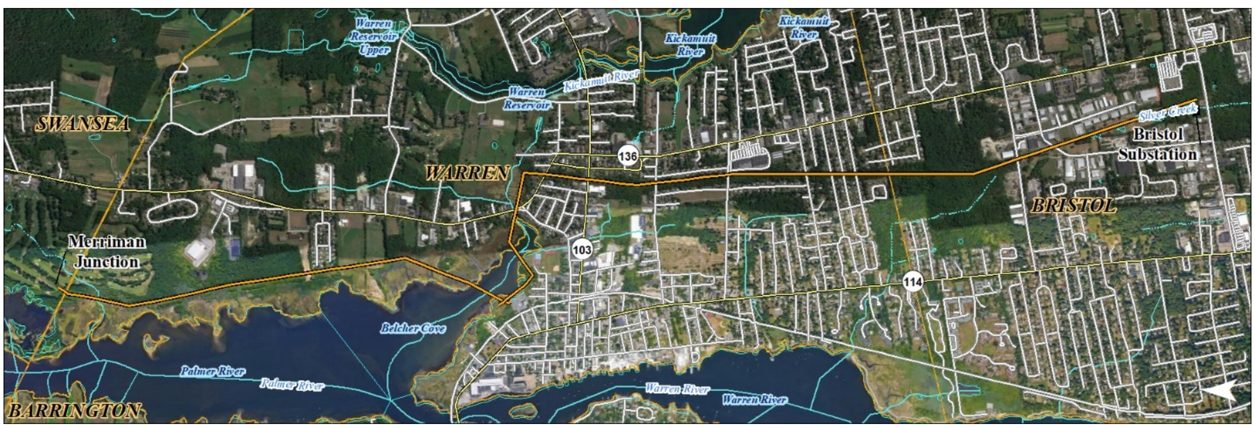

FIGURE 3.2 RECONDUCTORING OF 5.1 MILES OF THE EXISTING 115-KV F-184 LINE

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.

