EFSB 24-02 and D.P.U. 24-190

Palmer to Ware Improvement Project

Palmer, West Brookfield, and Ware, Massachusetts

PREPARED FOR

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1 PROJECT OVERVIEW

1.1 INTRODUCTION

New England Power Company d/b/a National Grid ("NEP" or the "Company") submits this Application to Support the Petition before the Energy Facilities Siting Board ("Siting Board") ("Application") pursuant to G.L. c. 164, § 69J ("Section 69J Petition") seeking approval to remove the existing O15N Line (the "Existing Line") and to rebuild it (the "Rebuilt Line") within the existing electric transmission line right-of-way ("ROW") between NEP's Ware #501 Substation in Ware, Massachusetts ("Ware Substation") and NEP's Palmer #503 Substation in Palmer, Massachusetts ("Palmer Substation") (the "Palmer to Ware Improvement Project" or the "Project").

The Existing Line is approximately 10.35 miles long and passes through portions of Palmer, West Brookfield and Ware, Massachusetts. The ROW is comprised of NEP easements or land owned in fee and varies between 100 and 200 feet wide, with heavy vegetation and tall trees on both sides of the circuit outside of the ROW for its entire length. Existing access roads traverse parts of the ROW; however, much of the ROW is extremely hilly and rocky, and access is limited. The Project will include minor vegetation management, upgrading existing access, and creating new access as required to construct and maintain the Rebuilt Line.

The Existing Line must be rebuilt because inherent design characteristics and physical deterioration have resulted in poor reliability. In addition, increased fiber optic capability is needed both to protect the line from lightning and improve telecommunications. Rebuilding the Existing Line will address widespread damage to the existing structures, improve telecommunications between the two substations, and improve reliability.

There are 147 structures, including 125 wood suspension structures, 14 wood dead-end structures, six steel H-frame steel suspension structures, and two steel H-frame dead-end structures on the Existing Line. All structures will be replaced with steel structures. The Rebuilt Line will generally be constructed on light-duty steel single-pole braced-post structures ranging from approximately 75 feet to 110 feet above ground. The Existing Line is off-center in the ROW, with the outermost conductor only approximately 30 feet away from the ROW edge. The structures on the Rebuilt Line will be constructed close to the centerline of the ROW, which will place the conductors farther from tall vegetation outside the ROW. The Company will replace the existing 795 kcmil aluminum conductor steel-reinforced ("ACSR") Condor cable, with 795 kcmil aluminum conductor steel-supported ("ACSS") Drake cable and the single existing shield wire will be replaced with optical ground wire ("OPGW"). The new conductor can carry more current and, therefore, its use on the Rebuilt Line will increase the capacity of the system. The OPGW will improve communication between stations.

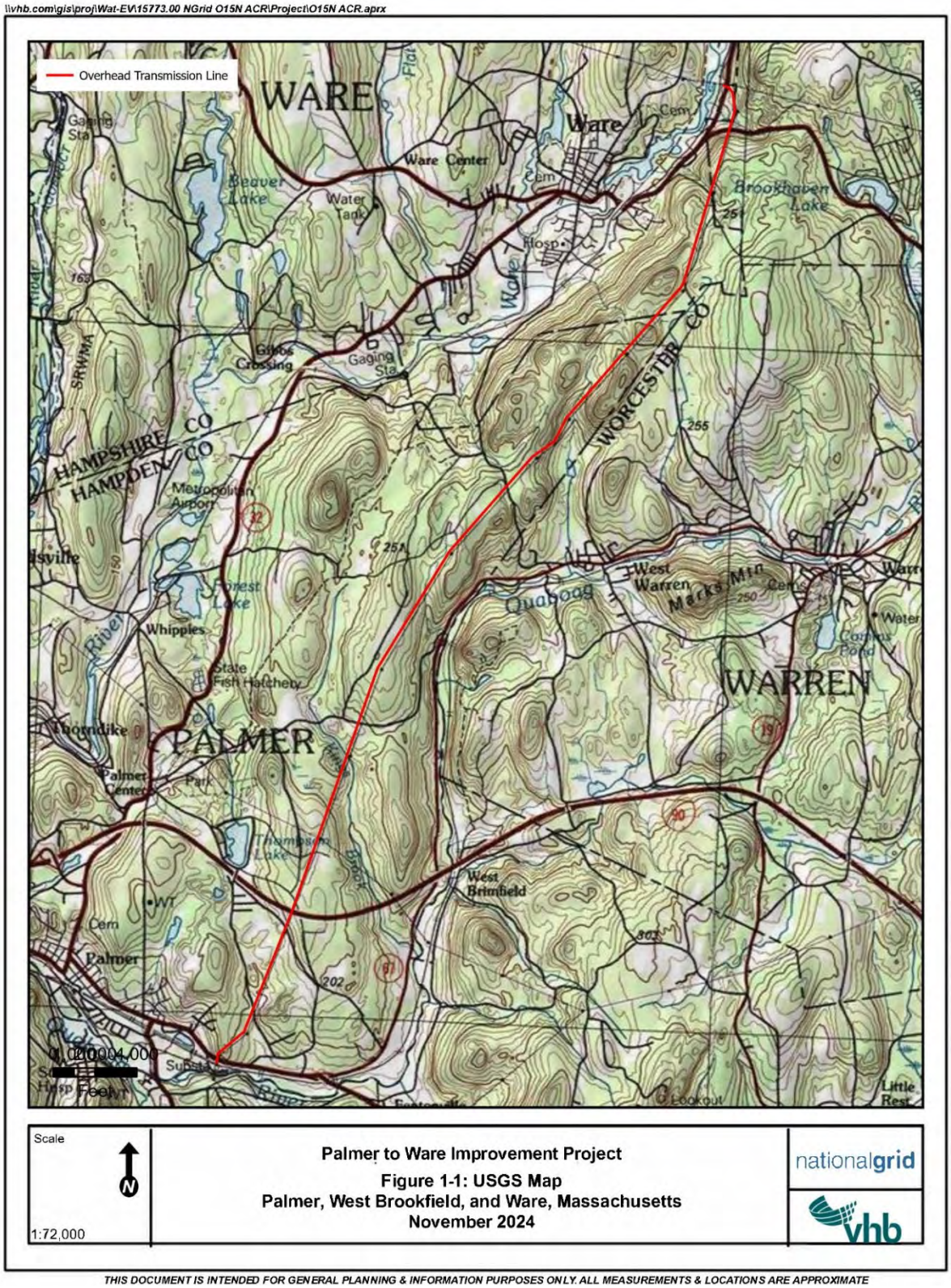
The Company proposes to construct the Rebuilt Line using its 115 kV design standards even though there are currently no immediate reliability needs that would necessitate the operation of the Rebuilt Line at 115 kV within the 10-year planning horizon. Even when operating at 69 kV, the Rebuilt Line

will provide increased capacity due to the proposed use of ACSS conductor. Notably, the Rebuilt Line will support future operation at 115 kV, which will provide flexibility in meeting future transmission system needs as the implementation of electrification and climate change initiatives in the Commonwealth increase across the state.

As discussed further in Section 4, the Company proposes constructing the Rebuilt Line along the route of, and in the same ROW as, the Existing Line because this route is superior to any other potential route between Palmer and Ware Substations. Constructing the Project along any other route would result in increased costs, schedule delays, and new and/or increased impacts to human and natural environments. *Figure 1-1* is a United States Geological Survey ("USGS") quadrangle base map showing the location of the Existing Line.

As set forth in detail below, and consistent with the requirements of G.L. c. 164, §§ 69H, 69J and 72, the Project will provide a reliable energy supply for the Commonwealth of Massachusetts with a minimum impact on the environment at the lowest possible cost. The Project will serve the public interest by: (1) improving the reliability of the electric system while minimizing environmental impacts and costs; (2) enhancing the telecommunication pathway between the Palmer and Ware Substations; and (3) increasing the voltage capability of the Rebuilt Line to meet future load growth and provide additional capacity to support widespread electrification and the connection of new renewable energy resources to the transmission system. For these reasons, NEP requests the Siting Board's approval of the Project.

Figure 1-1: USGS Map



1.2 OVERVIEW OF APPLICATION

The balance of *Section 1* presents an overview of the Project. The remaining sections of this Application provide detailed information and analysis to support the Project, specifically the need for the Rebuilt Line (*Section 2*), a comparison of Project alternatives (*Section 3*), a description of the route evaluation process that was used to ensure that the existing O15N corridor is the optimal route for the Rebuilt Line (*Section 4*), a detailed analysis of the Project's impacts on the natural and social environment, including mitigation of those impacts (*Section 5*), and an analysis of the Project's consistency with the health, environmental protection, resource use, and development policies of the Commonwealth of Massachusetts (*Section 6*).

1.3 PROJECT NEED

A review of the recent operating history, design, and physical condition of the Existing Line demonstrates that it should be rebuilt to ensure reliable service. As discussed in Section 2, the Existing Line's wooden structures have widespread damage caused by woodpecker activity, which poses a threat to the reliability of the transmission system. Broader physical issues related to the off-center location of the transmission line in the ROW and close, tall trees adjacent to the ROW, as well as poor shielding angles when compared to industry standard, have contributed to the poor performance of the Existing Line. Accordingly, the Existing Line must be replaced in the near term to allow NEP to continue to meet regional demands for a reliable supply of electricity and to provide increased fiber optic capability to both protect the line from lightning and improve telecommunications.

1.4 PROJECT ALTERNATIVES

In accordance with Siting Board precedent, NEP evaluated a series of Project alternatives for the potential to meet the identified need and to determine the approach that best balances reliability, cost, and environmental impact. Section 3 summarizes the analyses used to identify and evaluate alternative means of meeting the identified need. These include: (1) a No-Build Alternative; (2) Non-Wires Alternatives; and (3) a Spacer Cable Alternative; and (4) a Complete Rebuild Alternative (the Project).

After determining that rebuilding the Existing Line was the only alternative that could meet all the identified needs, the Company assessed two transmission structure designs for the Rebuilt Line – rebuilding the Existing Line for operation at 69 kV or rebuilding the Existing Line to support present day operation at 69 kV and future operation at 115 kV. The Company determined that the Project as proposed – rebuilding the Existing Line to support future operation at 115 kV – will most effectively provide a reliable energy supply with the least impact on the environment at the lowest reasonable cost, as well as support long-term electric load growth.

1.5 THE PROJECT ROUTE

NEP proposes replacing the Existing Line with a Rebuilt Line within the existing ROW. Section 4 of this Application describes the process by which NEP evaluated potential route alternatives to ensure no clearly superior route was overlooked. As an initial matter, the Company identified a geographic study area (the "Study Area") that encompassed possible route options for the Rebuilt Line. The Study Area and the routing opportunities and constraints within it are described in Section 4. The Company established criteria to identify, screen and evaluate potential overhead routes with a focus on maximizing the use of existing linear corridors, limiting construction constraints, and minimizing the potential for natural and social environmental impacts. After evaluating a wide array of potential route corridors and options, NEP determined that all potential alternative routes for the O15N Line, as compared to the route along the Existing Line ROW (the "Project Route"), were clearly inferior in that they would be longer, have greater environmental impacts and more significant constructability issues and, therefore, would be more costly.

1.6 SUMMARY OF PROJECT SCHEDULE AND COST

Assuming receipt of all necessary permits and approvals, the Company expects to begin access road improvements in July 2027 and construction of the structures and transmission line in June 2028. The Rebuilt Line is expected to be energized and all Project-related activities, including removal of the Existing Line, are expected to be completed in November 2028.

1.6.1 Project Schedule

A summary of the major Project elements and their corresponding target milestone dates is provided in Table 1-1.

Table 1-1: Anticipated Project Schedule

Project Component	Estimated Start Date	Estimated End Date
Access Route Construction, Restoration, and Improvements	July 2027	May 2028
Rebuild Existing Line	July 2027	December 2028
Remove Existing Line	January 2029	May 2029
Restore ROW (where required)	January 2029	May 2029

1.6.2 Project Cost

NEP estimates that the total cost of the Project is approximately $65.6 million. This estimate is provided with an accuracy level of –25%/+25%.

1.7 CONSTRUCTION OVERVIEW AND MINIMIZATION OF IMPACTS

Section 5 describes the methodology by which the Project will be constructed, assesses the potential for environmental impacts, and describes mitigation measures that will be implemented by the Company to minimize impacts of construction on the environment and surrounding community.

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 routes; (4) construction of work pads and staging areas; (5) installation of foundations and transmission structures; (6) installation of overhead conductor and OPGW; (7) removal and disposal of existing transmission line components; and (8) restoration and stabilization of the ROW. Several 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 line section will be visited intermittently to complete each phase of construction.

Potential impacts from Project construction will include temporary traffic congestion, construction noise, and sediment generation. As discussed in *Section 5*, the Company has thoroughly assessed the potential for impacts to the environment and surrounding community as a result of the Project, and has avoided, minimized, or mitigated those impacts. The Project is simultaneously undergoing review pursuant to the Massachusetts Environmental Policy Act, G.L. c. 30, §§ 61 through 62L ("MEPA"). NEP submitted an Expanded Environmental Notification Form ("EENF") on August 15, 2024, provided as *Appendix 1-1*. The Secretary's Certificate on the EENF, issued on September 30, 2024, is provided as *Appendix 1-2*.

1.8 AGENCY AND COMMUNITY OUTREACH

NEP is committed to providing proactive and transparent communication to municipal officials, local businesses, residents, communities along the Project Route, and any interested stakeholders throughout the life of the Project. NEP's initial outreach efforts have been aimed at providing notification to abutting landowners of activities within the ROW and briefing local officials and other stakeholders on the need for the Project, providing details regarding the Project Route and Project schedule, and detailing the permitting and siting processes, including opportunities for public input. The Company will continue these efforts throughout the licensing and permitting process and will maintain a focused communications program during and after construction. This outreach program is designed to educate and engage the Project communities, foster public participation, and solicit feedback from stakeholders. Key elements of NEP's outreach program for the Project are described below.

Municipal Outreach: NEP presented an overview of the Project to the Ware Board of Selectmen on April 16, 2024, and Palmer Town Council on May 13, 2024. At the request of the West Brookfield Board of Selectmen, the Company emailed a Project presentation in lieu of an in-person meeting.

Open House: NEP held open houses in Ware on May 22, 2024, and Palmer on May 28, 2024. Invitations to these open houses were sent to all abutters within 500 feet of the Project Route in Ware, Palmer, and West Brookfield. Per 301 CMR 11.05(4)(b), the Company also sent advanced notification in the form of a completed "Environmental Justice Screening Form" via electronic mail on July 16, 2024, to all contacts on the Environmental Justice ("EJ") Reference List provided by the MEPA Office. The open house invitations were also posted in print publications. The open houses provided the public an opportunity to speak with subject matter experts, ask questions, and share concerns about the Project. During the open houses, NEP provided a Project overview with a focus on the need, benefits, permitting process, location, design, schedule, and anticipated construction activities, as well as a summary of participation opportunities for all interested persons.

Door-to-Door: The Company has reached out in-person to landowners upon request and/or as needed to discuss ongoing field activities and future use of abutter properties for things like access and tree trimming. Door-to-door outreach will continue as needed.

Website: NEP hosts a Project website, https://palmertowareimprovementproject.com/index.htm. The website currently provides basic Project information, maps, regular updates, links to public filings, and contact information. The website can be viewed in English; however, content can be translated to other languages by submitting a request through the website. The website will be maintained and updated for the duration of the Project.

Project Hotline: NEP has a dedicated toll-free Project hotline number (800) 674-9510. The Project hotline number is included in all Project outreach materials, including fact sheets and mailings, is posted on the website, and is available at all community events. NEP commits to responding promptly to all inquiries received via the Project hotline. Inquiries received through the hotline are typically answered within three business days.

Project Email: NEP has designated info@o15nproject.com as its Project email address. The email address is included in all Project outreach materials, including fact sheets and mailings, is posted on the website, and is available at all community events. As with the hotline, NEP commits to responding promptly to all inquiries received via the Project email.

Municipal and Stakeholder Briefings: A list of outreach meetings with the municipalities, communities, regulatory agencies and other officials is provided in Table 1-2 and Table 1-3.

Table 1-2: Outreach and Consultations

Date	Activities and Milestones	Interaction Type/Description
03/27/2024	West Brookfield PowerPoint	Emailed Presentation to Board of Selectmen which included information on Project need, design, location, permitting, schedule, construction activities
04/16/2024	Ware Selectboard Meeting	Presented Project to Selectboard, including Project need, design, location, permitting, schedule, construction activities
05/13/2024	Palmer Town Council Meeting	Presented Project to Town Council including Project need, design, location, permitting, schedule, construction activities
05/22/2024	Ware Open House	Held Open House with Project information and Project team members for the public to join. Open House flyers were sent in multiple rounds and posted in local publications.
05/23/2024	MEPA/EJ Pre-filing Meeting	Discussed EJ requirements in relation to environmental impacts and public outreach plans
05/28/2024	Palmer Open House	Held Open House with Project information and Project team members for the public to join. Open House flyers were sent in multiple rounds and posted in local publications.
07/16/2024	EJ Screening Form	EJ Screening Form emailed to all organizations provided by MEPA

Construction Community Outreach Plan: NEP will execute a comprehensive construction community outreach plan to keep landowners, businesses, and municipal officials, including fire, police, and emergency personnel, updated on planned construction activities. NEP will notify abutting landowners and municipal officials of its 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 as needed throughout construction to notify landowners of upcoming activities and to address any questions or concerns they may have. Translation services will be made available as requested.
- In-person or virtual pre-construction briefings with municipalities and other stakeholder groups.
- Regular email updates to municipal officials and any other stakeholders requesting this form of communication.
- Periodic communications with abutters and other stakeholders providing advance notice of scheduled construction activities. Written communications will be provided in English and can be translated into other languages upon request.
- Meetings, emails, and phone calls with concerned landowners will be held on a case-by-case basis.
- Upon request, meetings with affected landowners prior to each major stage of construction.

1.9 CONCLUSION

NEP proposes to rebuild its O15N Line with steel pole structures, conductor, and OPGW designed to operate at 115 kV. The Rebuilt Line will address underlying issues associated with the Existing Line and will enhance reliability, increase resilience, and improve communication, as well as enhancing long-term capacity on its transmission system. Improvements to access will facilitate future maintenance. The Company seeks authority to construct the Project to fulfill its obligations to ensure the safe and reliable transmission of power to its customers with a minimum impact on the environment at the lowest possible cost.

As described above and as demonstrated throughout this Application, the Project also will serve the public convenience and is consistent with the public interest, as required by Section 72. Given the operational history of the Existing Line, the Project is needed to address system reliability requirements. Further, NEP extensively considered potential alternatives to, and the environmental impacts of, the Project and has avoided and minimized environmental impacts and proposed appropriate mitigation for any unavoidable impacts. As such, the Project meets the standards applicable under Section 72 for authorization to construct and operate its transmission facilities. For the reasons described in greater detail in this Application, NEP has demonstrated that the Project is consistent with Siting Board and DPU standards and precedent on need, alternatives, routing, and minimization of environmental impacts under G.L. c. 164, § 69J, and therefore should be approved.

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2 PROJECT NEED

2.1 INTRODUCTION

The NEP transmission system is an integral part of the regional power grid, transmitting electricity to support regional electricity markets and delivering electricity to customers throughout New England. The need for the Project stems from NEP's fundamental obligation as an electric company to provide safe and reliable transmission service to residential, commercial, and industrial customers throughout its service territory. In addition, maintaining system reliability is critical to support recent local, state and federal climate change and electrification policies that are aimed at addressing the adverse effects of climate change and eliminating reliance on fossil fuels by increasing the use of electric vehicles and electric heating applications.

To maintain the integrity of this system, NEP must ensure that adequate and reliable transmission capacity is available to meet existing and projected load requirements and that a secure and reliable telecommunications network is in place to strengthen the security and resilience of critical infrastructure. The grid is designed to meet reliability standards and criteria developed by the North American Electric Reliability Commission ("NERC"), which sets the minimum reliability standards for electric power transmission for North America, the Northeast Power Coordinating Council, Inc. ("NPCC"), and the Independent System Operator – New England ("ISO-NE").

Accordingly, to ensure that its transmission assets are and will remain in condition to meet these objectives, the Company evaluates the reliability and condition of its assets to determine whether they should be replaced before their performance negatively impacts the provision of safe and reliable service. The Project is consistent with the Company's proactive approach to ensuring the continued reliability of its transmission system.

A review of the recent operating history, design, and physical condition of the Existing Line demonstrates that it should be rebuilt to ensure reliable service. As discussed below, the Existing Line has inherent design characteristics that compromise the Company's ability to provide reliable service. Those characteristics, as well as physical deterioration of many of the structures, have resulted in poor reliability performance. In addition, the Project is needed to provide increased fiber optic capability both to protect the line from lightning and improve telecommunications.

In light of these concerns, NEP proposes replacing the Existing Line with a Rebuilt Line in the same ROW. Replacing this degraded asset will increase the reliability of the line. The Project also includes installation of a new OPGW, which will better protect the wires from fault-causing lightning strikes and provide an upgraded communications path that will allow for fault detection and high-speed communication between the ends of the Rebuilt Line. The Rebuilt Line will be designed with additional capacity to meet anticipated future requirements and increasing transfers of power over time to support electrification within the Commonwealth. As further discussed in *Section 3*, the Rebuilt Line

will be operated at 69 kV but will be designed to allow for future operation at 115 kV as long-term load growth from electrification and climate change policies are implemented on a widespread basis.

Section 2.2 provides a description of the Existing Line and its role in the regional transmission system. *Section 2.3* discusses the operating history and current condition of the Existing Line and the need to rebuild this asset. *Section 2.4* describes the need for increased fiber optic capability and Sections *2.5* and *2.6* discuss the potential for additional capacity and voltage support as well as long-term needs for additional transmission capacity across New England to support state climate and renewable energy policies. Finally, *Section 2.7* summarizes the need for the Project.

2.2 DESCRIPTION OF THE EXISTING TRANSMISSION SYSTEM

2.2.1 Existing Line and Substations

The O15N Line is approximately 10.35 miles in length and connects NEP's Ware #501 and Palmer #503 Substations. The Existing Line traverses the Massachusetts towns of Ware, West Brookfield, and Palmer. The Ware Substation serves Massachusetts Electric Company ("MECo") customers in Ware and Hardwick. The Palmer Substation serves MECo customers in Palmer, Monson and Brimfield. There are no taps or other substations on the Existing Line.

From Ware Substation south for approximately eight miles to Structure 118, the Existing Line is the only circuit in the ROW. For the remaining approximately two miles to the Palmer Substation, the Existing Line shares the ROW with the Company's 115 kV X-176 Line.

The eight-mile stretch of the ROW from the Ware Substation to Structure 118 is approximately 100 feet wide. For the remaining two miles to the Palmer Substation, the ROW is approximately 200 feet wide. For its entire length, there is heavy vegetation and tall off-ROW trees on both sides and the line is positioned off-center in the ROW, with the outermost conductor only approximately 30 feet away from the edge of the ROW. The ROW has sloped terrain in many areas, which effectively increases the height of the off-ROW trees relative to the line. In addition to the Company's regular five-year vegetation management cycle for tree trimming and hazard tree removal, the Company performs additional work on the line to trim or remove off-ROW hazard trees. Access along the ROW is extremely difficult given the existing terrain, resulting in areas not easily accessible with equipment, which slows maintenance and repair work and increases restoration time during outages.

The Existing Line consists of a total of 147 structures, 125 wood suspension structures, 14 wood dead end structures, six steel H-frame steel suspension structures and two steel H-frame steel dead end structures, ranging in height from approximately 50 to 90 feet above ground. The majority of the structures are in a pole arm configuration with a chair frame design with horizontal framing. There is one shield wire at the top location on the poles. A representative cross-section of the Existing Line is provided as *Figure 2-1*. A one-line diagram of the existing transmission system is provided as *Figure 2-2*.

Figure 2-1: Representative Cross-Section (Mile 0 to Mile 8)

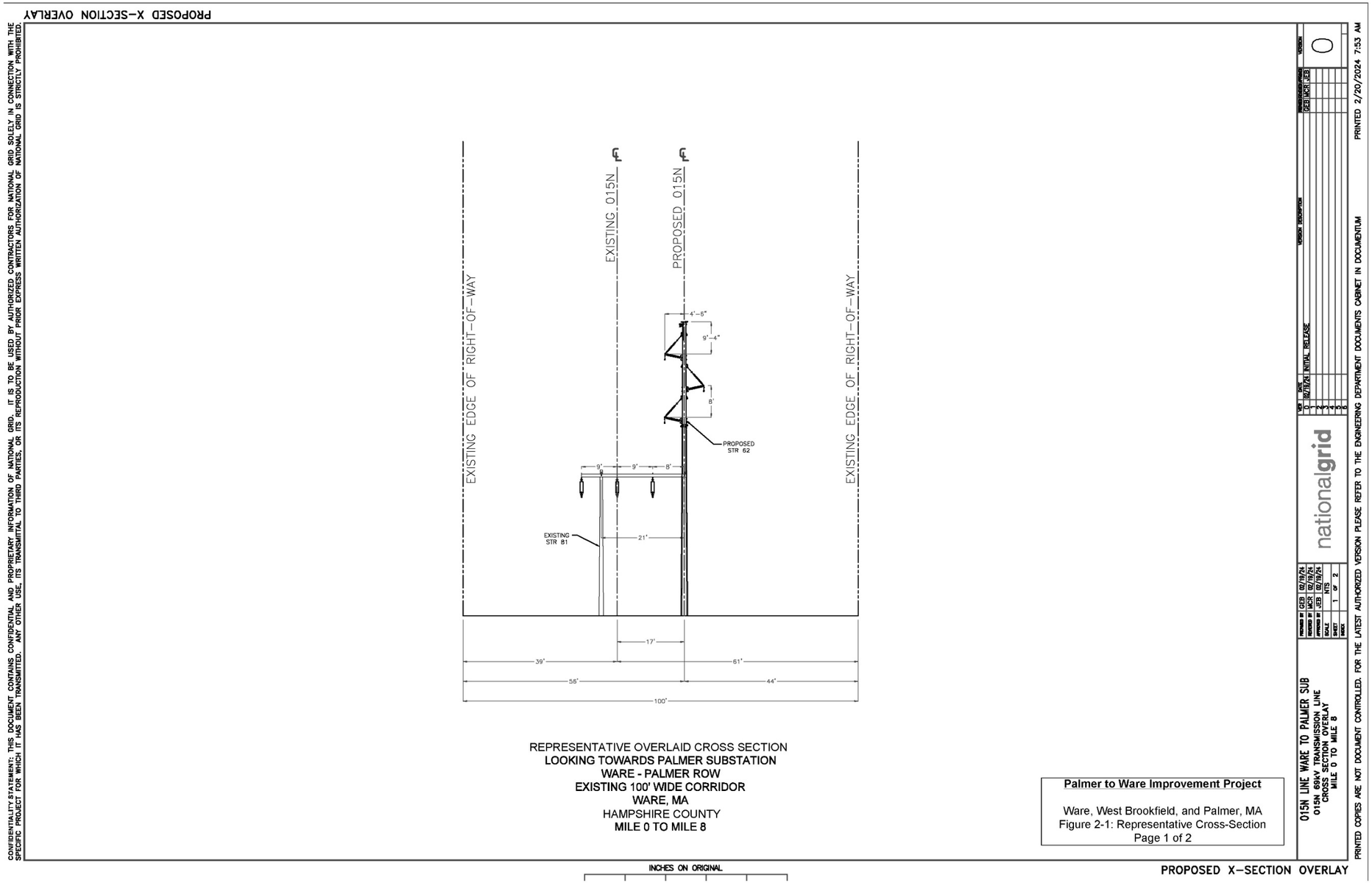


Figure 2-1: Representative Cross-Section (Mile 8 to Mile 10)

