COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

Petition of NSTAR Electric Company d/b/a Eversource Energy Pursuant to G.L. c. 164, § 72 for Approval to Construct and Operate a New 115-kV Transmission Line from Carver to Kingston	)	D.P.U. 20-67

PETITION OF NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY PURSUANT TO G.L. c. 164, § 72 FOR APPROVAL TO CONSTRUCT AND OPERATE A NEW 115-kV TRANSMISSION LINE IN THE TOWNS OF CARVER, PLYMPTON AND KINGSTON

I. INTRODUCTION

Now comes NSTAR Electric Company d/b/a Eversource Energy ("Eversource" or the "Company"), seeking a determination from the Department of Public Utilities (the "Department") that, pursuant to G.L. c. 164, § 72, Eversource's proposal to construct and operate an approximately eight-mile, 115-kilovolt ("kV") predominantly overhead electric transmission line (the "New Line") in the Towns of Carver, Plympton, and Kingston, between Eversource's Carver Substation #726 located off Main Street in the Town of Carver ("Carver Substation") and its Kingston Substation #735 located on Pembroke Street in the Town of Kingston ("Kingston Substation") is necessary to meet a reliability need, serves the public convenience and is consistent with the public interest. The New Line and the related connections at the Carver and Kingston Substations are referred to as the "Carver to Kingston Reliability Project" or the "Project." In support thereof, the Company states as follows:

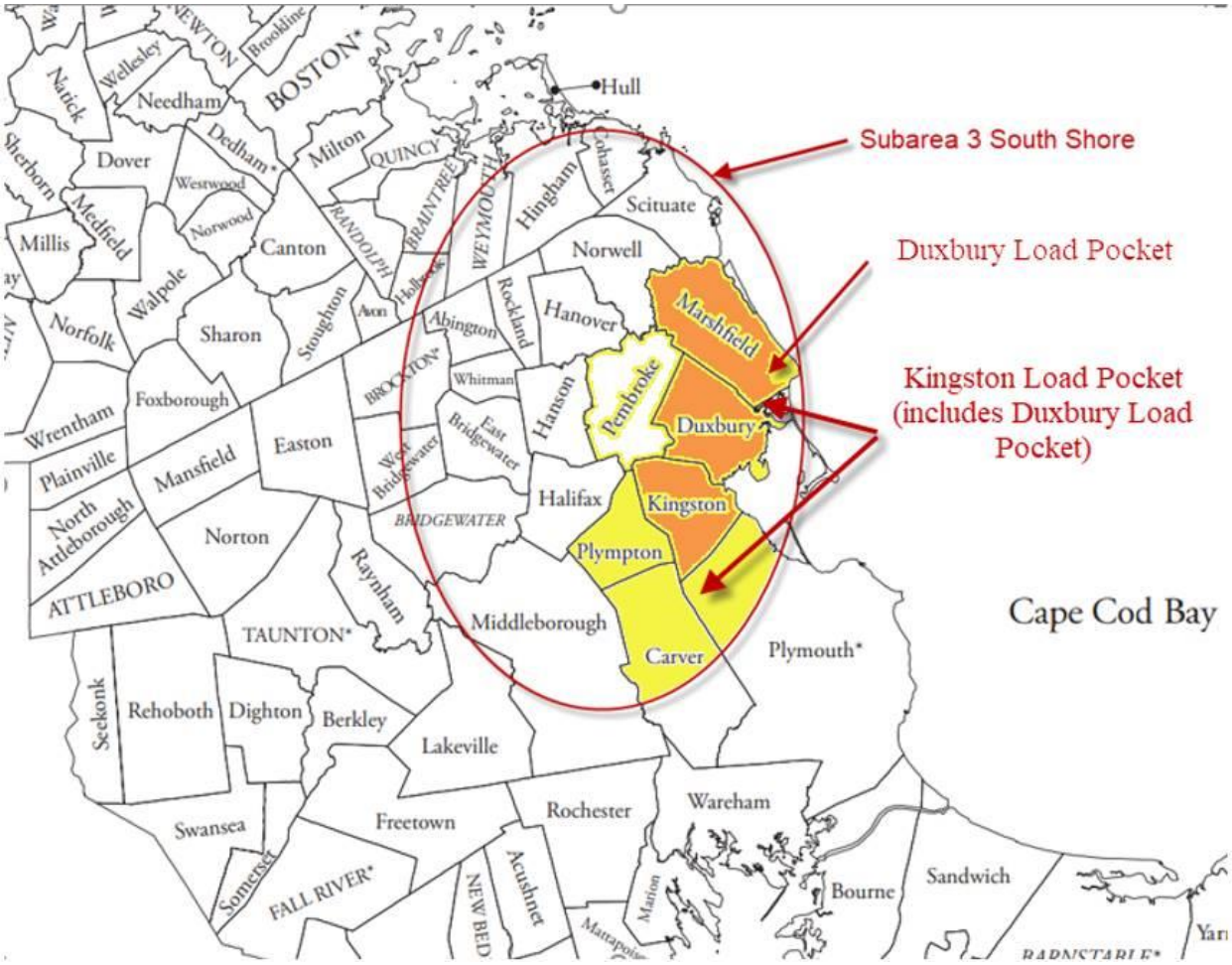
1. Eversource, with a principal place of business at 800 Boylston Street, 17th Floor, Boston, Massachusetts 02199, is an electric company as defined by G.L. c. 164, § 1 and, therefore, is authorized to transmit electricity. NSTAR Electric Company d/b/a Eversource Energy, EFSB 7-02/D.P.U. 17-82/17-83, at 194 (2019) ("Sudbury"); NSTAR Electric Company d/b/a Eversource Energy, EFSB 16-

