August 3, 2022

NEW ENGLAND POWER COMPANY d/b/a NATIONAL GRID

N12/M13 Double Circuit Tower Separation Project

Application to Support the Petition before the Department of Public Utilities
D.P.U. 22-95
Volume I of II

Submitted to:
Department of Public Utilities
One South Station, 5th Floor
Boston, MA 02110

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

Prepared by:
POWER Engineers Consulting, PC
2 Hampshire Street, Suite 301
Foxborough, MA 02035

This page intentionally left blank.

TABLE OF CONTENTS (VOLUME I)

TABLES:

FIGURES: (REFER TO VOLUME II UNLESS OTHERWISE NOTED)

**Figures denoted with a single asterisk are located within the text of the document.*

APPENDICES:

***Appendix provided separately in electronic version on thumb drive.*

****Appendices found in Volume I with Application to Support the Petition.*

ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
BMP	Best Management Practice
BVW	bordering vegetated wetland
CB	coastal bank
CBO	Community Based Organizations
CELT	Capacity, Energy, Loads and Transmission Report
Certificate	Certificate on the Expanded Environmental Notification Form filed with the Massachusetts Environmental Policy Act Office
CLL	Critical Load Levels
CMR	Code of Massachusetts Regulations
Company	New England Power Company d/b/a National Grid
CVP	Certified Vernal Pool
dBA	A-weighted decibels
DCT	Double-Circuit Tower
Department	Department of Public Utilities
EEA	Executive Office of Energy and Environmental Affairs
EG303NE	National Grid's Environmental Guidance: ROW Access, Maintenance and Construction Best Management Practices for New England
EJ	Environmental Justice
ENF	Environmental Notification Form
Eversource	NSTAR Electric Company d/b/a Eversource Energy
FEMA	Federal Emergency Management Agency
HDD	horizontal directional drilling
ISO-NE	ISO New England Inc., the Independent System Operator for New England
kV	kilovolt
kV/m	kilovolt per meter
LSCSF	Land Subject to Coastal Storm Flowage
LGP	low ground pressure equipment
LNAPL	light non-aqueous phase liquid
LSP	licensed site professional
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassGIS	Massachusetts Geographic Information System
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
mG	milligauss
MHC	Massachusetts Historical Commission
MHW	mean high water
MVAR	Megavolt Amperes Reactive
MW	Megawatt
MWhr	Megawatt hour
N-1	A first contingency; the largest impact on the system when a first power element (generation or transmission facility) of a system is lost.
N-1-1	A second contingency; the loss of the facility that would have the largest impact on the system after the first facility is lost.
NEP	New England Power Company d/b/a National Grid
NEPOOL	New England Power Pool

NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
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
PAC	Planning Advisory Committee
PAL	Public Archaeological Laboratory
POWER	POWER Engineers Consulting, PC
Project	N12/M13 Double Circuit Tower Separation Project
psi	pounds per square inch
PTF	Pool Transmission Facilities
p.u.	per unit
PV	Photovoltaic
RFA	riverfront area
RMAT	Resilient MA Action Team
PVP	Potential Vernal Pools
RIE	Rhode Island Energy
ROW(s)	Right(s)-of-Way
RSP	Regional System Plan
SEIR	Single Environmental Impact Report
SEMA-RI	Southeastern Massachusetts and Rhode Island
SWPPP	Stormwater Pollution Prevention Plan
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

This page intentionally left blank.

1.0 PROJECT OVERVIEW

1.1 Introduction

Pursuant to G.L. c. 164, § 72, New England Power Company d/b/a National Grid ("NEP" or the "Company") submits this application ("Application") to the Department of Public Utilities (the "Department") in support of its petition for authority to undertake the N12/M13 Double Circuit Tower ("DCT") Separation Project (the "Project"). The Project will be located within an existing electric transmission line right-of-way ("ROW") that extends from NEP's Pottersville Switching Station in Somerset, Massachusetts to Sykes Road Substation in Fall River, a distance of approximately 1.85 miles (see Volume II, United States Geological Survey ["USGS"] Locus Map, Figure 1-1). This ROW is currently occupied by two 115 kilovolt ("kV") overhead transmission circuits called the N12 and the M13 Lines. For approximately 1.85 miles, these lines are supported on double circuit steel lattice towers (i.e., the two circuits, each consisting of three individual phase conductors, share the same series of towers within the ROW). The Project involves the removal of the existing double circuit steel lattice towers and the construction of two sets of single circuit steel monopoles and conductors to carry the separated N12 and M13[1] Lines. With certain limited exceptions, the Project will be constructed entirely within NEP's existing ROW.[2] The Project also includes some minor modifications at the Sykes Road Substation to interconnect the N12 and M13 Lines into the station.

Consistent with statute and Department precedent, the Project is needed to provide a reliable energy supply for the Southeastern Massachusetts and Rhode Island ("SEMA-RI") area, will serve the public convenience, and is consistent with the public interest.

1.2 Project Need

The NEP transmission system is an integral part of the regional power system delivering electricity to customers throughout New England. To maintain the integrity of this system, the Company must ensure that adequate transmission capacity exists to meet existing and projected load requirements. As a transmission provider, NEP must also maintain its system 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 New England Inc., the Independent System Operator for New England ("ISO-NE"); and (4) the Company itself. 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

---

[1] The M13 Line between the Pottersville Switching Station and the Bell Rock Substation will be redesignated M13N Line following the completion of an on-going rebuild of the Bell Rock Substation. NEP anticipates that this redesignation may take place sometime during the pendency of this proceeding. For ease of discussion, this Application refers to both the existing M13 Line and the proposed separated M13 Line as "M13". However, proposed structure numbers (e.g., M13N-6) reflect the anticipated redesignation. The N12 Line will retain the designation of N12 Line. As discussed in Section 2.0, NEP's need and alternatives analyses assume that the Bell Rock Substation Project is in service.
[2] The installation of the proposed approximately 300-foot-tall Y-frame river crossing structure (Structure M13N-6) on the Fall River side of the Taunton River requires additional easement to maintain a safe separation distance from the existing adjacent 300-foot-tall steel lattice river crossing structure. Additionally, NEP's engineering design includes an option to eliminate the installation of Structures M13N-13 and N12-13 if additional easement can be secured for the overhead wire spans. NEP is in discussion with the affected landowners in attempts to obtain the necessary real estate easements.

specified in these reliability criteria, the Company 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, and Marion 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 and from updated analysis undertaken by the Company, including a description of the process by which system reliability was analyzed and the need for the Project was determined, are provided in Section 2.0 of this Application. In summary, Section 2.0 demonstrates that the Project is immediately required to prevent voltage collapse within the Load Pocket and thermal overloads on NEP and NSTAR Electric Company d/b/a Eversource Energy ("Eversource") transmission equipment under a range of transmission system contingencies. 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 SEMA-RI area.

1.3 Project Alternatives

The Company evaluated several alternative means of addressing the identified need for the Project. The Company evaluated: (1) a "No-Action Alternative;" (2) an Undersea Cable Alternative based on Alternative 1 identified in ISO-NE's 2026 Solutions Study; (3) a Hybrid Solution involving the reconductoring of 34.6 miles of 115 kV transmission lines and the installation of a 150 megavolt amperes reactive ("MVAR") synchronous condenser at Eversource's High Hill Substation and a 30 MVAR synchronous condenser at the Rhode Island Energy ("RIE") (formerly The Narragansett Electric Company)[3] Dexter Substation; and (4) non-transmission alternatives ("NTAs") including active and passive demand response, energy storage and solar photovoltaics, utility-scale generation, and off-shore wind. As described more fully in Section 3.0 of this Application, through this assessment, the Company 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 Project Description

NEP proposes to separate a 1.85-mile segment of its existing N12 and M13 overhead transmission lines, currently installed on double circuit steel lattice towers, and place the lines on two distinct sets of structures. The existing double circuit segment begins at existing Structure 4 on the west shore of the Taunton River in Somerset, crosses the Taunton River into Fall River, and continues easterly within an existing NEP transmission corridor to the Sykes Road Substation in Fall River ("Project Route").

To accomplish this separation, NEP will remove a total of seven existing steel lattice towers, one 3-pole structure, and one H-frame structure and replace these structures with 11 paired, single circuit steel monopole structures; four intermediate single circuit steel monopole structures; and two steel H-frame structures. Existing structures range in height from approximately 50 to 110 feet and replacement structures will range in height from 65 to 130 feet. Additionally, at the Taunton River crossing, the two existing approximately 300-foot-tall steel lattice towers will remain in place (existing structures N12-1 and N12-2 to be renumbered as N12-5 and N12-6, respectively) and two new approximately 300-foot-tall galvanized steel Y-frame monopole structures will be installed (proposed structures M13N-5 and M13N-

[3] On May 25, 2022, National Grid completed the sale of its Rhode Island gas and electricity businesses to PPL Corporation. PPL Corporation will operate these Rhode Island businesses as Rhode Island Energy.

6), one on each side of the river. The existing conductor between existing structures N12-5, N12-6 and N12-7 will be electrically connected (bussed) to become the N12 Line. Overhead conductor will be installed between proposed N12 structures N12-7 and N12-19, and between proposed structures M13N-5 and M13N-19 and from there, into the Sykes Road Substation where they will be terminated onto existing structures. Two new line disconnect switches will be installed at the Sykes Road Substation to accept the N12 and M13 Lines.

The new N12 and M13 monopole structures will be constructed within NEP's existing ROW to replace the existing DCT transmission structures. Construction of the Y-frame river crossing structure proposed on the Fall River side of the Taunton River (proposed structure M13N-6) will require additional temporary and permanent property rights from the adjacent landowner for installation of the structure and to maintain safe horizontal clearance from the existing river crossing tower. NEP is also seeking to eliminate the construction of proposed structures N12-13 and M13N-13 (located on the west side of Highland Avenue), if additional real estate easements can be obtained from the abutting property owners; if not, these structures will be constructed as part of the Project. The remainder of the Project will be constructed on NEP property and within NEP's existing ROW.

1.5 Project Schedule and Cost

Assuming receipt of all necessary permits and approvals, construction of the Project is anticipated to commence in late 2024. Current plans call for the Project to be energized by late 2026.

The current cost estimate for the Project is approximately $69.8M (2022 dollars) and is a +25% / -25% grade cost estimate.

1.6 Construction Overview

This section provides an overview of proposed construction methods to be used for the Project.

Generally, there are eight phases of construction for an overhead transmission line project: (1) removal of vegetation and ROW mowing in advance of construction; (2) installation of soil erosion and sediment controls; (3) construction and improvements to access roads; (4) structure 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; (7) removal and disposal of transmission line components; and (8) 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.

A more detailed construction overview can be found in Section 4.0 of this Application.

1.7 Minimization of Project Impacts

The Project as proposed will have minimal and largely temporary impacts to the human and natural environments. These impacts include: (i) approximately 2.6 acres of temporary impact and approximately 1.0 acre of permanent impact to Land Subject to Coastal Storm Flowage for the purposes of creating access to and erecting the proposed 300-foot-tall river crossing structure along the east bank of the Taunton River; (ii) approximately 1,600 square feet of temporary impact to salt marsh to string the new overhead conductors; (iii) approximately 0.25 acre of permanent impact to coastal bank to establish access to the proposed river crossing structure in Fall River; (iv) approximately 2.7 acres of temporary impact and approximately 400 square feet of permanent impact to bordering vegetated wetlands resulting from the temporary installation of construction mats and installation of new structure foundations, respectively; and (v) intermittent temporary increases in noise, dust and traffic during construction along the existing ROW. Section 4.0 of this filing provides a more detailed summary of the temporary and permanent impacts associated with the Project, including impacts related to land use, historical / archeological sites, wetland and water resources, climate change, rare species habitat, oil and hazardous materials, air quality, visual impacts, noise, traffic and transportation, electric and magnetic fields (“EMF”), and environmental justice (“EJ”) populations.

Siting of the Project on an existing ROW and use of appropriate best management practices during construction will assist in avoiding significant impacts to the environment. Based on a thorough analysis of potential alternatives, the Project, as proposed is the alternative with the least impact to the environment that meets the identified need for the Project.

1.8 Agency and Community Outreach

NEP is 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. NEP’s initial outreach efforts have been aimed at briefing local officials and other stakeholders on the need for the Project; providing stakeholders with details regarding the Project Route; detailing the overall Project schedule; and explaining the permitting and siting processes, including opportunities for public input. NEP 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 NEP’s outreach program for the Project are described below. Additional information related to outreach to EJ populations is provided in Section 4.5.12 of this Application.

Open Houses: NEP held two Open Houses to introduce the Project. Both Open Houses were held in virtual settings that provided the public with opportunities to speak with subject matter experts, ask questions, and share concerns about the Project. The Open Houses were held on June 21, 2022, and July 14, 2022, using the Zoom Virtual Platform. At each Open House, NEP provided a Project overview with a focus on the need, the benefits, the permitting process, location, design, schedule, anticipated construction activities, as well as a summary of participation opportunities for all interested persons. Live translators were available in Spanish and European Portuguese. A recording of both Open Houses is posted on the Project website and may be viewed in the languages listed above and also in Cape Verdean Portuguese.

In preparation for the virtual Open Houses, NEP actively sought meaningful conversations with all interested stakeholders, including residents of EJ populations, by creating and mailing invitations in multiple languages (featuring, in equal parts: English, Spanish, Cape Verdean and European Portuguese) to all property owners along the Project Route and to municipal officials. The invitation included a QR code that provided instant access to each virtual Open House via a simple scan using any smartphone/device. NEP’s outreach team subsequently conducted door-to-door visits with abutters to remind them of the upcoming Open House and gather any input. The handouts distributed during the door-to-door outreach also were printed in English, European Portuguese, Cape Verdean, and Spanish. Community Based Organizations (“CBOs”) and community groups in Fall River and Somerset, as recommended by city employees, were contacted with information on how to attend the event. These organizations sent invitations to their members. The Open Houses were also advertised online at the City of Fall River's website and social media account. NEP ran multiple newspaper advertisements in the Herald News and The Reporter prior to the second Open House. Posts were made on local Fall River social media accounts including Facebook pages like "Fall River," "Growing up in Fall River," "Grew up in Fall River," and "Growing up in New Bedford." Flyers for the event were posted in community centers including the Town Hall and the Public Library.

During each virtual Open House, the presentation material was narrated in English with live, simultaneous European Portuguese and Spanish interpretation. This was made possible by having experienced professional interpreters at the virtual Open House – one interpreter for each language in different breakout rooms – to provide smooth, continuous coverage of the Open House. The interpretation was bi-directional with the dominant amount from English into European Portuguese, Cape Verdean, and Spanish. To achieve the best possible experience for the virtual Open House attendees, NEP sent a prepared presentation to all interpreters a week prior to the event so that they had sufficient opportunity to familiarize themselves with the content and resolve any questions/concerns prior to the virtual Open Houses.

Door-to-Door: NEP has conducted door-to-door outreach on multiple occasions to notify the landowners of the proposed Project, to promote awareness of the Open House events, and to address any questions or concerns that abutters may have had. Outreach materials were printed in English, European Portuguese, Cape Verdean, and Spanish.

Website: NEP hosts a Project website, https://www.southcoastreliabilityprojects.com/N12M13-Upgrade/. The website provides basic Project information, maps, regular updates, a construction process animation video, and contact information. The website can be viewed in English, Spanish and European Portuguese. The website will be maintained and updated for the duration of the Project.

Project Hotline: NEP has a dedicated toll-free number (1-833-233-7277) for the Project. The Project hotline number is included in all Project outreach materials, including fact sheets, subsequent mailings, the websites, and at all community events. NEP commits to responding promptly to all inquiries received via the Project hotline. To date all inquiries received through the hotline have been answered within a few days.

Project Email: NEP has designated **info@southcoastreliabilityprojects.com** as its Project email address. The email address is included in all Project outreach materials, including fact sheets, mailings, the website, and at all community events. As with the hotline, NEP commits to responding promptly to all inquiries received via the Project email.

Multilingual Materials: All collateral and Project related materials, including a fact sheet and a map, are available in English, European Portuguese, Cape Verdean, and Spanish. The Project website provides content in English, European Portuguese, and Spanish. Additionally, the virtual Open Houses, held in June and July of 2022, included translators who interpreted the presentation content in English, European Portuguese, Cape Verdean, and Spanish along with a chat option.

Municipal and Stakeholder Briefings: NEP has met with municipal officials and other stakeholders in Fall River, 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
2015-Present (various dates)	MassDOT and MBTA	Engineering design meetings to discuss the NEP project and the MBTA South Coast Rail Project
July 17, 2018	Massachusetts Department of Environmental Protection, Southeast Regional Office	Project introduction and overview of state permitting
August 7, 2018	USACE, New England District	Project introduction and overview of federal permitting
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 and review of Project scope of work
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
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
October 21, 2021	MEPA	Remote consultation, NEP provided supplemental information for the Expanded ENF
November 3, 2021	MEPA	Remote consultation meeting with Environmental Analyst
November 9, 2021	MEP	Response to questions and comments received during the November 9, 2021 remote consultation meeting
May 10, 2021	Fall River: City Engineer	Project status update
December 20, 2021	Fall River: City Mayor, City Engineer, City Water Dept., City Utilities, Police Chief	Project status update
February 8, 2022	Fall River: City Engineer, City Water Dept., City Utilities, Police Chief	General status update
May 3, 2022	MA NHESP	Response to MESA Checklist
May 26, 2022	MEPA	SEIR Pre-filing meeting
June 21, 2022	Virtual Open House	Project need, benefits, permitting, location, design, schedule, construction activities, participation opportunities
July 14, 2022	Virtual Open House	Project need, benefits, permitting, location, design, schedule, construction activities, participation opportunities

Note: Acronyms/abbreviations are defined on the list at the beginning of this document.