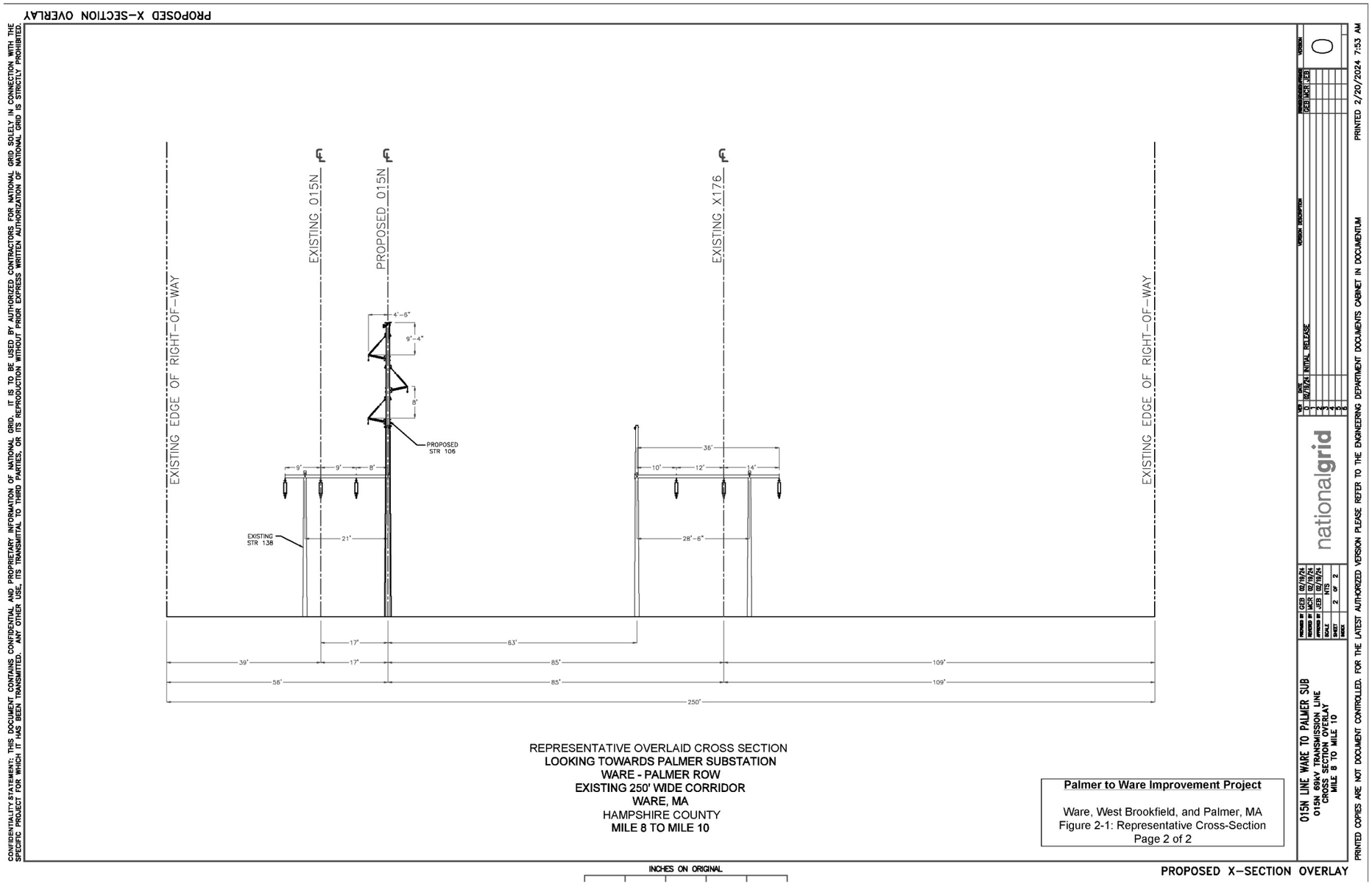
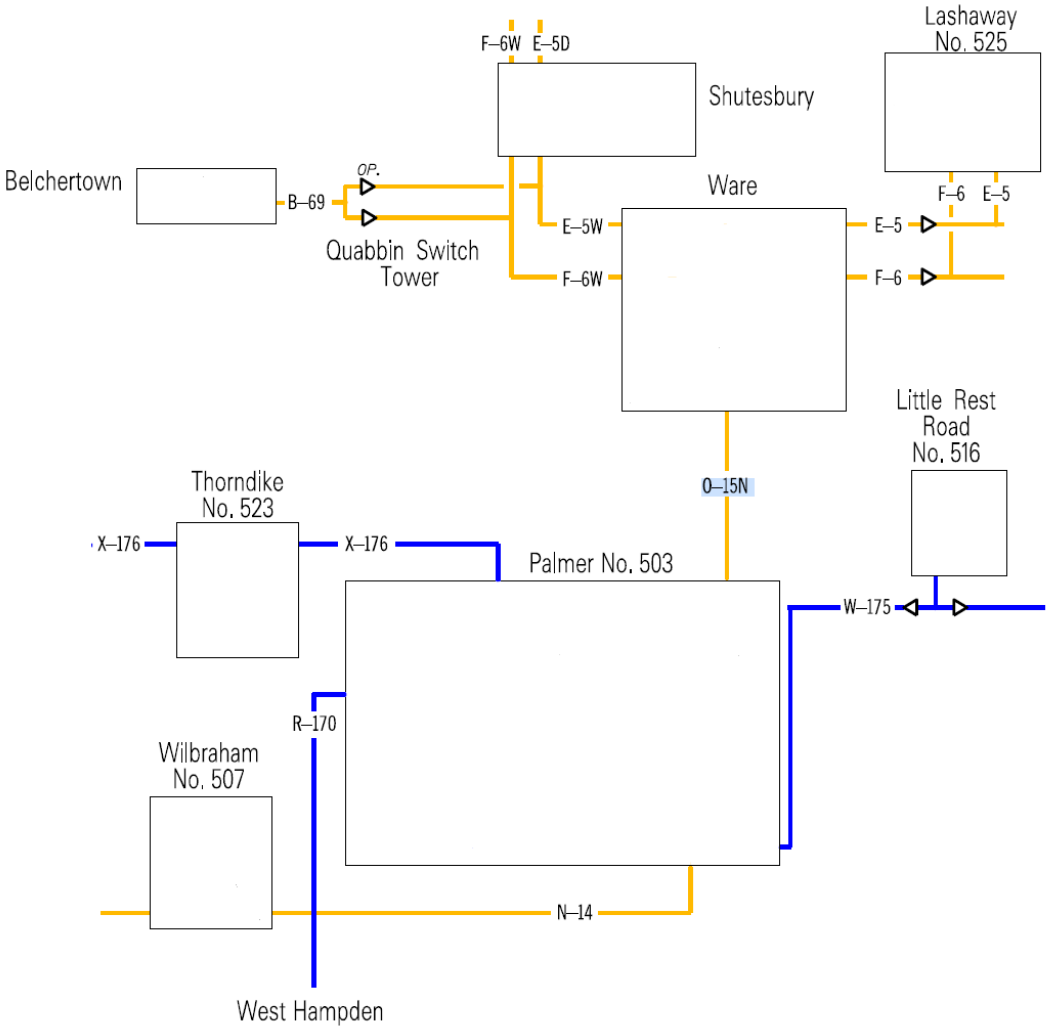


Figure 2-2: One-Line Diagram of Existing Transmission System



The Existing Line was constructed and put into operation in 1955. The majority of the wood poles were replaced in the 1990s and the original shield wire was replaced in 1993. In 2009, one structure in poor condition was replaced. In 2021, the Company replaced six wood polearm structures with light duty steel structures due to woodpecker issues. As discussed in *Section 2.3.2* below, woodpecker damage persists and the number of structures with woodpecker damage has increased over time. The existing transmission conductor is 795 kcmil ACSR, which was replaced in 1997 along with most of the insulators.

2.2.2 Summer Peak Load

As shown in Table 2-1, approximately 10,000 electric customers are served from the two substations connected to the Existing Line. The 2023 summer peak load for the Ware and Palmer Substations was approximately 29.3 megawatts (MW).

Table 2-1: 2022 Summer Peak Load served from Existing O15N Line

Substation	Customers	Load (MW)	Towns Served
Ware Substation	13.2 kV Commercial Customers: 606 13.2 kV Residential Customers: 4,893	13.2 kV: 15 MW	Ware, Hardwick
Palmer Substation	13.2 kV Commercial Customers: 740 13.2 kV Residential Customers: 4,953 23 kV Commercial Customers: 9 23 kV Residential Customers: 1	13.2 kV: 17.3 MW 23 kV: 7 MW	Palmer, Monson, Brimfield

2.3 OPERATING HISTORY, ASSET CONDITION AND DESIGN ISSUES

The Existing Line has a history of poor performance. The Existing Line experienced 32 outages due to lightning, heavy thunderstorms, and fallen trees over the past 25 years. This operational history results from the following inherent design issues:

- The Existing Line has poor shielding angles when compared to the industry standard, resulting in a higher likelihood of the conductors being directly struck by lightning.
- The Existing Line is not centered on the ROW and, therefore, is located closer to the tall trees along the ROW edge, which contributes to the poor performance of the Existing Line.

Recent analyses and studies confirm that the Existing Line must be rebuilt to provide better shielding to reduce lightning and weather-related outages and to ensure the safe, efficient and reliable operation of the electric network.

2.3.1 Operating History

As shown in Table 2-2, in the past 25 years, the Existing Line experienced 32 outages, including 22 momentary interruptions and 10 sustained interruptions.

Table 2-2: O15N Line Outage History, 1999-2023

Outage Date	Duration (Minutes)	Cause[1]
3/30/1998	461	Unknown
6/18/1998	231	Weather
7/04/1999	< 1	Lightning
8/17/1999	163	Line Equipment
1/17/2000	< 1	Miscellaneous
5/10/2000	< 1	Weather
5/24/2000	< 1	Weather
6/02/2000	< 1	Weather
6/17/2001	< 1	Weather
6/20/2001	< 1	Lightning
3/07/2002	< 1	Unknown
3/10/2002	< 1	Weather
7/23/2002	< 1	Weather
5/15/2004	< 1	Weather (heavy rain, wind)
7/02/2004	< 1	Lightning (rain, wind)
6/01/2004	< 1	Lightning (heavy rain, thunderstorms)
6/27/2007	< 1	Lightning (heavy rain)
7/15/2007	5	Lightning (thunderstorms)
7/15/2007	3	Lightning (thunderstorms)
7/23/2008	< 1	Lightning (thunderstorms)
9/09/2008	< 1	Lightning (thunderstorms)
5/27/2010	< 1	Vegetation (thunderstorm)
7/16/2010	263	Lightning (thunderstorm)
8/25/2011	1	Unknown (heavy rain, thunderstorms)
10/29/2011	3875	Tree Fell (snow, wind)
7/07/2013	< 1	Weather, Storm (thunderstorms)
10/30/2017	2352	Tree Fell (heavy rain, major storm)
9/26/2018	< 1	Unknown (thunderstorms)
1/12/2020	522	Tree Fell (rain, light wind)
7/22/2020	< 1	Lightning (thunderstorms)

1 The Company did not record weather conditions prior to 2003.

Outage Date	Duration (Minutes)	Cause[1]
8/02/2020	< 1	Weather (thunderstorms)
8/23/2020	<1	Lightning (thunderstorms)

Since 2010, there have been 11 outages, four of which were sustained outages (i.e., those lasting longer than one minute). For the most part, the outages occurred during thunderstorms and windy conditions. Notably, one third of the sustained outages were due to trees falling on the Existing Line, including the three most recent sustained outages, which totaled 6,749 minutes in outage duration. The sloping terrain of the ROW, the fact that few roads intersect the ROW, and the poor condition of existing access roads makes it difficult for machinery to reach the ROW, which increases restoration time during outages.

The data in Table 2-2 above shows a pattern of increasing duration of outages. Regarding the particular causes, Table 2-3 provides a summary of the causes of outages on the Existing Line during the 1999-2023 period. Note that even momentary (less than one minute) outages may have significant impacts on customers with sensitive equipment that can be taken offline or damaged by voltage fluctuations.

Table 2-3: O15N Line Outage Counts by Cause, 1999-2023

	Momentary Outage	Sustained Outage
Lightning	9	3
Weather/Storm	9	1
Vegetation/Tree	1	3
Line Equipment/Other	1	1
Unknown	3	1

As can be seen from the above tables, lightning is a frequent cause of outages, followed by bad weather, wind and resulting vegetation/tree falls. An assessment of the Existing Line indicates that its off-center location on the ROW, placing it closer to adjacent, taller, off-ROW trees, is a contributing factor to its sub-optimal performance as are its non-standard shielding angles. The Company cannot remedy these issues without rebuilding the Existing Line.

2.3.2 Asset Condition

A 2020 aerial inspection and a foot patrol ground inspection conducted in 2023 revealed that the Existing Line needs to be rebuilt to address widespread woodpecker damage and deteriorated wood pole structures that are located near danger trees and heavy vegetation.

The main anomalies observed during the aerial inspection were widespread woodpecker damage, pole deterioration, pole top deterioration and flashed insulators. Woodpecker damage was observed on 39 structures. In addition, there were 25 structures with deteriorating poles, 19 structures with flashed

insulators, and six structures with deteriorating pole tops.[2] The steel crossarms were observed to be in good, not excellent, condition. Six of these wood structures with more immediate concerns were replaced with steel structures following the results of the aerial inspection.

Every five years, the Company conducts a ground level inspection of its transmission line assets to assess their condition and determine maintenance or refurbishment needs. The most recent five-year ground level inspection of the Existing Line was conducted in 2023. The purpose of the inspection was to review the physical condition of the Existing Line structures to identify any issues that might negatively affect the service reliability of the line.

All 139 wooden structures were evaluated during the 2023 ground level inspection. The most widespread issue noted on the line was woodpecker damage. Out of the 139 wood structures on the line, woodpecker damage was observed on 60 structures, which constitutes 43% of the wood structures on the line. The number of structures with woodpecker damage increased by 53% compared to the aerial inspection performed in 2020. The woodpecker damage is spread throughout the line and is not localized to a particular section of the line. Insect damage and damaged insulators were also observed. Absent construction of the Project, 64 of the structures (those with woodpecker damage, insulator damage, missing or broken conductor ground wire, or insect damage) would require repairs within three years and the remaining eight structures would be repaired when the work coincides with another project.

Overall, the inspections indicate that woodpecker and other damage compromise the integrity of the structures. While external decay can be directly measured as a reduction in groundline circumference, the extent of woodpecker damage is more difficult to quantify, limiting the ability to accurately predict the remaining strength of the pole. The proximity of a woodpecker hole to critical assets such as cross arms, which carry the conductor, could present a danger to the integrity of the crossarm. Failure of a crossarm presents a danger to the public and will also likely cause an outage. Woodpecker holes result in, and can cause, further decay within the hole. Even smaller holes can lead to moisture penetration and decay, which can weaken the pole over time and make it more susceptible to failure during high winds or other extreme weather events. While it is possible to fill woodpecker holes, doing so does not prevent future woodpecker activity. Woodpeckers will simply create new holes and they have been observed to peck at the site of previously filled holes. Further, replacing the woodpecker-damaged wood structures with steel structures is merely a band-aid approach and typically results in the woodpeckers moving to a nearby wood structure.

Because there is sustained and continued woodpecker activity in the vicinity of the Existing Line, the only feasible option is to replace the Existing Line's wood structures with steel structures.

[2] Many structures evidence more than one type of damage.

2.3.3 Design Issues Impacting Reliability

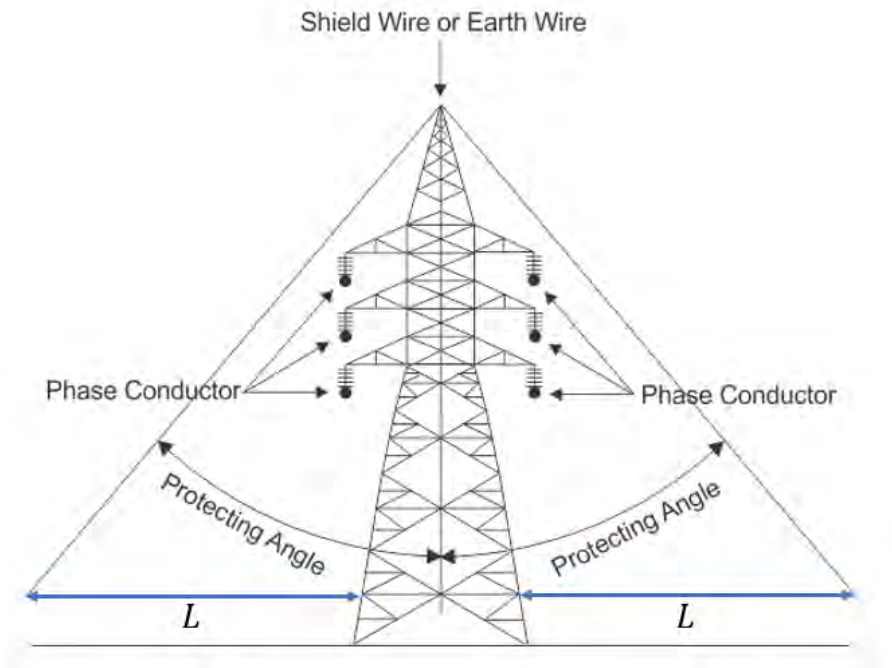
The design of a transmission line is of paramount importance because it affects its ability to provide reliable service under current and future transmission line load requirements. Even though the majority of the line components were replaced in the 1990s, some inherent design features of this older line can only be remedied by replacing it.

2.3.3.1 Need for Improved Resiliency from Lightning

Transmission lines can be severely damaged by direct lightning strikes to the electrical conductors. Accordingly, transmission lines must be designed with ground or shield wires of adequate mechanical strength and located on the structure to properly shield the conductors.

The shield wire functions to intercept direct strikes to the conductors within a protective area beneath it. The area of greatest protection is measured by the shielding angle—i.e., the angle between a vertical line drawn through the shield wire at the attachment point on the structure and a line between the shield wire and the outermost conductor that is to be protected. *Figure 2-3* below illustrates the concept of shielding (protecting) angle.

Figure 2-3 Shielding Angle Concept



The smaller the shielding angle, the more directly under the shielding wire the conductors are, and the greater the protection of the conductors from lightning strikes. Lines with a greater shielding angle are more likely to have the conductors struck by lightning, causing a flashover.[3]

The Existing Line has an approximately 55-degree shielding angle. National Grid policy and current industry practice is to restrict shielding angle to 30 degrees or less, which allows the shield wire to intercept lightning strikes prior to the lightning hitting an energized conductor and, thus, significantly reduces the potential for a flashover creating an outage. Per section 16.3 of National Grid Standard GL.06.01.121 Transmission Line Design Guide:

> For new construction at all transmission voltages, overhead groundwire(s) shall be utilized to protect the circuit from lightning strikes. The shielding angle shall be no larger than 30°. For spans subjected to increased lightning activity, e.g., exceptionally long spans and river crossings, a smaller shielding angle should be considered. Deviations from the above may be appropriate in certain locations, such as in the vicinity of airports or where the circuit is naturally shielded by trees or other transmission lines but shall be made only with the approval of Transmission Line Engineering.

The use of a maximum 30-degree shielding angle is considered good utility practice and is recommended by the Rural Utility Service in Chapter 8 of Bulletin 1724E-200, which is broadly used by a number of utilities as a guideline for their standards.

The shielding angle on the Existing Line is much greater than the current 30-degree standard for shield wire angles and provides insufficient shielding from lightning, which is consistent with, and predictive of, the types of events experienced on the Existing Line. As shown in Table 2-3, lightning strikes account for approximately one third of total line outages in the 2019-2023 period—and perhaps more, since some the outages attributed to "weather" and "unknown" may be unidentified lightning strikes. The frequency of lightning-related outages reflects the insufficient shielding angle on the Existing Lines.

The only way to decrease the shield angle of each structure from the existing 55-degree angles would be to increase the distance on each structure between the shield wire and the conductors on each structure. While pole extenders could be added to each structure to increase this distance, this is not a feasible solution for the Existing Line because pole extensions would add increased weight to the already-deteriorating wood structures. The only practical way to remedy this inherent structural design issue is to replace the existing structures with taller structures. Adding a second shield wire, which would not be feasible on the existing structures, will also create a wider protected area. The Rebuilt Line structures and OPGW will have a shielding angle of less than 30 degrees.

[3] A flashover is an unintended high voltage electric discharge over or around an insulator or sparking between two or more adjacent conductors. A flashover can cause damage to the line and nearby equipment, as well as interrupt service.

Another design feature of the Rebuilt Line is that it will have more insulation and, therefore, will provide greater protection against lightning strikes. The Company is proposing construction of the Rebuilt Line to a 115 kV design, which increases the length of the insulators in a conductor assembly as compared to the 69 kV design. While this requires a slightly higher structure, the additional insulation provides greater protection against a back-flashover across the insulation should a structure or shield wire be hit by lightning. When lightning contacts a shield wire, a traveling current wave is created, which in turn induces a traveling voltage wave. This traveling voltage wave typically increases in magnitude as it travels down the wire until it reaches a grounded element (transmission structure). The grounded transmission structure creates a reflection of the traveling voltage wave, which serves to cancel it out and prevents the traveling voltage wave from increasing. If the traveling voltage wave is of sufficient magnitude, the air gap between the energized conductors and grounded structure arm can be breached, creating a back-flashover of the insulators resulting in an outage. The greater the insulation, the lower the probability of occurrence of this event.

Lastly, the increase in spacing between conductor phases on the Rebuilt Line will reduce the potential for voltage induced by a lightning strike that travels to a single conductor from flashing over to an adjacent conductor, or for motion due to wind to cause a flashover between phase conductors. The spacing between the phases on the Existing Line structures is approximately 9 feet whereas the spacing between the proposed phases for the Rebuilt Line will be approximately 12 feet 6 inches.

In summary, the Project will replace the existing structures with taller structures, which will provide additional space to separate the shield wire/OPGW from the conductors and, therefore, decrease the shielding angle. In turn, the reduced shield angle will provide greater protection from lightning strikes to the conductors. The increased height of the structures on the Rebuilt Line will also allow longer suspension insulator strings to be installed, and greater spacing between conductor phases, each of which contributes to increased resilience to lightning events.

2.3.3.2 Interference from Vegetation

The height of structures, together with the location of structures on a ROW, contributes to a transmission line's reliability. If the structures are lower than adjacent off-ROW vegetation (i.e., trees not within the Company's control to manage), the line will be susceptible to interference from vegetation. When these trees fall or drop limbs during periods of high winds, they contact the existing conductors and cause either momentary or sustained outages. The risk of interference from vegetation is increased if a transmission line is off the center line of the ROW, closer to the maintained edge of a ROW.

These conditions exist on the Existing Line. The proximity of tall trees along, but outside, the ROW contributes to the high frequency of tree-related outages on the Existing Line. In many areas, the abutting land just beyond the ROW is densely vegetated with tall-growing species that exceed the height of the existing structures. In addition, the sloped terrain of the ROW effectively increases the height of the trees relative to the line, increasing the potential for outages caused by fallen vegetation. As shown in Table 2-2, the three longest outages on the Existing Line, which lasted from approximately nine hours to 64 hours, were caused by tree damage on the Existing Line.

While the Company performs more frequent vegetation maintenance along the O15N Line ROW (in addition to the regular five-year cycle for tree trimming and hazard tree removal), the off-center location of the line, the dense off-ROW vegetation, and the poor access road condition make these efforts insufficient. Rebuilding the line to the center of the ROW, on taller and narrower structures, will reduce the likelihood of trees falling on the line.

2.4 NEED FOR ENHANCED FIBER OPTIC CAPABILITY

OPGW is a dual functioning cable that both acts as shield wire and contains optical fibers that are used for telecommunications purposes. There is no OPGW on the Existing Line. The existing shield wire is insufficient to provide adequate shielding and does not provide telecommunications capabilities. Rebuilding the Existing Line will enable the Company to install OPGW on the Rebuilt Line in place of traditional shield wire. The OPGW will be placed in the topmost position of the taller transmission structures where it will shield the conductors from lightning while providing a telecommunications path to connect the Palmer and Ware Substations.

In the OPGW cable, the optical fibers are surrounded by layers of steel and aluminum wire. OPGW fibers are more reliable and secure than the microwave connections currently used for communication purposes because they are less affected by environmental factors, such as weather, noise or other obstacles. Moreover, OPGW fibers are harder to tap or hack because they do not radiate signals outside the cable. Microwave connections, on the other hand, are more vulnerable to interference, fading, or jamming, and they can be easily intercepted or disrupted.

Improving fiber-optic coverage in the Central Massachusetts area will allow NEP to phase out microwave communications between several substations in the area, improving communications and fault protection reliability. Fiber optic communication is used by NEP in the daily operation of the transmission system elsewhere on its system and it is becoming critically more important as automation and system condition monitoring equipment become more prevalent and involved in the management of transmission system operations. Adding OPGW between the Ware and Palmer Substations will enable the Company to connect existing fiber on the W175 Line at Palmer Substation and planned fiber on the E5/F6 Line at Ware Substation for improved communications in the area.

By enabling direct communication between relays at substations, OPGW can be used to monitor substations and remotely operate transmission system components (switches, breakers, etc.). It is also used to remotely access digital fault recorders and relay information without physically visiting a substation, which enables the Company to diagnose, locate, and repair faults more quickly and cost-effectively. In addition, transmitting data between and among substations and control centers via OPGW is more secure and can be less costly than using public communications network services. Lastly, OPGW provides a communication path for substation security monitoring (cameras, access control, gunshot detection systems, etc.).

Adding OPGW to the existing structures is not feasible because the deteriorating wood structures are not able to support the weight of the OPGW. Hypothetically, it may be possible to modify the existing structures that are not already in deteriorating condition, to increase their structural capacity to support an OPGW; however, these modifications would be extensive and labor-intensive, negating any savings compared to replacement of the structures with new structures designed to support OPGW. Additionally, it would be impossible to attach the new OPGW to structures with existing wood pole rot and woodpecker holes; thus, replacement of such structures would be required before installing OPGW. Notably, while these measures to replace the existing shield wire with OPGW would add fiber optic capability, they would not address the shielding angle issues discussed in Section 2.3. Thus, replacing the Existing Line is the only solution to add OPGW.

2.5 LONG TERM BENEFITS

Over the next several decades, renewable energy resources like wind and solar photovoltaic generation are expected to substantially displace natural gas-fired generation as the region's primary resource, while at the same time, increased electrification is expected to significantly increase overall consumer demand for electricity and drive changes in usage patterns, including seasonal and daily shifts in peak demand. One of ISO-NE's responsibilities is ensuring the regional power system continues to operate reliably as system conditions change. Transmission planning helps to maintain system reliability and enhance the region's ability to support a robust, competitive wholesale power market by moving power from various internal and external sources to the region's load centers.

To facilitate a smooth, reliable clean energy transition, ISO-NE, in coordination with the New England States Committee on Energy, undertook a study of the ways in which the transmission system in New England may be affected by changes to the power grid. On February 12, 2024, ISO-NE issued a *2050 Transmission Study* (provided as *Appendix 2-1*), which is a comprehensive long-term regional transmission study undertaken to help inform stakeholders of the amount and type of transmission infrastructure necessary to provide reliable, cost-effective energy to the region throughout the transition to clean energy. The *2050 Transmission Study* points to a long-term need for additional capacity across the New England transmission system to support long-term electric load growth driven by these regional commitments. The *2050 Transmission Study* concluded that assuming increased buildouts of renewable energy resources continue, and electrification of heating and transportation proceeds as expected, the region's aging transmission system has the potential to become a significant bottleneck to progress if it does not keep pace with changes to other elements of the power system.

In addition to the primary needs to ensure the reliability of the transmission system and the security of the communications network, with power delivery expectations on the power system increasing and with high volumes of new devices and energy sources connecting to the system, NEP must ensure that the condition of electrical infrastructure does not become an obstacle to achieving its own, as well as state and regional climate change goals. The proposed Project, with the ability to operate at 115 kV in

the future, will provide additional transmission capacity and voltage support along this corridor, when needed to provide for future increased electricity usage.

2.6 CONCLUSION

NEP is obligated to ensure the safe and reliable delivery of electricity to customers and the transmission of electricity to support regional electricity markets. Accordingly, the Company employs a forward-looking approach to asset management whereby it evaluates asset conditions to determine which assets should be replaced before their performance negatively impacts the provision of safe and reliable service.

The Company identified significant woodpecker damage on over 40% of the structures on the Existing Line. The poor and deteriorating physical condition of the Existing Line and its inherent deficiencies (height and shielding) demonstrate that the line needs to be rebuilt. The existence of tall, dense vegetation along the ROW and the line's off-center location on the ROW likely contributes to the frequency with which downed trees and dropped limbs interrupt power flow. The single shield wire on the Existing Line is inadequate because the shield angle does not properly protect the lines from lightning strikes. The majority of outages on the Existing Line have been associated with storm conditions. These outages are likely to continue—perhaps exacerbated by an increase in storm frequency and intensity due to climate change—until their underlying causes are addressed. Consequently, the Project is needed to address the condition of the Existing Line in order to improve its performance and increase reliability of service to electric customers.