02/D.P.U. 16-77, at 77-78 (2018) ("Needham"); NSTAR Electric Company d/b/a Eversource NSTAR Electric Company d/b/a Eversource Energy and New England Power Company d/b/a National Grid, EFSB 15-04/D.P.U. 15-140/15-141, at 41 (2018) ("Woburn-Wakefield"); NSTAR Electric Company, EFSB 14-04/D.P.U. 14-153/14-154, at 148 (2017) ("East Eagle").

2. The Company is represented by Catherine J. Keuthen, Esq. and Cheryl A. Blaine, Esq., Keegan Werlin LLP, 99 High Street, Suite 2900, Boston, MA 02110.

3. The Project is one of the Southeastern Massachusetts and Rhode Island ("SEMA-RI") area suite of reliability projects. SEMA-RI includes a set of transmission projects identified by ISO New England Inc. ("ISO-NE"), the independent system operator in New England, through its regional planning process that is designed to reinforce the transmission system in the southeastern Massachusetts and Rhode Island area and ensure that the Company's transmission system in this area meets national and regional reliability standards. The Project will address potential low voltage conditions and thermal overloads in the Kingston Load Pocket, the area comprising all, or part of the towns of Kingston, Carver, Marshfield, Duxbury, Plymouth, and Plympton, with a few customers in Pembroke. The Kingston Load Pocket is a portion of what ISO-NE has designated as Subarea 3 South Shore ("Subarea 3"). See Figure 1 for a depiction of Subarea 3 and the Kingston Load Pocket. As described in more detail below, under certain contingency conditions, there is a potential for line overloads and low voltage in the Kingston Load Pocket, which compromises the transmission system's reliability and could impact approximately 44,000 customers.

Figure 1 – ISO-NE Subarea 3 and Kingston Load Pocket



4. Within the Kingston Load Pocket, there is a load pocket served by the Kingston, Marshfield and Duxbury Substations, referred to herein as the Duxbury Load Pocket. The Duxbury Load Pocket is comprised of the portions of Kingston, Marshfield and Duxbury served by these three substations and accounts for approximately 26,000 of the 44,000 customers within the Kingston Load Pocket. Two lines serve the Duxbury Load Pocket and the loss of both lines could result in a consequential load loss to these 26,000 customers.[1] An additional benefit of the Project is that it will resolve this potential consequential load loss within the Duxbury Load Pocket.

[1] Consequential load loss refers to the load that is no longer served by the transmission system as a result of transmission facilities being removed from service by a protection system operation designed to isolate the fault.