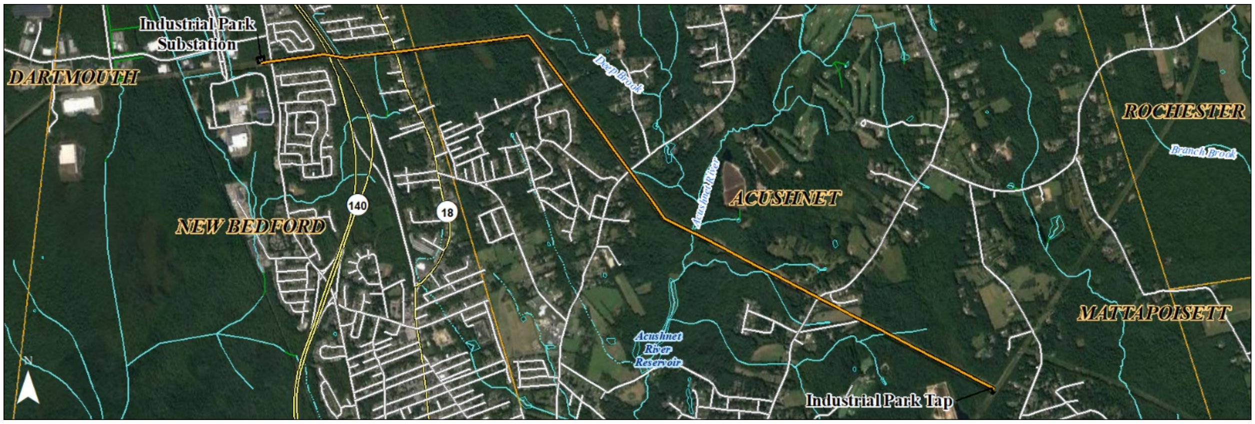

FIGURE 3.3 RECONDUCTORING 4.1 MILES OF THE 115-KV 112 LINE

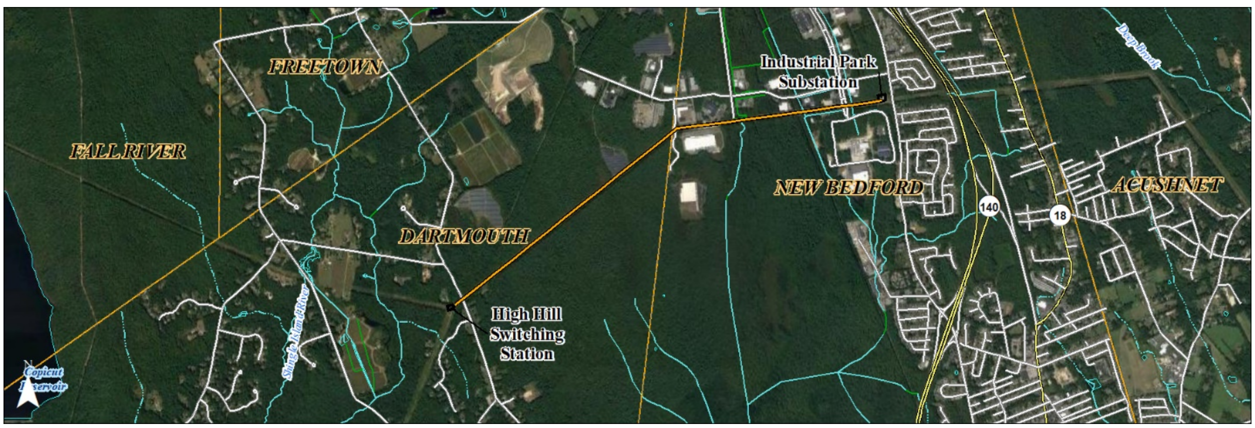

FIGURE 3.4 RECONDUCTORING 2.4 MILES OF THE 115-KV 111 LINE

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 (<u>see</u> 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 (<u>see</u> 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 (<u>see</u> 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 (<u>see</u> 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 (<u>see</u> 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

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[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).

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[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.

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[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.

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[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.

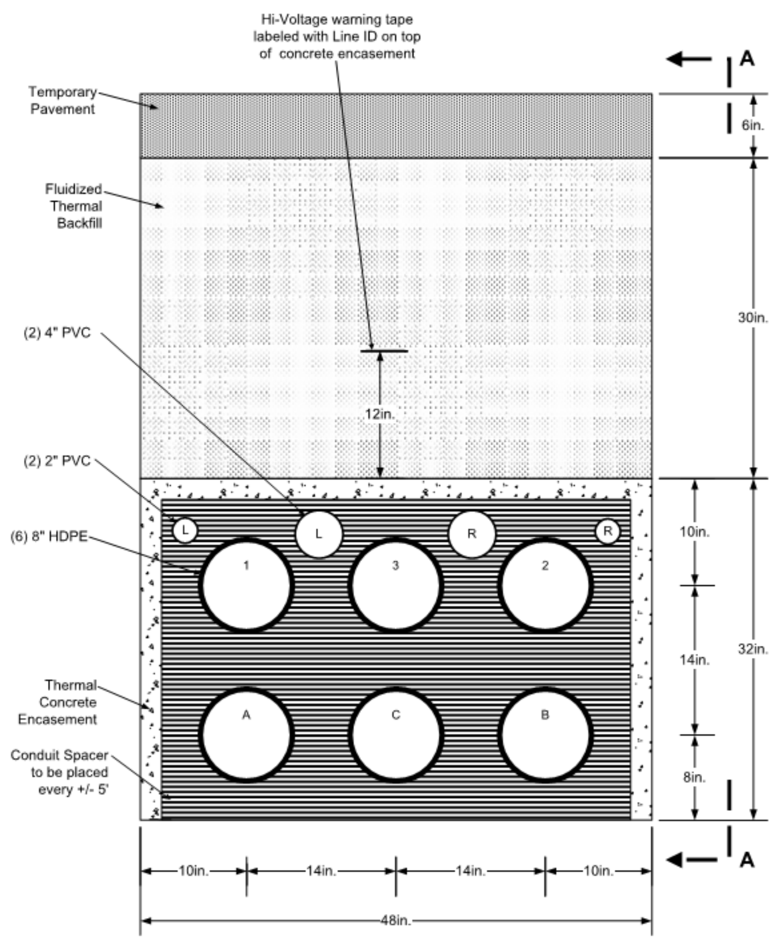

FIGURE 5-4 TYPICAL DUCT BANK CONFIGURATION

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.

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[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).

<u>Preferred Route</u>

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.

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[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.