Further, with power delivery expectations on the power system increasing, and with high volumes of new devices and energy sources connecting the system, transmission infrastructure must not become an obstacle to achieving NEP, state, and regional climate change goals, which further underscores need for the Project.

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3 PROJECT ALTERNATIVES

3.1 INTRODUCTION

This section discusses the Project alternatives that NEP identified and evaluated for their potential to address the transmission needs identified in *Section 2*. Recent analyses and studies demonstrate that the Existing Line is in poor condition and needs to be rebuilt. Specifically:

- A physical review of the condition of the Existing Line found widespread damage to the Existing Line's wooden structures caused by woodpecker activity, which threatens the reliability of the transmission system.
- The Existing Line has a history of poor performance related to its age and the original design of the structures, which will increase if the Existing Line continues to deteriorate.
- Broader physical issues related to the off-center location of the line in the ROW and poor shielding angles when compared to current industry standards contribute to the poor performance of the Existing Line.
- Increased fiber optic capability is needed to serve fault protection and telecommunications needs.

The sections below describe the Project alternatives considered, including a No-Build Alternative (*Section 3.2*); Non-Wires Alternatives (*Section 3.3*); Rebuild with Spacer Cable (*Section 3.4*); and Complete Line Rebuild Alternative (the Project) (*Section 3.5*). Of these, only the Complete Rebuild Alternative addresses the full range of needs identified in *Section 2*.

In addition, the Company considered two transmission structure designs for the Rebuilt Line: one that complies with NEP's 115 kV design standards, and a second that complies with NEP's 69 kV design standards. *Section 3.7* compares these two structure designs with respect to transmission system reliability, environmental impacts, and project cost. This comparison also considers the ability of the two designs to support long-term electric load growth driven by regional commitments to address climate change through electrification and a deeper integration of renewable resources. These analyses demonstrate that the replacement of the Existing Line with an overhead line centered in the existing ROW to 115 kV design specifications is the superior approach in terms of its ability to meet the identified need at the lowest reasonable cost, with the fewest environmental impacts, and with a high degree of reliability.

3.2 NO-BUILD ALTERNATIVE

Under a No-Build Alternative, the Existing Line would remain in place and NEP would not execute a capital project to address performance issues, physical issues or the need for increased fiber optic capability. The Company would continue to maintain the Existing Line by addressing line components that are imminently about to fail, as it does with all its transmission assets. Accordingly, the Company

would repair or replace structures on an as-needed basis to address deterioration caused by woodpecker damage.

This approach is inferior to the Project for several reasons. Given that over 40% of the structures already have woodpecker damage, and the number of damaged structures is increasing, replacing the structures on an as needed basis would be inefficient because the targeted replacement of woodpecker-damaged wooden structures with steel structures typically results in woodpeckers moving to a nearby wooden structure. Further, while repairing and replacing structures on an as-needed basis would address physical issues on individual structures, it would not address the inherent design issues that affect the entire line. Replacing individual structures in a piecemeal fashion would require keeping the Existing Line in its current location, which is off-center in the ROW, and would not allow for all structures to be taller with a narrow one-pole configuration to improve the shielding angle; therefore, a piecemeal approach to replacing the structures would not reduce the potential for outages due to fallen trees. Further, because OPGW could not be added to the Existing Line, the No-Build Alternative would not provide fiber optic capability that would improve communications between substations. The No-Build Alternative would not address these issues and, therefore, it was eliminated from further consideration.[4]

3.3 NON-WIRES ALTERNATIVES

Non-wire alternatives ("NWAs") use some combination of energy efficiency and demand response programs, distributed generation, solar photo voltaic and energy storage facilities as alternative means of deferring or addressing the underlying need for a transmission or distribution project. NWAs generally are appropriate when the underlying need for a Project is driven by increasing load levels, so that the load reductions provided by the NWA allow an increasing number of electric customers to be served with the existing transmission and distribution infrastructure.

While the Project will provide additional reliability and capacity, the Project is driven by the need to remedy the deteriorating condition and design of the Existing Line, as well as the need for increased fiber optic capability. The implementation of an NWA would not address the deteriorating condition of the structures, the inherent structure constraints that predispose the Existing Line to outages from lightning strikes, or the proximity of tall, dense vegetation outside of the Company's control that exposes the line to tree falls and dropped limbs, nor would it enable the Company to enhance its protection and telecommunication abilities. For these reasons, NWAs would not meet the identified need and the Company eliminated them from further consideration.

4 Partially rebuilding a portion of the Existing Line would be as ineffective in addressing the inherent design issues as the No Build Alternative would be. The woodpeckers would simply relocate to other wooden structures, the Existing Line would remain off-center in the ROW and the Company would not be able to correct the shielding angle deficiencies. Therefore, the Company did not evaluate partial rebuild alternatives.

3.4 COMPLETE REBUILD WITH SPACER CABLE

Spacer cable is a pre-engineered system primarily used for distribution and 69-kV lines along narrow ROWs. The system consists of heavily covered non-shielded phase conductors held together and supported by a high strength cable and connected to diamond shaped spacers within each span. It is a completely covered system and, accordingly, requires less foliage removal and reduces the risk of temporary faults due to tree contact and incidental bird and animal contact. However, while providing a high level of reliability, this alternative would require more than three times the number of structures as the Project to support the greatly increased weight and wind load of the covered spacer cable conductors, and result in greatly increased project cost. Moreover, the additional structures needed for this alternative would increase the environmental impact of the Project. In this case, the ROW is sufficiently wide to enable the relocation of the Existing Line to the middle of the ROW, thereby reducing the likelihood of outages due to vegetation interference. For these reasons, the Company determined that use of a spacer cable system is not warranted, and this alternative was eliminated from further consideration.

3.5 COMPLETE REBUILD ALTERNATIVE (THE PROJECT)

The Project consists of rebuilding the Existing Line centered on the existing ROW and completely replacing the existing wood structures, conductor, and shield wire. Key components of this alternative include:

- Replace all wood structures on the Existing Line with direct imbedded steel and replace all wood dead-end structures with engineered steel on concrete foundations.
- Replace 10.35 miles of existing conductor with new ACSS conductor.
- Replace 10.35 miles of existing steel shield wire with one OPGW.
- Perform vegetation management, upgrade existing access, and create new access as required to construct and maintain the Rebuilt Line.

The estimated cost of this option is approximately $65.6 million.

Rebuilding the Existing Line on taller steel structures in the center of the ROW will address all the needs identified in *Section 2*. Moving to a single pole configuration in the center of the corridor will minimize exposure to danger trees by maximizing the distance between wires and trees. Taller and narrower structures will also reduce opportunities for trees striking the line. In addition, the taller replacement structures will correct the poor shielding angle and avoid many of the outages caused by lightning. Steel monopole structures will completely remove the risk of woodpecker damage and bird nesting. Taken together, these design changes will reduce the frequency of outages on the Existing

Line and increase its reliability. In addition, the OPGW will improve NEP's ability to quickly repair damage to the line when an outage does occur.

Replacing the existing conductor with 795 kcmil ACSS conductor will increase thermal capacity by 27% compared to the Existing Line, provide voltage support needed both to support future electric load growth and, if needed, to interconnect future distributed energy resources, such as photovoltaic projects and battery energy storage systems. Replacing the existing shield wire with OPGW will improve fault protection and communications in the area by enabling the Company to connect the fiber already on the W175 Line at Palmer Substation and the planned fiber at Ware Substation.

The Complete Rebuild Alternative is the only alternative that will improve performance of the Existing Line by addressing all the needs and that will provide additional thermal capacity and voltage support required to serve future load growth. Accordingly, NEP selected it and dismissed other alternatives from further consideration.

3.6 DESIGN ALTERNATIVES

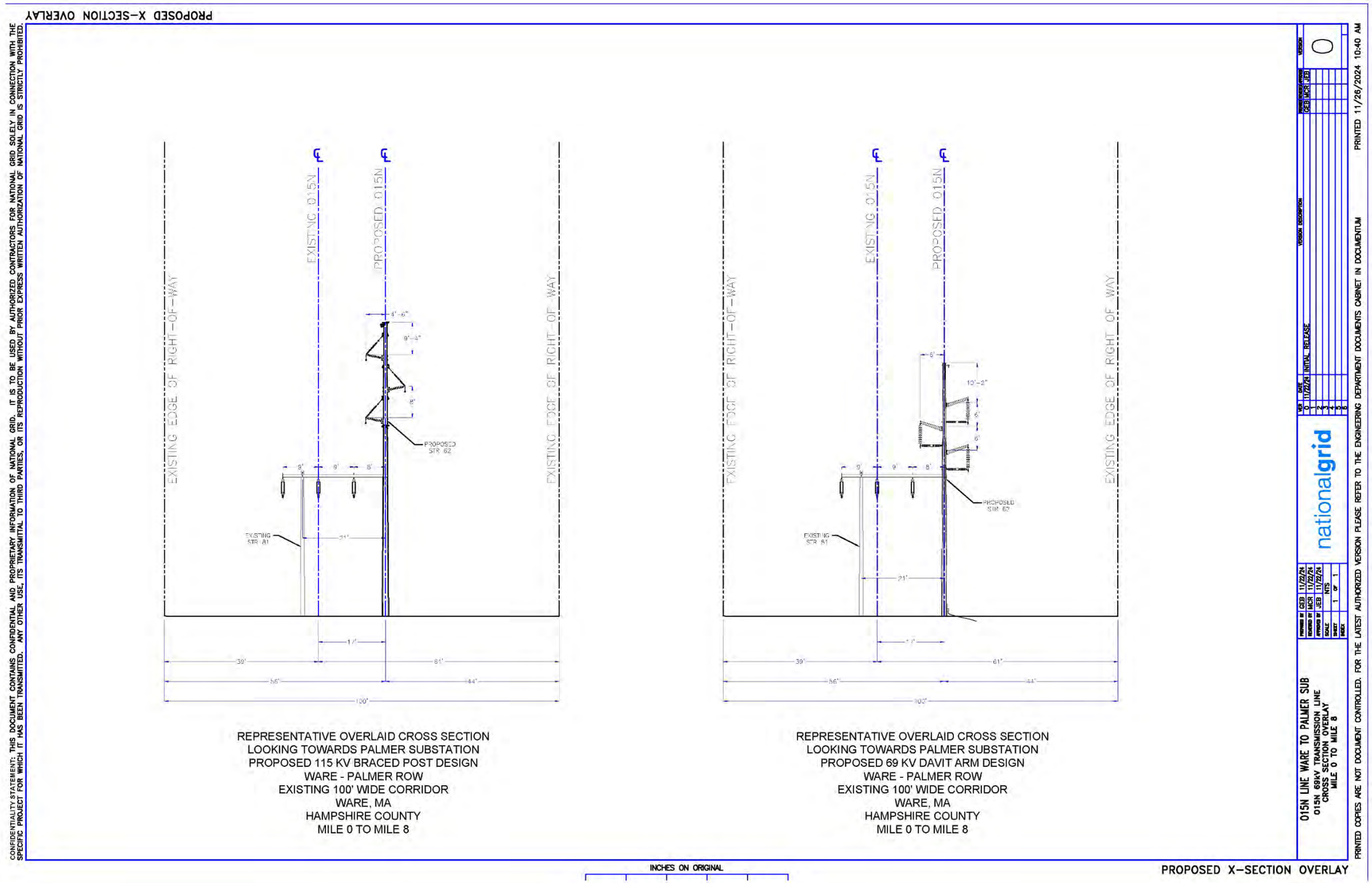
NEP then evaluated three designs to determine which would best meet the identified need while minimizing cost and environmental impacts and providing for the long-term reliability of the electric transmission system. The Company analyzed rebuilding the Existing Line using spacer cable, as well as two transmission structure design alternatives: one that complies with NEP's 115 kV design standards ("115 kV Design"), and a second that complies with NEP's 69 kV design standards ("69 kV Design").

3.6.1 69 kV and 115 kV Designs

The Company has established design criteria for its transmission lines to assure acceptable reliability of its bulk transmission system facilities. These criteria apply to conductors, structures, and equipment and establish insulation levels and required clearances for various voltage transmission lines. For this Project, the Company evaluated the 69 kV and the 115 kV Design options.

Both the 69 kV and 115 kV Designs would support the new conductor and OPGW, and in both cases, the Company would rebuild the line in the center of the ROW. The 115 kV Design would require an approximately 10-foot taller structure height than required for the 69 kV Design because the higher design voltage requires a greater distance between two energized conductors and between energized conductors and the ground or nearby objects. However, the increased structure height may allow for fewer structures to be installed for the 115 kV Design than for the 69 kV Design. *Figure 3-1* depicts typical 69 kV and 115 kV structure designs for the Project.

Figure 3-1: Typical 69 kV and 116 kV Structure Designs for the Project



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As discussed below, the Company evaluated reliability, environmental and cost considerations of constructing the Rebuilt Line to 115 kV Design standards. The Company notes that the Existing Line is operating at 69 kV. There are no immediate reliability needs that would now necessitate the operation of the Rebuilt Line at 115 kV within the 10-year planning horizon. If future planning studies find that increased DER penetration and/or increased load growth require the operation of the lines at 115 kV, NEP will advance any remaining upgrades required for such operation. As noted above, use of 795 kcmil ACSS conductor with either the 69 kV or 115 kV design option will increase thermal capacity of the Rebuilt Line by 27% compared to the Existing Line.

3.6.1.1 Reliability Comparison

The 69 kV and 115 kV Designs both address the design issues associated with the deteriorating condition and poor performance record of the Existing Line. Replacing the wooden structures with steel will eliminate damage from woodpecker activity and prevent recurrence in the future. In addition, the replacement structures at the proposed height under either design will yield a shielding angle of 30 degrees or less, consistent with the current industry practice. The higher elevation of the conductors on the Rebuilt Line, as well as the position of the structures in the center of the ROW, will reduce the probability of faults resulting from off-ROW vegetation striking the energized lines. In addition, the change in structure configuration from pole arm structures to narrower delta monopole structures will reduce the potential for tree-related outages by increasing the horizontal distance to off-ROW vegetation. Overall, either design will result in significant improvements in line performance.

Notably, however, construction of the Rebuilt Line to the 115 kV Design standard, even if operated at 69 kV, will provide both near-term and longer-term transmission system reliability benefits that the 69 kV Design would not.

In the near term, some physical differences between the 69 kV and 115 kV Designs will result in reliability benefits from operating the 115 kV Design at 69 kV; namely, the length of the insulator string, phase spacing at the top of each monopole structure, and the distance in clearance to ground and nearby objects. The additional insulation and increased spacing between the conductor phases for the 115 kV Design would provide increased resilience to lightning and tree-related events. The increase in structure height will provide additional vertical clearance that may further reduce the probability of off-ROW vegetation striking the energized conductor. In addition, the lowest conductor, which is the most likely to be struck by vegetation, will be elevated higher with the 115 kV Design, thus improving reliability for the 115 kV Design option. In the longer term, future operation of the Rebuilt Line at 115 kV will increase the thermal capacity of the Rebuilt Line by 66%, which will support future load growth and enable the future interconnection of DER. Table 3-1 shows the higher thermal ratings that can be achieved by operating the proposed 795 ACSS conductor at 115 kV rather than at 69 kV.

Table 3-1: Thermal Ratings of Proposed 795 kcmil ACSS Conductor at 69 kV and 115 kV

Overhead Line Conductor	Thermal Ratings when Operated at 69 kV	Thermal Ratings when Operated at 115 kV
795 kcmil ACSS DRAKE (Proposed)	220/220 MVA (Summer Normal/Long Term Emergency)	366/366 MVA (Summer Normal/Long Term Emergency)
795 kcmil ACSR CONDOR (Existing)	140/173 MVA (Summer Normal/Long Term Emergency)	--

Additionally, 115 kV lines characteristically have lower impedance than 69 kV lines on a per Mega Volt-Ampere basis – that is, there is less resistance along the line and, therefore, less reactive power is required to maintain voltage. In practice, this helps avoid the need for additional transmission switching stations, capacitor banks, reactors, or dynamic voltage control devices to support new load.

3.6.1.2 Environmental Comparison

Section 5 provides a detailed analysis of the environmental impacts of the Project using the 115 kV Design, including temporary and permanent impacts to wetlands and water resources, impacts associated with vegetation management and removal, access improvements, visual impacts associated with the proposed increase in structure heights, construction noise and traffic impacts. *Section 5* also summarizes the measures that NEP has taken during Project design and engineering to reduce and mitigate these impacts.

NEP anticipates that construction of the Rebuilt Line using the 69 kV Design would not significantly reduce any of these impacts. The same construction techniques would be used and, as a result, construction-related impacts, including vegetative clearing, access improvements, wetlands and water resource impacts, and construction noise and traffic, would be similar or identical. Although there would be an approximately 10-foot difference in structure height, visual impacts from the new structures will be minimal in either case. Magnetic fields at any given load level would marginally increase due to the lower height.

Finally, the use of the 115 kV Design for the Project obviates the possible need to construct a new 115 kV line when reliability needs call for additional capacity. Using the 69 kV Design for the Rebuilt Line now would require the future construction of a new line using the 115 kV Design, including replacement of all structures, because the structures would not have the appropriate phase-to-phase separation to allow for insulation or operation at 115 kV. This would require a re-mobilization and significant redundant construction efforts, which would place a repeat burden on the abutters along this ROW, as well as create an approximate doubling of environmental impacts. On balance, NEP considers the 115 kV Design to be preferable to the 69 kV Design from the perspective of environmental impacts.

3.6.1.3 Cost Comparison

At the time the 115 kV Design was selected as the preferred alternative, the estimated cost of the Project using the 115 kV Design was approximately $39.1 million, while the estimated cost for the Project using the 69 kV Design was approximately $37.0 million. Most of the cost difference is associated with increased materials costs for the 115 kV Design.

The cost difference would amount to approximately $2 million, or approximately 5% of the estimated cost of the Project. If the Existing Line is built using the 69 kV Design, should the need arise to operate the lines at 115 kV in the future, not only would the full material, labor, and equipment costs associated with the structure replacements be incurred again, but costs associated with engineering, permitting and construction would be incurred as well. Specifically, construction matting in sensitive areas, as well as associated mitigation costs, would be required where permanent access is not being constructed. These costs would far exceed the small percentage increase in cost at the time the Existing Line is replaced. In addition, if the Company fails to take advantage of the opportunity to rebuild to 115 kV standards now and a second project is required later, it will not only be more costly, but likely result in wasted costs because the New Line will have to be removed well before its useful life has expired.

By constructing the line to the Company's 115 kV Design standard now, no physical upgrades to the Rebuilt Line would be required for future operation at 115 kV. The cost of moving from 69 kV to 115 kV operation would be limited to planning costs and crew time to implement the voltage switch. Note, however, that future operation of the Rebuilt Line at 115 kV would require some upgrades at the Palmer and Ware Substations. The Company anticipates that these station upgrade projects will be undertaken when needed in the future to address reliability or asset condition issues. The Company has not estimated the costs of these future upgrades but expects that they would be a small fraction of the cost of rebuilding the line to 115 kV standards.

3.6.1.4 Summary of Comparison of 69 kV and 115 kV Designs

The Company proposes to construct the Rebuilt Line with the 115 kV Design because the conductor phase spacing and increased insulation provide significant reliability benefits even when operated at 69 kV. Moreover, building to the 115 kV Design now provides the ability to operate the line at 115 kV in the future without constructing a new line when such need arises. If the Company fails to take advantage of the opportunity to rebuild the new line to 115 kV Design standards now, when the additional capacity of a 115 kV line is potentially needed in the future, the Company would need to either replace the Rebuilt Line with a new 115 kV line, or construct a second transmission line in the same area, both of which would result in a duplication of costs and impacts. As discussed above, the environmental impacts of the Project would be similar regardless of the structure design. The incremental cost of the 115 kV Design is low relative to the overall cost of the Project and ensures the

ability to maximize the utilization of the line by enabling future operation at 115 kV without undertaking another new construction project.

NEP believes that constructing the Rebuilt Line to 115 kV Design is prudent, particularly in light of the findings of ISO-NE's *2050 Transmission Study*, which highlights the need for additional transmission capacity across New England to accommodate the electrification of heating and transportation systems and the large-scale integration of on-shore and off-shore wind, solar, and storage resources. It is also consistent with the Federal Energy Regulatory Commission's recent findings that underscore the need for transmission planning and grid enhancement to take advantage of "right-sizing" opportunities to cost effectively and efficiently add to the long-term reliability of transmission service. See generally *Building for the Future Through Electric Regional Transmission Planning and Cost Allocation*, 187 FERC ¶ 61,068 (2024). "Right-sizing" promotes efficiency by providing cost savings for customers and reducing construction impacts to both abutters and the community as would otherwise be experienced by a second cycle of construction to add needed equipment in the future.

The 115 kV Design provides reliability benefits and gives NEP the flexibility to operate the Rebuilt Line at 115 kV in the future without a costly upgrade project if needed to support large-scale electrification and interconnection of renewable energy sources. For these reasons, NEP selected the 115 kV Design for the Rebuilt Line.

3.7 CONCLUSION

As described in *Sections 3.2 through 3.6*, above, the Company considered various alternatives to meet the identified need. No-Build (and partial rebuild options) and Non-Wires Alternatives were rejected because they would neither address the asset condition and design issues of the Existing Line, nor enable the Company to add OPGW. NEP therefore determined that the needs identified in *Section 2* could only be met by replacing both the existing structures and the existing conductor, as well as adding OPGW to the entirety of the Existing Line. After dismissing the use of spacer cable to rebuild the Existing Line due to its cost and environmental impacts, NEP compared the cost, environmental impact, and reliability benefits associated with the use of a 69 kV Design and a 115 kV Design and concluded that the improved reliability and flexibility provided by the 115 kV Design outweighed the minor additional costs. Consequently, NEP concluded that the replacement of the Existing Line in the existing ROW, using a 115 kV Design, would best address the identified needs at a low cost while minimizing environmental impact.

4 ROUTE SELECTION PROCESS

As discussed in previous sections, NEP proposes to replace the Existing Line with a Rebuilt Line within its existing ROW. The Rebuilt Line will address asset condition concerns and allow for future operation at 115 kV should this become necessary to address future system requirements.

Consistent with the Siting Board's standards and the requirements of G. L. c. 164, § 69J, this section describes the process by which NEP evaluated potential route alternatives to ensure no clearly superior route was overlooked. This routing evaluation was informed by the common-sense premise that rebuilding a transmission line within its existing ROW generally will be more efficient, more cost-effective, and less disruptive than relocating it to a new ROW. Furthermore, even if an alternative route was selected, the existing O15N infrastructure would still need to be deconstructed and salvaged for safety reasons, which would generate environmental impacts from road and work pad construction comparable to the anticipated impacts from the proposed rebuilding of the line. Nonetheless, to ensure that no clearly superior route was overlooked, NEP evaluated several potential route alternatives to determine whether other routes provided clear advantages over the existing O15N route in terms of reliability, impacts, or cost. When compared to other potential routing opportunities, the current O15N Line ROW offers clear advantages and, as such, is presented as the single route option for the Project ("Project Route").

4.1 OVERVIEW OF ROUTE SELECTION METHODOLOGY

The objective of NEP's routing evaluation was to identify technically feasible route alternatives that would maintain system function, minimize impacts to the natural and social environments, and minimize construction and operation costs and to ensure that no identified alternatives were superior to the existing O15N Line ROW.

The route evaluation began with NEP defining a study area centered on the existing O15N Line ROW and developing a general set of route evaluation criteria. NEP then identified a wide variety of potential overhead routes using the most recent available mapping, databases, and aerial photography, focusing on identifying existing linear corridors located within or adjacent to the O15N transmission corridor. These potential route options included existing electric transmission, railroad, pipeline, and highway and roadway corridors.

NEP then screened these linear corridors against the route selection criteria to assess whether any would be a potentially superior route to the existing O15N Line ROW. Routes were initially screened out if they were found to be clearly inferior to the Project Route because they were longer, posed significant obstacles to constructability, would cause greater environmental impacts, or would require additional capital expenditure for construction. Following the initial screening, NEP continued to focus on maximizing the use of existing linear corridors while minimizing construction constraints, costs, and environmental impacts. As a result of this iterative process, NEP determined that no candidate

routes were equal or superior to the Project Route, which maintains the O15N in its existing ROW. As such, NEP is not proposing to construct the Project on any route other than along the existing O15N corridor.

4.2 DESCRIPTION OF EXISTING ROUTE

The existing O15N Line is approximately 10.35 miles in length and connects NEP's Ware Substation and Palmer Substation. The Ware Substation serves Massachusetts Electric Company customers in Ware and Hardwick. The Palmer Substation serves Massachusetts Electric Company customers in Palmer, Monson and Brimfield.

The Existing Line traverses the Massachusetts towns of Ware, West Brookfield, and Palmer. Beginning at the Palmer Substation at the southern end of the line, the O15N Line travels in a northeasterly direction, crossing U.S. Route 20, Flynt Street, Thompson Street, the Massachusetts Turnpike (Interstate 90), Smith Street, Old Warren Road, and West Ware Street for a total of 8.07 miles in Palmer. The Existing Line then crosses into Ware, continuing in a northeasterly direction across Prendiville Road twice and traveling 1.18 miles, before entering West Brookfield. In West Brookfield it continues northeast, crossing West Main Street/MA Route 9 and traveling 0.9 miles before turning westward back into Ware. In Ware the Existing Line travels 0.2 miles and crosses Gilbertville Road/MA Route 32 just before entering the Ware Substation.

There are no taps or other substations on the Existing Line. From Ware Substation south for approximately eight miles to Structure 118, the O15N Line is the only circuit in the ROW. For the remaining approximately two miles to the Palmer Substation, the Existing Line shares the ROW with NEP's 115 kV X-176 Line.

The eight-mile stretch of the ROW from the Ware Substation to Structure 118 is approximately 100 feet wide and is generally cleared to the edge of the Project ROW's easement rights. In the remaining two miles to the Palmer Substation, the ROW is approximately 200 feet wide and similarly cleared to the edge of its easement rights. Heavy vegetation and tall trees are located on either side of the circuit outside of the ROW.

The primary land use on the Project ROW, and within 300 feet of the ROW, consists of approximately 341 acres of land owned primarily by municipalities and the Massachusetts Department of Fish and Game. The remaining nearby land is mostly residential. Approximately 38 acres and 171 acres of land on the Project ROW and within 300 feet, respectively, are classified as residential land use. Industrial development is minimal along and within the Project ROW. The primary commercial area near the ROW is the Palmer Motorsports Track. Thirty acres of ROW land use includes transportation corridors such as Interstate 90, a CSX railroad line, and MassDOT roads.

4.3 DEFINITION OF STUDY AREA

NEP began the route evaluation by establishing a study area surrounding the O15N Line ROW between the Ware and Palmer Substations (the "Study Area"). In order to ensure that the full range of options was considered, and that a clearly superior route alternative was not overlooked, NEP broadly defined the Study Area to include land within the following boundaries, as shown in *Figure 4-1*:

- NEP's E5/F6 transmission ROW (to the north of the existing O15N Line ROW);
- NEP's T20 transmission ROW (to the east of the existing O15N Line ROW);
- NEP's W175 transmission ROW (to the south of the existing O15N Line ROW); and
- NSTAR Electric Company dba Eversource Energy's ("Eversource") 354 and 395 ROWs (to the west of the existing O15N Line ROW).

Expanding outward from the O15N Line ROW, the 241 square mile Study Area is bounded by the first overhead transmission corridors that do not present reasonable options to supply power to the existing Ware and Palmer Substations.

In general, the Study Area contains municipalities in Worcester, Hampden, and Hampshire Counties, of which Worcester County contains the most densely developed population areas. The majority of the Study Area consists of deciduous and evergreen forests interspersed with areas of commercial, residential, and industrial development and pockets, mixed use, transportation corridors, and agricultural lands.