NEP has also had discussions with the building inspectors of Somerset and Fall River, Massachusetts, to discuss the Project and confirmed that no zoning related approvals are required for the Project.

Construction Community Outreach Plan: NEP 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. NEP 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:

- Door-to-door outreach throughout construction to notify landowners of upcoming activities and to address any questions or concerns they may have. Translation services will be accessible through this form of outreach.

- In-person pre-construction briefings with municipalities and other stakeholder groups.
- Regular email updates to municipal officials.
- Periodic letters to abutters and other stakeholders regarding advance notice of scheduled construction activities. These letters will be written in English, Spanish, European Portuguese, and Cape Verdean.
- Meetings, emails, and phone calls with concerned landowners and Project personnel will be held on a case-by-case basis.
- Weekly newsletters or updates sent to abutters upon request via email on construction related progress and activities
- Opportunity to sign up for email updates by scanning a QR code.
- Meetings with affected property owners prior to each major stage of construction.

1.9 Massachusetts Environmental Policy Act Status

NEP submitted an Expanded Environmental Notification Form ("Expanded ENF") for the Project to the Massachusetts Environmental Policy Act ("MEPA") Office on September 30, 2021. On October 22, 2021, the MEPA Office published notice of the Expanded ENF for public review in the *Environmental Monitor*, stating that public comments would be due on November 22, 2021. On November 29, 2021, the Secretary of Energy and Environmental Affairs issued a Certificate ("Certificate") on the Expanded ENF for the Project (EEA #16467). The Secretary scoped the Project for the preparation of a Single Environmental Impact Report ("SEIR"). The Expanded ENF and the Secretary's Certificate are provided as Appendices 1-1 and 1-2.

The MEPA Office has issued new regulations and EJ outreach protocols which became effective on December 24, 2021, and January 1, 2022, respectively. The Project was already through the Expanded ENF stage of the MEPA process prior to the adoption of the regulations and protocols. Consistent with the protocols and after consultation with the MEPA Office, NEP has 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 2022 Open House presentations in Spanish, Cape Verdean, and European Portuguese.

NEP is actively preparing the SEIR to address Project updates and the items scoped by the Secretary in the Certificate. The Company anticipates filing the SEIR with the MEPA Office in the third quarter of 2022. NEP will comply with all applicable EJ regulations and/or protocols and will coordinate with the MEPA Office regarding ongoing outreach and communications to EJ populations, CBOs, Tribal organizations, and other organizations as recommended by the City of Fall River during the SEIR review process.

1.10 Conclusion

The Project will address critical reliability issues affecting the existing transmission system. NEP seeks authority to construct the Project to fulfill its obligations to ensure safe and reliable transmission service to its customers. NEP will meet this objective through construction and operation of the Project. For the reasons described in greater detail in the subsequent sections of this Application, the Project conforms to the Department's standards under G.L. c. 164, § 72, and should therefore be approved by the Department.

This page intentionally left blank.

2.0 PROJECT NEED

2.1 Introduction

The NEP transmission system is an integral part of the regional power system, delivering electricity to customers throughout New England. To maintain the integrity of this system, the Company must ensure that adequate transmission capacity exists to meet existing and projected load requirements. As a transmission provider, NEP must also maintain its system 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) the NPCC; (3) ISO-NE; and (4) the Company itself. 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 Company must plan and implement system additions and upgrades to address the identified performance issues and remain in compliance with the standards.

The Project was first identified as a solution to meet regional transmission system needs 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 forecast. The 2029 Needs Update is provided as Appendix 2-2. The Company is making this Application in accordance with ISO-NE's directive to "bring the identified projects to completion" (2029 Needs Update at Section 6.1).

As more fully described below, the Project addresses the potential for thermal overloads on NEP's N12 and M13 Lines and on Eversource's existing 115 kV 111, 112, and 114 Lines following a range of N-1-1[4] contingencies, by eliminating the potential for loss of both the N12 and M13 Lines due to a double-circuit tower contingency following the loss of another 115 kV line. The reconductoring of the N12 and M13 Lines address the thermal overloads on the N12 and M13 Lines due to loss of either N12 or M13 following the loss of another 115 kV line. The Project also addresses the potential for widespread voltage collapse following an N-1-1 contingency at forecasted load levels, and at levels already experienced in 2020 and 2021. 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, including areas served by NEP, RIE, and Eversource. 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 green;

[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.

RIE's substations and municipalities are shaded blue; NEP's substations and municipalities are not shaded.

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 west by 115 kV lines extending from NEP's Pottersville Switching Station,[5] and from the east by 115 kV lines extending from Eversource's Tremont Substation. For purposes of this filing, the area will be referred to as the "Load Pocket."

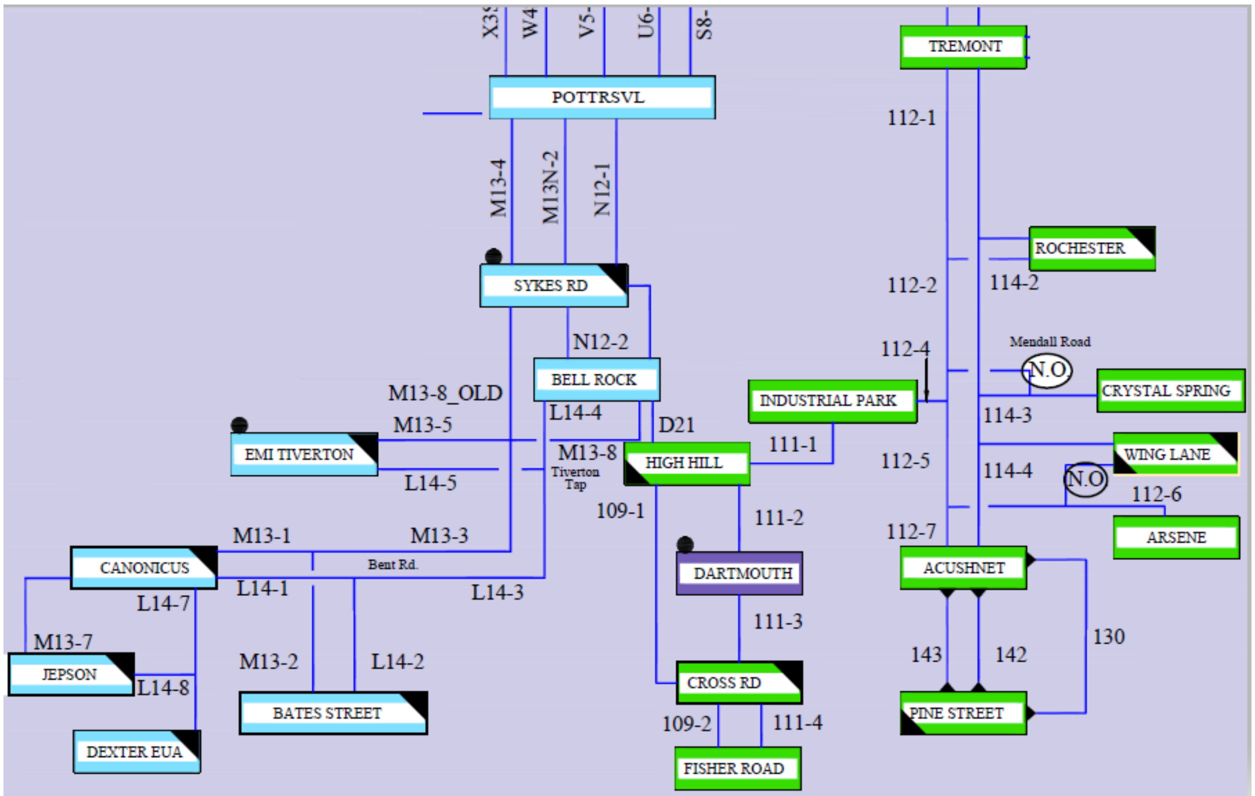
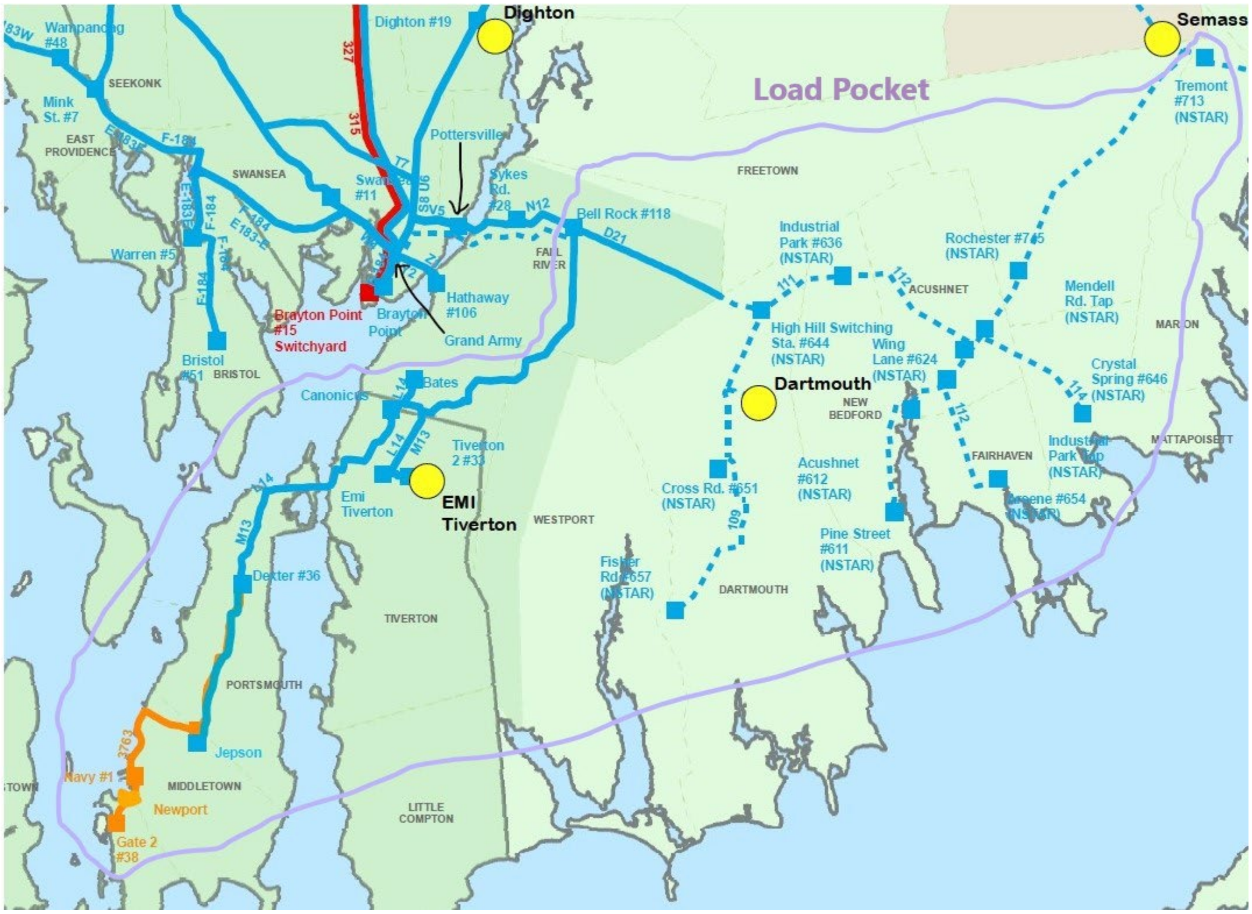


FIGURE 2-1 LOAD POCKET TRANSMISSION SYSTEM ONE-LINE

[5] Pottersville Switching Station was formerly known as Somerset Substation. The name was changed when the substation was completely rebuilt as a part of a recent NEP Asset Condition improvement project.



* Color Key: Red 345 kV, Blue 115 kV, Orange 69 kV; Solid lines are owned by National Grid in Massachusetts and RIE in Rhode Island; dashed lines are owned by Eversource.

FIGURE 2-2 LOAD POCKET TRANSMISSION SYSTEM MAP

As shown in the figures above, the Company's N12 Line runs between its Pottersville Switching Station and Bell Rock Substation, serving the Load Pocket from the west. The Company's M13 Line runs between its Pottersville Switching Station and RIE's Jepson Substations; although the line passes through Bell Rock Substation, it does not currently interconnect there.[6] The N12 and M13 Lines share a ROW between Pottersville and Bell Rock and are currently double-circuited (i.e., they share the same transmission tower) between Pottersville Switching Station and Sykes Road Substation.

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 Company's 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.

---

[6] As discussed in Section 1.0, NEP plans to connect the M13 Line to the Bell Rock Substation as part of the ongoing rebuild of the Bell Rock Substation.

2.3 Transmission Planning Standards

The Company 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 and planning 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 NEP service territory, 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 that 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 Company itself develops its own planning guidelines that are specific to the Company's territory.

The Company is 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, "Reliability Standards for the New England Pool Transmission Facilities."
- Transmission Group Procedure ("TGP") 28, National Grid Transmission Planning Guide.

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 a regional transmission plan using a 10-year planning horizon.

Needs Assessments are designed to identify future system needs on the regional transmission 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 10-year transmission plan is referred to as the Regional System Plan ("RSP"). The Company's 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 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 periodic Needs Assessments undertaken by ISO-NE subject to stakeholder review and input; (2) potential transmission solutions that meet identified system needs are evaluated through Solution Studies or a competitive process; (3) if the need is determined to be within three years, Solution Studies are prepared to identify the preferred regulated transmission solution; (4) proposed regulated transmission solutions are reviewed and approved by ISO-NE; and (5) a transmission cost allocation review is conducted.

2.4 The 2026 SEMA-RI Area Study

ISO-NE led a Needs Assessment study to evaluate the performance of the transmission system serving SEMA-RI[7] under the reliability standards listed in Section 2.2, 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.

2.5 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

[7] The study area included ISO-NE's SEMA and RI load zones, which together encompass the areas within Massachusetts located south of Boston as well as the entire state of Rhode Island.

components would still be needed to solve any criteria violations identified in SEMA-RI for the year 2029.[8] 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 SEMA-RI 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 ID 1720).

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

PROJECT ID	PROJECT DESCRIPTION
1720	Separate the N12/M13 DCT 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-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

Note: Acronyms/abbreviations are defined on the list at the beginning of this document.

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 LOADING
112-4	Industrial Park Tap to Industrial Park	153.7
111-1	High Hill to Industrial Park	138.7
L14-3	Bent Rd to Tiverton	119.0
L14-4	Bell Rock to Tiverton	111.8
L14-7	Canonicus to Dexter W	101.8

[8] Section 3.2 of the 2029 Needs Update states that "ISO Planning Procedure No. 3, "Reliability Standards for the New England Area Pool Transmission Facilities," was updated on 09/15/2017, after the completion of the SEMA/RI 2026 Needs Assessment." As revised, Planning Procedure 3 does not require system reliability testing for N-1-1 contingencies where the second contingency involves a multiple facility event (double-circuit tower or breaker failure) on equipment that is not a part of the bulk power system. However, the NPCC Regional Reliability Reference Directory #1 does require system reliability testing for N-1-1 contingencies where the second contingency involves a multiple facility that is part of the bulk power system. The N12 and M13 Lines are bulk power system facilities, thus, the Project is needed to achieve compliance with the NPCC design criteria.

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

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

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 would affect approximately 161,000 electric customers in Southeast Massachusetts and Rhode Island.

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 NEP to bring these projects to completion.[9] The confirmed projects include the Project (Project ID 1720) proposed herein by the Company.

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
1722	Extend Line 114 – Eversource/National Grid border to Bell Rock[1]
1730	Extend Line 114 – Eversource/National Grid border to Industrial Park tap[1]
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

Notes: Acronyms/abbreviations are defined on the list at the beginning of this document.
[1] The Line 114 Extension (Projects 1722 and 1730), which is currently under review by the Energy Facilities Siting Board in docket EFSB 21-04/D.P.U. 21-149, addresses different contingencies and is geographically distinct from the Project.

2.6 Additional Needs Analysis Performed by the Company

To address the changing load forecasts and inconsistency with observed actual loads (see Section 2.7.1, below), and to serve as a basis for an updated alternatives analysis (since ISO-NE did not issue an updated Solutions Study report), the Company analyzed the performance of the transmission system with all required SEMA-RI upgrades in place except for the Project (ID 1720) 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 Company's analysis confirmed the need for the Project.