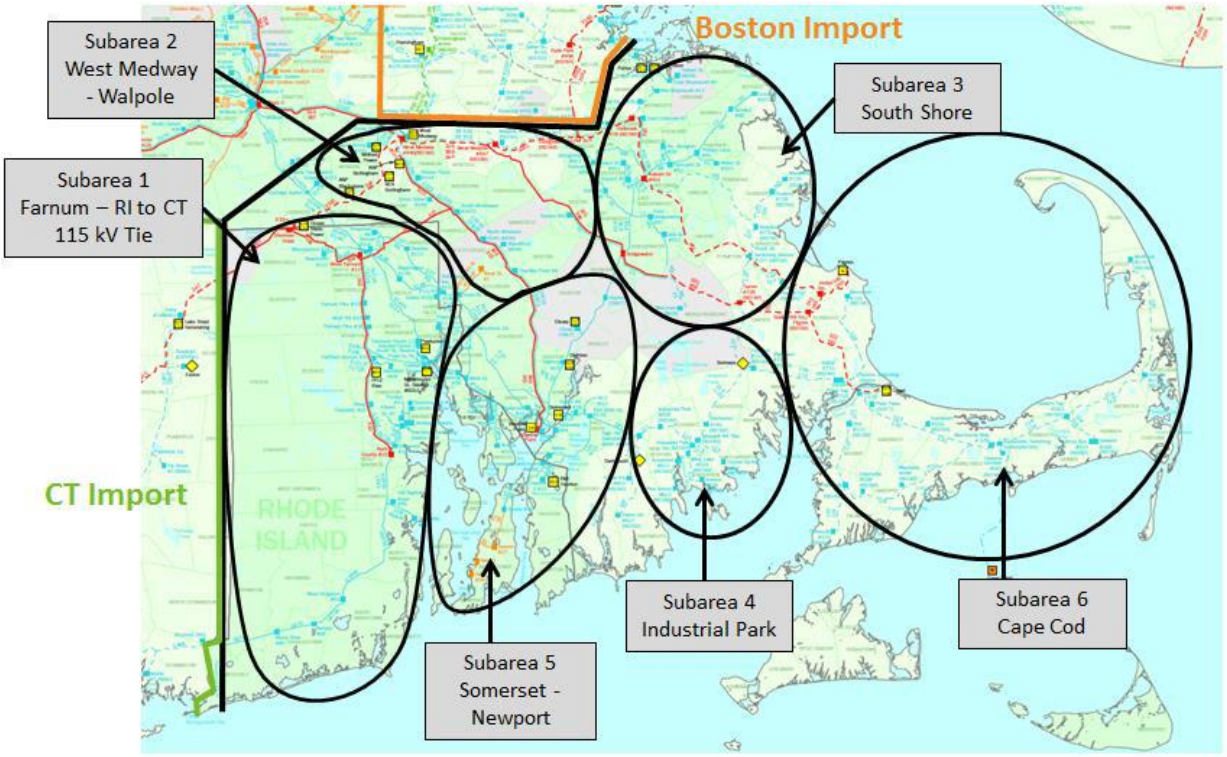
5. ISO-NE has determined the Project is needed to maintain transmission system capability and the Company has reconfirmed the need based on its own updated analysis. The Project will resolve the identified transmission system reliability issues by creating an alternative path for power to flow into the Kingston Load Pocket and providing a new source of supply to the Duxbury Load Pocket.

6. The Project will provide a reliable energy supply for the Commonwealth while minimizing cost and environmental impacts. The Project satisfies the Department's standards for approval under G.L. c. 164, § 72 because, in accordance with applicable planning standards, the Project is needed and will serve the public interest by increasing the reliability and capacity of the electric transmission system in the area, resulting in improved service to its customers.

II. DESCRIPTION OF THE EXISTING TRANSMISSION SYSTEM IN THE KINGSTON LOAD POCKET

7. The transmission system configuration in the SEMA-RI area, including six general geographic need areas identified by ISO-NE, is shown in Figure 2, below. Subarea 3 South Shore includes the central and northern portions of Plymouth County and a few municipalities in eastern Norfolk County.

Figure 2 – Existing SEMA-RI Area Transmission System



8. The Kingston Load Pocket is within Subarea 3 and encompasses the area served by 115-kV Lines 116, 117, 191, and 194, and Eversource's Kingston, Duxbury, Marshfield, West Pond, and Brook Street Substations. There are approximately 44,000 customers served within the Kingston Load Pocket and its actual 2019 summer net peak load was approximately 154 megawatts ("MW"). Line 194 is the only line that shares its structures with another line. It is mounted on a Double Circuit Tower ("DCT") with Line 342, a 345-kV line that runs from National Grid's Auburn Street Substation in Whitman to the termination of Line 194 at Eversource's Brook Street Substation #727 ("Brook Street Substation") in Plympton. Line 342 bypasses the Kingston Load Pocket and continues to Rocky Hill

Substation in Plymouth and Canal Substation in Sandwich. See Appendix A for a line drawing of the existing transmission system depicting the Kingston Load Pocket and surrounding area.[2]

9. The Duxbury Load Pocket, a load pocket within the Kingston load pocket, is supplied by just two 115-kV transmission lines and the approximately 26,000 customers served by these lines would be dropped under certain contingency conditions. The actual 2019 summer peak load for the Duxbury Load Pocket was approximately 84 MW.