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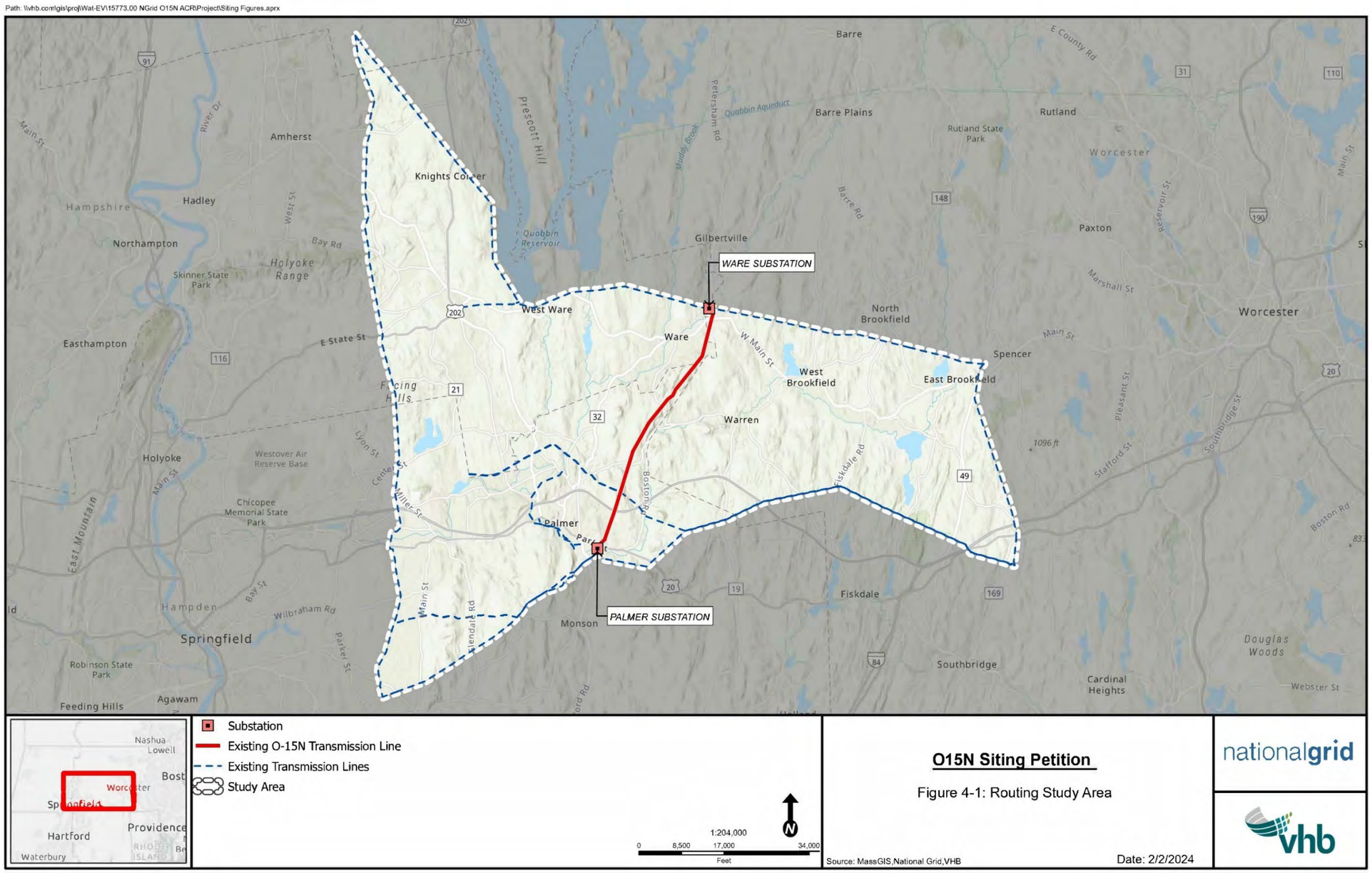
Figure 4-1: Routing Study Area



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4.4 ESTABLISHMENT OF ROUTE EVALUATION CRITERIA

An initial step in NEP's analysis was to establish general criteria to identify potential routes. An important consideration is the corridor requirements to construct an overhead line, including vertical and horizontal clearance codes, depths and setbacks from other active utilities, and connections to the Ware and Palmer Substations. Based on these operational considerations and additional construction and environmental considerations, NEP established the following general criteria:

1. **Maximize the use of existing linear corridors.** Because the Project can be accommodated within existing ROWs, established linear corridors (e.g., transmission line, highway, railroad, and pipeline corridors) were prioritized in the route evaluation. Where sufficient space is available, collocation along existing linear corridors already encumbered by infrastructure minimizes conflicts with local, state, and federal land use plans and policies; minimizes the need to acquire land or land rights; and decreases environmental impacts significantly as compared to the establishment of a new corridor. Utilizing existing transmission line ROWs, in particular, offers the benefit of an established network of access routes and lands already encumbered with utility easements without the need to expand or create a new ROW. These attributes of existing linear corridors also have a positive impact on project cost and schedule.

2. **Minimize impacts to environmental resources.** NEP sought to identify route alternatives that would minimize impacts to environmental resources such as land use, wetlands and wildlife, rare species habitats, historical/archaeological resources, and other designated resources.

3. **Minimize cost.** NEP sought to identify route alternatives that would avoid costly remediation or construction requirements or, alternatively, would provide some opportunity for securing cost reductions.

4. **Maintain system function and reliability.** Because the Project is proposed to address existing asset condition concerns and support future system needs, a primary routing consideration was the need to maintain reliable delivery of electricity to customers served by the Palmer and Ware Substations. In addition, comparable or superior routes must allow general accessibility for future maintenance or repair. Access to all locations along an overhead route is typically not required; however, all structure locations must be reachable from some appropriate access point. NEP accordingly sought routes that would minimize access restrictions.

5. **Limit construction constraints.** In evaluating potential route options within the Study Area, NEP gave preference to route alternatives that would minimize constructability constraints and limitations. For example, road/highway crossings or working within other utility corridors (e.g., railroad corridors) can result in access restrictions, workspace constraints, safety concerns, traffic disruptions, and restrictive work hours, all of which impact project cost and schedule.

6. **Minimize impacts to densely developed areas.** The placement of transmission facilities in densely developed areas typically creates additional complexity both during initial construction and when maintenance or replacement is required. The potential for construction and maintenance work-hour restrictions, limited access availability, and the need for additional ROW and/or temporary workspace are more prevalent in densely populated areas. Therefore, NEP sought to identify route alternatives that would, to the extent practicable, minimize impacts to densely developed areas and the social environment.

4.5 POTENTIAL ALTERNATIVE ROUTE OPTIONS

Using the route evaluation criteria, NEP mapped existing linear corridors within the Study Area that could be used to develop routes that connect the Palmer and Ware Substations without the need to create a new ROW. NEP focused on the use of existing utility and transportation corridors in proximity to the O15N corridor. Numerous linear corridors were identified through a macro-review of USGS topographic maps, Geographic Information System ("GIS") data, and aerial imagery within the Study Area. Theoretically, these corridors could be utilized to develop potential routes, including those associated with electric transmission lines, pipelines, railroads, and highways and major roadways. The existing corridors identified in the Study Area are summarized below and depicted in *Figure 4-2*.

4.5.1 Electric Transmission Line Corridors

Ten existing overhead electric transmission line corridors were identified in the Study Area, as listed below. In addition to the O15N Line ROW, NEP owns and operates the majority of ROWs B, C, D, E, F, G, I, and J and Eversource owns and operates the majority of ROW A. ROW H consists of co-located NEP and Eversource assets.

The existing transmission line corridors identified in the Study Area are described below and shown on *Figure 4-3*.

- **ROW A:** This is an approximately 125-foot-wide transmission ROW that runs 25.8 miles N/S along the western edge of the Study Area (Eversource's 354 and 395 ROWs).
- **ROW B:** This is an approximately 125-foot-wide transmission ROW that runs 26.8 miles SE/NW along the northern edge of the Study Area (NEP's E5W/F6W ROW).
- **ROW C:** This is an approximately 125-foot-wide transmission ROW that runs 10.8 miles E/W along the northern edge of the Study Area (NEP's E5/F6 ROW).
- **ROW D:** This is an approximately 60-foot-wide transmission ROW that runs 16.7 miles S/N along the eastern edge of the Study Area (NEP's T20 ROW).
- **ROW E:** This is an approximately 200-foot-wide transmission ROW that runs 23.1 miles E/W along the southern edge of the Study Area (NEP's 301 ROW).

- **ROW F:** This is an approximately 100-foot-wide transmission ROW that runs 4.1 miles E/W along the southern edge of the Study Area (NEP's W175 ROW).
- **ROW G:** This is an approximately 100-foot-wide transmission ROW that runs 23 miles E/W along the southern edge of the Study Area (NEP's N14 ROW).
- **ROW H:** This is an approximately 50-foot-wide sub-transmission ROW that runs 2.1 miles NW/SE through the southwestern corner of the Study Area (NEP's 504/507 ROW).
- **ROW I:** This is an approximately 50-foot-wide sub-transmission ROW that runs 1.66 miles NE/SW through the southwestern corner of the Study Area (NEP's 504 ROW).
- **ROW J:** This is an approximately 80-foot-wide transmission ROW that runs 2 miles E/W through the northern edge of the Study Area (NEP's B69 ROW).

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Figure 4-2: Potential Routing Options within the Study Area

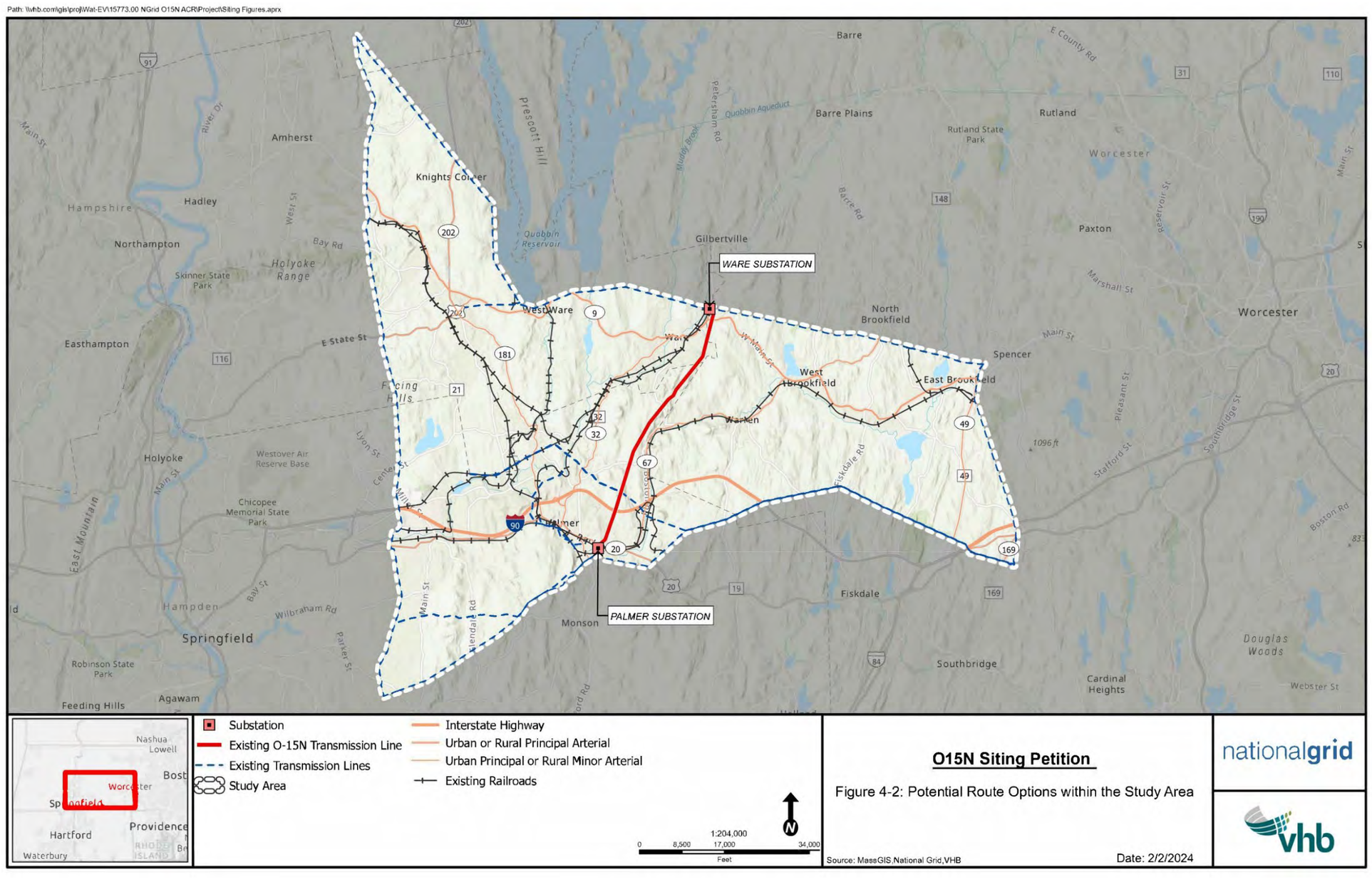
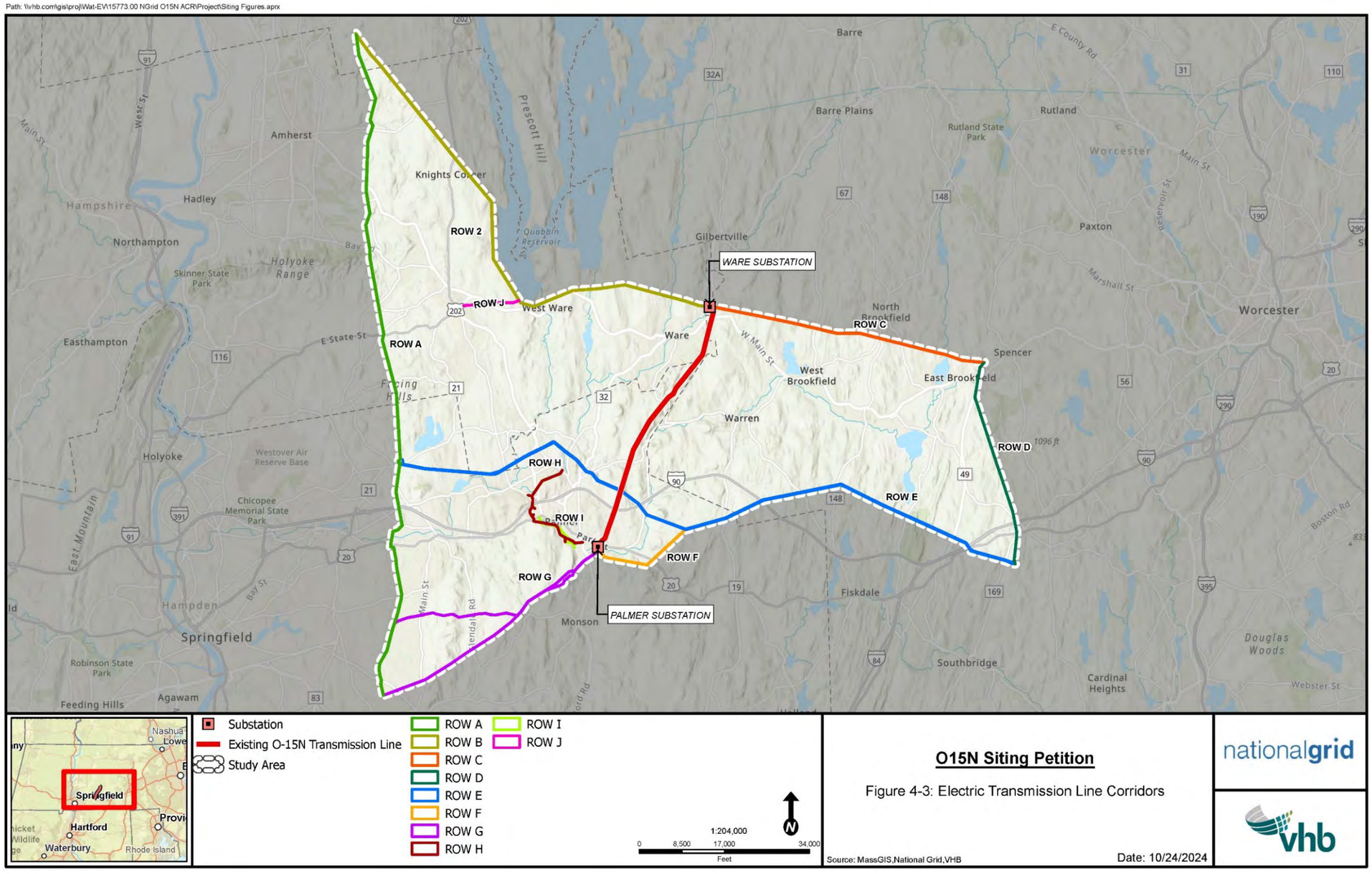


Figure 4-3: Electric Transmission Line Corridors



4.5.2 Municipal Utility Corridors

No viable municipal utility corridors were identified within the Study Area.

4.5.3 Railroad Corridors

Several railroad corridors run north-south and east-west through the Study Area as shown in *Figure 4-4*. Of the existing railroad corridors identified, three corridors have significant portions that run northeast-southwest in proximity to the O15N corridor:

- The CSX Boston Subdivision – The CSX Boston Subdivision rail line runs primarily east-west through the Study Area, but a portion of the line runs north-south roughly parallel to O15N between West Warren and Palmer. The line runs in proximity to the Palmer substation.
- The Central Mass Line – The Central Mass rail line runs southwest out of Ware roughly parallel to the northern portion of the O15N before turning northwest. The line runs in the vicinity of the Ware substation.
- The West Ware Branch – The Massachusetts Department of Transportation-owned West Ware Branch rail line runs between Ware and Palmer where it joins the CSX Boston Subdivision line. The corridor is located near the Ware and Palmer substations.

4.5.4 Highway and Major Roadway Corridors

Several major highways and roadway corridors run north-south and east-west through the Study Area as shown in *Figure 4-5*. Of the existing roadway and highway corridors identified, the following run proximate to the O15N corridor in a southwest-northwest direction:

- State Route 32 – State Route 32 generally runs southwest-northeast through the Study Area and is roughly parallel to O15N and is in close proximity to both the Ware and Palmer Substations.
- State Route 67 – State Route 67 generally runs southwest-northeast through the Study Area with the northern portion entering the Study Area in North Brookfield well east of the Ware Substation and O15N. However, the southern portion runs parallel to O15N and is in proximity to the Palmer Substation.
- State Route 148 – State Route 148 runs southwest-northeast through the study area but is significantly to the east of O15N and is not in proximity to the Ware or Palmer Substations.

- State Route 19 – State Route 19 runs southwest-northeast through the study area. From West Brookfield to Warren, it shares the route with State Route 67, but it turns south at Warren. It is not in the vicinity of the Ware or Palmer Substation.

4.5.5 Local Roadway Network

There are numerous local roadway networks throughout the municipalities located within the Study Area. None of the roadway networks are very dense; the highest concentrations of local roads are around the cities of Ware and Palmer with many of the roads being rural. The local roadway networks across the Study Area are typically paved, but also consist of gravel and dirt roadways, especially in the most rural settings.

4.5.6 Pipeline Corridors

Two pipeline corridors, which appear to have at one time transported oil but now are shown as abandoned, were identified within the southwestern portion of the Study Area, as shown in *Figure 4-6*. One corridor runs east to west, starting in Ludlow, and running east through Wilbraham, Palmer, and Monson and terminating in Brimfield. The second corridor runs northeast to southwest within the town of Wilbraham and connects to the first easement at the northern terminus.

Figure 4-4: Railroad Corridors

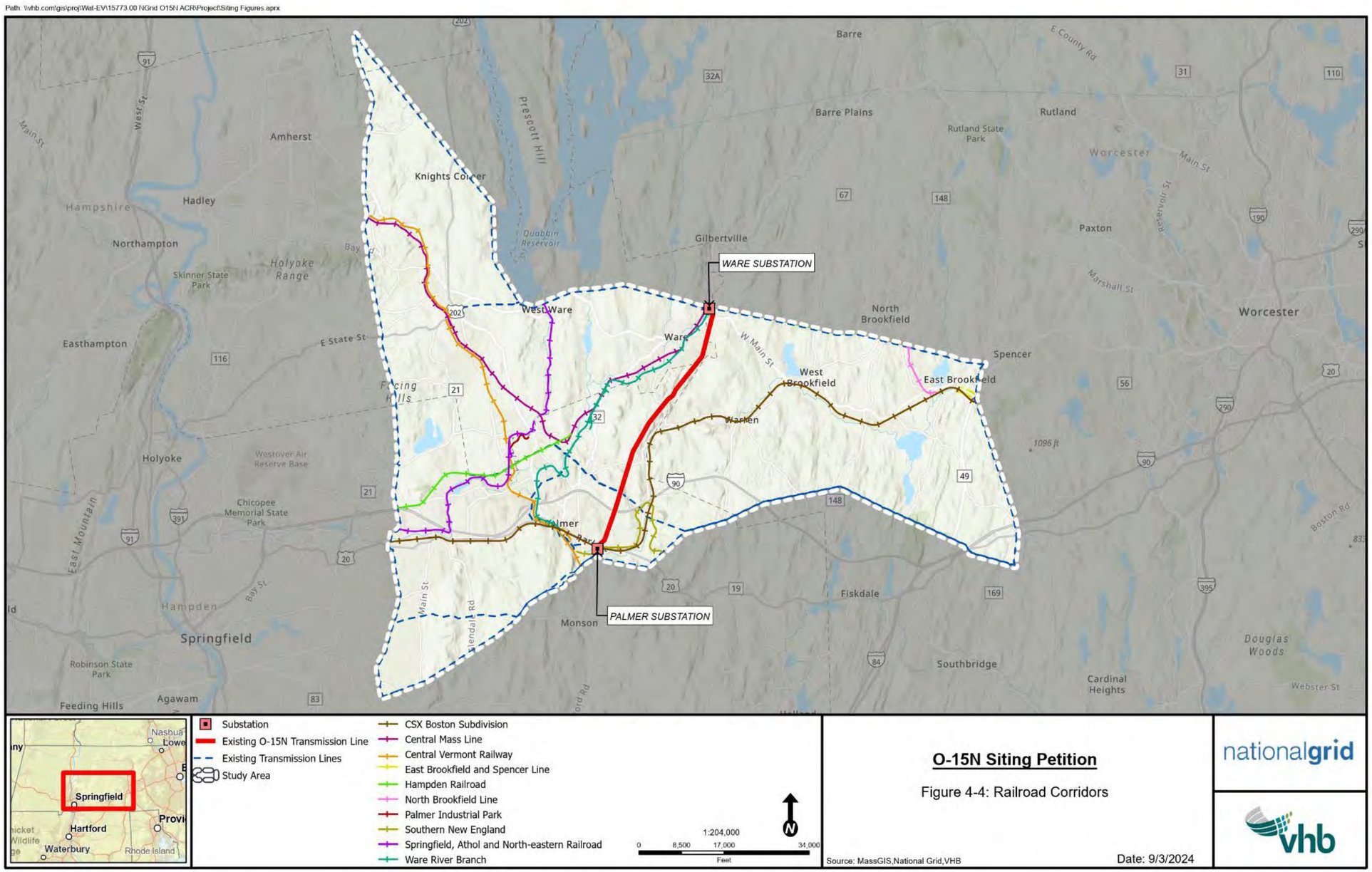


Figure 4-5: Major Road Corridors

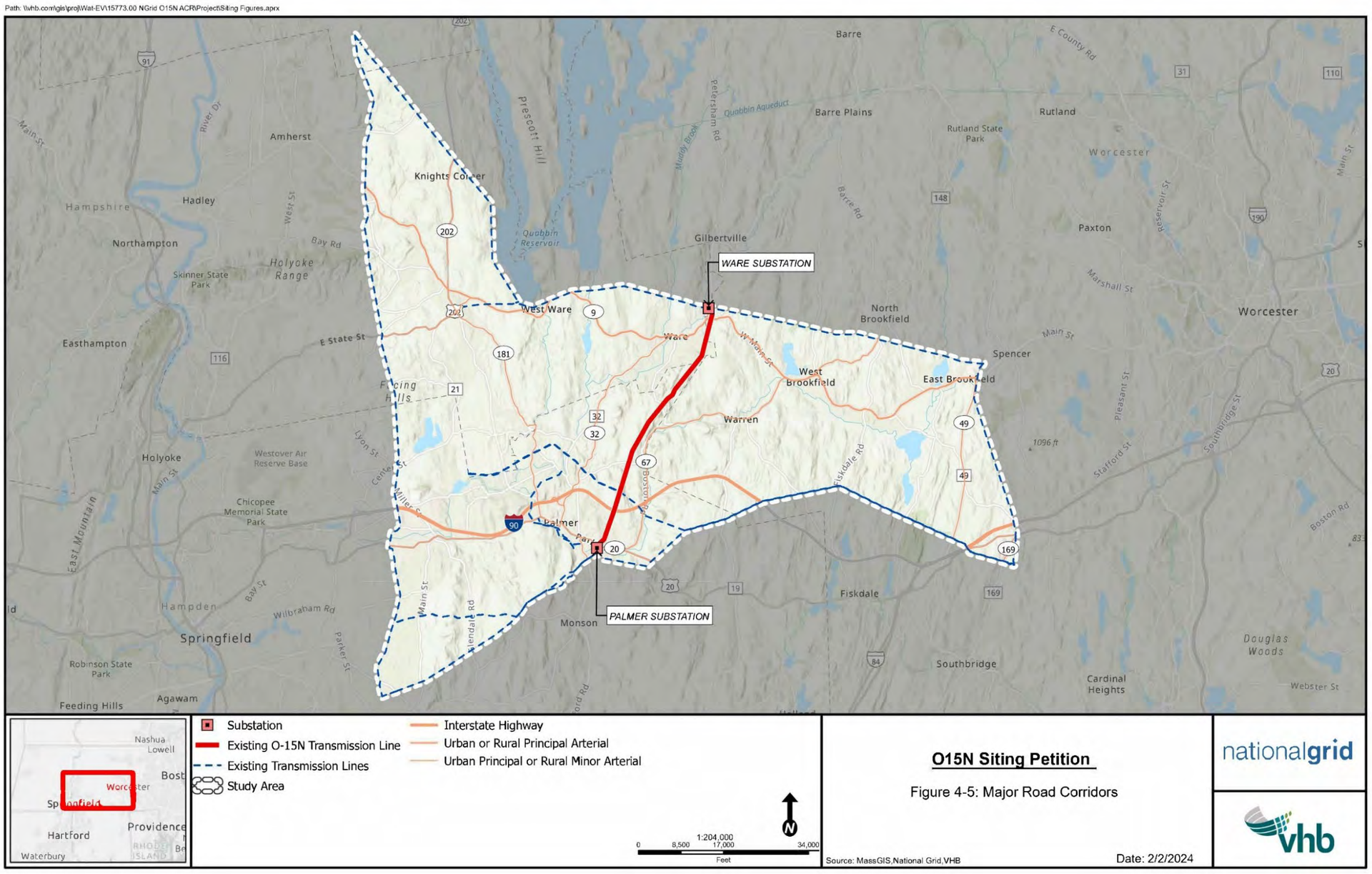
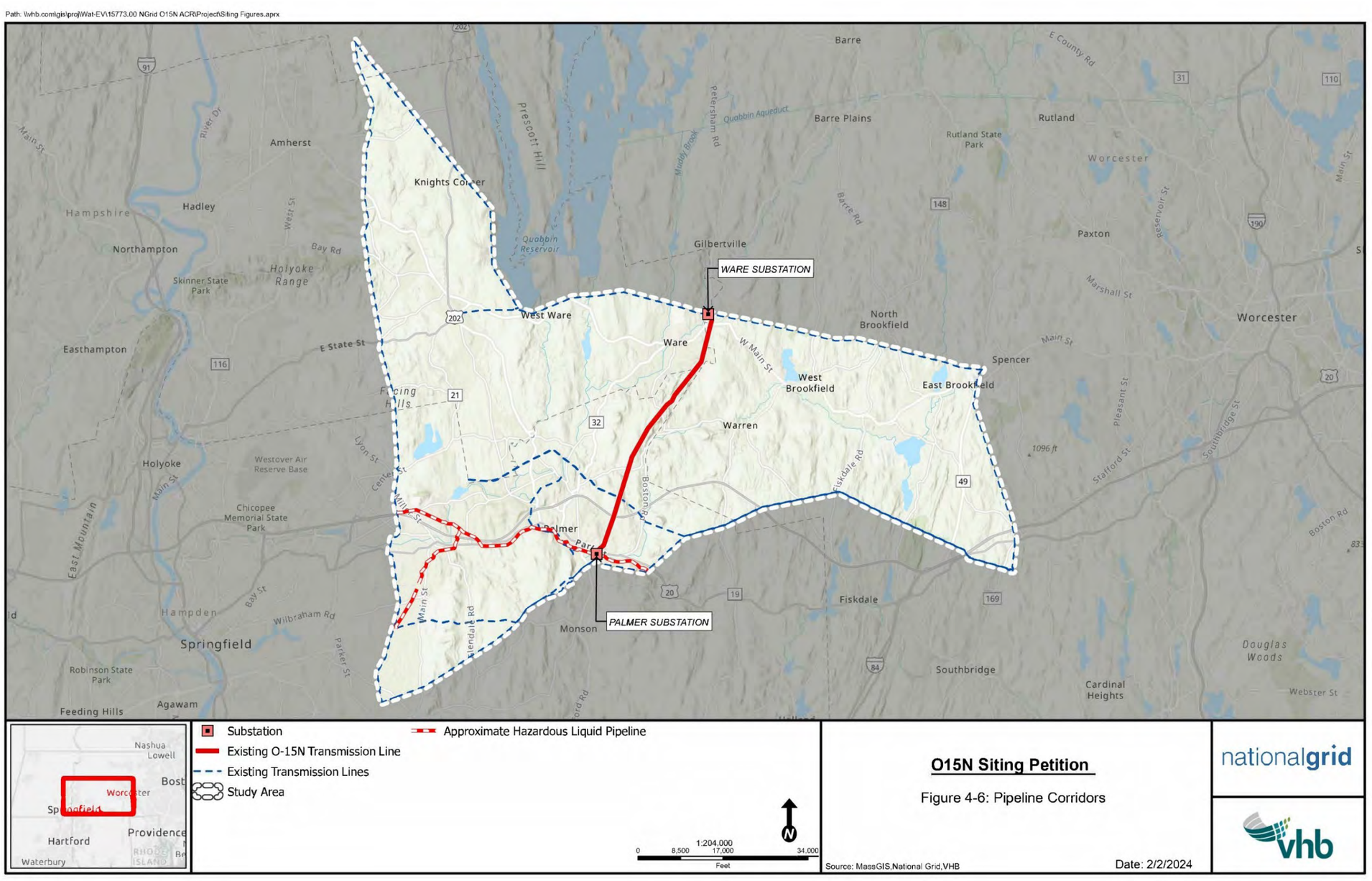


Figure 4-6: Pipeline Corridors



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4.6 IDENTIFICATION AND SCREENING OF POTENTIAL ROUTE OPTIONS

NEP applied the route evaluation criteria to identify existing linear corridors that could serve as a potentially superior route alternative for some or all of the Project. All corridors evaluated in the initial screening process were shown in *Figure 4-2*.