2.6.1 Load Forecast Scenarios

For consistency with the traditional 10-year horizon used for planning purposes, the Company examined 2031 load projections for two different net peak load forecasts for the Load Pocket -- (1) the 2021 ISO-

[9] 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.

NE CELT Forecast; and (2) a forecast that combines internal NEP and Eversource forecasts for substations within the Load Pocket ("Companies' Forecast").[10]

Table 2-9 presents the projected 90/10[11] 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 these two forecasts, with most of the disparity occurring in the Eversource portion of the Load Pocket. A detailed analysis of the differences between these forecasts was provided in the Companies' Analysis presented in Docket No. EFSB 21-04/D.P.U. 21-149.[12] In summary, 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. In both cases, the Eversource forecast relied on more granular information specific to the Load Pocket.[13]

For the NEP/RIE portion of the Load Pocket, the difference between the two forecasts is 19 MW, or about 8%. This difference is attributable to more granular forecasts of peaks in specific load zones and the use of Company-specific information and methodologies for forecasting energy efficiency, solar photovoltaic ("PV"), electric vehicles, electric heat pumps, energy storage, and Company-run demand response programs. Like Eversource, NEP adjusts the assumed PV contribution based on the anticipated hour of peak load. In 2020, this part of NEP'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, at which time the PV contribution would be even lower.

Overall, NEP believes that the Companies' Forecast better represents actual conditions within the Load Pocket, and therefore provides a better basis for transmission planning within the Load Pocket, than does the 2021 CELT Forecast.

2.6.2 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 2-10 compares actual and weather-adjusted peak loads for 2020 and 2021 for the Load Pocket to the ISO-NE projected 2021 load from the 2021 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

[10] The Companies' Forecast has also been provided in the joint application of National Grid and Eversource currently under review in Docket No. EFSB 21-04/D.P.U. 21-149. The forecast was developed prior to the sale of National Grid's Rhode Island assets to RIE.
[11] 90/10 load forecast specifies a 10% probability that the forecast could be exceeded.
[12] The relevant portions of the Analysis are provided as Appendix 2-4.
[13] The Department extensively examined similar differences between the ISO-NE and Eversource forecasts in Docket No. D.P.U. 20-67 and determined in that instance that "for the Kingston Load Pocket, the Company's forecast is more suitable than the load-pocket forecast derived from ISO-NE's CELT Report." Eversource Energy, D.P.U. 20-67, at 24 (2022).

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 2-10 NET PEAK LOADS

	2021 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

Note: Units are in megawatts.

Moreover, the 2021 CELT Forecast shows declining loads within the Load Pocket over time, resulting in a peak forecast of only 403 MW for the Load Pocket in 2031, which is 111 MW, or 22%, lower than the 2021 weather-adjusted peak. This projection appears inconsistent with recent experience regarding actual peak demand in the Load Pocket as well as the Commonwealth's plans for increasing electrification within Massachusetts.[14] The 2020 and 2021 Weather-Adjusted scenarios analyzed below show the anticipated transmission system impacts of 90/10 weather at present-day load levels.

2.6.3 Results of Scenario Analysis

Table 2-11 provides the thermal loading violations identified in the Company's analysis 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 Forecast. As shown in Table 2-11, large thermal overloads were observed on segments of the Company's N12 and M13 Lines and on Eversource's existing 115 kV Lines 111 and 112 under N-1-1 contingency conditions.[15] These overloads will be fully addressed by the Project.

TABLE 2-11 N-1-1 THERMAL OVERLOADS

OVERLOADED ELEMENT	THERMAL LOADINGS (% LTE)			
	2031 ISO-NE Forecast (based on 2021 CELT)	2020 Weather-Adjusted Load	2021 Weather-Adjusted Load	2031 Companies' Forecast
	Load Pocket 405 MW	Load Pocket 528 MW	Load Pocket 514 MW	Load Pocket 555 MW
Industrial Park – High Hill 115-kV (Line 111)	115%	N/A[1]	N/A[1]	N/A[1]
Industrial Park - Industrial Park Tap 115-kV (Line 112)	124%	N/A[1]	N/A[1]	N/A[1]

[14] The 2022 CELT Report projects that 90/10 net summer peak loads for the entire New England region will rise from 26,416 MW to 27,139 MW between 2022 and 2031.

[15] Thermal overloads would also be expected on Eversource's Line 114 under certain contingencies; however, these thermal overloads cannot be specified because the voltage collapses in the Load Pocket and the power flow case does not solve in the Companies' modeling.

OVERLOADED ELEMENT	THERMAL LOADINGS (% LTE)			
	2031 ISO-NE Forecast (based on 2021 CELT)	2020 Weather-Adjusted Load	2021 Weather-Adjusted Load	2031 Companies' Forecast
	Load Pocket 405 MW	Load Pocket 528 MW	Load Pocket 514 MW	Load Pocket 555 MW
Industrial Park Tap – Crystal Tap 115 kV (Line 112)	117%	N/A[1]	N/A[1]	N/A[1]
Crystal Tap to Rochester 115 kV (Line 112)	117%	N/A[1]	N/A[1]	N/A[1]
Rochester to Tremont 115 kV (Line 112)	118%	N/A[1]	N/A[1]	N/A[1]
Industrial Park Tap – Crystal Tap 115 kV (Line 114)	85%	N/A[1]	N/A[1]	N/A[1]
Crystal Tap to Rochester 115 kV (Line 114)	86%	N/A[1]	N/A[1]	N/A[1]
Rochester to Tremont 115 kV (Line 114)	87%	N/A[1]	N/A[1]	N/A[1]
Pottersville to Sykes Road 115 kV (Line M13)	100%	124%	122%	130%
Sykes Road to Bell Rock 115 kV (Line M13)	90%	115%	112%	121%
Pottersville to Sykes Road 115 kV (Line N12)	100%	124%	123%	131%
Sykes Road to Bell Rock 115 kV (Line N12)	91%	116%	113%	123%

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 2-12 provides the voltage results for the Company's analysis for the same four instances shown in Table 2-11. The table shows acceptable voltages for the 2031 ISO-NE forecast load based on the 2021 CELT Report. However, under the other three scenarios, N-1-1 contingencies result in total voltage collapse[16] and loss of load throughout the Load Pocket. The risk of voltage collapse will also be fully addressed by the Project.

---

[16] 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."

TABLE 2-12 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, but approaching voltage collapse	Voltage Collapse	Voltage Collapse	Voltage Collapse

Notes: MW = megawatt; kV = kilovolt.

Additional sensitivity analysis was performed to determine the minimum load levels within the Load Pocket that would result in thermal overloads, voltage violations, and voltage collapse under N-1-1 contingency conditions. These load levels are known as Critical Load Levels ("CLLs"). This analysis demonstrates that thermal criteria violations begin to appear at a Load Pocket load level of approximately 355 MW, that voltage violations appear at a load level of approximately 436 MW, and that voltage collapse appears at a load level of approximately 449 MW. Notably, the CLLs of 436 MW and 449 MW, for voltage violations and voltage collapse, respectively, are lower than the actual loads in 2020 and 2021.

To summarize, under all scenarios, N-1-1 contingencies could lead to thermal overloads on the NEP and Eversource 115 kV transmission systems. Moreover, in three out of the four scenarios considered here, such contingencies lead to voltage collapse, resulting in the loss of service to as many as 161,000 electric customers across the 16 communities in the Load Pocket. Further, CLL analysis indicates that certain N-1-1 contingencies would lead to voltage collapse under the actual (non-weather adjusted) peak load levels experienced in both 2020 and 2021. In short, the Load Pocket is now and will continue to be at risk for thermal overloads and widespread voltage collapse under certain N-1-1 contingencies.

2.7 Summary of Project Need

The need for the Project was first identified in the 2026 Solutions Study and was confirmed by ISO-NE in the 2029 Needs Update. In that update, ISO-NE also concluded that the need for the Project is time-sensitive and directed the Company to bring the Project to completion.

Additional load flow analysis conducted by the Company confirms that the Project is required to avoid thermal overloading of five 115 kV lines under two distinctly different load forecast scenarios and at weather-adjusted net load levels experienced in 2020 and 2021. This analysis also demonstrates the potential for N-1-1 contingencies to result in voltage collapse under three out of four scenarios. Finally, CLL analysis indicates that certain N-1-1 contingencies would lead to voltage collapse under actual (non-weather-adjusted) 2020 and 2021 net peak load levels. For these reasons, there is a strong and immediate need for the Project.

This page intentionally left blank.

3.0 PROJECT ALTERNATIVES

3.1 Introduction

This section summarizes the alternatives analysis performed by NEP to assess the means of meeting the thermal and voltage needs identified in Section 2.0. To address these needs, the Company considered the following alternatives in addition to the Project:

- A No-Action Alternative.
- An Undersea Cable Alternative based on Alternative 1 in the ISO-NE 2026 Solutions Study.
- A Hybrid Solution involving a variety of upgrades, including the reconductoring of 34.6 miles of 115 kV transmission lines, the installation of two 75 MVAR synchronous condensers at Eversource's High Hill Substation, and two 15 MVAR synchronous condensers at RIE's Dexter Substation.
- NTAs such as energy efficiency/demand response, energy storage and solar PV, and conventional and renewable generation.

Through this assessment and the discussion below, the Company demonstrates that the Project – the separation of the double-circuited N12 and M13 Lines between the Pottersville Switching Station and Sykes Road Substation – is the alternative that addresses the identified need at the lowest cost and with the least impact to the environment.

3.2 No-Action Alternative

Under the No-Action Alternative, the Company would not construct any new facilities or upgrade any existing facilities to address the transmission reliability needs identified in Section 2.0. The current transmission system would remain unchanged.

As discussed in Section 2.0, ISO-NE's 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 Company has confirmed that the Project is needed to address both the potential for thermal overloads on five 115 kV transmission lines and the potential for widespread voltage collapse at actual (non-weather-adjusted) 2020 and 2021 net peak load levels.

If these issues are not addressed, the transmission system would not meet relevant transmission reliability planning standards and criteria, and the Company would not meet its obligation 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 2.0 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 2.0. Each solution set consisted of: (1) two transmission projects selected from a set of four alternatives; and (2) a set of projects that is required regardless of the combination ("Common Projects").[17]

The four alternatives can be summarized as follows:

- Install new undersea cable and switching station in Rhode Island, and reconductor 5.1 miles of the F-184 115 kV transmission line in Rhode Island ("ISO Alternative 1").
- Separate and reconductor the N12 and M13 Lines between Pottersville Switching Station and Sykes Road Substation and reconductor the N12 and M13 Lines between Sykes Road Substation and Bell Rock Substation ("ISO Alternative 2").[18]
- Install a new 115 kV line between Pottersville Switching Station and Bell Rock Substation ("ISO Alternative 3").
- Extend Line 114 from Industrial Park Tap to Bell Rock Substation ("ISO Alternative 4").

The 2026 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 + ISO Alternative 2.
- ISO Alternative 1 + ISO Alternative 3.
- ISO Alternative 1 + ISO Alternative 4; or
- ISO Alternative 2/3 + ISO Alternative 4.[19]

ISO-NE then selected the combination of ISO Alternative 2/3 + ISO Alternative 4 as the preferred solution for the Load Pocket based on a comparison of costs.[20]

Following the 2029 Needs Update, the Company revisited the alternatives presented in the 2026 Solutions Study to determine whether any should be presented as an alternative to the Project in this proceeding. In EFSB 21-04, NEP and Eversource are proposing the construction of a project based on ISO Alternative 4. In this docket, the Company proposes the construction of a project based on ISO Alternative 2/3. The

---

[17] See ID #13 – 17, Table 7-2, Pg. 55 of the Solutions Study.
[18] ISO Alternative 2 includes work – specifically the reconductoring of the N12 and M13 Lines between Sykes Road and Bell Rock Substations – that is not a part of this Section 72 Application. NEP is pursuing that reconductoring on a separate timeline.
[19] The 2026 Solutions Study noted that the combination of ISO Alternatives 2 and 3 is not feasible. It also determined that "… Alternatives #2 and #3 propose work in the same right of way from Somerset (now Pottersville) toward Bell Rock and, when combined with Alternative #4, are essentially the same from an electrical performance and cost standpoint… This combination will be referred to as Alternative #2/#3 and Alternative #4." 2026 Solutions Study at 38.
[20] 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.

only remaining alternative is ISO Alternative 1, the new undersea cable and switching station in Rhode Island. In this respect, ISO Alternative 1 can be regarded as a direct alternative to the Project. Consequently, in Sections 3.3.2 and 3.3.3 below, the Company summarizes and compares 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 Description of the Undersea Cable Alternative

The Undersea Cable Alternative includes:

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

The locations of the new switching station and underground cable are depicted in Figure 3-1. The location of the F-184 Line is depicted in Figure 3-2.

3.3.3 Comparison

Below, the Company compares the Undersea Cable Alternative with ISO-NE Alternative 2 – including both the Project and the separate reconductoring of the N12 and M13 Lines between the Sykes Road and Bell Rock Substations – 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.[21] Given the general increase in both material and labor costs since the 2026 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 1.0, the current cost estimate for the Project is $69.8 million. The current cost estimate for the separate project to reconductor the N12 and M13 Lines between Sykes Road and Bell Rock is approximately $10.2 million. Thus, the Project, even when combined with the separate Sykes Road to Bell Rock project, is 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 (555 MW) is very close to the load forecast used in the 2026 Solutions Study (543 MW), and all the 2026 solutions included a reliability margin, it is more

[21] 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).

than reasonable to conclude that the Undersea Cable Alternative remains a viable alternative to the Project and that either project would address the reliability needs identified in Section 2.[22]

Environmental Comparison

In comparing project alternatives, the Company gives preference to alternatives that minimize impacts to the natural and social environments. Here, the Undersea Cable Alternative requires a horizontal directional drill ("HDD") crossing of approximately 0.78 mile (4,120 feet) beneath Mount Hope Bay, onshore construction of approximately 4.4 miles of new underground duct bank and cable system, reconductoring of approximately 5.1 miles of the existing F-184 115 kV overhead transmission line, upgrades at the existing Bristol 51 Substation in Bristol, Rhode Island, and construction of a new greenfield switching station in Portsmouth, Rhode Island. Establishing a temporary staging area for an HDD and installing an underground conduit and cable system would require easements from the Rhode Island Turnpike and Bridge Authority for work within state ROW adjacent to the Mount Hope Bridge. In addition, the installation of an underground duct bank and cable system within a medium density residential area would have the typical temporary impacts from traffic restrictions and construction noise associated with underground construction within public roadway ROW. Construction of a new greenfield switching station would result in permanent land use impacts and potential noise, dust, and traffic impacts over a multi-year construction period.

In contrast, the Project minimizes environmental impacts by using one of NEP's existing overhead transmission ROWs to reconstruct 1.85 miles of the existing N12 and M13 Lines as separate circuits. Project construction would occur on existing NEP-owned property or within the existing maintained ROW, except for some additional property rights required on the Fall River side of the Taunton River to facilitate the construction of the 300-foot-tall river crossing "Y-frame" structure for the M13 Line. Temporary disturbances to natural resources and socioeconomic resources would mainly be limited to impacts that would occur within the existing ROW, including access road improvements, the installation of structure work pads and the construction of new transmission structures. The separate Sykes Road-to-Bell Rock reconductoring project would add overhead construction impacts along an additional 1.72 miles of existing NEP ROW – considerably less than the 5.1 miles of ROW affected by the F-184 Line reconductoring required for the Undersea Cable Alternative. As a result, the Project, even when combined with the separate Sykes Road to Bell Rock 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)

Both the Project and the Undersea Cable Alternative would address the needs identified in Section 2.0. However, the Undersea Cable Alternative is substantially more expensive than the Project. Additionally, the construction of the Undersea Cable Alternative would result in significantly greater impacts to the natural and social environments, including land use and construction impacts associated with the construction of a new greenfield switching station, construction impacts and impacts to natural resources associated with a lengthy HDD beneath Mount Hope Bay, underground construction through medium-density residential areas, and overhead construction along 5.1 miles of the F-184 ROW. Consequently, the Project is superior to the Undersea Cable Alternative when balancing considerations of system reliability, costs to customers, and environmental impacts.

[22] 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 ISO Alternative 4, would be sufficient to address the needs identified in Section 2.0.

3.4 Hybrid Solution

3.4.1 Description

As discussed in Section 2.0, ISO-NE has confirmed the ongoing need for the Project in the 2029 Needs Update and has directed the Company to implement the Project. Additional modeling by the Company determined that, with all other Load Pocket solutions in place, the Project is needed to address the potential for thermal overloads on Eversource Lines 111, 112 and 114 and on NEP N12 and M13 Lines. It also is required to address the potential for voltage collapse that would result in loss of power to the entire Load Pocket.