III. PROJECT OVERVIEW

10. The Project will provide a new supply source into the Kingston Load Pocket to resolve the potential line overload and low voltage issues. It will also provide a third 115-kV transmission supply to the Duxbury Load Pocket to resolve the consequential loss of all load in this load pocket under certain contingency conditions. The New Line (designated Line 147) will extend through the Towns of Carver, Plympton and Kingston on an existing Eversource 150-foot wide right-of-way ("ROW") (ROW 240), an eight-mile stretch between the Carver and Kingston Substations. The New Line route begins at the Carver Substation and extends north approximately five miles to Eversource's Brook Street Substation. This portion of the New Line route parallels both existing Line 116 and a 23-kV distribution line for 1.4-miles from Spring Street in Plympton to Brook Street Substation. From Brook Street Substation, the New Line route parallels existing Line 117 and a 23-kV distribution line, continuing north approximately three miles to the Kingston Substation. Appendix B shows the proposed route for the New Line on a United States Geological Survey ("USGS") locus map. Appendix C shows the proposed routing of the

[2] Appendix A has been redacted for the public record in order to avoid disclosure of Critical Energy Infrastructure Information ("CEII"). An unredacted copy has been provided to the Department under seal and subject to a Motion for Protective Treatment and will be provided to eligible parties who have executed CEII Non-Disclosure Agreements.

New Line on a MassGIS aerial photograph. Appendix D is a line drawing of the proposed transmission system post-Project.[3]

11. In support of the New Line, 61 new overhead line support structures and two new transition structures will be installed. The transition structures are needed to convert the overhead line to an underground design for a small segment of the route. Thirty-six of the new structures will carry the New Line overhead in the center of the ROW from Carver Substation to a transition structure on the southwesterly side of the Brook Street Substation. At this point, the New Line will be placed underground for approximately 1,200 feet, using solid dielectric cable, to avoid the reliability risk of an overhead crossing of transmission and distribution lines as the New Line passes Brook Street Substation. Four 115-kV lines, Lines 116, 117, 132 and 133, all connect at Brook Street Substation and 345-kV Line 342 passes by Brook Street Substation. Undergrounding this section of the New Line will avoid crossing these existing overhead lines as well as avoid any clearance issues with these lines. Further, going underground will allow the Project to proceed without modifications to the existing lines and will not require outages associated with the modifications. The underground section will start approximately 150 feet from the southwestern side of Brook Street Substation, angling southeast and then north to pass the station before transitioning back to an overhead design at a second transition structure located approximately 300 feet northeast of Brook Street Substation. From this point, 25 new structures will carry the New Line on the easterly side of the ROW to Kingston Substation. The general location, layout, dimensions and configuration of the proposed line structures are shown on the plans attached as Appendix E. Depictions of typical cross-sections of the ROW showing existing and proposed lines and structures are provided as Appendix F.

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[3] Appendix D has been redacted for the public record in order to avoid disclosure of CEII. An unredacted copy has been provided to the Department under seal and subject to a Motion for Protective Treatment and will be provided to eligible parties who have executed CEII Non-Disclosure Agreements.

12. Three angle structures on Line 117 will be replaced as part of the Project in order to eliminate guy wires and anchors that would interfere with the placement and construction of structures for the New Line. These new structures will be placed within 20' of their existing locations and be within 10' of their existing heights.

13. Kingston Substation Work. Kingston Substation is currently being rebuilt with a breaker-and-a-half design as part of an asset condition replacement project anticipated to be completed in 2022. As part of the Project, a termination position, including a circuit breaker with associated disconnect switches, relays and control system, will be added at Kingston Substation to terminate the proposed line. No additional structures are needed at the Kingston Substation as part of the Project.

14. Carver Substation Work. An existing spare terminal position at Carver Substation will be utilized to accommodate the New Line. As part of this Project, a circuit breaker with associated disconnect switches, relays and control system will be added to the terminal position.

15. Construction of the Project is expected to take approximately 10 months. A detailed construction schedule will be prepared in coordination with the construction contractors prior to construction commencement.

16. The Project cost is estimated to be $33.1 million, based on a planning grade estimate with an anticipated level of accuracy of +25/-25 percent, and includes costs for engineering, project management, siting, permitting, materials, construction and testing.

IV. MUNICIPAL AND COMMUNITY OUTREACH

17. The Company is committed to working with municipal officials, businesses and residents along the Project route and providing proactive and transparent communications throughout the life of the Project. The Company's initial outreach efforts have been aimed at briefing local officials and other stakeholders on the need for the Project, detailing overall Project schedule and explaining the

permitting and siting processes, including opportunities for public input. The Company will continue these efforts during the permitting and siting process and will maintain a focused communication program throughout construction, including outreach to municipalities and local businesses along the route with regards to construction staging and laydown and traffic management plans, as such details become available. This outreach program is designed to engage the community, foster public participation, and solicit feedback from stakeholders.