4.6.1 Initial Screening

NEP's initial screening of existing linear corridors focused on identifying corridors that could connect the Palmer and Ware Substations, as well as allow for general accessibility for future maintenance or repair. Corridors that provided no practical connection between Palmer and Ware were eliminated during this screening. Table 4-1 summarizes those corridors.

Table 4-1: Corridors Eliminated from Further Consideration

Linear Corridor	Linear Corridor Name or Identifier
Electric Transmission Corridors	• Eversource's 354 and 395 ROW, and NEP's ROWs for the E5W/F6W, E5/F6, T20, 301, W175, N14, 504, 507, and B69 Lines
Railroad Corridors	• Central Vermont Railway • The portion of the Central Mass Line east of Bondsville • Hampden Railroad • East Brookfield and Spencer Line • North Brookfield Line • Palmer Industrial Park • Springfield, Athol, and North-eastern Railroad • Southern New England
Highway and Major Roadway Corridors	• Interstate Route 90 ("I-90") • State Route 20 east of Palmer • State Route 19 south of Warren • State Route 181 • State Route 148 • All other major roadways run perpendicular to the O15N Line ROW and/or are far removed from the Existing Line
Pipeline Corridors	• Abandoned lines with unknown owner

4.6.2 Secondary Screening

Following the initial route screening, NEP reviewed the remaining linear corridors (depicted in *Figure 4-7*) and determined there were five route alternatives for the O15N transmission corridor that warranted additional consideration.

As part of the secondary screening, NEP further evaluated potential route alternatives with a focus on minimizing engineering, construction, and future operating constraints, as well as potential natural and social/developed environmental constraints. Of the linear corridors remaining for consideration, potential route alternatives consisted of railroad, highway, major roadways, and the local roadway network. These potential route alternatives for the O15N corridor are summarized in *Table 4-2*.

Figure 4-7: Linear Corridors Remaining after Screening

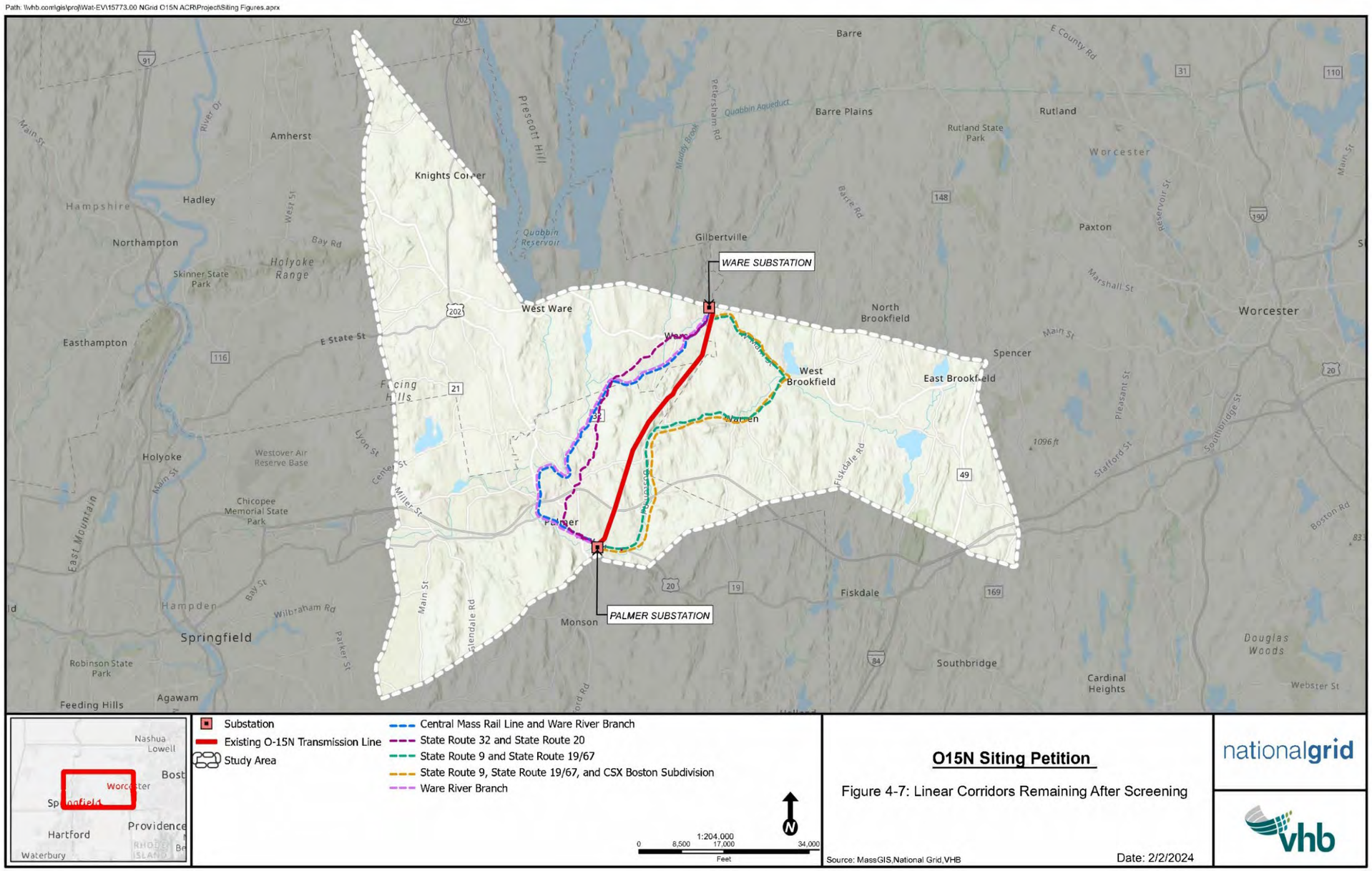

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Table 4-2: Potential Route Alternatives Reviewed During Secondary Screening

Corridor Type	Potential Route Alternative	Length (mi)	Location
Major Roadway Combination	State Routes 20 and 32	12.95	• Between Ware Substation in Ware and Palmer Substation in Palmer
Major Roadway Combination	State Routes 9 and 19/67	16.6	• Between Ware Substation in Ware and State Route 19/67 in West Brookfield • Between West Brookfield and Palmer Substation
Major Roadway and Railroad Combination	State Routes 9, 19/67, and CSX Boston Subdivision	16.46	• Between Ware Substation in Ware and State Route 19 in West Brookfield • Between West Brookfield and Palmer Substation
Railroad Combination	Central Mass Rail Line and Ware River Branch	14.94	• Between East Bondsville and Palmer Substations
Railroad	Ware River Branch	14.85	• Between Ware Substation in Ware and Palmer Substation in Palmer

These potential route alternatives were measured against the route evaluation criteria and were found to be inferior to the Project Route.

The Existing Line has the advantage over alternative routes of following a more direct path between the Ware Substation and the Palmer Substation. Additionally, ongoing vegetation maintenance along the Existing Line means that no additional tree clearing will be necessary. Furthermore, because the O15N Line is partially collocated with X176 Line, access can be shared for vegetation and other maintenance on the collocated sections.

The isolated nature of the existing O15N Line ROW means there are fewer visual impacts to surrounding abutters compared with alternative routes. Additionally, the small number of residential abutters and isolated access points reduce the potential for any air, noise, or construction traffic impacts that may occur during construction and maintenance activities.

While all potential route alternatives would involve utilizing existing linear corridors to the maximum extent feasible, installation of a new overhead line along railroads, highways, and major roadways would require obtaining new property rights, and encroaching upon open space and residential properties in some locations. Furthermore, all of these route alternatives are at least 2.6 miles longer than the existing 10.35-mile O15N corridor and would result in a proportional increase in cost per mile. The exact amount of land alteration and wetland impacts would vary depending on the actual design. It is possible that there would be less land alteration and wetland impact than the Project along roadways, as the roadway serves

as an existing access road; however, there would still be new land alteration and some amount of new wetland impacts for installation of new structures along any road or railroad. In addition, as noted above, impacts on the O15N Line ROW would not be fully avoided as the existing structures would still need to be removed, and the attendant work pad and road construction would still be necessary, along with the cost for this work.

Installation of a new overhead line along railroad, highways, and major roadways also presents significant construction and maintenance constraints, presents reliability concerns, and increases associated cost and environmental impacts:

- Collocating a transmission line along a railroad corridor or highway corridor may be possible; however, a project proponent must demonstrate to the applicable transportation agency that there is no feasible alternative to collocating with these facilities, which is not the case here.
- Working within other utility corridors (e.g., railroad corridors) and road/highway crossings would result in access restrictions, workspace constraints, safety concerns, traffic disruptions, and restrictive work hours during both initial construction and long-term maintenance and operations activities.
- Highway and roadway corridors also present issues that can affect reliability. Vehicle collisions can lead to structure damage and outages which can impact system reliability when damage occurs to transmission infrastructure.
- Establishment of the infrastructure in road corridors is done by licensing agreement. These agreements give priority to transportation requirements and can lead to needing to relocate infrastructure when in conflict. This can lead to timing and outage issues that are incompatible with the need to supply electricity to the system.
- Locating a new overhead transmission line along major highways, roadways, and railroads would result in new visual, traffic, and environmental impacts to communities and natural systems.

For the reasons described above, given the availability of the existing O15N corridor, the remaining railroad, highway, and major roadway corridors were eliminated from further consideration.

4.6.3 Summary and Proposed Project Route

NEP began the route selection process by defining a study area centered on the existing O15N Line ROW and identifying a set of route evaluation criteria. NEP then identified a variety of potential overhead routes within the study area using existing electric transmission, railroad, pipeline, and highway and roadway corridors. NEP's initial screening of these linear corridors identified some routes as clearly inferior due to excessive length, significant constructability concerns, greater environmental impacts, or additional capital expenditure. After removing those routes from consideration, NEP evaluated the remaining routes with a focus on minimizing engineering, construction, and future operating constraints, as well as natural

and social environmental constraints. This evaluation found that none of the potential route alternatives were superior to the existing O15N Line ROW. Therefore, the Existing Line corridor is proposed as the Project Route (*Figure 4-8*). Specifically, the Project Route provides the following benefits:

- The Project Route provides a direct route between the Ware Substation and the Palmer Substations and maintains system function and service to the five communities that are served by these substations. Although several route options could be delineated using existing linear corridors within the Study Area, none would be shorter, less costly, or less impactful to the human and natural environments while still maintaining existing function.
- The Existing Line along the proposed Project Route is a well-established and maintained NEP asset. As such, the existing O15N Line ROW has been historically accessed and maintained for the purpose of NEP's operations. Maintaining system operability and reliability has included vegetation maintenance, placing temporary construction mat crossings within existing wetland systems crossing the ROW, and accessing and performing repairs. While access route improvements will be necessary as part of the Project, utilizing the existing O15N Line ROW also offers the benefit of an established network of access routes and lands already encumbered for this use.
- The Project Route does not require the acquisition of new or expansion of existing transmission line ROW. Relatedly, using the Project Route means that all construction and removal activities are contained within one existing ROW.
- Since use of any alternative route would require the existing O15N infrastructure to be deconstructed and salvaged for safety reasons, environmental impacts similar to the proposed Project would still be incurred within the O15N Line ROW. Continued use of the O15N corridor for the Project Route will keep all environmental impacts within a single corridor rather than incurring construction impacts in two separate corridors.

4.7 CONCLUSION

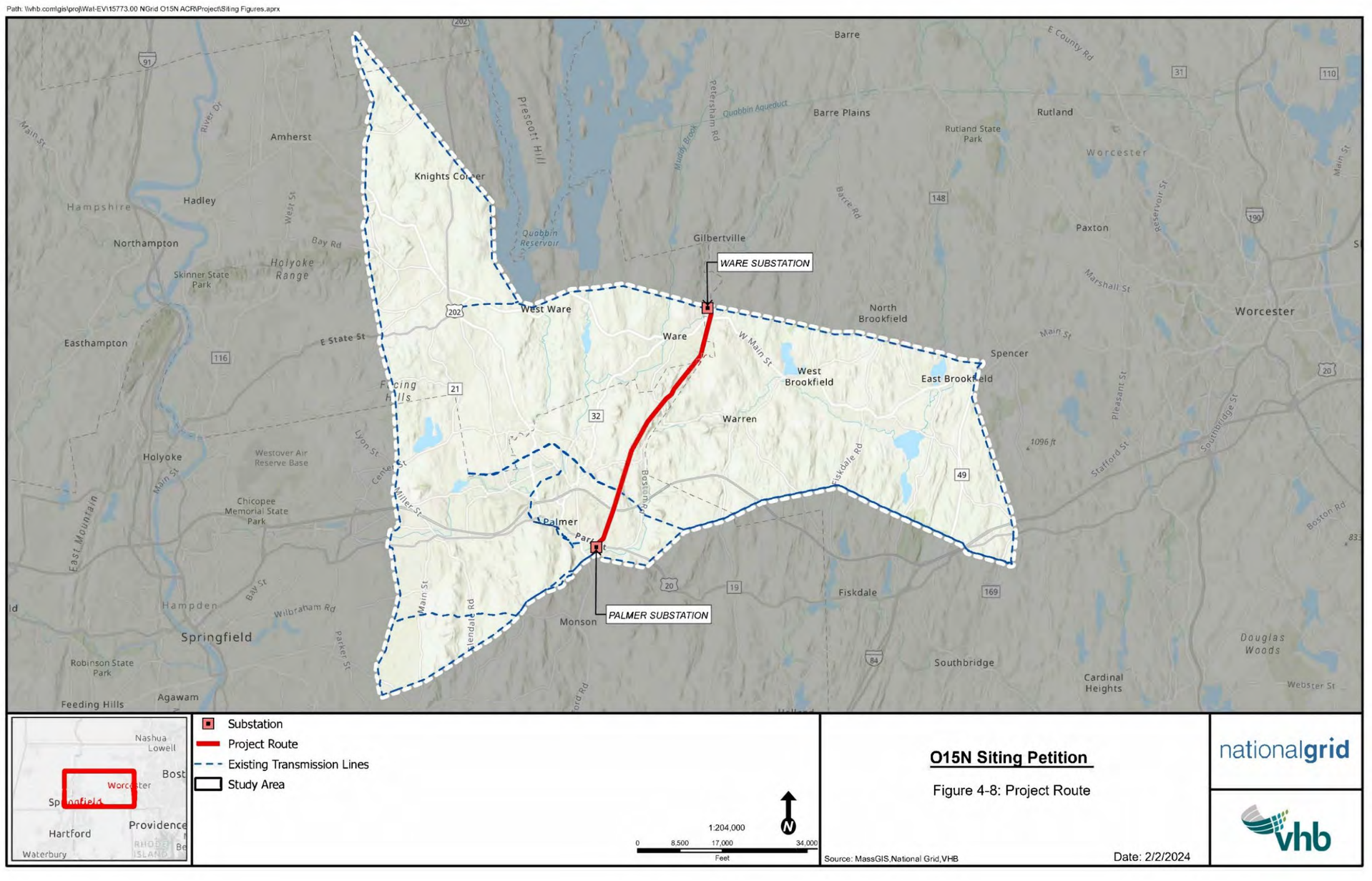
NEP's process for selecting the Project Route for the proposed Rebuilt Line addresses the Siting Board's standards applicable to jurisdictional energy facilities in an objective and comprehensive fashion. NEP approached the process by identifying existing linear corridors within a broad routing Study Area to review potential route alternatives. Providing significant consideration to the need for the Project and the significant length, cost, and constructability concerns, the route evaluation relied heavily on NEP's responsibility to ensure that no clearly superior route was overlooked. As a result of the in-depth screening process, no candidate routes were found to meet the route evaluation criteria and/or provide benefits comparable to rebuilding the Existing Line within its existing ROW, the Project Route.

While it is feasible to construct the Project using alternative routes consisting of existing linear corridors, this would result in increased costs, schedule delays, and new and/or increased impacts to human and

natural environments. Developing a Noticed Alternative Route over 10 miles would require a significant expenditure of funds and would unnecessarily raise concerns among abutters along inferior routes where NEP has no intention of constructing the Project. Thus, NEP determined that designating a Noticed Alternative Route was not warranted under these circumstances.

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

Figure 4-8: Project Route



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5 PROJECT IMPACTS ANALYSIS

5.1 INTRODUCTION

This section provides a detailed analysis of the Project's impacts on the natural and social environment. To assess these potential environmental impacts and mitigation, NEP evaluated a series of natural and social environment criteria including land use, protected land and open space, historical/archaeological sites, wetlands and water crossings, rare species habitat, public water supplies, visual, noise, traffic, air quality and electric and magnetic fields ("EMF").

The potential impacts of the Project are both construction-related (temporary) and siting and operation-related (permanent). Examples of potential temporary construction-related impacts include the temporary disturbance of wetlands resulting from the placement of construction matting for access and work areas, ground disturbance associated with structure installation and removal, traffic impacts at roadway crossings, and short-term construction noise associated with the operation of heavy equipment. Examples of permanent impacts include wetland fill, loss of rare species habitat, and visual impacts.

A description of the Project Route is provided in *Section 5.2*. Related maps and figures are found in Appendices 5-1 and 5-3 of this Analysis. *Section 5.3* provides an overview of NEP's construction methodology and impact avoidance and minimization measures.

Project impacts to the natural and social environment, as well as proposed mitigation measures, are discussed in *Section 5.4*. Finally, a summary of the analysis and conclusion are provided in *Section 5.5*.

5.2 DESCRIPTION OF THE PROJECT ROUTE

5.2.1 Project Route

NEP proposes replacing the Existing Line with a Rebuilt Line within the existing ROW. The Project Route is illustrated in *Figure 5-1* in *Appendix 5-1*, typical ROW cross-sections are provided as *Figure 2-1*, and typical O15N structure details are shown in *Figure 3-1*. The Existing Line will be rebuilt in Ware, West Brookfield, and Palmer.

The Existing Line is situated entirely within an existing ROW comprised either of NEP easements or land owned in fee. The existing O15N Line ROW encompasses approximately 10.35 miles of the Project Route and varies between 100 and 200 feet wide. From Ware Substation south for approximately eight miles to Structure 118, the Existing Line is the only circuit in the ROW, which is approximately 100 feet wide in this stretch. For the remaining approximately two miles to the Palmer Substation, the Existing Line shares the ROW with the Company's 115 kV X-176 Line where the ROW is approximately 200 feet wide.

The Rebuilt Line will generally be constructed on light duty steel single-pole braced post structures ranging in height from approximately 75 feet to 110 feet above ground. Dead-end structures will be engineered steel single-pole davit arm structures, except for the portion of the line that goes under NEP's 345-kV Line 301 in Palmer, which will use engineered steel H-frame dead-ends.

The majority of structures on the Rebuilt Line will be directly embedded. The steel single-pole davit-arm dead-end structures along the Rebuilt Line and the steel, H-Frame dead ends will be supported by concrete caisson foundations. The proposed caisson foundations are larger than the footprint of existing wood pole structures. Alternative foundation types such as helical piles, steel vibratory caisson foundations or micro pile foundations may be utilized if warranted by site conditions or other factors.

5.2.1.1 Route Maps

Project Route maps supporting the evaluation of Project impacts are provided in 11-inch by 17-inch format in *Figure 5-1* of *Appendix 5-1*.

5.2.1.2 Land Use Maps

Land Use Maps, which are also provided in *Figure 5-2* of *Appendix 5-1,* illustrate land use within the Project ROW and include adjacent properties located within 300 feet of the boundaries of the Project Route. Land uses include mixed use, residential, commercial, agricultural, forest, industrial, transportation, municipally and federally owned open space, and other uses, as described in *Section 5.4.1*. The land use information was obtained from the Massachusetts Geographic Information System ("MassGIS") parcel data. Land use mapping from MassGIS is based on 2022 aerial photography, and illustrates physical conditions identified by aerial photographs rather than zoning districts. A discussion of applicable zoning information and districts as they pertain to land use is provided for the Project Route in the sections below.

5.2.1.3 Environmental Justice Maps

The EJ Maps provided in *Figure 5-3* of *Appendix 5-1* illustrate the 2020 EJ block groups based upon demographic socioeconomic indicators developed by Executive Office of Energy and Environmental Affairs ("EEA") within the 1-mile and 5-mile buffer to the ROW. The EJ maps include demographic data for the residents of each U.S. Census block group within the one-mile and five-mile radius of the Project Route including Minority, Income, Minority and Income, Minority and English Isolation, and Minority, Income and English Isolation. A summary of the EJ populations in the vicinity of the Project Route is provided in *Section 5.4.13*.

5.2.1.4 Environmental Resources Maps

The Environmental Resources Maps provided in *Figure 5-4* of *Appendix 5-1* illustrate the natural and social environmental resources within the O15N Line ROW. Environmental resources include open space/recreational land, historic/archaeological sites, wetlands and water crossings, vernal pools

(certified and potential), rare species habitat, and Outstanding Resource Waters ("ORW"). A detailed description of the environmental resources is presented in *Section 5.4*.

5.3 CONSTRUCTION METHODS

NEP has robust and thorough policies and procedures for minimizing construction related disturbances throughout all phases of construction. These policies and procedures are included in National Grid's ROW Access, Maintenance and Construction Best Management Practices ("BMPs") Environmental Guidance Document - EG-303NE ("National Grid's BMPs"), provided as *Appendix 5-2*. NEP and its contractors will follow these procedures for construction of the Project.

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

5.3.1 Overhead Transmission Line Construction Sequence

The Project activities will be sequenced to reduce impacts to the natural and human environment. Project construction will not occur along the entire Project ROW all at one time. Project activities will be conducted in segments along the line, meaning that construction within a given segment will not occur continuously throughout the life of the Project. Other than the installation of new structures and access roads, no long-term impacts on soil, vegetation, surface water, groundwater, wetland resources or air quality will occur. The work will be completed in a progression of activities that will generally proceed as follows:

1. Removal of vegetation and ROW mowing in advance of construction.
2. Installation of soil erosion and sediment controls.
3. Construction of access routes and access route improvements.
4. Construction of work pads and staging areas.
5. Installation of foundations and structures.
6. Installation of conductor and OPGW.
7. Removal and disposal of existing transmission line components.
8. Restoration and stabilization of the ROW.

The following subsections describe the sequence of construction activities that will be used for the installation of the Rebuilt Line. In addition to these activities, this section also addresses construction-related issues such as traffic, work hours, equipment, environmental compliance and monitoring, safety and public health considerations, and vegetation maintenance.

5.3.1.1 Vegetation Management in Advance of Construction

Within the Project ROW, mowing or other vegetation management is required prior to the start of construction to provide access to the proposed structure locations, facilitate safe vehicular and equipment passage, and provide safe work sites for personnel. Mowing will be completed by mechanical means. Small saplings and shrubs will be mowed as necessary with the intent of preserving root systems to the extent practicable. Where the Project Route crosses streams and brooks, any necessary vegetation mowing along the stream bank will be minimized to the extent practicable to reduce disturbance of soils and the potential for construction-related erosion. No tree removal is anticipated.

5.3.1.2 Installation of Soil Erosion and Sediment Controls

Following vegetation management activities, erosion, and sediment control devices such as straw bales, straw wattles, siltation fencing, compost socks, and/or chip bales will be installed in accordance with National Grid's BMPs and approved plans and permit requirements. Installation of erosion and sediment controls may occur concurrently with installation of work pads, pulling pads, and/or access route construction. The installation of these erosion and sediment control devices will be supervised by NEP contractors and reviewed by NEP Construction Supervisors and/or designated environmental monitors. Erosion and sediment controls will be installed between the work site and environmentally sensitive areas such as wetlands, streams, drainage courses, roads, and adjacent properties when work activities will disturb soil and result in the potential for soil erosion and sedimentation. Erosion and sediment control 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. NEP contractors, supervisors, and environmental monitors will regularly monitor installed controls.

In addition to those locations described above, erosion and sediment control devices will be installed along the perimeter of identified wetland resource areas prior to the onset of soil disturbance activities to ensure that stockpiles and other disturbed soil areas are confined and do not result in downslope sedimentation of wetland resources. Where structures requiring concrete foundations are located near wetlands, sedimentation controls will be installed to prevent transport of materials to these downgradient resource areas.

5.3.1.3 Construction and Improvement of Access

In preparation for construction, NEP will establish the physical access required to construct, inspect, and maintain the Rebuilt Line through improvement of existing or historic accessways, temporary placement of construction mats, and construction of new access where necessary. Existing and proposed access routes are shown on the Environmental Resources Maps in *Figure 5-4* of *Appendix 5-1*.

In order to minimize construction impacts, NEP plans to utilize established and existing access to and within the ROW to transport construction equipment on and offsite, to the maximum extent practicable. However, in many cases, historic access ways will require significant improvement to meet the access requirements for the Project, ranging from a light resurfacing with clean gravel to full reestablishment, including mowing, grading, and addition of stone. Stabilized construction entrances will also need to be installed or refreshed where the ROWs cross public roadways.

In addition, new on-ROW access will be needed for construction, inspection and maintenance of the Rebuilt Line. New access routes have been designed to avoid or minimize disturbance to wetland resources to the extent feasible, to follow the existing contours of the land as closely as possible, and where practicable, to avoid severe slopes. Access way travel widths are generally 12 to 16 feet, but the constructed footprint may be wider in some locations to accommodate grading and stormwater BMPs, such as swales, stone check dams, water bars, or other similar measures. No off-ROW access is currently planned; however, NEP will continue to evaluate off-ROW access options in cases where they may allow avoidance of wetland or rare species habitat impacts.

Where upland access is not available, access across wetlands and streams will be accomplished by the temporary placement of construction mats. The use of construction mats allows for heavy equipment access within wetland areas, minimizes the need to remove vegetation beneath the access way, and helps to reduce the degree of soil disturbance, soil compaction, and rutting in soft wetland soils. Construction mats most often used by NEP are wooden timbers bolted together, typically into 4-foot by 16-foot sections. Typically, construction mats are installed on top of the existing vegetation; however, in some instances cutting or mowing woody vegetation, without root disturbance, may be required. Construction mats will be removed following completion of construction, and areas will be restored to reestablish pre-existing topography and hydrology, as necessary.