To confirm that the Project remains the most cost-effective, least environmentally impactful solution to meet the updated need, the Company reviewed other means of addressing these specific needs. As part of this review, the Company developed an additional solution that would address thermal violations by increasing the capacity of overloaded transmission lines and would address voltage issues by installing dynamic reactive devices within the Load Pocket (the "Hybrid Solution"). The Hybrid Solution includes the following upgrades on the NEP, RIE and Eversource transmission systems:

- Reconductor the N12 and M13 Lines within NEP's ROW between NEP's Pottersville Switching Station and its Sykes Road Substation (1.93 miles).[23]
- Install two 15 MVAR synchronous condensers at RIE's Dexter Substation in Portsmouth, Rhode Island.
- Reconductor Line 111 from Eversource's Industrial Park Substation to its High Hill Switching Station (2.4 miles).
- Reconductor Line 112 from Eversource's Industrial Park Substation to its Tremont Substation (14.4 miles).
- Reconductor Line 114 from Eversource's Tremont Substation to its Industrial Park Tap (10.5 miles).
- Install two 75 MVAR synchronous condensers at Eversource's High Hill Switching Station in Dartmouth, Massachusetts.

A brief description of each element of the Hybrid Solution is provided below. The general locations of these upgrades are shown on Figure 3-3.

<u>N12/M13 Line Reconductoring</u>

The Hybrid Solution requires reconductoring the existing N12 and M13 Lines within the existing ROW between the Pottersville Switching Station and the Sykes Road Substation <u>i.e.</u>, along the Project Route. For this alternative, the Company likely would use 795 kcmil ACCR "Drake" conductor, which provides higher ampacity than the existing conductor while maintaining a similar conductor size, weight and sag. Further analysis would be required to determine the appropriate design clearance for this type of work and

[23] The Hybrid Alternative also requires NEP to reconductor the N12 and M13 Lines between the Sykes Road and Bell Rock Substations to address potential thermal overloads. Because NEP already has plans to reconductor this segment of the N12 and M13 Lines, this element has been excluded from the comparison between the Project and the Hybrid Solution.

determine whether selected towers would need to be replaced to achieve these design clearance requirements.

Additional analysis also would be required to determine whether it is feasible to reconductor the existing river crossing span, given outage constraints that currently prevent the Company from taking the N12 and M13 Lines out of service simultaneously. It may not be possible to maintain safe working clearances that would allow one circuit to be reconductored while the other circuit remains energized. If safety issues preclude placing both reconductored lines on the existing river crossing towers, it would be necessary to build the second river crossing proposed for the Project.

Eversource Transmission Line Upgrades

The Hybrid Solution also would require reconductoring approximately 27.3 miles of Eversource transmission Lines 111, 112 and 114, along approximately 17 miles of existing ROW.[24] Eversource recently provided a cost estimate of $9.2 million, or approximately $1.4 million/mile, to reconductor 2.4 miles of Line 111 and 4.1 miles of Line 112. Using this average cost per mile, the Company estimates that the total cost of the Eversource transmission line upgrades included in the Hybrid Solution is approximately $38.1 million, excluding the cost of any required substation terminal equipment upgrades.

Synchronous Condensers

Finally, the Hybrid Solution would require the installation of two 15 MVAR synchronous condensers at RIE's Dexter Substation in Portsmouth, RI, and two additional 75 MVAR synchronous condensers at Eversource's High Hill Switching Station in Dartmouth, Massachusetts. The size and location of the two synchronous condenser installations were determined based on load flow modeling. NEP's conceptual cost estimates for these two facilities are approximately $45 million for the 30 MVAR installation at Dexter Substation, and approximately $80 million for the 150 MVAR installation at High Hill Switching Station.

3.4.2 Comparison

The Company compared the Project to the Hybrid Solution based on cost, reliability, and environmental impacts.

Cost Comparison

As discussed in Section 1.0, the current cost estimate for the Project is $69.8 million. In comparison, the estimated cost of the Hybrid Solution would include approximately $38.1 million for transmission line upgrades on the Eversource system and approximately $125 million for the installation of two synchronous condenser facilities, plus the cost of reconductoring the N12 and M13 Lines between Pottersville Switching Station and Sykes Road Substation with a special high ampacity, low weight/size conductor. A separate NEP project to reconductor the N12 andM13 Lines between Sykes Road and Bell Rock at a cost of approximately $10.2 million would be required in either case. Thus, the Project is significantly less expensive than the Hybrid Solution.

---

[24] As shown in Figure 3-3, Lines 112 and 114 are located in the same ROW for approximately 10.2 miles between Eversource's Tremont Substation and the Industrial Park Tap.

Reliability Comparison

Both the Project and the Hybrid Solution would address the needs identified in Section 2.0. However, the Project has several reliability attributes that make it superior to the Hybrid Solution. First, the Project relies for voltage support on static equipment (a transmission line) with no moving parts and limited maintenance requirements. In contrast, the Hybrid Solution relies on multiple dynamic devices that must respond to constantly changing system conditions and are subject to multiple modes of failure.

In addition, the Project, unlike the Hybrid Solution, provides a new transmission path into and out of the Load Pocket. This additional path will help to 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 paths for service. Also in the present configuration, when one of the N12 or M13 Lines is removed from service for maintenance, there is a risk of tripping the adjacent line on a common tower during the maintenance activities. With the Project in place, the lines will be located on separate towers and the risk of tripping the adjacent line would be mitigated. Thus, 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.

Environmental Comparison

The Project is also superior to the Hybrid Solution from an environmental perspective. The Hybrid Solution requires reconductoring the N12 and M13 Lines along the Project Route, resulting in many of the same impacts as the Project. In addition, the Hybrid Solution would result in temporary and permanent impacts associated with overhead construction along 17 miles of Eversource ROW in Wareham, Rochester, Acushnet, New Bedford, and Dartmouth. These impacts would be similar in kind to those associated with the Project but spread over a longer distance and a larger population. Finally, the Hybrid Solution would result in impacts associated with the construction and operation of two new synchronous condenser installations in Dartmouth and in Portsmouth, Rhode Island.[25] These incremental impacts would exceed any reduction in impacts available from installing DCT structures, rather than single circuit structures, along the Project Route.

3.4.3 Conclusion (Project vs. Hybrid Solution)

In summary, the Hybrid Solution requires reconductoring the N12 and M13 Lines along the Project Route, potentially including the replacement of certain existing structures to meet clearance requirements and address construction related safety issues. It also requires construction of additional facilities with an estimated cost of more than $160 million in six additional cities and towns. Finally, the Hybrid Solution requires more operator engagement and maintenance than the Project and does not provide an additional transmission path into the Load Pocket. Consequently, the Project is superior to the Hybrid Solution based on a balancing of reliability, cost, and environmental impacts.

[25] The synchronous condenser installation in Dartmouth would require expansion of the High Hill substation's fenced yard, clearing of upland forest that abuts Town of Dartmouth Conservation Land, and likely work within the regulated 100-foot wetland buffer zone. Similarly, the synchronous condenser installation at the Dexter Substation would require an expansion of the existing fence line, clearing of trees and vegetated areas and, potentially, impacts to regulated freshwater wetlands, and wetland and stream buffers. Residences in proximity to both substations could experience noise and visual impacts, although noise impacts would be mitigated by an enclosure and would not be expected to be a public nuisance.

3.5 Non-Transmission Alternatives

In addition to transmission alternatives, the Company evaluated NTAs to the Project. The Company first completed an analysis of the size, duration, and location(s) of energy injections that would be needed to mitigate the transmission reliability needs addressed by construction of the Project. The Company then assessed the potential for various NTA technologies to address these needs and considered the environmental impacts and costs of deploying technically feasible NTAs.

3.5.1 NTA Requirements

At the outset of the NTA assessment, the Company conducted an analysis to determine the size, duration, and location of energy injection required to address the needs identified in Section 2.0 under the Companies' 2031 Forecast. Because it is required to address contingency conditions, any resource serving as an NTA must be dispatchable within 30 minutes of the first contingency[26] and must be able to continue to operate until either: (1) the failed transmission system element is repaired and returned to service; or (2) loads decline sufficiently to alleviate thermal and voltage issues. Table 3-1 shows the minimum level of energy resources needed to address N-1-1 contingencies occurring at a peak hour under the Companies' 2031 Forecast, the duration of anticipated thermal and voltage concerns, and the total amount of energy that an NTA would need to inject into the transmission system daily to address these contingencies.

TABLE 3-1 ENERGY RESOURCES NEEDED TO ADDRESS N-1-1 CONTINGENCY

Peak hour requirements	197 MW
Duration	18 hours[1]
Daily load cycle requirements	2,364 MWhr

Note:
[1] This number was determined by taking the five-year average historical peak day data load shape and scaling it to match the peak hour of 555 MW (Company Forecast 2031). The CLL was subtracted out to derive the maximum difference (197 MW) between the critical load level CLL and the peak load in any given hour of the peak day. This resulted in the overload duration of 18 hours and cumulative energy need over a 24-hour period of 2,364 MWhr.

The analysis above assumes that the resources in question would interconnect to the transmission system at or near the High Hill or Bell Rock Substations. These interconnection locations provided the optimum thermal and voltage performance for the Load Pocket during 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. Consequently, a somewhat higher level of resources could be required for an effective NTA in locations not proximate to High Hill or Bell Rock Substations.

3.5.2 NTA Feasibility and Practicality Assessment

The Company considered whether NTA technologies meeting this profile could hypothetically be developed as an alternative to the Project. The Company considered the following general categories of NTA technologies:

[26] 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.

- Active and passive demand response.
- Energy storage, either alone or in combination with solar photovoltaics.
- Utility-scale generation, including both conventional generation (e.g., combined-cycle gas turbines, aeroderivative combustion turbines, large frame combustion turbines) and wind.

The Company first considered whether each technology is a technically feasible solution, i.e., whether it could be dispatched in sufficient quantities within 30 minutes of a first contingency, and whether it could continue to supply energy until the failed transmission system element is returned to service or until electric demand declines sufficiently to obviate the need for an NTA. The Company then considered the potential costs and environmental impacts of implementing technically feasible technologies.

Active and Passive Demand Response

To address the identified need, active and passive demand response measures would need to reduce peak hour requirements within the load pocket by 197 MW (approximately 35% of forecasted peak load) and be able to provide approximately 2,364 MW hours ("MWhr") of load reduction over 18 consecutive hours, over and above the resources already planned for the Load Pocket. Neither active nor passive demand response measures are deployable to this scale within the Load Pocket. For purposes of comparison, currently planned passive demand response (energy efficiency) programs are projected to reduce peak load within the Load Pocket by approximately 58 MW by 2029. Active demand response programs are not expected to provide any significant new resources over the same time period.[27] Reducing peak hour demand sufficiently to meet the identified need therefore would require quadrupling the already-aggressive utility programs for the Load Pocket. Further, the programs would need to be designed to follow the load curve for the Load Pocket over an 18-hour cycle, substantially reducing demand during both peak and off-peak hours. A demand response program of this magnitude and complexity is simply not achievable. Therefore, active and passive demand response programs, taken alone, are not a feasible alternative to meet the identified need.

Energy Storage and Solar Photovoltaics

Energy storage is a dispatchable resource that could be a technically feasible NTA for projects that address contingencies on the transmission system. However, its usefulness as an NTA is dependent on its ability to fully recharge, either from the transmission system or from dedicated generation (e.g., solar PV) during off-peak hours when it is not being used to support the system.

Solar PV is an intermittent resource whose availability varies with cloud cover and limited daytime hours. On a stand-alone basis, it is not dispatchable, and therefore not an appropriate NTA for the Project. However, it could support the recharge of an energy storage system.

To address the identified need, an energy storage system would need to be able to inject up to 197 MW into the Load Pocket during the peak hour, to provide approximately 2,364 MWhr of energy over 18 consecutive hours, and to recharge in the remaining six hours.[28] NEP has recently developed estimates for the installation of two much smaller battery storage facilities: a 4 MW/10 MWhr facility with an

[27] Only 4 MW of new active demand response cleared FCA 15 for the entire New England region. See *Fifteenth Forward Capacity Auction for the 2024-25 Capacity Commitment Period – Demand Capacity Resource Summary,* presented to the ISO-NE Reliability Committee on March 16, 2021.
[28] As a point of comparison, the recently filed Cranberry Point Energy Storage project, currently pending before the Energy Facilities Siting Board as EFSB 21-02/D.P.U. 22-59, could provide only 300 MWhr of energy before needing to be recharged.

estimated cost of approximately $18.8 million, and a 1.5 MW/7 MWhr facility with an estimated cost of approximately $16.4 million. Even allowing for significant efficiencies of scale, the cost of a 197 MW/2,364 MWhr energy storage facility would be at least 10 times that of the approximately $69.8 million cost of the Project. Thus, an energy storage facility, even if feasible, would not be a cost-effective alternative to the Project.

Conventional Generation and Offshore Wind

Most conventional generation technologies (e.g., combined cycle gas turbines, aeroderivative combustion turbines, large frame combustion turbines) are dispatchable, and are scalable such that they could provide energy injections in the quantities needed to address the needs described in Section 2.0. Consequently, conventional generation technologies may be considered technically feasible alternatives to the Project.

However, there are significant barriers to the construction of new conventional generation as an alternative to the Project. First, there are no proposed conventional generation units in the ISO-NE interconnection queue that could obviate the need for the Project. The new generator would therefore need to be sited, designed, permitted, and constructed from scratch. The developer would need to identify and acquire rights to an appropriate site proximate to High Hill or Bell Rock substations, any new rights to connect the generator to the electric transmission system, and a source of fuel. It also would need to complete the required interconnection studies with ISO-NE, secure a fuel supply, secure a broad range of environmental permits, contract with equipment suppliers and construction vendors, and then construct, own, and operate the facility for its lifetime. Given these requirements, conventional generation could not be put in place in the same timeframe as the Project. Further, a new conventional generator would likely have greater environmental impacts and higher costs than the Project. New conventional generation is therefore not a reasonable alternative to the Project.

As of July 2022, the Company is aware of two offshore wind projects in the ISO-NE interconnection queue that would potentially interconnect in the Load Pocket.[29] The first project, QP1118,[30] would provide a 1,200 MW net injection and is requesting interconnection at Bell Rock Substation. The second project, QP1153, would provide a 440 MW net injection and is requesting interconnection at either the Acushnet Substation or the Pine Street Substation. The anticipated in-service dates for the projects are 2027 and 2026, respectively.

Although QP1118 and QP1153 would, if constructed, provide energy injections within the Load Pocket, it is not clear that they could serve as alternatives to the Project. Like solar PV, wind resources are intermittent and would not necessarily make energy available at the specific times required to address an N-1-1 contingency. Further, neither QP1118 nor QP1153 has a completed System Impact Study, and each will rely on the Project being in service in their interconnection studies. The Project, which provides additional transmission capacity into and out of the Load Pocket, would be needed to support the interconnection of these two facilities. Consequently, new offshore wind generation is not likely to be able to meet the identified need in a timely and reliable manner.

[29] The Mayflower Wind project, currently pending before the Energy Facilities Siting Board as EFSB 22-04/D.P.U. 22-67/68, would interconnect with NEP's transmission system at Brayton Point in Somerset, MA. Brayton Point is located outside of the Load Pocket; consequently, the Mayflower Wind project would not serve to address the need identified in Section 2.0.
[30] QP1118 is incremental to QP909 and increases QP909's 800 MW net injection to 1,200 MW net injection.

3.5.3 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 at 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 have more significant environmental impacts and would need to overcome significant challenges, including the necessary development time, land requirements, and infrastructure requirements, and therefore would not be practical. Currently proposed wind resources are intermittent and will rely on the Project to support their interconnection plans.

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. Consequently, NEP concluded that the Project – the separation of the double-circuited N12 and M13 Lines between the Pottersville Switching Station and Sykes Road Substation – is the alternative that best balances the various considerations required to satisfy the Department's standards.

3.6 Conclusion on Project Alternatives

NEP identified and evaluated potential alternatives for addressing the identified need, including: (1) a No-Action Alternative; (2) an Undersea Cable Alternative; (3) a Hybrid Solution involving reconductoring of multiple transmission lines and the construction of multiple synchronous condensers at existing substation facilities; and (4) Non-Transmission Alternatives. This evaluation demonstrates that: (1) the No-Action Alternative would not address the identified needs; (2) both the Undersea Cable Alternative and the Hybrid Solution would be more expensive than the Project and would result in greater and more widespread environmental impacts; and (3) there is no technically feasible and cost-effective Non-Transmission Alternative to the Project. Because the Project addresses the identified need at the lowest cost and with the least impact to the environment, the construction of the Project, within an existing overhead transmission line ROW, will serve the public convenience and be consistent with the public interest.

This page intentionally left blank.

4.0 MINIMIZATION OF PROJECT IMPACTS

4.1 Introduction

This section provides an analysis of the potential environmental impacts and mitigation associated with the Project. A series of social/developed and natural environmental criteria are evaluated in this Section including land use, historic and archaeologic resources, wetland and water resources, climate change, rare species habitat, oil and hazardous materials, air quality, visual impact, noise, traffic and transportation, EMF, and EJ populations.

Potential impacts associated with each of these criteria are described based on construction-related (temporary) impacts and maintenance and operation-related (permanent) impacts. Examples of potential temporary construction-related impacts include traffic disruptions, temporary use of areas to stage construction equipment and supplies, and short-term elevated construction noise associated with the operation of heavy equipment. Examples of permanent impacts include fill, vegetation removal and visual impacts.

The Project has been designed and planned to reduce impacts to the human and natural environment, and as such will serve the public convenience and is consistent with the public interest.

4.2 Description of Project and Route

4.2.1 Project Description

The Project will be located within an existing electric transmission line ROW extends from NEP's Pottersville Switching Station in Somerset, Massachusetts to Sykes Road Substation in Fall River. This ROW is currently occupied by the N12 and M13 Lines. For approximately 1.85 miles, these lines are supported on double circuit steel lattice towers (i.e., the two circuits, each consisting of three individual phase conductors, share the same series of towers within the ROW). This double circuit segment begins at existing Structure 4 on the west shore of the Taunton River in Somerset, crosses the Taunton River into Fall River, and continues easterly within an existing NEP transmission corridor to the Sykes Road Substation in Fall River. NEP proposes to separate the double circuit segments of its existing N12 and M13 Lines by placing them onto two distinct sets of structures. The Project is illustrated on Figure 1-1 and typical ROW cross-sections are provided in Figure 4-1.

NEP proposes to separate a 1.85-mile segment of its existing N12 and M13 Lines, currently installed on double circuit steel lattice towers, and place them onto two distinct sets of structures. The existing double circuit segment begins on the west shore of the Taunton River in Somerset, crosses the Taunton River into Fall River, and continues easterly within an existing NEP transmission corridor to the Sykes Road Substation in Fall River.

To accomplish this separation, existing structures 2 through 10 in Fall River will be removed and replaced with two sets of predominantly galvanized steel single circuit monopoles on caisson foundations and overhead conductors. At the Taunton River crossing, the two existing approximately 300-foot steel lattice towers (existing structures 1 and 2) will remain in place and the existing conductors that cross the river will be electrically connected (or bussed) to become the N12 Line. Two new approximately 300-foot galvanized steel Y-frame monopole river crossing structures on concrete pile-caps with micro-piles will be constructed to carry the M13 Line across the Taunton River. Two new line disconnect switches will be installed at the Sykes Road Substation to accept the N12 and M13 Lines. New overhead conductor will be installed between proposed N12 structures N12-7 and N12-19, and between proposed structures M13N-5 and M13N-19 and from there, into the Sykes Road Substation where they will be terminated onto existing structures. The transmission line upgrades that are proposed as part of the Project are summarized in Table 4-1 below.

Construction of the Y-frame river crossing structure proposed on the Fall River side of the Taunton River will require additional temporary and permanent property rights from the adjacent landowner for installation of the structure and to maintain safe horizontal clearance from the existing river crossing tower. NEP is also seeking to eliminate the construction of proposed Structures N12-13 and M13N-13, if additional real estate easements can be obtained from the abutting property owners; otherwise, these structures will be constructed as part of the Project. The remainder of the Project will be constructed on NEP property and within NEP's existing ROW.

TABLE 4-1 PROPOSED TRANSMISSION LINE UPGRADES

N12/M13 Double Circuit Tower Separation Project		
Transmission Work Scope	**Rebuilt N12 Circuit[1]**	**Replacement M13Circuit[2]**
Retain Existing Structures	-Retain two 300-foot double circuit steel towers	--
Remove & Replace Existing Structures	-Remove seven double circuit steel towers & replace with seven galvanized steel monopoles -Remove one 3-pole wood structure & replace with one galvanized steel H-frame structure	-Remove one 3-pole wood structure and replace with one galvanized steel monopole -Remove one 3-pole wood structure and replace with one galvanized steel 3-pole structure near the Sykes Road Substation-
Remove Existing Structures	--	-Remove one wood H-frame structure outside of the Sykes Road Substation
Install New Structures	-Install four galvanized steel monopoles as intermediate structures to maintain design clearances -Install one galvanized steel H-frame structure outside of the Sykes Road Substation	-Install two ~292-foot galvanized steel Y-frame river crossing structures -Install 12 galvanized steel monopoles -Install one galvanized steel H-frame structure outside of the Sykes Road Substation -Install one steel 3-pole tap structure outside of Sykes Road Substation -Install one galvanized steel flyover switch structure at the Sykes Road Substation
-Replace Conductor	-Install 1582 kcmil "Bittern" ACCC to achieve required clearances	- Install 1622 kcmil T13 "Pecos" ACCR across the Taunton River, which allows for the shortest structure height while maintaining clearance requirements under maximum operating temperature -Install 1582 kcmil "Bittern" ACCC to achieve required clearances
Install Concrete Caisson Foundations	-Install 10 concrete caisson foundations	-Install 16 concrete caisson foundations, plus two concrete pile-cap with micropile

N12/M13 Double Circuit Tower Separation Project		
Transmission Work Scope	**Rebuilt N12 Circuit[1]**	**Replacement M13Circuit[2]**
		foundations for the two proposed Y-frame river crossing structures
Direct Embedment Structures	-Install four direct embedment structures	-Install four direct embedment structures
Range of Proposed Structure Heights	~50 feet - ~130 feet, while retaining the two 300-foot river crossing towers	~65 feet – 130 feet, plus the two proposed ~292-foot Y-frame river crossing structures

[1] Existing N12/M13 DCT crossing of the Taunton River will maintain a minimum conductor height of 150 feet above Mean High Water (MHW), in compliance with the existing Chapter 91 Licenses and Section 10 Permits. The existing conductors will be replaced and bussed from Structures N12-5, N12-6 and N12-7.
[2] Proposed M13 replacement crossing of the Taunton River will maintain a minimum conductor height of 155 feet above Mean High Water (MHW).

4.2.2 Route Maps

Route maps, including a Land Use Map and an Environmental Resources Map, are presented in a separately bound volume (Volume II) to support the assessment of the Project impacts in this Application. A USGS locus map of the Project is provided as Figure 1-1. An area of 300 feet measured from the edges of the Project Route is defined as the "Study Area." 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.

Land Use Maps

The Land Use Maps (Figures 4-2A (existing conditions) and 4-2B (proposed conditions)) illustrate land uses within the Study Area. Land uses located within the Study Area include forest, forested wetland, non-forested wetland, residential, unconsolidated shore, industrial, water, powerline/utility, bare land, developed open space, and grassland, as described in Section 4.5.1. The land use information was obtained from the Massachusetts Geographic Information System ("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 in Section 4.5.1.

Environmental Resources Maps

The Environmental Resources Maps (Figures 4-3A (existing conditions) and 4-3B (proposed conditions)) illustrate the social/developed and natural environmental resources within the Study Area. Environmental resources include open space/recreational land, historic/archaeological sites and wetlands and water crossings. Environmental resources are described in detail throughout Section 4.5.

4.3 State and Local Environmental Policies

The Company will obtain all environmental approvals and permits required by federal, state and local agencies and will construct 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 4-2, below, identifies the anticipated permits, reviews, and approvals required for the Project.

TABLE 4-2 ANTICIPATED MAJOR FEDERAL, STATE, AND LOCAL PERMIT/CONSULTATION REQUIREMENTS FOR THE PROJECT

AGENCY/ REGULATORY AUTHORITY	PERMIT AND/OR PURPOSE OF APPROVAL
Federal Approvals	
U.S. Army Corps of Engineers, New England District (“USACE-NED”)	Section 404 Permit (Pre-Construction Notification) Section 10 Permit Modification
U.S. Fish and Wildlife Service (“USFWS”)	Section 7 Endangered Species Act Consultation, Information for Planning and Consultation (“IPaC”) review
Advisory Council on Historic Preservation (“ACHP”)	National Historic Preservation Act - Section 106 Consultation
U.S. Environmental Protection Agency (USEPA)	National Pollutant Discharge Elimination System (“NPDES”) – Construction General Permit
State Approvals	
Massachusetts Department of Public Utilities (“DPU”)	Petition for authority to construct a new transmission line pursuant to G.L. c. 164, § 72
Massachusetts Department of Environmental Protection (“MassDEP”), Waterways Division	Chapter 91 License (amendment)
MassDEP	Individual Section 401 Water Quality Certification
MassDEP	Massachusetts WPA – Superseding Order of Conditions (potential)
Massachusetts Historical Commission (“MHC”)	Consultation under National Historic Preservation Act (“NHPA”) of 1966 and review under Massachusetts General Law G.L. c. 9, § 27C
Massachusetts Office of Coastal Zone Management	Federal Consistency Review
Massachusetts Natural Heritage & Endangered Species Program	MESA Checklist
Massachusetts Department of Transportation (“MassDOT”)	State Highway Access Permit
Municipal Approvals	
City of Fall River City Council/Town of Somerset Board of Selectmen	New or amended grants of location under G.L. c. 166, Sec. 22
Somerset Conservation Commission	Massachusetts Wetlands Protection Act - Order of Conditions
Fall River Conservation Commission	Massachusetts Wetlands Protection Act - Order of Conditions

4.4 Construction Methods

This section describes the general construction methods anticipated for the Project.

NEP has long-established policies and procedures for minimizing construction-related disturbances throughout construction. NEP and its contractors will follow these procedures for construction of the Project. These policies and procedures include National Grid’s ROW Access, Maintenance and Construction Best Management Practices (EG-303NE) (provided as Appendix 4-1).

4.4.1 Transmission Line Construction Sequence

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

1. Removal of vegetation and ROW mowing in advance of construction.
2. Installation of soil erosion and sediment controls.
3. Construction and improvements to access roads.
4. Installation of structure work pads and staging areas.
5. Installation of foundations and structures.
6. Installation of conductor, optical ground wire, and shield wire.
7. Removal and disposal of existing transmission line components.
8. Restoration and stabilization of the ROW.

The general construction sequence for these activities will occur as follows: the foundations for the M13 circuit will be installed first, and then the bottom section of the new monopoles will be installed. Once the bottom sections of the M13 Line monopoles are installed, the existing M13 Line conductors will be removed and the crossarms that support the M13 Line will be cut off the existing steel lattice towers. This will allow the top sections of the M13 monopoles to be constructed. Once the new M13 structures are complete, new conductors will be pulled between all M13 structures, and the M13 Line will be energized. This same sequence of construction will be repeated for the proposed structures and conductors of the N12 Line. When both the N12 and M13 Lines are energized, the existing steel lattice structures will be cut below grade, and all materials and construction debris will be removed and disposed of or recycled as appropriate.

Each construction activity is further described below.

Removal of Vegetation and ROW Mowing in Advance of Construction

Construction of the Project will require vegetation and tree removal to provide safe vehicular and equipment access to existing structure locations and safe work sites for personnel within the ROW. Additionally, the vegetation management work provides safe clearances between vegetation and transmission line conductors for the life of the asset to assist the reliable operation of the transmission facilities.

Prior to vegetation removal and mowing, wetland boundaries will be clearly marked to prevent unauthorized encroachment into wetland areas. Appropriate forestry techniques will be implemented within wetlands to minimize ground disturbance. Other sensitive resources, such as cultural resource features, will be flagged and encompassed with protective fencing prior to removal of vegetation on the ROW. Existing access routes along the ROW will be used by vegetation management personnel and equipment to the extent practicable. Road improvements will be kept to a minimum during this phase of the work. Temporary construction mats will be used to gain access to and across forested wetlands, to minimize wetland disturbance, and to provide a stable platform for safe equipment operation. Typical construction mats used for construction access consist of timbers that are bolted together into 4-foot by 16-foot sections and placed over wetland areas to distribute equipment loads and minimize impacts to the wetland and soil substrates in accordance with National Grid's EG-303NE. Temporary construction mat roads placed in wetlands for vegetation removal will be installed, used for vegetation removal, and then removed by the contractor.

Mowing will occur along all access points and at work and pull pads. Limited tree removal will occur along the ROW, as needed. 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. NEP is planning to use the existing network of access roads previously established on the ROW to the greatest extent practicable. However, in locations where grading is required for new access roads and at structure locations, stumps will be removed. Small trees and shrubs within work pads and the ROW will be mowed as necessary with the intent of preserving root systems and low-growing vegetation to the extent practical. Brush, limbs, and cleared trees will be mowed or chipped. Chipped material will be removed from the site or applied to upland areas as an erosion control measure, with prior approval. Post construction, the ROW will be allowed to naturally revegetate.

In certain environmentally sensitive areas such as wetlands, it may be necessary and desirable to leave felled trees and snags to decompose in place rather than to disturb soft organic substrates while removing them. Where the ROW crosses streams and brooks, vegetation along the stream bank will be selectively cut to minimize the disturbance to bank soils and to reduce the potential for Project-related soil erosion. A minimum of a 25-foot-wide riparian zone will be maintained along watercourses, to the extent feasible.

Installation of Soil Erosion and Sediment Controls

Following vegetation management activities, soil erosion and sediment control devices such as straw wattles/bales, siltation fencing, and/or chip bales will be installed in accordance with approved plans and permit requirements. The soil erosion and sediment control program for the Project will follow the procedures identified in the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas: A Guide for Planners, Designers, and Municipal Officials, the Massachusetts Stormwater Handbook, and National Grid's EG-303NE.

The installation of sediment control devices will be overseen by NEP's environmental monitor. During construction, these devices will be periodically inspected by the environmental monitor, and the findings will be reported regularly to NEP's Construction Supervisor. The soil erosion and sediment controls will be installed between the work site and environmentally sensitive areas such as wetlands, streams, drainage courses, roads and adjacent properties when work activities will disturb soils and result in the potential for soil erosion and sedimentation. The devices will function to mitigate construction-related soil erosion and sedimentation and will also serve as a physical boundary to delineate resource areas and to contain construction activities within approved areas.

Where dewatering is necessary during excavations within or adjacent to wetland areas, water will be pumped into appropriate dewatering basins or silt bags. At all times, dewatering will be performed in compliance with National Grid's EG-303NE and all relevant permits and approvals. The dewatering basin and all accumulated sediment will be removed following dewatering operations and the area will be seeded and mulched. Soil erosion and sediment controls will be used to contain excess soil.

Staging areas and equipment storage, where feasible, will be situated outside of 100-foot wetland buffers and other environmentally sensitive areas. Equipment refueling (except for fixed equipment such as drill rigs) will occur outside of environmentally sensitive areas and secondary containment will be utilized. Where structures are located in or near wetlands, proper soil erosion and sediment controls will be installed to prevent impacts to these areas.

In accordance with Best Management Practice ("BMPs"), construction mats, soil erosion and sediment controls, and other measures will be implemented, as appropriate, in resource areas temporarily disturbed by construction. Herbaceous vegetation in disturbed areas will be restored using a native wetland or conservation seed mix. In tree removal areas, enhancements may be proposed as mitigation for important wildlife features lost due to tree removal and construction activities. Potential enhancement activities include seeding, planting native shrub species, leaving snags, and placing woody debris, slash, or stone piles to create wildlife cover.

Construction and Improvements to Access Roads

NEP proposes to improve existing access roads and construct new access as needed to provide the ability to construct, inspect and maintain the N12 and M13 Lines. Where feasible, NEP plans to use its existing network of access roads to construct the Project. Many of these existing access roads will require maintenance or upgrading to support construction vehicles and equipment. For example, clean gravel or trap rock may be used to stabilize and level the roads for construction vehicles. Construction of new access roads and access road improvement and maintenance will be carried out in compliance with the conditions and approvals of the appropriate federal and state regulatory agencies. Crushed stone aprons will be used at all access road entrances to public roadways to clean the tires of construction vehicles and minimize the migration of soil off-site. In uplands and in state regulated 100-foot buffer zone to bordering vegetated wetland ("BVW"), access road improvements will be left in place to facilitate future access to the ROW for inspection, and operation and maintenance purposes.

At present, NEP plans to improve existing ROW access roads and to construct new access roads in two locations:

- An approximately 885-foot-long road within NEP's existing ROW to provide access to proposed Structures N12-7, M13N-7, N12-8 and M13N-8 from North Main Street and will have a travelled width of approximately 14-16 feet to accommodate construction vehicles and equipment deliveries, including pole deliveries.
- An approximately 670-foot-long road adjacent to the MBTA ROW to access existing Structure N12-6 and proposed Structure M13N-6. NEP's facilities on this parcel are currently landlocked by private property and MBTA rail tracks. The new access road will be constructed with trap rock underlain by geotextile fabric and will have a travelled width of approximately 14 to 16 feet to accommodate construction vehicles and equipment deliveries, including pole deliveries.

Access across wetlands and streams, where upland access is not available, will be accomplished by the temporary placement of construction mats. Construction mats will be removed following completion of construction, and areas will be restored to reestablish pre-existing topography and hydrology as necessary. The use of construction mats allows for heavy equipment access within wetland areas. The use of construction mats minimizes the need to remove vegetation beneath the access way and helps to reduce the degree of soil disturbance, soil compaction, and rutting in soft wetland soils.

Mats will be certified clean by the vendor prior to installation. Clean is defined as being free of plant matter (stems, flowers, roots, etc.), soil, or other deleterious materials prior to being brought to the project site. Any equipment or construction mats that have been placed or used within areas containing invasive species within the Project site shall be cleaned of plant matter, soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project site to prevent the spread of invasive species from one area to another. Mats will be cleaned prior to being removed at the completion of the Project.