Access construction and improvements will be carried out in compliance with the conditions and approvals of the appropriate federal, state, and local regulatory agencies. Dust suppression measures, such as the use of water trucks to spray access surfaces, will be implemented as required to minimize fugitive dust from construction vehicle travel along the ROW. Crushed stone aprons/tracking pads will be used at all access entrances to public roadways as needed to minimize the migration of soils off-site from construction equipment. Additionally, stormwater BMPs will be installed as necessary as part of the access construction and improvement phase of the Project. These BMPs will reduce adverse impacts from stormwater flows, maintain the longevity of the access routes, and reduce overall maintenance needs.

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

Work pads will be constructed to provide a safe and level work area for construction equipment to undertake foundation work and structure assembly, and to provide adequate space for the live line construction associated with the Project. Mowing of low growing woody vegetation and brush, and grading, may be necessary to create a work pad of approximately 100 feet by 100 feet at each proposed

structure location, and approximately 50 feet by 60 feet at each location where existing structures will be removed (with no new structure added in the same location). The work pads may be smaller or larger depending on terrain, equipment, and overall site conditions at each structure location. Upland work pads will be constructed by grading and/or adding gravel or crushed stone to provide a stabilized work surface. Within agricultural areas and wetlands, work pads will consist of temporary construction matting placed on top of existing vegetation where feasible.

Construction of wire stringing and pulling sites will be required at angle points in the Rebuilt Line and at dead-end structures to provide a level workspace for equipment and personnel. Upland stringing and pulling sites may require mowing and grading to create a level work surface. Sites in agricultural and sensitive resource areas, such as wetlands and rare species habitat, will consist of construction matting placed on top of vegetation, where feasible. These temporary wire stringing and pulling sites will be restored, stabilized, and allowed to revegetate.

Temporary storage areas, staging areas, and laydown areas will also be needed to support construction. NEP and/or its designated contractor(s) will be responsible for selecting these areas and making arrangements with property owners for use of the land during construction. Selected staging areas and contractor laydown areas will typically be previously developed properties, where environmental resources can be avoided.

5.3.1.5 Installation of Foundations and Structures

Rebuilding the Existing Line requires the replacement of primarily wood pole structures, including polearm and three-pole structures. A small number of steel H-frame structures will also be replaced. The poles will primarily be replaced with light duty, steel, single pole, braced post, directly embedded structures to support the Rebuilt Line. Dead end structures will be engineered, steel, single pole, davit arm structures and the portion of the line that goes under the 345 kV Line 301 will use engineered, steel, H-frame dead end structures. These structures will be set on reinforced concrete caisson foundations. Alternative foundation types such as helical piles, steel vibratory caisson foundations or micro pile foundations may be utilized, if warranted by site conditions or other factors. Excavations will be performed using augers or rock drills and, depending on field conditions, backhoes, and excavators.

For direct embedment structures, a corrugated metal pipe will be placed vertically into the hole and backfilled. The annular space between the pole and the steel casing will then be backfilled with crushed stone. Caissons will be constructed by drilling a vertical shaft, installing a steel reinforcing bar cage, placing anchor bolt clusters, pouring concrete, and backfilling as needed. The poles will be field assembled and lifted by cranes, then placed on the anchor bolts and into the embedded corrugated metal pipe.

Excavated material will be temporarily stockpiled next to the excavation; however, this material will not be placed directly into wetland resource areas. If a stockpile is close to wetlands, the excavated

material will be enclosed by staked straw bales or other sediment controls. Additional controls, such as watertight spin off boxes or geotextile filter fabric, may be used for saturated stockpile management in work areas in wetlands (e.g., construction mat platforms) where sediment-laden runoff would pose an issue for the surrounding wetland. Excess excavated soil will be spread over upland areas outside of any applicable wetland buffer zones or other wetland resource areas or removed from the site in accordance with NEP's BMPs. Dewatering may be required during the foundation installation. Groundwater pumped from an excavation will be treated before discharge in accordance with NEP's BMPs. Dewatering discharge water will never be directed into wetlands, streams/rivers, or other sensitive resource areas. Dewatering flow will be controlled through the use of a dewatering basin, filter bag, or equivalent so that it does not cause scouring or erosion. The basin and all accumulated sediment will be removed following dewatering operations, and the area will be restored, as needed. Rock that is encountered during foundation excavation will generally be removed by means of drilling with rock coring augers rather than a standard soil auger. This method allows the same drill rig to be used and maintains a constant diameter hole. However, in some cases, rock hammering and excavation may be used to break up the rock. No blasting is currently anticipated for the Project.

5.3.1.6 Installation of Conductor and OPGW

Following the construction of transmission line structures, insulators will be installed on the structures. The insulators isolate the energized power conductors from the structure. OPGW and power conductors will then be installed using stringing blocks and wire stringing equipment. The wire stringing equipment is used to pull the conductors from a wire reel on the ground through stringing blocks attached to the structures to achieve the desired sag and tension. 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, and similar practices, are used to ensure public safety and uninterrupted operation of other utilities by keeping the wire away from other utility wires and clear of the traveled way.

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

5.3.1.7 Removal and Disposal of Existing Transmission Line Components

After the Rebuilt Line has been placed into service, the existing structures will be removed. The majority of existing structures are comprised of wood pole structures. Wood pole structures will be removed in their entirety unless the complete removal of the pole would create an adverse impact to environmentally sensitive areas. The resulting hole will be backfilled and thoroughly tamped to minimize settling, then capped with native topsoil and allowed to revegetate. NEP will transport used

wood poles to the nearest ROW street crossing that is accessible by truck for subsequent pick up. Treated wood poles will be transported for disposal at a licensed landfill or incinerator. All cross-arms, braces, and other hardware will be removed from the site and disposed of properly.

To the extent practicable, the steel, H-frame structures, conductors and insulators will be salvaged; and any equipment and debris that cannot be recycled will be transported to an appropriate off-site disposal facility. Handling of such materials will be performed in compliance with applicable laws and regulations and in accordance with NEP policy.

5.3.1.8 Restoration and Stabilization of the ROW

Restoration efforts, including removal of construction debris, final grading, and stabilization of disturbed soil, will be completed following construction. All disturbed areas around structure work pads and other graded locations will either be stabilized with a gravel surface or vegetated. Erosion control blankets, or similar, may be used to stabilize the soils in accordance with applicable regulations.

Temporary sediment control devices will be removed following the stabilization of disturbed areas. Existing stone walls and fences will be restored in accordance with property owner agreements and applicable local ordinances. Where authorized by property owners, permanent gates and access roadblocks will be installed at key locations to restrict access onto the ROW by unauthorized persons or vehicles. Regulated environmental resource areas temporarily or permanently disturbed by construction will be restored or replicated in accordance with applicable permit conditions.

5.3.2 Construction Traffic

Intermittent construction-related traffic will occur over the entire construction period. Construction equipment will typically gain access to the Project Route from public roadways crossing the ROW in various locations. Because each of the construction tasks will occur at different times and locations over the course of construction, traffic will be intermittent at these entry roadways. Traffic will consist of vehicle types ranging from pick-up trucks to heavy construction equipment.

NEP's contractors will coordinate closely with state transportation authorities to develop acceptable traffic management plans for work within state highway layouts. NEP will coordinate with local authorities for work on local streets and 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. Further traffic information is provided in Section *5.4.10*. NEP will notify affected landowners in advance of any use of off-ROW access and will work on a case-by-case basis with any abutting landowners that express concern.

5.3.3 Construction Work Hours

Construction activities and related deliveries will be limited to 7:00 a.m. to 7:00 p.m. on weekdays and 8:00 a.m. to 5:00 p.m. on Saturdays, with no construction on Sundays or state/federal holidays. Some

work tasks such as concrete pours and transmission line stringing, once started, must be continued through to completion, and may go beyond normal work hours. Construction hours will be developed in consultation with the municipalities of Palmer, Ware, West Brookfield, the Massachusetts Department of Transportation (MassDOT), and the CSX Railroad.

The Town of Palmer limits earth removal activities to the hours of 7:30 a.m. to 4:00 p.m. on weekdays and 8:00 a.m. to noon on Saturdays, with no activities allowed on Sundays or holidays. The Town of West Brookfield limits earth removal activities to the hours of 7:00 a.m. to 7:00 p.m. The Town of Ware does not appear to have specific limits on construction work hours.

NEP will work closely with each of the municipalities to negotiate mutually agreeable work hours and will secure approval in advance of construction outside of established work hours. In addition, during construction, NEP will assign a community outreach representative to keep abutting property owners and municipal officials informed about the Project as it progresses along the ROW through each community.

5.3.4 Environmental Compliance and Monitoring

NEP will retain the services of environmental compliance monitors to observe civil construction activities, including the installation and maintenance of soil erosion and sediment control BMPs, on a routine basis to ensure compliance with all federal, state, and local permit commitments. The environmental monitors will be experienced in soil erosion and sediment control techniques and will have an understanding of wetland resources to be protected.

In addition, NEP will require that its 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 the team involved, will be responsible for providing appropriate training and direction to the other members of the construction crew regarding work methods as they relate to permit compliance and construction mitigation commitments. Additionally, construction personnel will undergo pre-construction training on appropriate environmental protection and compliance obligations prior to the start of construction of the Project. Training topics will include environmental, stormwater management, cultural resources, and safety considerations. Daily tailboard meetings will occur, including a review of the day's environmental requirements and considerations. Regular construction progress meetings will be held to reinforce contractor awareness of these mitigation measures, and training will be provided to new crew members as they join the work force.

NEP will develop and maintain a Stormwater Pollution Prevention Plan ("SWPPP") and Soil Erosion and Sediment Control Plan for the Project. The SWPPP will identify controls to be implemented to avoid and minimize the potential for erosion and sedimentation from soil disturbance during construction. The SWPPP will include a construction personnel contact list, a description of the proposed work, stormwater controls and spill prevention measures, and inspection practices to be

implemented for the management of construction-related storm water discharges from the Project. The SWPPP will be adhered to by the contractors during all phases of Project construction in accordance with the general conditions prescribed in the Project's U.S. Environmental Protection Agency ("USEPA") Stormwater Construction General Permit.

As necessary, deficiencies of erosion and sediment control measures and other permit compliance matters will be immediately brought to the attention of the contractor's construction supervisor for implementation of corrective measures. A copy of the Final Decision issued by the Siting Board, and copies of all other permits and approvals, will be provided to and reviewed by NEP project managers and construction supervisors in advance of construction. These documents will also be provided to the contractor's project manager and construction supervisor prior to construction. Contractors are required, through their contracts with NEP, to understand and comply with Siting Board conditions or requirements and any other 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.

5.3.5 Safety and Public Health Considerations

NEP will construct and maintain the Project so that the health and safety of the public is 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. Practices that will be used during construction will include, but not be limited to, establishing traffic control plans for construction traffic on busy streets to maintain safe driving conditions, restricting public access to potentially hazardous work areas, and using temporary guard structures at road and electric line crossings to prevent accidental contact with the conductor during installation.

Prior to construction, NEP will ensure all contractors are familiar with and understand NEP's detailed public safety measures. All safety measures will conform to NEP's Safety Procedures and Work Area Protection Manual. Site-specific measures in this document include traffic control, excavation protection, exclusionary fencing, warning signs/devices, safety and orientation training for all crew members, and general housekeeping.

Following construction, all transmission structures will be clearly marked with warning signs to alert the public to potential hazards if climbed or entered. Throughout the Project design and implementation sequence, NEP will evaluate locations that may require the installation of signs, and/or other types of barriers (e.g., large stones) at access points from public roads.

5.4 ENVIRONMENTAL IMPACT ANALYSIS

This section describes the existing conditions 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 undertake to avoid, minimize, and mitigate such impacts.

Categories of potential impacts considered include land use, protected lands and open space, historic and archaeological resources, wetlands and water resources, rare species habitat, noise, visual, traffic and transportation, air quality, electric and magnetic fields, climate change, and EJ considerations. Data on natural and social environmental resources were compiled for the Project Route using field collected data and most recently available MassGIS data and mapping.

5.4.1 Land Use and Sensitive Receptors

The Project is located entirely within an existing ROW corridor held in fee or easement by NEP. Project construction is contained within existing NEP ROW and along historically utilized access routes. There are no anticipated permanent changes to abutting land uses associated with construction of the Project along the Project Route. However, NEP has evaluated land uses within the Project ROWs, as well as adjacent lands within 300 feet, to identify potential impacts to abutting stakeholders during construction.

Parcel data from MassGIS was used to identify land uses along the route, based on parcel designation. Land use types along the Project Route are shown in *Table 5-1* below and in *Figure 5-2* in *Appendix 5-1*.

Table 5-1: Land Uses Within the Project ROWs and 300-foot Buffer to ROW

	Project Route (Acres)	
Land Use Type	**Within Existing ROW**	**300-foot Buffer to Existing ROW**
Agricultural/Horticultural	7	25
Commercial	4	20
Open Space	53	288
Forest Land	10	41
Industrial	16	45
Residential	38	171
Vacant	21	108
Right-of-Way	5	25
Total	155	723

As shown in Table 5-1, the primary land use on and within 300 feet of the Project ROW consists of approximately 288 acres of open space land owned primarily by municipalities and the Massachusetts Department of Fish and Game ("DFG"). Municipal properties include the Midura Family Conservation Area and the King's Brook Conservation Area in Palmer. The DFG properties include the Cory Hill Wildlife Management Area and the Palmer Wildlife Management Area.

Secondarily, approximately 38 acres of land on Project ROW and 171 acres within 300 feet are classified as residential land use. Along the Project Route, residential development occurs primarily at existing roadway crossings or roads running parallel to the right of way, such as Gilbertsville Road in Ware and West Ware Road, Saint John Street, Thompson Street, and Old Farm Road in Palmer.

Industrial development is minimal along the Project ROW. Palmer Paving Corporation has a production facility along Blanchard Street. Other significant industrial areas are all operated by NEP. The primary commercial area near the ROW is the Palmer Motorsports Track. The "Right-of-Way" land use type consists of transportation corridors such as Interstate 90, MassDOT roads, and CSX's Boston Subdivision railroad ROW.

There are no sensitive receptors located near the Project ROW. Sensitive receptor land uses are defined as public facilities including hospitals, elder care facilities and nursing homes, public and private schools, cemeteries, licensed daycares, district courts, police stations, fire stations, and places of worship.

Avoidance, Minimization, and Mitigation

There are no anticipated permanent changes to abutting land uses associated with construction of the Project along the Project Route and no property acquisitions are necessary. The Rebuilt Line is replacing an Existing Line within the Project ROW corridor held in fee or easement by NEP. This is consistent with the existing and surrounding utility infrastructure and current land uses. While Project construction may result in temporary impacts to abutting stakeholders, the Project infrastructure is not anticipated to interfere with any residential, business, or public facilities.

A construction communication plan will be developed for the Project that will provide outreach during construction and a consistent point of contact for the public. Recognizing the varying needs of its stakeholders, NEP is developing various communication methods to inform stakeholders of construction activities, including, as needed: work area signage; advance notification of scheduled construction; personal contact with residents, community groups, and businesses; and regular e-mail updates to residents (upon request) and local officials that will include information on upcoming construction activity. A public website (www.palmertowareimprovementproject.com) has been made available for this Project, which provides details of the Project, an interactive map, and contact information.

As discussed in further detail in the Sections that follow, NEP will mitigate temporary impacts related to noise (*Section 5.4.8*), and traffic and transportation (*Section 5.4.9*). With the implementation of these measures, the anticipated impacts of the Project on adjacent land uses will be minimized.

5.4.2 Protected Lands, Open Space and Recreation

Within areas classified as protected lands or open space and recreation, Project construction is contained within an existing NEP ROW and along historically utilized access routes. As such, there are no anticipated permanent changes to open space and recreational land uses associated with construction of the Project along the Project Route, and no additional easements or property acquisitions are necessary. However, NEP has evaluated protected lands and properties used for open space and recreation within the Project ROW, as well as adjacent lands within 300 feet, to identify potential impacts to abutting stakeholders during construction.

Protected open space and recreational land uses were identified using the MassGIS Protected and Recreational Open Space data layer and are depicted in *Figure 5-5* in *Appendix 5-1*. *Table 5-2* shows a summary of all Open Space and Recreation Resources identified for the Project. As part of this analysis, NEP also evaluated Areas of Critical Environmental Concern ("ACECs").[5] No ACECs are located within proximity of the Project ROW or within 300 feet of the ROW.

Table 5-2: Open Space and Recreation Resources

Open Space and Recreation Resources				
Municipality	**Site Name**	**Agency**	**Owner**	**Primary Purpose**
PALMER	Palmer WMA	State	MA Department of Fish and Game	Conservation
	Midura Family Conservation Area	Local	Town of Palmer	Conservation and Recreation
	King's Brook Conservation Area	Local	Town of Palmer	Conservation
WARE	Coy Hill WMA	State	MA Department of Fish and Game	Conservation
WEST BROOKFIELD				

[5] ACECs are identified as environmentally significant places in Massachusetts that receive special recognition because of the quality, uniqueness, and significance of their natural and cultural resources.

NEP identified four state and municipal, and non-profit owned open space lands located within or adjacent to the Project ROW, consisting of a total of approximately 42 acres of open space within the Project ROW and 247 acres within 300 feet of the Project ROW. The primary purpose of these protected lands is conservation. Many of these areas provide year-round recreational opportunities such as hiking and nature study, and seasonal activities such as fishing. These open space areas provide scenic views and are often associated with rivers, reservoirs, wetlands, and streams.

The Massachusetts DFG owns and manages two state Wildlife Management Areas ("WMAs") within 300 feet of the Project ROW. These properties account for 40 acres of land within the Project ROW, and approximately 238 acres within 300 feet. The Palmer WMA is split across three main parcels located in Palmer and Warren. The primary habitat types are upland hardwood forests mixed with white pine and hemlock. There are also numerous beaver wetlands. The Coy Hill WMA is approximately 866 acres located in Ware and West Brookfield. It consists of mature hardwood forests and white pine stands. These DFG properties offer opportunities for hunting and wildlife viewing. In addition to the two DFG properties, there are two town-owned conservation properties, the Midura Family Conservation Area and the Kings Brook Conservation Area, both of which are owned by the town of Palmer. The Midura Family Conservation Area offers recreational opportunities including hunting, fishing, and hiking. There is a network of hiking trails on the property.

Avoidance, Minimization, and Mitigation

The Project Route is located within an existing ROW held in fee or easement by NEP. Rebuilding the Existing Line along the Project Route is consistent with the existing use of the ROW. Since the Project will continue to support utility infrastructure, it is not anticipated to interfere with any long-term existing or future land uses.

NEP will provide notification of the intended construction plan and schedule to any affected abutters to minimize the effect of any temporary disruptions. To mitigate temporary construction-phase disturbances to public open spaces, specifically existing trail systems, NEP will coordinate with the affected stakeholders and will develop an outreach plan to include safety signage and temporary detours around active construction zones. Following construction, normal operation at all facilities and existing land uses will be allowed to continue.

With the implementation of these measures, the anticipated impacts of the Project on protected, open space, and recreational lands will be minimized.

5.4.3 Historic and Archaeological 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 Gray & Pape Heritage Management ("GPHM") to conduct cultural resource due diligence and archaeological sensitivity assessment of the Project. GPHM defined a study area for the Project which consisted of a 0.5-mile radius within 0.25 mile of the Project ROW centerline for above-ground resources, and a 1.0-mile radius within 0.5 miles of the Project ROW center line for archaeological resources. GPHM utilized the Massachusetts Cultural Resource Information System, a database compiled by the Massachusetts Historical Commission ("MHC"), to review previously recorded archaeological and aboveground resources within the study area. The results of this research are summarized in Table 5-3. There are no known historic or archaeological sites within the Project ROW.

Table 5-3: Historic & Archaeological Resources within 0.5 Miles of the Project ROW Centerline

Site ID	Town	National Register Eligible?	Distance from Project Centerline
Aboveground Historic Resources			
Franklin Blanchard House (PAL.509)	Palmer	Unevaluated	Within 0.25 miles
Bernard McNitt House (PAL.510)	Palmer	Unevaluated	Within 0.5 miles
William Blair House (WRR.49)	Warren	Unevaluated	Within 0.5 miles
Pre-contact Archaeological Resources			
Site 19-WR-578	Warren	Unevaluated	Within 0.25 miles
Site 19-HD-5	Monson	Unevaluated	Within 0.5 miles
Hunter Hill Road Site (19-HD-339)	Monson	Recommended potentially eligible	Within 0.5 miles
Site 19-HD-183	Palmer	Unevaluated	Within 0.5 miles
Post-contact Archaeological Resources			
PAL.HA.5 Madura Historic Site	Palmer	Recommended not eligible	Within 0.5 miles
PAL.HA.6 Schoolhouse No. 9 Foundation	Palmer	Recommended not eligible	Within 0.5 miles
PAL.HA.7 Wood-Chopper's Hut	Palmer	Recommended potentially eligible	Within 0.5 miles

GPHM then prepared and submitted a Project Notification Form to the MHC as well as an archaeological survey permit. GPHM followed with a walkover survey to confirm their desktop assessment. An intensive survey was then performed along the ROW at structure locations and work areas in 2022 and intensive surveys were performed along the access road layout in 2023-2024. GPHM has coordinated with representatives of federally recognized Tribal representatives throughout the archaeological survey process. The location of archaeological resources is sensitive and protected information per G.L. c. 9, §26A.

Avoidance, Minimization, and Mitigation

The Project Route is located within an established ROW associated with the Existing Line. The Rebuilt Line is not expected to impact the existing viewshed from above-ground resources within 0.5 miles of the Project. Construction within the ROW has the potential to impact archaeological sites depending on the depth and extent of planned ground disturbance in relation to archaeological resources. The Project will not have any impacts on the eligibility of these resources for inclusion in the National Register of Historic Places.

The Project will be subject to review by the MHC under G.L. c. 9, §§ 26–27C. Since the Project will require a permit from the United States Army Corps of Engineers ("USACE") under Section 404 of the federal Clean Water Act, the Project will also be subject to review under Section 106 of the National Historic Preservation Act ("Section 106"). NEP will coordinate with the USACE, and continue to coordinate with MHC, to incorporate avoidance and/or minimization measures as needed to avoid adverse effects to potential NRHP-eligible resources. As part of the USACE Section 404 permit review, and pursuant to Section 106, the USACE will consult with the Wampanoag Tribe of Gay Head/Aquinnah (WTGH/A), Mashpee Wampanoag Tribe, and Narragansett Indian Tribe. The USACE has identified the WTGH/A and Mashpee Wampanoag Tribes as having interests in the entire state of Massachusetts; and for the Narragansett Indian Tribe, the area of Massachusetts east of the Connecticut River.

In addition, several tribes are identified by the Executive Office of Energy and Environmental Affairs as indigenous organizations who should be notified of MEPA filings for projects located within one mile of an Environmental Justice community. For this Project, the distribution list included the Chappaquiddick Tribe of the Wampanoag Nation; the Nipmuc Nation (Hassanamisco Nipmucs); the Massachusetts Commission on Indian Affairs; the Herring Pond Wampanoag Tribe; the Chappaquiddick Tribe of the Wampanoag Nation, Whale Clan; the North American Indian Center of Boston; the Pocassett Wampanoag Tribe; the Massachusetts Tribe at Ponkapoag; the WTGH/A; the Stockbridge-Munsee Tribe; and the Mashpee Wampanoag Tribe.

NEP will continue to coordinate with GPHM, in consultation with MHC and the USACE, to identify historic, archaeological, or cultural resources prior to construction and to avoid, minimize, or mitigate impacts to historic resources. Any protection or avoidance measures required to avoid or minimize impacts to significant resources will be outlined in an Avoidance and Protection Plan. Procedures to

handle unanticipated discoveries during construction will be specified as part of a Post Review Discoveries Plan.

5.4.4 Wetlands, Water Resources and Vernal Pools

The Project's wetland, watercourse, and vernal pool impacts have been minimized to the greatest extent practicable by utilizing the ROW associated with the Existing Line and existing access ways where feasible. However, given the scale and landscape setting of the Project, certain wetland impacts cannot be avoided.

The assessment of wetlands and watercourses within the Project ROW is based on field reviews and wetland delineations performed for the Project in the Summer and Fall of 2022. The vernal pool assessment and identification of wetlands, water crossings, and vernal pools located outside of the Project ROW is based on field delineations and the following digital data layers: MassDEP Wetlands Data[6] and MassGIS NHESP Certified Vernal Pool Maps.[7][8]

Table 5-4 summarizes the wetlands, watercourses, and vernal pools and associated impacts within the Project, which are also depicted in *Figure 5-4* in *Appendix 5-1*.

Table 5-4: Wetlands, Watercourses, and Vernal Pools Associated with the Project

Resource Area	Permanent Impacts	Temporary Impacts	Total Impacts
Bordering Vegetated Wetlands	133 sf / 0.003 ac	199,967 sf / 4.59 ac	200,080 sf / 4.59 ac
Bank	0	2,617 lf	2,617 lf
Land Under Water Bodies and Waterways	0	4,811 sf / 0.11 ac	4,811 sf / 0.11 ac
Riverfront Area	2,496 sf / 0.06 ac	46,477 / 1.07 ac	48,973 sf / 1.13 ac
Certified Vernal Pools	0	0	0

sf = square feet; ac = acres; lf = linear feet

Approximately 16 acres of wetlands were identified within the Project ROW. Wetlands are found sporadically throughout the entire Project Route. These wetlands typically consist of scrub-shrub,

6 MassGIS. 2017. MassGIS Data: MassDEP Wetlands.

7 MassGIS. 2022. MassGIS Data: NHESP Certified Vernal Pools.

8 Wetlands include local, state, and federal freshwater wetlands as defined in the Federal Clean Water Act (33 U.S.C. §§ 1251 et seq., Section 404 and Section 401), MWPA (G.L. c. 131 § 40) and Regulations (310 CMR 10.00), and local bylaws/ordinances for each municipality along the Project Route. These wetlands include all field delineated BVW within and adjacent to Project ROW.

emergent marsh, or wet meadow communities. In accordance with the federal classification system found in Cowardin (1979),[9] Palustrine Forested Wetlands, Palustrine Emergent Wetlands, and Palustrine Scrub Shrub Wetlands were identified on the ROW. Additional information on field delineated wetlands for the Project Route is outlined in the EENF in *Appendix 1-1*.

Construction will result in temporary and permanent impacts to wetland resources. Temporary impacts associated with the construction of the Project include placement of construction matting for work pads, pull pads, and access roads. Permanent impacts in wetlands include fill associated with the installation of the structures, and permanent impacts in Riverfront Area as a result of new structures and construction of new access roads.

Avoidance, Minimization, and Mitigation

To reduce the impacts associated with the construction and operation of the Project, NEP incorporated design measures to minimize permanent impacts and BMPs to minimize temporary alterations associated with construction. In addition to using an existing ROW, design measures include utilizing existing access routes and avoiding the placement and construction of structures and access in wetlands and watercourses where possible. This has resulted in the avoidance and minimization of impacts to wetlands, watercourses, and vernal pools to the greatest extent practicable.

NEP will also utilize temporary construction mats for wetland access and work pads instead of permanent fill (i.e., stone, or similar), and as described in *Section 5.3.1*, NEP will install and maintain erosion and sediment controls throughout construction, as well as other typical measures described in National Grid's BMPs.

Permit applications to be submitted to state and federal regulatory agencies will provide the specific mitigation information required for the Project. As required under the Massachusetts Wetlands Protection Act, NEP will provide 1 for 1 replication for the 133 square feet of anticipated wetland loss. At the local level, NEP will work with local Conservation Commissions to discuss impacts and provide mitigation for impacts within Riverfront Area, if determined to be necessary, as part of the Notice of Intent process. In addition, post-construction, NEP will prepare applications for Certificates of Compliance from each of the Conservation Commissions. These Certificates ensure that wetland resources have been restored and losses have been mitigated, as applicable.

5.4.5 Rare Species Habitat

Impacts to rare species have been minimized to the greatest extent practicable by utilizing an existing, managed ROW and existing access routes where feasible. However, improvements to access and

[9] The Cowardin system is used by the USFWS for the National Wetlands Inventory. In this system, wetlands are classified by landscape position, vegetation cover and hydrologic regime. The Cowardin system includes five major wetland types: marine, tidal, lacustrine, palustrine, and riverine.

construction of new access and work pads will temporarily and permanently alter habitats within the ROW.