Installation of Structure Work Pads and Staging Areas

Upland work pads will be constructed at structure locations by grading or adding gravel or crushed stone to provide a level work surface for construction equipment and crews. Once construction is complete, the work pads in uplands will remain in place, and will be stabilized with topsoil and mulched to allow vegetation to re-establish. Stone-covered work pads or other disturbances within the 100-foot buffer or riverfront area will be removed and restored on a case-by-case basis in consultation with the Somerset and Fall River's Conservation Commission. Stone-covered work pads within the riverfront area ("RFA") will be removed and the areas stabilized and reseeded or, as an alternative, constructed with temporary construction mats. In wetlands, these work pads will be constructed with temporary construction mats and will be removed after the completion of construction activities. Wetlands will be restored to pre-construction configuration and elevations to the extent practicable. If necessary, vegetation will also be restored within the wetland through native seeding.

Earthwork is necessary to accommodate the construction of the steel monopole Y-frame river crossing structure in Fall River (Structure M13N-6). Physical constraints on NEP's peninsula-shaped fee-owned property necessitate the creation of a level work pad to enable equipment access and successful maneuvering and assembly of prefabricated parts. Temporary work areas may be cleared, grubbed, and leveled with temporary fill over geotextile fabric to create a level workspace. Any exposed or loose sediment will be secured with straw mulch and/or seed mix, as appropriate. Once construction is complete, the temporary fill and geotextile fabric will be removed, and the area will be stabilized and allowed to revegetate. NEP will conduct minor grading within the proposed access road and associated structure work pad to bring the topography to grade. Stone will be placed on top of the work pad and access road to restrict occurrences of soil erosion and to provide stability to the area when heavy construction vehicle transverse these locations.

Installation of Foundations and Structures

The proposed transmission line structures include a combination of steel structure types including monopole, H-frame, and Y-frame that will be installed either on reinforced concrete caisson foundations or direct embedment into buried steel casings, dependent upon the structure type. 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 three and five 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.

Some structures will require drilled concrete caisson foundations, typically 20 to 35 feet deep, with typical diameters in the range of approximately 6 and 10 feet. These structures may include 3-pole structures and monopoles. 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.

Two single circuit galvanized steel monopole Y-frame dead end structures will be installed on pile-supported concrete caisson foundations located on the east and west sides of the Taunton River. These proposed structures will be approximately 300 feet tall and supported by a series of micro-piles stabilized with a 42-foot-wide concrete foundation cap. The foundation cap will be connected to the structure using a 23-foot-wide concrete pedestal, which will extend four feet above the surface of the ground. The piles for these foundations will vary in depth based on the respective soil profile, ranging from 59 to 121 feet below grade. These will be connected to the concrete foundation cap.

Excavated material will be temporarily stockpiled next to the excavation; however, this material will not be placed directly into resource areas. The stockpile of excavated material will be enclosed by staked straw bales or other sediment controls. Additional controls, such as watertight mud boxes, will be used for saturated stockpile management in work areas in wetlands (i.e., construction mat platforms) where sediment-laden runoff would pose an issue for the surrounding wetland. Following the backfilling operations, excess soil will be spread over unregulated upland areas or removed from the site in accordance with NEP's policies and procedures.

Dewatering may be necessary during excavations or pouring concrete for foundations. Dewatering will be performed in compliance with National Grid's ROW Access, Maintenance and Construction Best Management Practices (EG-303NE) (Appendix 4-1). Handling and management of wetland soils will be performed in accordance with a wetland soils management plan to be prepared by the contractor and accepted by NEP. 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. If overnight dewatering is required, the contractor will develop a plan for review and approval by NEP prior to commencing overnight dewatering activities.

Dust suppression methods will be used during drilling operations, as deemed necessary, to minimize impact. In addition, minimal quantities of earth will be moved or impacted during construction. Therefore, any impacts from fugitive dust particles will be of short duration and localized.

Installation of Conductor, Optical Ground Wire, and Shield Wire

Following the construction of transmission line structures, insulators will be installed to 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. First, a temporary lead line will be installed on the structures within a given stringing section. The lead line will then be used to pull the final wire into place. The wire stringing equipment will be used to pull the conductors from a wire reel on the ground through stringing blocks attached to the structures to achieve the desired sag and tension condition. During the stringing operation, temporary guard structures or boom trucks will be placed at road and highway crossings and at crossings of existing utility lines. These guard structures are used to ensure public safety and uninterrupted operation of other utility equipment by keeping the wire away from other utility wires and clear of the traveled way at these crossing locations. Construction of temporary wire stringing and pulling sites will be required to provide safe and level locations for equipment and personnel to perform wire stringing operation.

NEP plans to install overhead wires between Structures M13N-5 and M13N-6 (i.e., to cross the Taunton River) either by helicopter, or by using a boat to tow the lead line across the river. NEP may also use helicopter installation in other locations.

A small embayment of the Taunton River containing salt marsh lies between proposed Structures M13N-6 and M13N-7 (see Figure 4-3B). NEP may use low ground pressure equipment (e.g., a Marsh Master) in this location to pull in the lead line across the salt marsh. NEP has used this type of equipment in the past to access over emergent, scrub-shrub habitats, salt marsh and standing water easily and without adversely affecting the soils and hydrology of these habitats.

Removal and Disposal of Existing Transmission Line Components

As part of the Project, NEP will need to remove existing structures from the ROW. Once both the M13 and N12 transmission line replacement structures are set and the separated lines are energized, the old structures will be cut below the ground line and removed from the ROW.

NEP proposes to recycle as much of the removed material as possible. Those components that are not salvageable and any debris that cannot be recycled will be removed from the ROW and disposed of at an approved off-site facility. Such materials will be handled in compliance with applicable laws and regulations and in accordance with NEP's policy and procedures.

Lead paint may be encountered during lattice tower removal. NEP will follow National Grid's Safety and Environmental Guidance Documents for handling lead paint chip debris during the tower removal process. Towers will be dismantled and recycled while paint chip debris will be managed as hazardous waste.

NEP's Investment Recovery Department manages the recycling and disposal of company facilities, equipment, and materials. The Investment Recovery Department will oversee the recycling and disposal activities associated with the Project and incorporate these materials into the recycling program as appropriate.

Restoration and Stabilization of the ROW

Restoration efforts, including removal of construction debris, final grading, stabilization of disturbed soil, and the installation of permanent sediment control devices, will be completed following construction. All disturbed areas around structures and other graded locations will be seeded with an appropriate conservation seed mixture and/or mulched to stabilize the soils in accordance with applicable regulations. Temporary sediment control devices will be removed following the stabilization of disturbed areas. Existing stone walls will be restored to the pre-existing conditions. Where authorized by property owners, permanent gates and access roadblocks will be installed at key locations to restrict access onto the ROWs by unauthorized persons or vehicles. Regulated environmental resource areas that are temporarily disturbed by construction will be restored in accordance with applicable permit conditions. Wetland mitigation areas will be installed as necessary.

4.4.2 Construction Work Hours

NEP will coordinate with local authorities on approved work hours in advance of construction; however, construction will generally take place Monday to Saturday during daylight hours (7:00 a.m. to 5:00 p.m.). Certain work activities, including work requiring scheduled transmission line outages, may need to be performed on a limited basis outside of normal working hours, including night shifts, Sundays, and holidays. Some activities 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 night shifts, Sundays, and holidays.

4.4.3 Environmental Compliance and Monitoring

NEP will develop and implement a Stormwater Pollution Prevention Plan ("SWPPP") for the Project that will identify controls to mitigate 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 USEPA Stormwater Construction General Permit.

NEP will require that the 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 compliance, stormwater management, cultural resources, and safety considerations. Daily tailboard meetings will include 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.

NEP will also retain the services of one or more environmental compliance monitors to observe 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.

If necessary, documentation identifying 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 all permits and approvals issued for the Project will be provided to and reviewed by NEP project managers and construction supervisors. 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 NEP, to understand and comply with all conditions or requirements for any applicable Project permits and approvals. NEP also requires 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 NEP representatives and contractor personnel.

In addition to the measures discussed above, the applicable conditions and provisions of all 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.

4.4.4 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 ("NESC") 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.

4.5 Environmental Impacts and Mitigation

This section describes the existing land uses and environmental resources along the Project Route, presents an analysis of potential impacts to specific resources as a result of Project construction, and describes the measures NEP proposes to mitigate such impacts.

Categories of potential impacts considered includes land use, historic and archaeologic resources, water resources, climate change, rare species habitat, navigation, oil and hazardous materials, air quality, visual impact, noise, traffic and transportation, EMF, and EJ populations. Data on natural and human environmental resources were compiled for the Project Route using information such as the most recently available MassGIS data layer and mapping. In addition to this information, comprehensive field reviews were conducted and inform the sections that follow.

4.5.1 Land Use

This section discusses potential impacts to land use, including consistency with municipal land use plans and zoning requirements, impacts on protected lands, open space and recreation, proposed acquisition of property rights, and coordination with Mass DOT construction projects.

NEP proposes to construct the Project along its existing N12/M13 ROW, which is currently occupied by the N12 and M13 Lines. Existing land use conditions along the ROW were assessed based on publicly available MassGIS land use data layers.[31] Table 4-3 identifies land uses within the Study Area around NEP's ROW.

---

[31] Sanborn. 2005. MassGIS Data – Land Use. Retrieved May 3, 2018 from http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html.

TABLE 4-3 LAND USE WITHIN THE STUDY AREA AROUND NEP'S PROJECT ROUTE

LAND USE DESCRIPTION	PERCENTAGE WITHIN STUDY AREA
Bare Land (undeveloped and denuded land)	3
Deciduous Forest	26
Developed Open Space	14
Evergreen Forest	2
Forested Wetland	1
Grassland	4
Industrial	7
Non-forested Wetland	1
Other Impervious	1
Residential - Multi-Family	1
Residential - Single Family	4
Powerline/Utility	7
Scrub/Shrub	3
Unconsolidated Shore	2
Water	24

As can be seen in Table 4-3, land uses in the vicinity of the ROW primarily consist of forest and water; single- and multi-family residential uses account for 5% of the Study Area. The Project is not expected to significantly affect existing land uses, as it will replace two existing 115 kV circuits with two separated 115 kV circuits within an existing transmission line ROW. NEP has reviewed the Project with the Somerset and Fall River Building Inspectors and has confirmed that no zoning-related permits or approvals are required for the Project.

The Company has reviewed the Project's consistency with Somerset and Fall River land use plans, as listed in Table 4-4. Consistent with the Community Needs Assessment Act, the Community Preservation Plans and guidelines have the goals of providing affordable housing and recreational facilities and preserving historic and open space resources. The Project is consistent with these goals because it minimizes impacts to open space and historic resources.

TABLE 4-4 COMMUNITY LAND USE PLANS

COMMUNITY	PLAN OR GUIDELINE REFERENCE
Town of Somerset	Town of Somerset Conservation, Recreation and Open Space Plan (2017) Town of Somerset Community Preservation Plan (2019)
City of Fall River	City of Fall River Open Space and Recreation Plan (2010) City of Fall River Draft Community Preservation Plan (2014) City of Fall River Waterfront Urban Renewal Plan (2018)

Local Open Space and Recreation Plans help jurisdictions to protect, preserve and increase open space and recreation assets and resources, and to provide citizens with a plan regarding future policies and actions necessary to the town's changing physical, cultural, and social needs. The Project does not traverse any areas identified as public open space or recreational areas, with the exception of the Taunton River, which serves as a marine vessel transportation corridor for commerce and recreational boating. NEP may use a boat to pull wires across the Taunton River; no other construction activity is planned within the Taunton River, and Project construction will have little to no impact on recreational uses such as fishing and boating. Consequently, the Project does not affect the assets and resources addressed by these plans.

A portion of the existing ROW abuts and crosses an MBTA rail corridor and adjacent land owned by Massachusetts Department of Transportation ("MassDOT"). This area is being developed as part of the South Coast Rail Project, which will restore commuter rail service between Boston and Southeastern Massachusetts. A train layover area with six storage tracks, crew quarters, a maintenance shed, and parking facilities is currently under construction on the MassDOT parcel, which is adjacent to the planned construction site for Structure M13N-6. NEP has met with the MBTA on multiple occasions since 2018 to coordinate construction sequencing and schedules; as a result of these discussions, the MBTA has agreed to create a temporary access road over its tracks to facilitate access to Structure M13N-6 during construction. Communication between NEP and the MBTA will continue for the duration of both projects.

Construction of the Project will require NEP to obtain permanent and temporary easements from an abutting industrial landowner to facilitate construction of and access to proposed structure M13N-6, the river crossing structure on the Fall River side of the Taunton River. Due to the limited available space on the NEP-owned parcel in this location, the foundations of this structure will extend slightly onto the vacant abutting property; NEP is also seeking temporary construction and laydown space from this landowner.

NEP is also seeking aerial easements from five property owners in the vicinity of proposed Structures N12-13 and M13N-13 to address contingency blowout conditions of the overhead conductor between Structures N12-12 and N12-14. These aerial easements are not necessary to enable NEP to build the Project; however, if NEP can secure these additional easements, it can eliminate Structures N12-13 and M13N-13, which will reduce the Project cost and visual impacts. Structures N12-13 and M13N-13 are further addressed in Section 4.5.8.

As shown on Figure 4-3B, construction of the Project will require tree removal, pruning and mowing in certain areas between State Route 24 and the Sykes Road Substation, and in the vicinity of proposed Structure M13N-6. After construction is complete, the ROW will continue to be maintained consistent with NEP's vegetation management policy. As further discussed in Section 4.5.8, NEP will work with individual abutters to minimize visual impacts from tree removal and pruning near residences.

In summary, the Project has been designed to minimize land use impacts by following an existing transmission line ROW and will be almost entirely confined within existing NEP-owned land and easements. The Project does not traverse public open space and recreational areas with the exception of the Taunton River and is not anticipated to affect recreational uses such as fishing and boating. NEP is working with the MBTA and MassDOT to coordinate Project construction with the construction of a future rail yard on a neighboring parcel. Finally, as discussed in further detail in the Sections that follow, the Company will mitigate temporary impacts related to visual impacts (Section 4.5.8), noise (Section 4.5.9), and traffic and transportation (Section 4.5.10). With the implementation of these measures, the land use impacts of the Project will be minimized.

4.5.2 Historic and Archaeologic Resources

This section describes archaeological sites and historic architectural properties present in the vicinity of the Project. 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").

NEP contracted The Public Archaeology Laboratory, Inc. ("PAL") to identify historic and archaeologic resources. PAL conducted a search of the Massachusetts Historical Commission ("MHC")'s Inventory of the Historic and Archeological Assets of the Commonwealth ("MHC Inventory"), which includes resources that are listed in the National Register of Historic Places ("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.

NEP has begun the process of evaluating potential impacts to historic and archaeological resources in consultation with the MHC and, as part of consultation under Section 106 of the National Historic Preservation Act (Section 106), the Tribal Historic Preservation Officers of the Mashpee Wampanoag Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and the Narragansett Indian Tribe. On behalf of NEP, PAL submitted a Project information package to the MHC on August 17, 2018, consisting of an initial outreach letter, Project Notification Form, a due diligence report, and an application for a permit to conduct an intensive (locational) archaeological survey for the proposed structure replacement locations along the ROW.

PAL established a study area from the center of the route out to a half-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.

Between September 2018 and February 2022, PAL, on behalf of NEP, has communicated with the MHC regarding various intensive (locational) archaeological survey and site examination investigations conducted along the NEP Project corridor. PAL conducted a due diligence and archaeological sensitivity assessment of the existing N12/M13 transmission corridor in April 2018. The archaeological resources due diligence included a file review of previously recorded archaeological resources in the Project vicinity, a walkover survey, and an archaeological sensitivity assessment of the ROW to provide information about archaeological resources that could be affected by the Project. Portions of the existing and proposed N12/M13 ROW were assessed with high, moderate, and low archaeological sensitivity. No archaeological sites and no historic architectural properties have been previously recorded within the study areas around Sykes Road substation.

PAL identified two archaeological sites recorded near the existing N12 and M13 transmission lines with the potential to be listed on the NRHP. The Project has been designed to avoid direct impacts to these resources. PAL will be developing an Archaeological Site Avoidance and Protection Plan to be implemented during the construction-phase of the Project to ensure protection of these resources.

The Project occurs predominantly within the established transmission line ROW. Based on the results of the PAL architectural survey report, the Project will not result in any visual impacts to historic structures.

The Project will require a Section 404 permit from the USACE and will be subject to review under Section 106. As part of the Section 106 process, the USACE consults with federally recognized Tribes that express an interest in the cultural resources that may be affected by those portions of the Project subject to USACE jurisdiction. The Project will also be subject to review by the MHC under G.L. c. 9, §§26-27C. NEP will continue to communicate with the USACE, MHC and federally recognized Tribes during the Section 106 and MHC review processes to identify potentially significant historic, cultural, and archaeological resources and avoid, minimize, or mitigate any potential Project impacts on those resources.

4.5.3 Wetland and Water Resources

This section identifies the wetland and water resources associated with the Project. The assessment of wetlands and water resources within the Project ROW is based on field delineations and studies.

Within the Town of Somerset and the City of Fall River, the Project traverses watercourses and wetlands that are designated as Class B, which serve as habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation.[32] The Taunton River is also classified as Land Containing Shellfish since American oysters, quahogs, and soft-shell clams have been mapped.[33] However, the shellfish area has been classified as restricted.

Five wetlands and five watercourses were identified in the Project ROW (refer to Figures 4-3A and 4-3B). There are a variety of wetland habitats in the ROW that include both coastal and freshwater wetlands. The predominant freshwater wetland habitat in the area is scrub-shrub wetland (PSS) within the existing transmission line ROW and deciduous wetland forest (PFO) adjacent to the line. The watercourses identified in the ROW include the tidal Taunton River (SM10), two perennial streams (SM9 and SM9A, Steep Brook), one intermittent stream (SM8), and one ephemeral stream (SM9B) that is a tributary of Steep Brook (SM9A).

Based on a review of MassGIS Natural Heritage and Endangered Species Program ("NHESP") vernal pool data layers, no Certified Vernal Pools ("CVPs") or Potential Vernal Pools ("PVPs") are located within the Project Route, and no CVPs were identified within the Study Area. There are no inventoried public water supplies, well head protection areas, or tributaries to Outstanding Resource Waters ("ORWs") located within the Project study area or along the Project ROW. No impacts to ORW or public water supplies are anticipated to result from this Project.

Throughout Project planning and design, wetland impacts have been minimized to the greatest extent practicable by utilizing the existing transmission line corridors. However, given the scale and landscape setting of the Project, certain wetland impacts cannot be avoided. Construction will result in temporary, permanent, and secondary impacts to wetland resources and watercourses. Temporary anticipated impacts to resources through Project activities includes grading/earthwork and placement of construction mats. Permanent anticipated resource impacts proposed through this Project includes the construction of

[32] Massachusetts Department of Environmental Protection. 2013. 314CMR 4.00 Massachusetts Surface Water Quality Standards. Retrieved July 09, 2021, from https://www.mass.gov/files/documents/2017/10/18/314cmr4.pdf.
[33] Massachusetts Division of Marine Fisheries. 2015. Shellfish Sanitation and Management. Retrieved April 20, 2015-July 09, 2021, from http://www.massmarinefisheries.net/shellfish/dsga/MHB2.pdf.

structure foundations and creation of an access road through water resources. Secondary impacts to water resources through construction of this project involve the conversion of forested wetland habitat to scrub-shrub or emergent wetland habitat, whereby the cover type changes but results in a no net-loss of wetlands. These impacts are further described in Table 4-5.

TABLE 4-5 SUMMARY OF ANTICIPATED WETLAND AND WATER RESOURCE IMPACTS

RESOURCE AREA	TEMPORARY IMPACTS	PERMANENT IMPACTS
Coastal Wetland Resource Areas		
Land Subject to Coastal Storm Flowage ("LSCSF")	Approximately 115,171 square feet ("sf") (2.6 acres) Temporary grading/earthwork/construction matting where level area is necessary to create a safe and effective work pad for equipment and crews.	Approximately 43,098 (0.99 acre) Structure foundations where LSCSF could not be avoided. Permanent access road and associated grading where LSCSF could not be avoided. Permanent gravel work pad for future operations and maintenance of electric facilities where LSCSF could not be avoided.
Salt Marsh ("SM")	Approximately 1,600 sf Temporary crossing of the salt marsh with a Low Ground Pressure Vehicle for wire pulling between structures N12-6 and N12-7.	No anticipated permanent impacts
Coastal Bank ("CB")	Approximately 4,142 sf Temporary grading/earthwork where level area is necessary to create a safe and effective work pad for equipment and crews.	Approximately 10,426 sf (0.24 acre) Construction of permanent access road where CB could not be avoided (4,154 sf). Permanent gravel work pad for future operations and maintenance of electric facilities where CB could not be avoided. (6,272 sf)
Inland Wetland Resource Areas		
Bordering Vegetated Wetland ("BVW")	Approximately 120,996 sf (2.7 acres) Construction mats for access routes where BVW crossings could not be avoided. Construction mats where work pads for construction and pull pads overlap with BVW.	Approximately 400 sf permanent Structure foundations where BVW could not be avoided
Inland Bank ("IB")	Approximately 208 linear feet ("lf") Approximately 208 lf of construction mats for an access route over the banks (IB) of the perennial Steep Brook (SM9A) and the associated ephemeral tributary (SM9B) of Steep Brook.	Approximately 47 lf secondary Conversion of forested wetland to scrub shrub wetland due to the removal of tree canopy over the banks (IB) of SM9.
Riverfront Area ("RFA")	Approximately 75,037 sf (1.7 acres) Approximately 1,951 sf of these impacts are accounted for as BVW secondary impacts above and 16,099 sf of these impacts are accounted for as LSCSF temporary impacts above. Construction mats for access routes where RFA crossings could not be avoided. Construction work pads and pull pads on paved surfaces where activities within RFA could not be avoided (Somerset).	Approximately 1,018 sf permanent Structure foundations where RFA could not be avoided in Somerset.

Impacts to Coastal Wetland Resource Areas

Installation of structure M13N-6 will result in permanent fill in LSCSF associated with the Taunton River in Fall River. The foundation will include perimeter bollards to prevent damage to the structure from floating debris in the event of a storm which exceeds the Base Flood Elevation.

NEP is proposing to construct a permanent work pad on NEP-fee owned property within LSCSF and CB to maintain access to and workspace around the structure. The work pad is necessary to accommodate on-going future maintenance of structures N12-6 and M13N-6. The work pad will be constructed with trap rock underlain by geotextile fabric.

Construction mats will be temporarily placed in LSCSF and CB to allow for construction equipment and crews to safely construct structure M13N-6. NEP will anchor temporary construction matting within LSCSF and CB at the time of construction. The temporary removal and replacement of construction mats will be determined based on considerations of the field conditions, weather conditions, forecasted water levels, coastal storm events, crew safety and the size of the matting footprint.

NEP is proposing the construction of a new access road within its existing, undeveloped easement within LSCSF and CB to the Taunton River. The new access road is required to perform installation of structure M13N-6 and for future maintenance of the transmission line facilities. NEP's facilities in this area are currently landlocked by private property and MBTA rail tracks. Permanent grading/earthwork will be necessary to accommodate the access roadway. The permanent access road will be constructed with trap rock underlain by geotextile fabric. The width of the travelled way on this proposed new access road will be approximately 14 feet to accommodate construction vehicles and equipment deliveries, including pole deliveries.

Coastal salt marsh wetland may be traversed by an amphibious LGP vehicle to facilitate wire pulling and installation of overhead conductors and wires (see Section 4.4.1).

Impacts to Inland Wetland Resource Areas

Existing access roads will be improved to allow for construction vehicle access. Access roads were designed to avoid BVWs, where feasible. Where access routes traverse wetland resource areas, temporary construction matting will be installed. The disturbance area for the temporary matting has been conservatively estimated to be 20 feet wide, with the actual mat travel surface having a 16-foot width. One BVW (M8) will be temporarily impacted for construction access. Additionally, construction mats will be used to bridge over IB associated with Steep Brook (SM9A) and its associated ephemeral tributary (SM9B). All mats will be removed after construction and impacted areas will be restored to pre-existing conditions.

Temporary construction mats will be used to create temporary work areas to safely accommodate equipment and crews during work activities including structure replacement and wire pulling. Construction mats typically consist of timber members that are bolted together. The temporary use of these wooden mats is a best management practice to alleviate the loading of heavy equipment working on wet or soft soils. Work pad dimensions vary by structure type and location. Proposed monopole and H-frame structure work pads will generally have a footprint of 100 feet by 100 feet. Pull pad areas, used for wire installation, generally have a footprint of 150 feet by 50 feet. The actual area required will be determined by the type of equipment and site-specific activities and by applicable NEP safety requirements. All mats will be removed after construction and impacted areas will be restored to pre-existing conditions.

Proposed structures have been sited outside wetlands and other sensitive areas to the maximum extent practicable. However, unavoidable permanent fill in BVW M8 will be required for the installation of four new structures. Depending on the structure type, the pole diameter can range from 5.5 feet per pole (for a direct embedment H-frame structure) to 10 feet (for a monopole with concrete caisson foundation) with a total of 48- to 150-square-foot impact area.

The majority of the existing N12 and M13 transmission corridor has been cleared of trees and maintained historically as active ROW. However, selective tree removal within BVW M9 and BVW M8 in Fall River will be required for safe installation and operation of the Project. Tree removal will result in the conversion of some forested wetlands to either scrub-shrub or emergent BVW in these locations. Once the trees are removed, these areas will be maintained as scrub-shrub or emergent wetlands. A section of tree canopy over the banks of perennial stream (SM9) will be removed. Tree pruning and "danger" tree removal will be performed, as necessary, as well as mowing of low-growth vegetation along the ROW.

Chapter 91 and Navigation

The placement of the new conductors associated with the relocated M13 Line will have no permanent impact on navigability or other public interests. The existing N12/M13 conductor height is 150 feet above MHW, and the replacement M13 conductor will be installed at an elevation of 155 feet above MHW (five feet above the existing conductor height). The conductor height is greater than the height of the downstream Veteran's Memorial Bridge, which has a clearance of approximately 60 feet above MHW, and greater than the upstream Berkley-Dighton Bridge which has a clearance of approximately 12 feet above MHW. Therefore, the overhead conductors of the N12 and M13 Lines will not adversely affect navigation or marine uses along this reach of the Taunton River. To the extent NEP utilizes vessels to tow lead lines for the new M13 conductors across the Taunton River as part of the wire-stringing process, NEP will mitigate any temporary impacts through advance notification to the U.S. Coast Guard by means of Local Notice to Mariners, informing the applicable Harbormasters, and notifying nearby mariners of the proposed activity and schedule.

The existing aerial crossings of the Taunton River by the N12 and M13 Lines is authorized under two existing Chapter 91 Licenses and a Section 10 Permit from the USACE, New England District. NEP has consulted with the Massachusetts Department of Environmental Protection ("MassDEP") Waterways Program on the Project. Although the Project will have no material impacts to navigation or other public trust interests, NEP anticipates that the new set of conductors and OPGW over the Taunton River will require a new Chapter 91 license for a water-dependent infrastructure crossing facility or an amendment to the existing licenses. Additionally, the new conductors will also require a modification to the existing Section 10 Permit.

Summary: Impacts to Wetlands and Water Resources

Throughout Project planning and design, NEP has taken measures to minimize impacts to wetland resources and water resources. These measures include using the existing ROW and access roads and avoiding the placement and construction of structures and access roads in wetlands and water resources wherever possible, have resulted in the avoidance and minimization of impacts to wetlands and wildlife to the greatest extent practicable.

Where permanent wetland impacts are unavoidable, NEP will provide appropriate mitigation. While mitigation plans are currently in the preliminary phases of development, NEP is committed to working with the USACE, MassDEP, and the Somerset and Fall River Conservation Commissions 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. To offset environmental impacts associated with the Project, appropriate compensatory mitigation (in collaborative consultation with local, state, and federal resource agencies and other stakeholders) will be provided, as a component of the final Project design.

Temporary construction-related wetland impacts will be mitigated through in-place restoration and stabilization. Restoration activities may include removing construction mats, re-grading the area to restore elevations and to address any rutting, removing all construction debris and restoring wetlands either directly or through natural revegetation. With the implementation of these measures, wetlands and water resource impacts from the Project will be minimized.

4.5.4 Climate Change

NEP has taken steps to promote climate change adaptation and resiliency in the design of the Project. The Project will result in a more climate change-ready and resilient transmission system that can: (1) withstand more extreme weather events; (2) address existing system capacity shortages and increased demand; and (3) support future interconnections from renewable energy projects and offshore wind. In addition, NEP's proposed Project uses substantial portions of existing ROW, thereby minimizing alteration of new land resources to construct the Project.

Climate Change Data and Protection Against Extreme Weather Events

The Executive Office of Energy and Environmental Affairs' ("EEA") Climate Change and Adaptation Report documents that with increasing temperatures as a result of climate change, electricity demand in the Commonwealth could increase by 40 percent in 2030. The report identifies that without reliable energy service, the basic needs of residents, visitors, businesses, and governments cannot be met. The energy sector's three primary climate change concerns are flooding, extreme weather events, and increased temperature. NEP considered each of these factors in designing the Project.

With respect to flooding, NEP reviewed the Resilient Massachusetts Action Team's Climate Resilience Design Standards Tool for climate projections, including coastal vulnerability, sea level rise and coastal flooding from the National Oceanic and Atmospheric Administration and temperature rise. NEP also reviewed the Massachusetts Sea Level Rise and Coastal Flooding Viewer for the Project.

At the Taunton River crossing, real estate constraints and design restrictions severely limited the siting of one new 300-foot-tall Y-frame structure (structure M13N-6) parallel to the existing N12/M13 crossing of the Taunton River. Due to these limitations, one structure will be located within LSCSF and within a regulatory floodway. However, NEP has incorporated design measures to minimize impacts to these areas while providing protection for the proposed transmission assets.

On the Somerset side of the Taunton River, existing structure N12-5 and proposed structure M13N-5 are located outside of the Federal Emergency Management Agency ("FEMA") 100-year flood zone. A portion of proposed structure M13N-5 is located immediately adjacent to a Category 4 hurricane surge inundation area as projected by the Resilient MA Action Team ("RMAT") data. Both transmission structures are located inland of the seawall along the west bank of the Taunton River in Somerset, which provides a level of protection during projected hurricane inundation and sea level rise. On the Fall River side of the Taunton River, existing structure N12-6 and proposed structure M13N-6 are both located within the FEMA 100-year flood zone, with a determined base flood elevation of 17 feet and within the Velocity Zone. The RMAT projections indicate that the area on the Fall River side of the Taunton River could encounter sea level rise with potential mean higher high-water with sea level rise of up to 4 to 5 feet above the current mean higher high-water mark. These structure locations are also mapped within a Category 1 hurricane surge inundation area as project by the RMAT.

For work occurring within the coastal zone of the Taunton River, NEP will take measures to ensure coastal features are protected from future effects of climate change and storm surges, including mitigation to prevent soil erosion, scouring and destabilization of the shorefront. NEP integrated climate adaptation and resiliency strategies into the overall Project design, including the use of elevated structures, reinforced structure foundations, storm protection measures, minimization of impacts to the existing topography/contours, coastal site stabilization, and re-establishment of natural vegetation. These design elements are meant to protect the long-term viability of the coastal zone and maintain the operability of the electric transmission assets by reducing the vulnerability to anticipated climate risks and improving resiliency for future climate conditions.

The proposed new structures will be located above the existing 10-year storm level and the foundation for the new structure will extend 4.0 feet above the ground line. This will result in an approximate 2.5 feet of buffer between the projected MHW mark and the bottom of the steel structure, and the proposed structure foundation will sit above the forecasted new sea level in this reach of the Taunton River. The proposed 12.5-foot-diameter steel monopole structure will be centered on a 42-foot-diameter concrete pile cap supported by a total of 36 micro-piles to secure the structure's position with LSCSF. The base of the transmission structure will be encircled by 6- to 8-foot-tall reinforced concrete bollards to protect the structure from the potential impact of floating debris during extreme flooding and wave action. NEP is currently assessing whether any shoreline protection measures are warranted at this time to further protect the Y-frame river crossing structure on the Fall River side of the Taunton River from forecasted sea level rise. In these ways, the new structures will be adequately protected from the anticipated effects of climate change.

The Project is also designed to account for more frequent extreme weather events. The Project's engineering design used structure loading criteria required by the NESC and National Grid Design Loads for Overhead Transmission Structures. The NESC load criteria require consideration of combined ice and wind district loading, extreme wind conditions, and extreme ice with concurrent wind conditions. NEP's standards also include consideration and contingency for heavy load imbalances and heavy ice conditions. All these considerations result in a design that is better equipped to withstand extreme weather. The design also incorporates materials (including steel structures and state of the art conductors) that have long useful lives and respond well to corrosive environments. The Project is also equipped to respond to increases in temperature. The RMAT temperature forecasts project a minimum change in temperature of 3.5°F and a maximum change in temperature of 3.9°F in the Project area. The new transmission line conductors are designed to operate at higher maximum operating temperatures at a higher carrying capacity and under fluctuations in air temperature. The OPGW is designed with vibration dampers to counter effects of wind-induced vibration. The overhead conductors are being analyzed for wind effects and will be equipped with dampers, if warranted.

Existing Capacity Shortages and Increased Power Demand

The Project contributes to regional adaptation strategies for the SEMA-RI area. As previously described, EEA's Climate Change and Adaptation Report ("Report") documents that with increasing temperatures as a result of climate change, electricity demand in the Commonwealth could increase by 40% by 2030. The Report documents the vulnerability of existing aging infrastructure and identifies key strategies to alleviate these vulnerabilities, including repair, upgrades and reuse and timely maintenance. The Project addresses the issues identified in the Report and ISO studies by supporting future load growth within the

SEMA-RI area. The Project will result in a stronger electrical transmission system that is vital to the area's safety, security, and economic prosperity.