To assess the potential for plant and/or animal species listed as state or federally endangered, threatened, and/or special concern to be present along the Project Route, NEP reviewed MassGIS Priority and Estimated Habitat data layers for the 15th Edition Natural Heritage Atlas (2021), solicited database information from the NHESP, and followed the USFWS Information for Planning and Consultation ("IPAC") available on its website. Field assessments and surveys were also conducted in 2022 to support the consultation process with NHESP.

The results of the USFWS IPAC determined that two federally listed species may be present within the Project area. One species is an endangered mammal, and the other species is a candidate insect. Additionally, based on NHESP data layers and information, the Project Route contains habitat for five state-listed species (three plants, one amphibian, and one invertebrate) along portions of the Project Route in Palmer and Ware. Specific species are not identified herein at the agency's request.

The Priority Habitat ("PH") data layer available from MassGIS depicts approximately 48.5 acres, or approximately 31% of the ROW, within rare species habitat. Additionally, there are 3.1 acres of Estimated Habitat ("EH") in the ROW. Based on the preliminary project design, approximately 0.06 acres of EH and 2.3 acres of PH will be permanently impacted from the installation of new structures and access roads. Although there will be 2.3 acres of permanent road construction and structure installation within PH, across the 3.96 miles of PH within the ROW there are only six locations that may result in direct impacts to known listed plant or host plant locations based on the field surveys conducted. Similarly, although there will be 0.06 acres of permanent impact within EH, due to the maintained nature of ROW vegetation, no impacts are anticipated to the state-listed vertebrate animal.

An additional 0.9 acres of temporary impact will occur in EH and approximately 18 acres of temporary impacts will occur within PH. These impacts will result from grading and construction matting for work pads, pull pads, and access; these areas will be restored upon completion of construction. NEP will continue to refine design to avoid and minimize impacts to listed species to the greatest extent possible. Consultation is ongoing with NHESP to determine if any of these impacts will constitute a "take" of rare species.

To date, NHESP has provided comment during the MEPA process indicating that the Project is anticipated to avoid a "take" of Orange Sallow Moth and Jefferson Salamander. Continued coordination will occur to determine the appropriate permitting pathway for state-listed plants (Climbing Fumitory, Green Rock-Cress, and Lion's foot). If it is determined that a proposed action will result in a "take," NEP and NHESP will determine whether the action can be revised to avoid a "take." If that is not possible, NEP will file for the issuance of a Conservation and Management Permit ("CMP") and take action to meet the performance standards for the CMP.

Avoidance, Minimization, and Mitigation

In addition to using existing, managed ROWs and access to the maximum extent practicable, the habitat information obtained through assessments and field surveys was used to design the Project to avoid and minimize impacts to rare species habitat where feasible. Wherever possible, permanent impacts to PH will be minimized by limiting the extent of access and work pads to the minimum safe size required for conducting utility line maintenance work.

Consultation with NHESP is ongoing and NEP will implement the necessary actions to avoid, minimize, and mitigate Project-related impacts to comply with the Massachusetts Endangered Species Act ("MESA") permit issued for the Project. NEP will work with NHESP staff through the MESA review process to determine appropriate protection plans for each state-listed rare species. Measures included within the state-listed species protection plans could include time-of-year restrictions, pre-construction surveys, and/or use of temporary avoidance fencing during construction. Final protection measures will be developed through coordination with the NHESP.

If, after further consultation with NHESP, it is determined that a "take" will occur, a CMP will be prepared to comply with MESA. Mitigation options under a CMP may include, but are not limited to, funding of programs that directly benefit the affected species, onsite and/or offsite habitat protection and/or creation. Offsite habitat protection typically requires the acquisition of land, under fee ownership or conservation restriction, for permanent habitat conservation. Other mitigation options include financial contribution toward land acquisition, conservation research funding, habitat management, or other programs that directly benefit the affected species. With the implementation of these measures, impacts to rare species and their habitats as a result of the Project will be minimized.

5.4.6 Public Water Supplies

The existing Project ROW traverses two public water supply resources as summarized in Table 5-5. However, potential impacts are anticipated to be negligible and associated with construction only.

Public water supplies can be sourced from either groundwater aquifers or surface waters. To identify public water supply areas within the Project ROWs, the following resources were used:

- MassGIS ORW Datalayer (2010)[10]
- MassGIS Aquifers (2007)[11]
- MassGIS Approved Wellhead Protection Areas (Zone II, Zone I, IWPA) Datalayer (2022)[12]

[10] MassGIS. 2010. MassGIS Data: Outstanding Resource Waters.
[11] MassGIS. 2007. MassGIS Data: Aquifers.
[12] MassGIS. 2022. MassDEP Wellhead Protection Areas (Zone II, Zone I, IWPA).

- MassGIS Major Watershed (2000)[13]

As stated in 310 CMR 22.02, a Zone II Wellhead Protection Area is defined as "that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). It is bounded by the groundwater divides which result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock." Information and Zone II locations for the Project Route are provided in *Figure 5-6* in *Appendix 5-1*.

MassGIS Aquifer Dataset maps show high, medium, and low yield aquifers. The definition of high and medium yield varies between panels, as it does on the source manuscripts. Medium yield aquifers for most basins are between 100 and 300 gallons per minute; this range may vary greatly from basin to basin. High and low yield definitions vary from basin to basin as well. Information and aquifer locations for the Project Route are provided in *Figure 5-6* in *Appendix 5-1*. There are three aquifers that intersect the Project Route, primarily at the Palmer and Ware substations. They are all medium yield aquifers located in the Chicopee River Basin.

MassDEP has established a category of waterbodies known as Outstanding Resource Waters ("ORWs"), which are designated in the Massachusetts Surface Water Quality Standards Regulations (314 CMR 4.00) and include high quality waters with socioeconomic, recreational, ecological and/or aesthetic values. No work will be done in ORWs as part of the Project.

Table 5-5: Public Water Supplies Traversed by the Project

Resource Areas	Name	Municipality	Area within ROW (acres)
Zone II	Palmer Water District No. 1	Palmer	5
Aquifers	Chicopee River Basin	Ware	2

Avoidance, Minimization, and Mitigation

Impacts to public water supply sources are not anticipated. There is minimal work proposed within the resource areas, and the Project will be designed to avoid interference with surface water flow and wetland functions. Potential impacts to surface water supplies could occur only as a result of unanticipated failure of sedimentation and erosion controls during construction. Appropriate sediment and erosion control, spill prevention, and response measures will be implemented, and these controls will be closely monitored and maintained. During structure replacement in BVW near surface water protection areas, no excavated materials will be placed directly into resource areas. If the stockpile is near wetlands, it will be enclosed by straw wattles or other erosion controls. Additional controls such

[13] MassGIS. 2000. MassGIS Data: Major Watersheds.

as watertight mud boxes will be considered for saturated stockpile management in work areas in wetlands where sediment-laden runoff would pose an issue for the surrounding wetland. Following backfilling operations, excess soil will be spread over unregulated upland areas or removed from the site in accordance with NEP policy. Where necessary, temporary construction matting will be used for access and work pads across wetlands to reduce soil disturbance and protect water quality in the area. Matting will be removed immediately after construction activities are complete. Following removal, any necessary restoration or stabilization will be completed as the equipment and vehicles demobilize from the ROW.

Potential impacts to groundwater supplies could occur from spills of fuel or hydraulic oil related to the construction equipment. NEP will require its contractors to adhere to National Grid BMPs regarding the storage and handling of oil and potentially hazardous materials during the Project. Equipment used for the construction of the Rebuilt Line will be properly inspected, maintained and operated to reduce the chances of spill occurrences of petroleum products. Where feasible, refueling will not occur within 100 feet of wetlands or waterways. When refueling must occur within 100 feet of wetlands/waterways for more stationary equipment (e.g., drill rigs), secondary containment will be used. Refueling equipment will be required to carry spill containment and prevention devices (i.e., drip pans, absorbent pads, etc.) and fueling of equipment will only occur in upland areas, unless equipment cannot be moved. Since the Project will consist of directly embedded steel structures along most of the route length, if ledge is encountered, it is generally preferable to drill for the required structure embedment depth than to blast. Blasting is not anticipated.

It is anticipated that most vegetation management will be done mechanically. The Project will comply with the National Pollutant Discharge Elimination System Construction General Permit and SWPPP requirements, requirements of the Section 401 Water Quality Certification, Massachusetts Wetlands Protection Act ("MWPA") and implementing regulations, and other restrictions as may be applied by the local Conservation Commissions in accordance with the MWPA.

Following construction, the normal operation and maintenance of the transmission line facilities will have no impact on public water supply resources. Vegetation management within sensitive areas, including public water supply areas, will follow the same procedures as are currently used on the ROW and described in National Grid's Vegetation Management Plan.

5.4.7 Visual Impact Assessment

This section describes the potential visual impacts of the Project from properties and public ROWs located adjacent to or within close proximity to the Project. In general, the potential for visual impact has been minimized through the Project's location in the center of an existing ROW located primarily in undeveloped and forested areas with relatively few residential or commercial abutters. Given the remoteness of the ROW, structures and wires will be visible mainly from road crossings, open water, open fields, and occasional commercial or residential uses directly adjacent to the ROW as shown in Land Use Maps in *Figure 5-2* of *Appendix 5-1*. Since the Rebuilt Line will be located within the center

of the existing ROW there will not be any tree removal; therefore, existing vegetation will continue to provide some screening.

Some changes in visibility could be anticipated due to differences in height between the existing and proposed structures. The existing structures range in height from approximately 50 to 90 feet above ground, while the proposed structures would range in height from 75 feet to 110 feet above ground. The Company analyzed potential areas of new visual impacts resulting from this increase in structure height. This analysis demonstrates that new impacts are minor and will occur primarily along roadways as shown in *Figure 5-7* in *Appendix 5-1*.

The potential visual contrast with existing views would be most distinct where the height of the new structures extends above adjacent vegetation and may be discerned more clearly and/or from a greater distance. When viewed against the tree line by a person standing at close proximity to the poles, the weathering steel structures are less discernable against dark backgrounds (e.g., vegetation) as compared to galvanized poles from the same perspective.

To provide a better understanding of the impact of changes in structure height and material, several key observation points were identified where there is a potential for greater visibility and/or sensitivity to views of new structures near roadways or residential areas. Photos were taken from these locations and after initial modeling two points were selected for visual renderings. *Appendix 5-3* depicts existing and simulated future conditions at these representative locations along the Project Route. As shown in these renderings, even in locations where the structures or wires may be visible, they are not anticipated to present a significant change in the view, as existing vegetative buffer will continue to provide screening.

Avoidance, Minimization, and Mitigation

The Company's analysis and visual modeling demonstrate that there will be minimal visual impacts from the Project due to the terrain in the area, the limited number of abutters along its length, and the lack of tree removal proposed. Any impact associated with the proposed increase in structure height will be partially offset by the reduction in the number of structures from 147 to 112. NEP will work with abutting landowners who may experience a material change in view as a result of construction to determine reasonable and practical screening that could be provided on their properties. Screening options may be in "soft" form (e.g., vegetation) or "hard" form (e.g., fencing), or a combination of the two. With the implementation of these measures, the visual impact of the Project will be minimized.

5.4.8 Noise

This section evaluates the potential for noise impacts from construction of the Project. The Project is not anticipated to generate noise during operation; consequently, noise impacts associated with the Rebuilt Line will be limited to the construction period, which currently is anticipated to extend over a 23-month period from July 2027 to May 2029, following the transmission line construction sequence

described in *Section 5.3.1*. Construction noise will be intermittent as activities progress and crews work in different areas along the ROW; noise will not be continuous at any one location for any extended period of time. Construction is expected to occur during typical work hours, though in specific instances, at some locations, or at the request of a municipality or state agency, NEP may seek municipal approval to work at night. Municipal noise bylaws applicable to construction are shown in *Table 5-6*.

Table 5-6: Municipal Noise Ordinance and Bylaw Summary

	Allowed Construction Hours		
Municipality Code	**Weekday**	**Weekend**	**Exceptions/Decibel Limits**
Town of Palmer	Not Specified	Not Specified	No prescribed decibel level limits for construction in general or zoning bylaws.
Town of Ware	Not Specified	Not Specified	No prescribed decibel level limits for construction in general or zoning bylaws.
Town of West Brookfield Town General Bylaw Chapter XII Miscellaneous Section 2 I. 8 Excavation Bylaw	7 a.m. to 7 p.m.	7 a.m. to 7 p.m.	Operation hours shall only be between 7:00 a.m. and 7:00 p.m., and trucks may enter and leave the premises only within such hours. All loaded vehicles shall be suitably covered to prevent dust and contents from spilling and blowing from the load.

Construction of the Rebuilt Line will require the use of various types of equipment. *Table 5-7* identifies the types of equipment to be used for each phase of construction and provides a range of typical sound levels from the equipment at a specific location and for the Project as a whole. The typical sound levels are provided at a distance of 50 feet from the source and have also been extrapolated for noise levels at 100, 200, and 300 feet. The estimated noise levels range from 80 dBA to 98 dBA at a distance of 50 feet from the construction activity.

Table 5-7: Typical Construction Sound Levels Along the Project Route

Description of Activity	Types of Equipment	Typical Sound Levels at 50 Feet (dBA)	Estimated Sound Levels (dBA) at Various Distances from Noise Sources		
			100 Feet	200 Feet	300 Feet
Vegetation Removal and ROW Mowing	Grapple trucks Bulldozers Track-mounted mowers Motorized tree shears Log forwarders Chippers, Chain saws Box trailers	84 to 98	78 to 92	72 to 86	69 to 83
Erosion/Sediment Controls and Access Route 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
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
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

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
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

As shown on *Table 5-8*, the closest residence is approximately 18 feet away from the O15N Line ROW in Palmer, with a total of 21 residences within 300 feet of the ROW. These residences may potentially be impacted by construction noise during one or more phases of construction. However, construction noise experienced at any given residence will be temporary and intermittent.

Table 5-8: Residences Along the Project Route

Project Component	Closest Residence (ft)	Residences within 50-ft of ROW	Residences within 100 ft of ROW	Residences within 200 ft of ROW	Residences within 300 ft of ROW
O15N Line ROW	18	2	5	9	21

Avoidance, Minimization, and Mitigation

To the extent practicable, NEP will comply with the noise bylaws and ordinances in the municipalities within which the Project is proposed. Some work tasks, once started, may require continuous operation until completion. Work requiring scheduled outages and work that requires continuous operation until completion may need to be performed on a limited basis outside of normal work hours, including Sundays and holidays. In these instances, NEP will seek advanced approval from the applicable municipality and provide notice to abutters.

Temporary noise impacts from construction equipment will be mitigated by maintaining equipment in good working condition and using appropriate mufflers. Noise sources that may operate continuously 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. There are exceptions for vehicles being serviced, vehicles making deliveries that need to keep their engines running, and vehicles that need to run their engines to operate accessories. Where construction takes place adjacent to residences, NEP will notify landowners in advance of construction

and will provide a point of contact for Project related questions and concerns. With the implementation of these measures, noise impacts associated with the Project will be minimized.

5.4.9 Traffic and Transportation

The Project will not have any permanent traffic impacts and post-construction traffic impacts will be limited to those associated with occasional ROW and transmission line maintenance activities. However, limited temporary construction-related impacts are anticipated for the Project. Potential traffic impacts were evaluated using the MassGIS Roadway Inventory 2020. Roadways are identified by six functional classification system categories developed by MassDOT as shown in *Table 5-9*.

Table 5-9: Roadways Crossed by the Project Route

Functional Classification System Category	Project Route
Local Street or Road (Class 0)	8
Interstate (Class 1)	1
Urban or Rural Principal Arterial (Class 2 & 3)	2
Urban Minor Arterial or Collector (Class 5 & 6)	2

Construction of the Project within the ROW will not result in a significant increase in traffic or material impacts to existing traffic patterns. During construction, the main impacts will 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 one time while working in a specific area; however, multiple trips may be conducted when delivering materials such as construction matting or stone. 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 conductors and shield wire need to be strung over public roadways. At such times, boom trucks may be set up in travel lanes, shoulders, or medians to serve as support to the lines as they are attached to the permanent transmission line structures. In addition, construction equipment may be necessary to install temporary guard structures. Traffic will be stopped for a short period of time to allow a rope to be manually pulled across the roadway. Conductor will then be attached to this rope and pulled above the roadway onto the temporary guard structures; traffic typically will be able to flow while the conductors are attached to the structures. Line stringing will be required along the Project Route across 13 roadway crossings and one railroad crossing. Permits from MassDOT will be required for this work at state highway crossings (Route 20 and I-90 in Palmer, and Route 32 in Ware).

Along local roadways, NEP will coordinate with the municipalities on requirements for work hours, signage, and police details.

Avoidance, Minimization, and Mitigation

Traffic impacts associated with the Project will be temporary in nature and confined to the amount of time necessary for construction. NEP will carefully coordinate construction to minimize impacts to adjacent residences and businesses and others relying on neighboring transportation corridors. Prior to beginning construction, NEP will work closely with the municipalities and MassDOT to develop construction Traffic Management Plans ("TMPs"), which include construction-phase traffic controls, and to minimize the impacts of construction on the traveling public. Implementation of a well-designed TMP will reduce the potential for traffic disruptions and inconvenience to drivers. The TMP may include closures to travel lanes and/or roadway shoulders in order to set up the work zone. Work covered by the TMP must conform to the Manual of Uniform Traffic Control Devices and MassDOT standards. With the implementation of these measures, the temporary traffic disruptions anticipated from the Project will be minimized.

5.4.10 Air Quality

The Project will not have any permanent air quality impacts and will not generate any permanent air quality emissions. Limited and temporary air quality impacts are anticipated during the construction of the Project due to vehicle and equipment exhaust and dust creation. *Table 5-9* lists typical equipment that may be used during construction.

Avoidance, Minimization, and Mitigation

Air quality impacts associated with the Project will be temporary in nature and confined to the amount of time necessary for construction. NEP will mitigate air quality impacts during the construction process by carefully coordinating construction phasing; implementing established policies and procedures for minimizing construction related impacts; and requiring its contractors to implement air quality and dust control measures on-site throughout the construction period in compliance with National Grid's EG303-NE guidance document.

Dust control measures such as water sprays during excavation, stockpiling, and loading of demolition and soil materials for removal and site watering to mitigate wind erosion will be implemented as required to minimize dust from construction activities and vehicle travel along the right of way. Additional measures, such as secure covering of piles of excavated materials, properly secured covers on truck cargos during materials transport, and minimization of the free drop height of excavated or aggregate material during earthwork operations will be implemented to reduce other sources of dust. Tire cleaning areas at construction vehicle entrances and exits and street sweeping of adjacent local roadways will address potential sediment accumulation.

Emissions from construction equipment and transport of construction materials will be minimized in accordance with Massachusetts' anti-idling law, G.L. c. 90, § 16A, c. 111, §§ 142A–142M, and 310 C.M.R. 7.11. NEP limits vehicle idling time to five minutes except when engine power is necessary for delivery of materials or to operate accessories to the vehicle, such as power lifts.

NEP requires contractors to use ultra-low-sulfur diesel ("ULSD") in off-road diesel vehicles. NEP will also comply with MassDEP's Diesel Retrofit Program. The Program requires that all diesel-powered non-road construction equipment with 50 or more horsepower used for 30 or more days during Project construction will either be EPA Tier 4–compliant or will have EPA-verified (or equivalent) emission control devices installed. Such devices include oxidation catalysts or other comparable technologies.

With respect to enforcement of the idling restrictions, it is the responsibility of every person on a job site to be in full compliance with all safety and environmental rules and policies. Supervisors and foremen at job sites are responsible for enforcement of these rules on a continuous basis, and environmental inspections will be conducted on a weekly basis.

5.4.11 Electric and Magnetic Fields

NEP's consultant, Gradient, assessed EMF associated with the Existing and Rebuilt Line along the Project Route at annual average and system peak loading conditions. Gradient conducted the EMF modeling at a height of one meter (3.28 feet) above the ground surface with conductors at the lowest clearance permissible by governing code. Modeling was performed for three cases:

- The existing overhead circuit configuration ("pre-Project case").
- The overhead circuit configuration after the O15N Line has been replaced, with current loadings representative of the in-service year operating at 69 kV ("69 kV post-Project case").
- The overhead circuit configuration after the O15N Line has been replaced, with current loadings representative of the in-service year operating at 115 kV ("115 kV post-Project case").

EMF modeling was conducted for both annual average and system peak load levels for each of the three cases. For system peak load levels, modeling was conducted for both a base case with East-West bias where Millennium, Northfield, and Mass Power are out of service (referred to as the "base case"), and a sensitivity case with West-East bias where Bear Swamp and Stony Brook are out of service (referred to as the "sensitivity case").

Modeling was conducted for two representative cross sections: Cross Section 1: Ware #1 Substation to Structure 119; and Cross Section 2: Structure 119 to Palmer #503 Substation. Additional information about Gradient's modeling methods and results are provided in *Appendix 5-4*, Gradient's EMF Modeling Analysis for the Project. Gradient's results are summarized below. For Cross Section 1 the O15N line is the only line present in the ROW. For Cross Section 2 the 69 kV X176 line is also present in the ROW. The EMF modeling for Cross Section 2 included Line X176 to determine cumulative EMF levels at the ROW edges.

Guidelines have been developed for EMF exposure. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) guideline for allowable public exposure to 60-hertz (Hz) magnetic fields (MFs) is 2,000 milligauss (mG), while the ICNIRP guideline for allowable public exposure to 60-Hz electric fields (EFs) is 4.2 kilovolts per meter (kV/m) (ICNIRP, 2010). The results of the EMF modeling in regard to health-based guidelines are discussed in the relevant sections below.

5.4.11.1 Magnetic Fields

Table 5-10 summarizes edge-of-ROW pre- and post-Project MF modeling results for the annual average and system peak loading scenarios.

Table 5-10: Summary of Modeled Pre-Project and Post-Project Edge-of-ROW Magnetic Fields for the Representative ROW Cross Sections

Cross Section	Magnetic Field (mG)					
	Left Edge-of-ROW			Right Edge-of-ROW		
	Pre-Project	Post-Project (69-kV)	Post-Project (115-kV)	Pre-Project	Post-project (69-kV)	Post-Project (115-kV)
Average Annual Load Levels						
Cross Section 1: Ware #1 Substation to Structure 119	4.68	2.36	1.91	2.15	2.33	1.89
Cross Section 2: Structure 119 to Palmer #503 Substation	4.45	2.15	1.77	1.23	1.36	1.41
System Peak Sensitivity Case Load Levels						
Cross Section 1: Ware #1 Substation to Structure 119	2.17	1.07	0.88	1.00	1.06	0.87
Cross Section 2: Structure 119 to Palmer #503 Substation	1.85	1.26	1.16	1.18	1.27	1.30
System Peak Base Case Load Levels						
Cross Section 1: Ware #1 Substation to Structure 119	22.80	11.47	9.25	10.48	11.34	9.14
Cross Section 2: Structure 119 to Palmer #503 Substation	21.71	10.95	8.85	3.96	4.78	5.04

Note: kV = Kilovolt; mG = Milligauss; ROW = Right-of-Way; Sh. = Sheet.

As shown in *Table 5-10*, construction of the Project results in decreased MF levels at the left ROW edge as compared to the pre-Project MF levels under all scenarios. The MF levels at the right ROW edge increase slightly, with a magnitude of less than 1.1 mG.

Both pre- and post-Project MF levels are very low under the annual average loading scenario. Post-Project edge-of-ROW fields are below 3 mG for both the 69-kV and 115-kV post-Project annual average loading cases. The expected MF levels fall well below the 2,000 mG health guideline.

Gradient's modeling indicates that the Project will result in either MF decreases or small MF increases along the O15N Line ROW. The resulting post-Project MF levels are low for a transmission line ROW and are well below both the International Commission on Non-Ionizing Radiation Protection ("ICNIRP") health-based guidelines of 2,000 mG for allowable public exposure to 60-Hz MF. Exposure to MFs is further mitigated by the Project's primarily rural setting and the very limited number of residential structures located within close proximity to the Project ROW (see *Table 5-11*).

Table 5-11: Residences Along the Project Route

Closest Residence (ft)	Residences within 50 ft of ROW	Residences within 100 ft of ROW	Residences within 200 ft of ROW	Residences within 300 ft of ROW
18	2	5	9	21

5.4.11.2 Electric Fields

Table 5-12 summarizes electric field modeling for both annual average and system peak loading scenarios.

Table 5-12: Summary of Modeled Pre-Project and Post-Project Edge-of-ROW Electric Field Values for the Representative ROW Cross Sections

Cross Section	Electric Field (kV/m)					
	Left Edge-of-ROW			Right Edge-of-ROW		
	Pre-Project	Post-Project (69-kV)	Post-Project (115-kV)	Pre-Project	Post-Project (69-kV)	Post-Project (115-kV)
Average Annual Load Levels						
Cross Section 1: Ware #1 Substation to Structure 119	0.36	0.12	0.20	0.08	0.18	0.29
Cross Section 2: Structure 119 to Palmer #503 Substation	0.35	0.13	0.20	0.07	0.07	0.07
System Peak Base Case Load Levels						
Cross Section 1: Ware #1 Substation to Structure 119	0.35	0.12	0.19	0.08	0.17	0.29
Cross Section 2: Structure 119 to Palmer #503 Substation	0.34	0.12	0.20	0.07	0.07	0.07

System Peak Sensitivity Case Load Levels						
Cross Section 1: Ware #1 Substation to Structure 119	0.35	0.12	0.19	0.08	0.17	0.29
Cross Section 2: Structure 119 to Palmer #503 Substation	0.35	0.12	0.20	0.07	0.07	0.07

Notes: kV = Kilovolt; kV/m = Kilovolts per Meter; mG = Right-of-Way;

As can be seen *Table 5-12*, pre- and post-Project edge-of-ROW electric field levels are very similar, with a maximum change of <0.3 kV/m. Although electric fields are not dependent on conductor loading (i.e., current) they are dependent on voltage. As a result, the EFs for the post-Project 115-kV operations are higher compared to the post-Project 69-kV operation. Both pre- and post-Project electric field levels are below 0.3 kV/m which is well below the ICNIRP 4.2 kV/m safety guideline.

5.4.11.3 Conclusion

Gradient's EMF modeling demonstrates that the Project will result in minor changes to magnetic and electric fields along the Project ROW. At annual average loading levels, edge-of-ROW magnetic fields levels will be less than 3 mG in all locations. Conductor arrangements and phasing configurations have been selected to minimize magnetic fields, and exposure to magnetic fields is further limited by the Project's primarily rural setting. Post-Project changes to modeled electric field levels at the ROW edges are below 0.3 kV/m in all cases. All modeled EMF levels under all scenarios are far below relevant health-based guidelines.

5.4.12 Climate Change Considerations

This Project is part of NEP's efforts to ensure the long-term longevity and reliability of the region's electrical infrastructure in the face of growing demand for electricity and the changing climate. The Project will result in a more climate-ready and resilient transmission system that can withstand more extreme weather events, meet future regional demand, and support future interconnection of renewable energy projects.

The increased capacity of the Rebuilt Line will be available to support higher volumes of future renewable energy resources in this region and increases in future electrical load demand. This longer-term view aligns with the State Hazard Mitigation & Climate Adaptation Plan, which projects electricity consumption during summer may triple, as well as the results of the ISO-NE *2050 Transmission Study*, which has found that the region's aging transmission system has the potential to become a significant bottleneck to progress toward electrification and the integration of renewable power if it does not keep pace with changes to other elements of the power system.

NEP consulted the Resilient MA Action Team Climate Resilience Design Standards Tool for the Project. The Tool assigns climate risks based on three variables: sea level rise and storm surge, extreme precipitation including urban flooding and riverine flooding, and extreme heat. According to the preliminary analysis, the Project Route is at high risk from extreme precipitation and extreme heat. It

is not exposed to sea level rise/storm surge. The Rebuilt Line will be made more resilient through installation of concrete caisson foundations, steel structures, and state of the art conductors that respond well to corrosion and operate at higher maximum operating temperatures. Further, the Project's engineering design used structure loading criteria required by the National Electrical Safety Code ("NESC"), 220 CMR 125, and National Grid Design Loads for Overhead Transmission Structures. The NESC load criteria require consideration of combined ice and wind loading, extreme wind conditions, and extreme ice with concurrent wind conditions. Local compensatory flood storage will be provided in accordance with local and state regulations for any proposed fill in Bordering Land Subject to Flooding.