The Project is consistent with these reliability strategies in the following ways:

- Reinforces electric transmission system reliability in the SEMA-RI region.
- Incorporates new design standards and the latest in design materials.
- Minimizes impacts to the natural and social environments because the proposed improvements are located within existing transmission line ROWs.
- Provides a stronger electrical transmission system that is vital to the area's safety, security, and economic prosperity.
- Meets growing transmission needs identified by the ISO-NE and supports future growth and forecasted demand within the SEMA-RI area.
- Improves the capability of the existing transmission system to move power more reliably into load centers.

4.5.5 Rare Species Habitat

This section describes the rare species habitats found within the Project ROW. Rare species habitat within the ROW was identified using the MassGIS NHESP Priority Habitats of Rare Species[34] data layer together with consultation with the Massachusetts NHESP. Based on the information provided by NHESP, the Project is not located within Priority Habitat or Estimated Habitat as indicated in the Massachusetts Natural Heritage Atlas (15th Edition).[35] However, one species is likely to occur within a portion of the Project limits. An anadromous fish species, the Atlantic sturgeon (*Acipenser oxyrinchus*) is found seasonally within the Taunton River.[36] The northern long-eared bat is also listed by the U.S. Fish and Wildlife Service; however, based on information received from NHESP, there are no known hibernacula or roost trees within the Project area. The Project is not subject to the rare wildlife species section of the Massachusetts Wetlands Protection Act Regulations (310 Code of Massachusetts Regulations ("CMR") 10.37, 10.59 and 10.58(4)(b)) or the Massachusetts Endangered Species Act Regulations (321 CMR 10.18).

The Project will avoid impacts to the Atlantic sturgeon by: (1) avoiding disturbance to the riverbed to maintain water quality; (2) avoiding in-water activities during the spawning migration in May and June to prevent interruption of the fish-run; and (3) implementing construction best management practices (dewatering containment, soils handling and management, and soil erosion controls) to prevent degradation to water quality of the river.

---

[34] 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.
[35] Natural Heritage and Endangered Species Program. 2021. MassGIS Data -- Regulatory Maps: Priority and Estimated Habitats. Retrieved September 26, 2021, from https://www.mass.gov/service-details/regulatory-maps-priority-estimated-habitats.
[36] Natural Heritage and Endangered Species Program. 2015. Atlantic sturgeon. *Acipenser oxyrinchus*. Retrieved July 09, 2021, from https://www.mass.gov/doc/atlantic-sturgeon/download.

4.5.6 Oil and Hazardous Materials

Given the proximity to the former Shell Oil Terminal located on the Fall River side of the Taunton River, and previous reports of light non-aqueous phase liquid on the terminal property, NEP may encounter known contaminants associated with previous oil terminal operations during the construction of the transmission tower foundations at structure M13N-6. NEP has retained a Massachusetts Licensed Site Professional from Coneco Engineers and Scientists to support Massachusetts Contingency Plan compliance associated with the construction of the Project. Coneco Engineers and Scientists will facilitate regulatory notifications and reporting required under the Massachusetts Contingency Plan and assist with planning and proper management and disposal of impacted soil and groundwater.

Lead paint may be encountered during lattice tower removal. NEP will follow National Grid's Safety and Environmental Guidance Documents for handling lead paint chip debris during the tower removal process. Towers will be dismantled and recycled while paint chip debris will be managed as hazardous waste.

4.5.7 Air Quality

NEP will take measures to limit vehicle idling times and to reduce air emissions during construction. NEP will also implement construction best management practices to suppress dust generation and fugitive dust emissions. Due to the transitory nature of construction activities, air quality in the Fall River and Somerset area will not be significantly affected by construction along the ROW.

Typical construction equipment will be used for construction of the Project. During all upgrade components, NEP will comply with the use of ultra-low sulfur diesel-powered equipment and restricted vehicle idling times during construction. NEP will also take measures to limit vehicle idling times and to reduce air emissions, including the following:

- In Massachusetts, any diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of construction will either be United States Environmental Protection Agency ("USEPA") Tier 4-compliant or will be retrofitted with USEPA-verified (or equivalent) emission control devices such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine.
- NEP requires the use of ultra-low sulfur diesel fuel in its diesel-powered construction equipment and limits idling time to five minutes except when engine power is necessary for the delivery of materials or to operate accessories to the vehicle such as power lifts.
- Vehicle idling is to be minimized during construction activities, in compliance with the Massachusetts Anti-idling Law, G.L. c. 90, § 16A, c. 111 §§ 142A – 142M, and 310 CMR 7.11.
- Exposed soils and access roads will be wetted and stabilized, as necessary, to suppress dust generation during construction.

There are no anticipated long-term impacts on air quality associated with the operation of the transmission lines.

4.5.8 Visual Impact Assessment

NEP engaged POWER to assess the potential for visual impacts from construction of the Project. Proposed views were modeled at fourteen locations in the Project area with the potential for high visibility, use, and/or sensitivity. Visual renderings were prepared from these observation points showing anticipated views before and after the Project is constructed. A Viewpoint Location Map and Simulations along the Project Route are presented in Figure 4-4.

As can be seen in Figure 4-4, the existing steel lattice transmission structures are visible from abutting residences located on and adjacent to North Main Street, Highland Avenue, Driftwood Lane, Wilson Road in Fall River, as well as from more densely populated areas of Somerset, including the residences along Riverside Avenue. The existing 300-foot river crossing structures may be viewed from greater distances.

The replacement of these existing structures with monopole structures would alter views from adjacent residences. This change would be expressed primarily by an increase in the number of structures, offset in part by a slimmer configuration; the approximate structure height would not be significantly altered. Vegetation removal will be limited to the extent possible; however, some tree removal will be required between Route 24 and the Sykes Road Substation.

NEP is seeking to further reduce visual impacts to residences located on and around Highland Avenue and Driftwood Street through the elimination of proposed Structures N12-13 and M13N-13 on the west side of Highland Avenue (see Figure 4-4, Viewpoints 8 and 9). These structures have been spotted directly adjacent to the roadway and would be visible both to abutters and to passing vehicles. Planned structures N12-13 and M13N-13 are needed to keep the N12 and M13 conductors within NEP's existing ROW under high wind conditions. The Company is negotiating with five landowners for "blow-out rights" – that is, for rights that would allow the conductors to swing outside the existing NEP ROW in high winds. If these rights can be acquired, the structures could be eliminated from the Project, resulting in reduced visual impacts, lower Project costs, and a shorter construction duration.

Overall, the Project's visual impacts are limited by the location of the Project within an already-developed transmission ROW, and by the relatively limited need for tree removal in locations near sensitive receptors. New pole structures have been sited adjacent to existing structures, where feasible, to minimize the potential for visual impact. NEP will work with abutting landowners who experience a material change in view to identify reasonable and practical screening that could be provided on their properties, in "soft" form (e.g., compatible vegetation), "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.

4.5.9 Noise

The noise impacts associated with the Project are limited to temporary construction noise. No new noise generating equipment that would result in continuous noise is proposed. Exponent analyzed the potential for audible noise associated with the Project and concluded that, because transmission lines operating at 115 kV and lower voltages do not have significant corona,[37] audible noise and radio noise would be minimal (see Volume 1, Appendix 4-2, Electric Field, Magnetic Field, Audible Noise, and Radio Noise Assessment).

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. Project construction is anticipated to

[37] When the electric field at a localized portion of the conductor surface exceeds the breakdown strength of air, a tiny amount of energy is released in the form of conductor vibration, light, audible noise (AN), and radio noise (RN) in a process known as "corona".

occur during typical work hours, though in specific instances, at some locations, or at the request of a municipality, NEP may seek municipal approval to work at night.

The Fall River and Somerset noise ordinances are shown in Table 4-6.

TABLE 4-6 MUNICIPAL NOISE ORDINANCE SUMMARY

MUNICIPALITY CODE	ALLOWED CONSTRUCTION HOURS		EXCEPTIONS
	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 only)	N/A
Town of Somerset Noise Control Bylaw, Article 34 - ATM 5/17/21	7:00 a.m. - 10:00 p.m.	8:00 am - 10:00 pm (weekends and legal holidays)	Construction outside of the allowed hours may be permitted by a permit issued by the Somerset Board of Health for such activity Construction-related activity on days for which "Danger" or "Extreme Danger" heat conditions are forecast by the National Weather Service, activities may begin before 7:00 a.m., but not before 5:30 a.m.

Noise generated by construction is generally temporary and intermittent. Sound levels from construction activity typically are dominated by the loudest piece of equipment operating at the time. Therefore, at any given point along the work corridor, the loudest piece of equipment will be the most representative of the expected sound levels in the area.

Table 4-7 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 A-weighted decibels ("dBA") to 98 dBA at a distance of 50 feet from the construction activity. The closest residence along the Project ROW is approximately 100 feet away from the separated transmission lines, resulting in intermittent noise of up to 92 dBA during vegetation removal and ROW mowing, with lower levels of noise during other phases of Project construction. Typical sound levels of construction noise experienced at any given residence will be sporadic and of limited duration.

TABLE 4-7 TYPICAL CONSTRUCTION SOUND LEVELS

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

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
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 • Aerial lift equipment • Tractor trailers	80 to 90	74 to 84	68 to 78	65 to 75
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

Source: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm

At Sykes Road Substation, construction activities will be limited to the replacement of line taps, installation of two line disconnect switches, and connections to the station bus. The substation is surrounded by utility corridors and commercial uses, including an industrial park with heavy truck traffic, with the nearest residence located approximately 300 feet south of the substation. Audible noise levels in residential areas are typically around 55 dBA during the day; the nearest resident to the substation may experience intermittent noise up to 75 dBA during construction activities.

NEP expects construction to occur over a period of approximately 12 months, depending upon the availability of outage windows. 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. NEP 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. Only necessary equipment will run during construction to minimize engine noise. With the implementation of these measures, noise impacts associated with the Project will be minimized.

4.5.10 Traffic and Transportation

This section evaluates the potential for traffic impacts associated with the Project. Potential traffic impacts were evaluated using the MassGIS, Massachusetts Department of Transportation ("MassDOT") Roads (2018). Roadways are identified by six functional classification system categories developed by MassDOT as shown in Table 4-8 below.

TABLE 4-8 ROADWAYS AFFECTED BY OVERHEAD LINE INSTALLATION

FUNCTIONAL CLASSIFICATION SYSTEM CATEGORY (MassDOT)	NUMBER AND LOCATION
Linear Mileage of Roadway Occupied	0
Road Crossings: Minor Road Arterials/Collectors	1 (Highland Avenue)
Road Crossings: Major Road Arterials/Collectors	2 (North Main Street & Wilson Road)
Road Crossings: Principal Arterial Other Freeways or Expressways	2 (State Route 79 & State Route 24)
Subtotal	**5**
Railroad Crossings (active)	1 (MassCoastal Rail/ MBTA)

Construction of the Project will 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, 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 serve as temporary guard structures to support the lines as they are attached to the newly installed structures. Traffic will be stopped for a short period of time to allow a rope to be manually pulled across the roadway. Conductors 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 five roadway crossings and one railroad crossing. Permits from the MBTA and MassDOT will be required for crossing of the rail line and state highways, respectively. Traffic Management Plans and traffic controls will be prepared by NEP to facilitate construction on and over public streets.

NEP will also coordinate with local authorities in the City of Fall River and Town of Somerset for work on local streets and roads. To the extent required, NEP and will apply for new or amended grant of locations for wire crossings across the municipally owned roads. At locations where construction equipment must be staged in a public way, the contractors will follow a pre-approved work zone traffic control plan with appropriate police details.

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. Construction traffic impacts related to the Sykes Road 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. The schedule for planned work and deliveries to the substation will be coordinated with the adjacent industrial park and potentially affected business owners in Fall River.

NEP will carefully coordinate construction to minimize impacts to adjacent residences and businesses and others relying on these transportation corridors. Prior to beginning construction, NEP and associated contractor(s) 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. Traffic impacts associated with all options would be temporary in nature and confined to the amount of time necessary for construction. 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.

4.5.11 Electric and Magnetic Fields

NEP's consultant, Exponent, assessed EMF associated with the Project at both peak and average loading conditions. Exponent modeled the EMF levels for three cross-sections of the ROW 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 from the Project are calculated to be small and that the Project generally reduces magnetic field levels along the Project ROW. Exponent's report and technical appendices, which describe its modeling methods and results, are provided as Appendix 4-2.

Electric Fields

Table 4-9 summarizes modeled electric field levels for the three ROW cross-sections under average loading conditions.

TABLE 4-9 CALCULATED ELECTRIC FIELD LEVELS (KV/M) AT AVERAGE LOADING

SECTION NUMBER	CONDITION	100 FEET BEYOND NORTHERN ROW EDGE	NORTH ROW EDGE	MAX ON ROW	SOUTH ROW EDGE	100 FT BEYOND SOUTHERN ROW EDGE
1	Existing	0.1	0.1	0.1	<0.1	<0.1
	Post-Project	0.1	0.2	0.2	0.1	0.1
2	Existing	<0.1	1.1	1.6	1.1	<0.1
	Post-Project	<0.1	0.8	1.9	1.0	<0.1
3	Existing	<0.1	0.7	2.0	0.6	<0.1
	Post-Project	<0.1	0.8	2.0	<0.1	<0.1

As shown in Table 4-9, the Project is expected to have extremely limited impacts on electric fields, with changes at the ROW edge ranging from an increase of 0.1 kV/m to a decrease of 0.6 kV/m.

Magnetic Fields

Table 4-10 summarizes modeled magnetic field levels for the three ROW cross-sections under average loading conditions.

TABLE 4-10 MAGNETIC FIELD LEVELS (MG) AT AVERAGE LOADING

SECTION NUMBER	CONFIGURATION	100 FEET BEYOND NORTHERN ROW EDGE	NORTH ROW EDGE	MAX ON ROW	SOUTH ROW EDGE	100 FT BEYOND SOUTHERN ROW EDGE
1	Existing	5.9	9.8	11	5.0	2.8
	Post-Project	3.6	8.0	12	7.5	3.4
2	Existing	8.3	89	141	91	8.4
	Post-Project	3.6	76	156	86	3.7
3	Existing	10	78	215	59	9.2
	Post-Project	7.4	63	228	25	5.1

Note: mG = milligauss

As shown above in Table 4-10, the Project is expected to reduce edge-of-ROW magnetic field levels for the land-based Cross-Sections 2 and 3. At Cross-Section 1, which corresponds to the Taunton River crossing, magnetic fields are calculated to increase by 2.5 milligauss ("mG") on the southern "edge" of the ROW, and to decrease by 1.8 mG on the northern "edge."

Conclusion

Exponent's modeling indicates that the Project would provide reductions in edge-of-ROW magnetic fields on both sides of both land-based cross-sections. In locations where the Project increases edge-of-ROW fields, these increases will be minimal (0.1 kV/m for electric fields and 2.5 mG for magnetic fields at average loading). 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.

4.5.12 Environmental Justice Populations

There are EJ populations located within one mile of the Project. These populations are found within Fall River and are mapped based on minority and/or minority and income criteria as generated by the Massachusetts Environmental Justice Populations Mapping Tool. Figure 4-5 depicts the EJ populations within one mile of the Project Route. Of the eight EJ census tracts within one mile of the existing ROW, two census tracts are directly crossed by the proposed Project. These EJ populations are Block Group 1, Census Tract 6421 and Block Group 1, Census Tract 6422.

As detailed in Section 1.9, NEP has taken several proactive steps to promote general community involvement during the planning of the Project. These steps have included – and will continue to include - the translation of project materials and translation services for the Project call-in line and email in Spanish, European Portuguese, and Cape Verdean. These translation services will enhance community involvement generally and the involvement of EJ populations in particular. In coordination with the MEPA Office and the City of Fall River, NEP identified CBOs and reached out to these organizations via email and phone. CBOs were informed of ways to request a community meeting and to contact the Project Team and were invited to the Project Open Houses. Table 4-11 lists the CBOs contacted by NEP for notice and circulation of materials. NEP will continue to work with the MEPA Office, the City of Fall River and other stakeholders to identify any additional CBOs or other individuals or entities and include them in the distribution of the MEPA EJ Screening Form that will be circulated prior to submission of the SEIR. NEP will continue to communicate and conduct outreach to CBOs during the permitting and construction phases of the Project.

TABLE 4-11 COMMUNITY BASED ORGANIZATIONS CONTACTED

AFFILIATION	SERVICE AREA
Groundwork South Coast	Fall River, Somerset
Coalition for Social Justice	Fall River
United Way	Fall River
United Neighbors of Fall River	Fall River
Youth Services	Fall River

As described throughout Section 4.0 of this filing, 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.

4.6 Conclusion – Environmental Impacts

The impacts of the Project will be minimized as a result of the avoidance, minimization, and mitigation measures described above. NEP also commits to mitigate environmental impacts in consultation with relevant federal, state, and local regulatory review agencies. NEP therefore concludes that, consistent with the Department's statutory mandate, the construction of the Project will serve the public convenience and be consistent with the public interest.