The Rebuilt Line will contribute to regional climate resilience by providing capacity to meet the region's growing energy demand, reducing the frequency of outages, and incorporating provisions such as enhanced ROW access and modernized transmission line switches, which should reduce emergency response times, shortening the duration of outages when they do occur.

5.4.13 Environmental Justice Considerations

This section reviews the Company's efforts to identify and engage with EJ populations within a one-mile radius of the Project Route and evaluates potential impacts to these EJ communities. EJ communities within the one-mile radius of the Project are depicted in the Environmental Justice Maps in *Figure 5-3* of *Appendix 5-1*. Based on review of the 2022 Massachusetts Environmental Justice Block Groups from MassGIS, there are three EJ populations within one mile of the Project, distributed in three municipalities, Monson, Ware, and Warren. Table 5-13 lists the EJ populations in the vicinity of the Project Route. The Project does not directly pass through any EJ communities.

Table 5-13: Environmental Justice Populations within One Mile of the Project Route[14]

Community	Census Tracts	EJ Criteria
Monson	Tract 8137.02 – Block Group 3	Income
Ware	Tract 8201.01 – Block Group 3	Minority and Income
Warren	Tract 7611 – Block Group 1	Income

NEP is developing and implementing this Project consistent with the Commonwealth's environmental and resource use laws and policies, including enhancing opportunities for public involvement. NEP aims to promote a robust transmission system and to properly plan for and address the

[14] Table contains revised block groups since the filing of the EENF based on the updated Massachusetts 2020 Environmental Justice Population Interactive Map (Updated November 2022). https://mass-eoeea.maps.arcgis.com/apps/webappviewer/index.html?id=1d6f63e7762a48e5930de84ed4849212

Commonwealth's energy needs in an efficient and timely way. NEP has taken proactive steps to enhance community involvement and engagement during the planning of the Project.

As part of its stakeholder outreach plan, NEP has promoted and will continue to promote public involvement by the EJ populations located within one mile of the Project Route through the use of Project fact sheets, website content, meeting invitations, and translation services upon request. As part of the MEPA process, an Environmental Justice Screening Form was sent to the list of Community-Based Organizations ("CBOs") and tribes identified by the MEPA Office. Contact information was provided in the EJ Screening Form to allow interested parties to request a meeting regarding this Project. NEP has not received any requests to date.

NEP has also taken the following public outreach measures:

- NEP held two open houses, one in Ware (May 22, 2024) and one in Palmer (May 28, 2024), to which invitations were sent to the CBOs and tribal organizations in addition to all abutters within 300 feet of the Project Route in Ware, Palmer, and West Brookfield. The Open House invitations were posted in *The Journal Register*, *Ware River News*, and *Quaboag Current* during the weeks of May 13th and May 20th.
- NEP also presented the Project in-person to the Ware Board of Selectmen on April 16, 2024, and Palmer Town Council on May 13, 2024; and provided a copy of the presentation via email to the West Brookfield Board of Selectmen on March 27, 2024 (the Board declined an offer for an in-person presentation).
- A Project website was launched to publicly broadcast Project information and provide another location to access public filings (https://palmertowareimprovementproject.com).
- A Project hotline and email address have also been created: (800) 674-9510 and info@O15Nproject.com.
- NEP completed the MEPA-required 45-day advanced notification of the Project by circulating the MEPA EJ Screening Form to the MEPA-determined EJ CBO list on April 16, 2024, and again on July 16, 2024, and provided contact information therein for interested parties to request an in-person/virtual meeting regarding the Project.
- NEP published the EENF public notice in the *Worcester Telegram* newspaper concurrent with the filing of the EENF.
- A hard copy of the EENF filing was provided at local library locations within approximately one mile of the Project Site, including the Young Men's Library Association in Ware, Palmer Public Library in Palmer, and Merriam-Gilbert Public Library in West Brookfield.

Following the filing of the EENF, a virtual public site consultation was held to present the Project to the MEPA office, state agencies, and the public and provide the opportunity to ask questions about the

Project with direct access to the NEP project team. Although there are no census tracts within one mile of the Project Site in which there are "Languages other than English spoken by 5% or more of the population who do not speak English very well," based on consultation with local officials, NEP will offer Spanish-language translation services on an as-requested basis. NEP will also continue to communicate with local officials and the public through quarterly update meetings, the EFSB process, and via the Project website.

The Project is proposed within the existing ROW, thereby minimizing adverse environmental impacts. Due to the nature of the Project, outage constraints in the region, and NEP's efforts to reduce impacts to the natural and human environment, Project activities will be sequenced. No long-term impacts to soil, bedrock, vegetation, surface water, groundwater, wetland resources, or air quality will occur. NEP will be implementing measures to avoid, minimize, and mitigate potential environmental impacts throughout the entire Project alignment, including where it is within one mile of mapped EJ populations. These include, but are not limited to, use of construction matting in wetlands to reduce soil disturbance and protect water quality, as well as implementation of a SWPPP to avoid impacts to receiving waters from sediment-laden stormwater runoff or from spills or other inadvertent releases of fuels, oils, or other hazardous materials used in equipment or as incidental use during construction.

During its extensive outreach efforts, NEP has not become aware of any unfair or inequitable environmental or public health burden impacting the EJ population. Because the nature and severity of Project impacts are minimal on all populations, including EJ populations, the Project will not materially exacerbate any existing unfair or inequitable environmental or public health burden impacting the EJ population. Overall, the Project will improve transmission system infrastructure and comply with comprehensive regional plans for maintaining electric transmission reliability in New England, for EJ and non-EJ populations alike.

The Company will continue outreach to EJ community members during the permitting and development phases of the Project to support participation by the EJ community. As the Project design and permitting progress, NEP will provide quarterly updates to interested parties, and translation services can be provided upon request.

Once permitting is complete and NEP is preparing for construction, pre-construction notifications will be provided to abutters and other interested parties, and regular Project updates will be provided during construction. Periodic updates will also be available on the Project website. When construction is complete, NEP will send a Project closeout notification.

5.4.14 Conclusion – Environmental Impacts

The preceding sections have reviewed the environmental and community impacts associated with the Project, including those related to land use, protected land and open space, historical/archeological sites, wetlands and water crossings, rare species habitat, public water supplies, visual, noise, traffic, and EMF. In addition, these sections have addressed climate change considerations and the potential

for impacts to EJ populations. By constructing the Project within the existing O15N Line ROW, which has been operated and maintained by NEP since 1949, permanent impacts to abutters and communities have been avoided and minimized. Construction related impacts will be mitigated through use of BMPs, which will be designed and implemented in compliance with federal, state, and local rules and regulations as well as NEP's own policies and standards.

5.5 CONCLUSION

The Project will provide a reliable and resilient energy supply for the Commonwealth with minimum impact on the environment at the lowest possible cost. Therefore, NEP concludes that, consistent with the Siting Board's statutory mandate, the construction of the Project along the Project Route properly minimizes environmental impacts and achieves an appropriate balance among conflicting environmental concerns, as well as among environmental impacts, cost, and reliability.

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

6.1 INTRODUCTION

Pursuant to G.L. c. 164, § 69J, the Siting Board shall approve a petition to construct a facility only if it determines that the plans for the applicant's new facilities are consistent with current health, environmental protection, and resource use and development policies of the Commonwealth. As discussed below and in more detail throughout this Application, the Project not only satisfies the requirements of this standard, but is also fully consistent with other important state energy laws and policies, such as the Electric Utility Restructuring Act of 1997 (the "Restructuring Act"), the Green Communities Act (c. 169 of the Acts of 2008), the Global Warming Solutions Act (c. 298 of the Acts of 2008) (the "GWSA"), the Energy Diversity Act (c. 188 of the Acts of 2016), the Clean Energy Act (c. 227 of the Acts of 2018), An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy (c. 8 of the Acts of 2021) (the "Roadmap Act"), and An Act Driving Clean Energy and Offshore Wind (St. 2022, c. 179) (the "Drive Act"). See, e.g., Conservation Law Foundation v. Energy Facilities Siting Board, 494 Mass. 594 (2024); GreenRoots, Inc. v. Energy Facilities Siting Board, 490 Mass. 747 (2022); Town of Sudbury v. Energy Facilities Siting Board, 487 Mass. 737 (2021).

6.2 HEALTH POLICIES

The Project will be consistent with applicable health policies of the Commonwealth. The Restructuring Act provides that reliable electric service is of the utmost importance to the safety, health and welfare of the Commonwealth's citizens and economy. See Restructuring Act § 1(h). The Legislature has expressly determined that an adequate and reliable supply of energy is critical to the state's citizens and economy and the Massachusetts Supreme Judicial Court (the "SJC") has affirmed that "reliable electric service is of utmost importance to the safety, health, and welfare of the [C]ommonwealth's citizens and economy." Sudbury, 487 Mass. at 748. The Project will be fully consistent with this tenet of the Restructuring Act. As discussed herein, the Project will enhance and ensure the reliability of the Company's interconnected electric transmission and distribution system that is served by the Rebuilt Line by replacing the existing transmission lines, which are subject to frequent outages, with new higher-capacity lines, thus ensuring the availability of sufficient and reliable electric service to the citizens and businesses of the Commonwealth and the region.

In addition, the Company will design, build, and maintain the Project so that the health and safety of the public are protected. Throughout the construction and operation of the Project, the Company will adhere to all applicable federal, state, and local regulations, and industry standards and guidelines established for protection of the public. As discussed in *Section 5*, all design, construction, and

operational activities will comply with applicable governmental and industry standards, such as the Massachusetts Code for the Installation and Maintenance of Electric Transmission Lines (220 C.M.R. §§ 125.00 et seq.) and the National Electrical Safety Code and Occupational Safety and Health Administration regulations and will have no adverse health effects. The Project will be designed in accordance with sound engineering practices using established design codes and guidelines published by, among others, the DPU, the Institute of Electrical and Electronic Engineers, the American Society of Civil Engineers, the American Concrete Institute, and the American National Standards Institute.

In sum, because the Project will be consistent with and promote the Commonwealth's energy policies as outlined in the Restructuring Act, and because reliable electric service is of "utmost importance to the safety, health and welfare of the Commonwealth's citizens and economy," the Project will also be consistent with the Commonwealth's health policies.

6.3 ENVIRONMENTAL PROTECTION POLICIES

The Company will obtain all environmental approvals and permits required by federal, state, and local agencies and will construct and operate the Project in full compliance with applicable federal, state, and municipal statutes, 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.

6.3.1 The Restructuring Act

The Restructuring Act requires that the Company demonstrate that the Project minimizes environmental impacts consistent with the minimization of costs associated with avoidance, minimization, and mitigation of the environmental impacts of the Project. Accordingly, an assessment of all impacts of a proposed project is necessary to determine whether an appropriate balance is achieved both among conflicting environmental concerns as well as among environmental impacts, cost, and reliability. A project that achieves the appropriate balance meets the requirement in G.L. c. 164, § 69J to minimize environmental impacts at the lowest possible cost.

To determine if a petitioner has achieved the proper balance among environmental impacts, cost and reliability, the Siting Board first determines if the petitioner has provided sufficient information regarding environmental impacts and potential mitigation measures. The Siting Board then determines whether environmental impacts are avoided, minimized, and mitigated to the maximum extent possible. Similarly, the Siting Board evaluates whether the petitioner has demonstrated that the project is needed and has provided sufficient cost information in order to determine if the appropriate balance among environmental impacts, cost, and reliability has been achieved.

Sections 3, 4, and 5 demonstrate that the Company compared a range of alternative projects and potential route options, and proposed specific plans to avoid, minimize and mitigate environmental

impacts associated with the construction, operation, and maintenance of the Rebuilt Line, consistent with cost minimization. As such, the Project is consistent with the environmental policies of the Commonwealth as set forth in the Restructuring Act.

6.3.2 State and Local Environmental Policies

The Company will obtain all environmental approvals and permits required by federal, state, and local agencies and the Project will be constructed and operated to comply fully with all applicable federal, state and local regulations and environmental policies. Thus, the Project will contribute to a reliable, low cost, diverse energy supply for the Commonwealth with minimal environmental impact. By meeting the requirements for acquiring each of the requisite federal, state and local permits, the Project will be consistent with applicable state and local environmental policies. *Table 6-1* identifies the anticipated permits, reviews, and approvals required for the Project. By meeting the requirements for acquiring each of these federal, state, and local permits, the Project will comply with applicable state and local environmental policies.

Table 6-1: Required Federal, State and Local Permits

Agency	Review/Permit/Approval	Status
Federal		
U.S. Army Corps of Engineers ("USACE")	Section 404 Pre-Construction Notification (PCN) *(Note: Section 106 Consultation with the State Historic Preservation Officer and Tribal Historic Preservation Officers will be completed as part of this process)*	Projected filing Q2 2025
U.S. Fish and Wildlife Service ("USFWS")	Section 7 Consultation for Threatened and Endangered Species	Included in Section 404 process
U.S. Environmental Protection Agency ("USEPA")	National Pollutant Discharge Elimination System ("NPDES") Construction General Permit ("CGP")	Projected filing June 2027

Agency	Review/Permit/Approval	Status
Commonwealth of Massachusetts		
Energy Facilities Siting Board ("EFSB") / Department of Public Utilities ("DPU")	Approval to construct, G.L. c. 164, § 69J and 72	This filing
Executive Office of Energy and Environmental Affairs ("EEA")	MEPA Environmental Notification Form/Environmental Impact Report	EENF Certificate received September 30, 2024 Single Environmental Impact Report projected filing January 2025
Massachusetts Department of Environmental Protection ("MassDEP")	Section 401 Water Quality Certificate (Joint Filing with Section 404)	Projected filing Q2 2025
Massachusetts Department of Transportation ("MassDOT")	State Highway Access Permit	Projected filing Q1 2026
Massachusetts Division of Fisheries and Wildlife ("DFW") Natural Heritage and Endangered Species Program ("NHESP")	MESA Conservation and Management Permit	Potential - To be Determined based on ongoing consultation with NHESP
Massachusetts Historical Commission ("MHC")	Review of Historic Properties G.L. c. 9, §§ 26-27C	MHC concurrence of intensive survey report finding no potential to affect historic properties received June 25, 2024
Local		
Conservation Commissions (Palmer, Ware, West Brookfield)	Massachusetts Wetlands Protection Act and Palmer and Ware Wetland Bylaw Notices of Intent ("NOI")	Projected filing Q1 2026
West Brookfield Stormwater Authority	Town of West Brookfield Stormwater Bylaw	Projected filing Q1 2026
Boards of Selectmen (Palmer, Ware, West Brookfield)	Grants of Location	Projected filing March 2027

6.3.3 The Green Communities Act

The Green Communities Act is a comprehensive, multi-faceted energy reform law that encourages energy and building efficiency, promotes renewable energy, creates green communities, implements elements of the Regional Greenhouse Gas Initiative (a program where Northeastern and Mid-Atlantic

states cooperate to reduce GHG emissions) and provides market incentives and funding for various types of energy generation. The Green Communities Act (as amended and supplemented by St. 2012, c. 209, An Act Relative to Competitively Priced Electricity) has resulted in greater renewable supplies and substantial new conservation initiatives since enactment and continuing in future years.

The replacement of the Existing Line will strengthen and improve the reliability of the Company's transmission system. While the primary Project purpose is to meet that specific need, the more robust system will also enable the future integration of additional clean energy generated by renewables suppliers, expansion of electrification projects in the area, and will support increased usage of electric vehicles and the associated installation of electric charging stations, consistent with the Green Communities Act. The Project will meet the identified need in a reliable, cost-effective, and environmentally benign manner and therefore is consistent with the Green Communities Act.

6.3.4 Global Warming Solutions Act and the Roadmap Act

The GWSA established aggressive GHG emissions reduction targets of 25% from 1990 levels by 2020 and 80% from 1990 levels by 2050. Pursuant to the GWSA, the Secretary of the EEA issued the Clean Energy & Climate Plan for 2020 in December 2010 and updated the plan in December 2015. Among other provisions, the GWSA requires administrative agencies such as the Siting Board to consider reasonably foreseeable climate change impacts (e.g., additional GHG emissions) and related effects (e.g., sea level rise) when considering and issuing permits. In April 2020, the Secretary of EEA established a 2050 statewide emissions limit of net zero GHG emissions (and in no event greater than 85% below 1990 levels). Further, in December 2020, the Secretary issued the Massachusetts 2050 Decarbonization Roadmap that calls for increased electrification (e.g., electric vehicles, electric home heating, new heat pump technologies), new local renewable resources (e.g., wind, solar and battery storage), and the delivery of power from remote clean energy resources, such as offshore wind.

In 2021, the Roadmap Act codified the commitment to net-zero emissions by 2050 and advances and extends the goals of the GWSA by establishing new interim goals for emissions reductions and authorizing a voluntary energy efficient building code for municipalities. The interim goals include: (1) by 2030, emissions must be 50% lower than they were in Massachusetts in 1990; and (2) by 2040, emissions must be 75% lower. The Roadmap Act also increases the required percentage of Massachusetts electricity that comes from renewable sources, requires an additional 2,400 MW of offshore wind, bringing the state's total renewable energy target to 5,600 MW, and improves access to solar power through a low-income services solar program trust.

Finally, the GWSA amended MEPA to require that agencies, departments, boards, commissions, and authorities, in considering and issuing permits, licenses, and other administrative approvals and decisions, consider reasonably foreseeable climate change impacts, including additional GHG emissions, and effects, such as predicted sea level rise. MEPA's GHG Emissions Policy and Protocol ("GHG Policy") requires that projects subject to MEPA quantify the project's GHG emissions and

identify measures to avoid, minimize, or mitigate such emissions. The GHG Policy also requires proponents to quantify the impact of proposed mitigation in terms of emissions and energy savings.

GHG emissions from the Project will be below the applicable reporting threshold and, during the construction phase, short-term localized air quality effects will be minimal. On August 15, 2024, NEP submitted an Expanded Environmental Notification Form for the Project in accordance with MEPA. In her Certificate on the EENF, the Secretary confirmed that GHG emissions associated with the Project will be limited to the construction period and are de minimis. The Company's adherence to the MEPA process demonstrates the Project's consistency with the requirements of the GWSA and the Roadmap Act.

NEP has taken steps to promote climate change adaptation and resiliency in the design of the Project and continues to consider climate change and long-term infrastructure resiliency as an important goal in its long-term infrastructure planning. The Project will result in a more climate-ready and resilient transmission system that can withstand more extreme weather events; address future increases in demand; and support future interconnections from renewable energy projects. In addition, the Project uses an existing ROW, thereby minimizing alteration of new land resources to construct the Project.

The system upgrades, as proposed, are intended to help ensure the long-term longevity and reliability of the region's electrical infrastructure in the face of growing demand and the changing climate. The Rebuilt Line and the access route improvements will improve the resiliency of this energy infrastructure and provide high speed communications between substations, which will improve outage response times and help protect communities from outages during severe weather events.

The proposed Project has been designed to align with NEP's reliability goals and strategies by: (1) incorporating current design standards; (2) providing needed upgrades to existing electric transmission infrastructure; (3) providing the shortest project delivery time to meet the identified needs; (4) minimizing impacts to natural and social environments; and (5) providing a stronger electrical transmission system, vital to the public's safety, security, and economic prosperity.

The Project as designed will strengthen the regional transmission system and is consistent with both the Commonwealth's electric facility siting requirements and these future-state and local planning initiatives. Consequently, the Project is consistent with the GWSA and the Roadmap Act.

6.3.5 Energy Diversity and Clean Energy Acts

The Energy Diversity Act facilitates the procurement and integration of renewable energy generation resources, including new offshore wind energy generation, firm service hydroelectric generation, and a new class of renewable energy facilities that meet eligibility criteria. The Clean Energy Act amends the Energy Diversity Act to further encourage energy storage efforts and requires the Department of Energy Resources to investigate the potential for additional clean energy solicitations.

The Project will not only improve the reliability of the transmission system, but the Rebuilt Line will also be able to accommodate future increased injections of renewable and other clean energy resources, such as new energy storage units, solar and wind. Accordingly, the Project is consistent with the Energy Diversity Act as amended by the Clean Energy Act.

6.3.6 Drive Act

The Drive Act includes several new climate change measures aimed at renewable energy and transportation sector GHG emissions and provides funding for offshore wind energy and electricity grid improvements and aims to bolster offshore wind industry by removing the price bidding cap. The law also increases offshore wind procurement to 5,600 MW and authorizes Massachusetts to join with other New England states when bidding for renewable energy projects, such as wind and solar. In addition, the Drive Act provides for the potential procurement of transmission infrastructure necessary to support the development of offshore wind generation for Massachusetts and the region. The Project is consistent with the Drive Act in that the Rebuilt Line will be able to accommodate increased injections of renewable and other clean energy resources that may come online in the future.

6.4 ENVIRONMENTAL JUSTICE

The Roadmap Act includes several provisions that address the Commonwealth's EJ policies. See Conservation Law Foundation, 494 Mass. at 601; GreenRoots, Inc., 490 Mass. at 753. It requires the Secretary to direct EEA agencies, including the Siting Board, to consider EJ principles in making "any policy, determination or taking any other action related to a project review, or in undertaking any project pursuant to MEPA and related regulations that is likely to affect environmental justice populations." The Roadmap Act defines those EJ principles as including: (1) the meaningful involvement of all people with respect to the development, implementation and enforcement of environmental laws, regulations, and policies, including climate change policies; and (2) the equitable distribution of energy and environmental benefits and environmental burdens.

The Roadmap Act includes revisions to the MEPA review process and requires the Secretary to consider EJ principles during MEPA review to "reduce the potential for unfair or inequitable effects upon an environmental justice population." For projects subject to MEPA, the Roadmap Act requires an environmental impact report ("EIR") for any project that is "likely to cause damage to the environment" and that is located within one mile of an EJ population (; this distance is extended to five miles for a project that impacts air quality). The EIR must assess any existing unfair or inequitable environmental burden and related public health consequences impacting the EJ population from any prior or current operation or project that has damaged the environment. If such assessment indicates an unfair or inequitable environmental burden or related health consequence, the EIR must also: (1) identify any environmental and public health impact from the proposed project that would likely result

in a disproportionate adverse effect on such population; and (2) potential impact or consequence from the proposed project that would increase or reduce the effects of climate change on the EJ population.

The Roadmap Act also requires the Secretary to provide opportunities for meaningful public involvement through the MEPA review process. Where an EJ population is present within the one-mile designated geographic area (or five miles if the project impacts air quality), and lacks English language proficiency, the proponent is required to indicate on an Environmental Notification Form ("ENF") if the population is reasonably likely to be affected negatively by the project. In such cases, the Secretary must require additional measures to improve public participation by the EJ populations, including: (1) translating public notices, ENFs, EIRs, and other key documents related to the Secretary's review and decisions in languages spoken by a significant number of the affected EJ population; (2) providing interpretation services at public meetings where a significant portion of the affected EJ population lacks English language proficiency; (3) requiring public meetings be held in accessible locations that are near public transportation; (4) providing appropriate information about the project review procedure for a proposed project; and (5) establishing a local repository for project review documents. MEPA has promulgated updated regulations and issued protocol to implement the provisions of the Roadmap Act (MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations and the MEPA Public Involvement Protocol for Environmental Justice Populations).

The Company has implemented all EJ requirements that are applicable to the Project. The Company has undertaken, and will continue to undertake, ongoing community outreach in EJ communities in or adjacent to the Project area to facilitate the meaningful opportunity to participate by all. The Project does not pass through any EJ populations but there are three EJ populations within one mile of the Project, one each in Ware, Warren and Monson. These populations meet the criteria for Income wherein at least 25% of households have a median household income 65% or less than the state median household income. The Company has taken measures to enhance public involvement by EJ populations and conducted a baseline assessment of any existing unfair or inequitable environmental burden and related public health consequences impacting EJ populations. The Company facilitated meaningful participation of residents of the proximate EJ communities by encouraging participation in outreach activities and soliciting feedback from the diverse cross section of the neighborhoods the Project will traverse. As part of the stakeholder outreach plan, NEP has promoted and will continue to promote public involvement by the EJ populations located within one mile of the Project through the use and dissemination Project fact sheets, website content, meeting invitations and translation services for future presentations if requested. NEP communicated with the West Brookfield Board of Selectmen on March 27, 2024. The Board declined an in-person meeting and indicated that sending the presentation via email would suffice. NEP presented the Project to the Ware Board of Selectmen on April 16, 2024, and Palmer Town Council on May 13, 2024.The continued outreach to EJ communities will be consistent with the Roadmap Act and the rules and protocols promulgated thereunder.

In addition to facilitating public involvement, NEP has designed the Project to minimize the Project's impacts to all populations, including EJ populations. The Project poses no inherent public safety or environmental risk to the communities in the Project Area. All persons, regardless of race or income, would experience these same impacts associated with the Project. The type of facilities proposed by the Company exist in virtually every community in the state, including within the Project area.

The Project is carefully designed to minimize impacts associated with wetlands, noise, traffic, air, electric and magnetic fields, safety, hazardous waste, flooding, visual aesthetics, and other environmental considerations. The Project is proposed within the existing ROW, thereby minimizing adverse environmental impacts to both EJ and non-EJ populations. NEP will implement measures to avoid, minimize, and mitigate potential environmental impacts throughout the entire Project alignment, including where it crosses through or is within one mile of mapped EJ populations. Permanent impacts to abutters and communities have been minimized and construction related impacts will be mitigated through use of BMPs, which will be designed and implemented in compliance with federal, state, and local rules and regulations. For these reasons, none of the impacts of the Project will result in disproportionately high or adverse human health or environmental effects to either EJ or non-EJ populations in the area. Because the nature and severity of Project impacts are minimal on all populations, including EJ populations, the Project will not materially exacerbate any existing unfair or inequitable environmental or public health burden impacting the EJ population. Overall, the Project will improve transmission system infrastructure and comply with comprehensive regional plans for maintaining electric transmission reliability in New England, for EJ and non-EJ Populations alike.

Regarding the equitable distribution of energy and environmental benefits and environmental burdens, the energy and environmental benefits of the Project greatly outweigh the minimal impacts of the Project, even considering existing environmental burdens in the community. The Siting Board has previously stated that it views electric system reliability as an important energy benefit in its analysis of jurisdictional facilities. NSTAR Electric Company d/b/a Eversource Energy, EFSB 22-01, at 160 (2022), affirmed Conservation Law Foundation, 494 Mass. at 602. To that end, the Project is needed to serve the electricity requirements of residents and businesses in the Project Area. Replacing the Existing Line, which is among the worst performing lines in the Company's system, with new, more resilient structures and conductors will improve the reliability of the electric system. In addition, the Project will allow for full participation in the electrification goals and the related objective of reducing emissions to offset the adverse effects of climate change, as set forth in the Commonwealth's 2050 Decarbonization objectives. Thus, from an energy resource perspective, the Project not only fully complies with the Roadmap Law and other statutory and regulatory policies, but it will contribute to advancing climate change and emission reduction initiatives and avoid a detrimental impact to the community and its residential and commercial inhabitants. A reliable electric supply is an essential need of society on which the health and welfare of citizens and the business interests of the Commonwealth are fundamentally dependent. The SJC recently found "State law makes it clear that the residents of the Commonwealth simply cannot be exposed to foreseeable and avoidable power

outages." Town of Sudbury, 487 Mass. at 748, referencing St. 1997, c. 164, § 1(h) (Electric Utility Restructuring Act) ("reliable electric service is of utmost importance to the safety, health, and welfare of the commonwealth's citizens and economy"); St. 1997, c. 164, § 1(a) ("electricity service is essential to the health and well-being of all residents of the commonwealth, to public safety, and to orderly and sustainable economic development"). The Project will ensure continued reliability of electric service in the Project Area.

For all the foregoing reasons, the Project is consistent with the Commonwealth's EJ policies as codified in the Roadmap Act.

6.5 RESOURCE USE AND DEVELOPMENT POLICIES

The Project, which will contribute to the long-term maintenance and reliability of the electric transmission system in the Project area and the region, will be constructed and operated in compliance with Massachusetts's policies regarding resource use and development. For example, in 2007, the EEA's Smart Growth/Smart Energy policy established the Commonwealth's Sustainable Development Principles, including: (1) supporting the revitalization of city centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources and integrates uses; (2) encouraging remediation and reuse of existing sites, structures and infrastructure rather than new construction in undeveloped areas; and (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes. As described more fully in *Section 5* of this Analysis, the Project will support these principles because, among other reasons, the Rebuilt Line will support the reliability of service to central Massachusetts, thereby supporting its revitalization and will not adversely affect environmentally sensitive lands because it will be predominantly located within previously disturbed parcels of land on an existing ROW.

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