18. The Company held public open houses on August 13, 2019 at the Carver Town Hall, and on August 14, 2019 at the Kingston Town Hall to provide the public with an opportunity to discuss concerns and meet with the Company's subject matter experts. The open houses provided information on the need for and benefits of the Project, described the siting process, presented Project details regarding design and structure locations, schedule and construction activities. Prior to the open houses, the Company mailed invitations to the open houses to property owners within 300 feet of the Project Route, within a quarter mile of the referenced substation facilities, and to municipal officials in each town. Door-to-door outreach was conducted to property owners directly abutting the ROW and the substations to personally invite them to the open houses and brief them on the Project. Five residents attended the open house in Kingston and eight residents attended the open house in Carver.

19. After the open houses, the Company followed up with door-to-door outreach to property owners directly abutting the ROW and the substations, providing a Project Fact Sheet discussing the need, scope and expected timeline of the Project, and offering individual meetings to discuss work as it pertains to specific properties. On June 4, 2020, the Company mailed abutting property owners a letter informing them that this petition is being filed and that they will receive a notice from the Department informing them of the proceeding and how they can participate.

20. The Company has met regularly with municipal officials and other stakeholders in the Towns of Carver, Kingston and Plympton. A list of such outreach meetings is provided in Table 1.

Table 1: Summary of Project Outreach Meetings

Date	Group	Topic
May 18, 2018	Town of Kingston Administrator	Project overview and anticipated timeline
September 24, 2018	Town of Carver Administrator	Project overview and anticipated timeline
October 3, 2018	Town of Plympton Administrator	Project overview and anticipated timeline
August 29, 2019	Town of Kingston Conservation Agent	Project overview/work in Hathaway Preserve

The Company has also communicated with municipal officials by email since the Project Outreach meetings and recently by mail to update them on the status of the Project. The Company will continue to communicate on a regular basis with municipal officials through the Department review process and construction of the Project.

21. Following the submittal of this petition, and throughout the permitting and construction of the Project, the Company will continue to work with neighboring property owners and other stakeholders, including all affected state and local agencies, to address any concerns or issues that may arise. In addition, the Company will:

a. Establish a toll-free Project Hotline (800-793-2202). The Project Hotline will be listed in all Project outreach materials, including fact sheets, subsequent mailings, the website, and at all community events. Eversource is committed to responding within 24 hours or one business day to all Hotline inquiries.

b. List an email address (ProjectInfo@eversource.com) in all Project outreach materials, including fact sheets, subsequent mailings, the website, and at all community events. Similar to the Project Hotline, Eversource is committed to responding within 24 hours or one business day to all email inquiries.

c. Execute comprehensive construction community outreach to keep property owners, businesses, and municipal officials, including fire, police, and emergency personnel, up-to-date on planned construction activities. The Company will notify abutting property owners and municipal officials of its planned construction start and work schedule prior to commencing construction and will work closely with both to limit construction impacts. Once the construction schedule is finalized, the Company will notify direct abutters of the hours of construction and address any concerns raised. The Company will also notify local police of the construction schedule. All notifications will occur as soon as practical. Typically, notification one to two weeks in advance of construction has proven to be effective on previous projects.

d. Secure, in consultation with property owners and local officials, police details at ROW road crossings as necessary to control traffic and maintain safety.

V. STANDARD OF REVIEW

22. Pursuant to G.L. c. 164, § 72, an electric company seeking approval to construct a transmission line must file a petition with the Department for:

> Authority to construct and use or to continue to use as constructed or with altered construction a line for the transmission of electricity for distribution in some definite area or for supplying electricity to itself or to another electric company or to a municipal lighting plant for distribution and sale . . . and shall represent that such line will or does serve the public convenience and is consistent with the public interest . . . The department, after notice and a public hearing in one or more of the towns affected, may determine that said line is necessary for the purpose alleged, and will serve the public convenience and is consistent with the public interest.

23. In making a determination under G.L. c. 164, § 72, the Department considers all aspects of the public interest. Boston Edison Company v. Town of Sudbury, 356 Mass. 406, 419 (1969); Sudbury at 219, Needham at 77; Woburn-Wakefield at 151-152; East Eagle at 164. All factors affecting any phase of the analyses performed by a company in connection with the public interest and public convenience are weighed fairly by the Department. Town of Sudbury v. Department of Public Utilities., 343 Mass. 428, 430 (1962).

24. In evaluating petitions filed under G.L. c. 164, § 72, the Department examines: (1) the present or proposed use and any alternatives identified; (2) the need for, or public benefits of, the present

or proposed use; and (3) the environmental impacts or any other impacts of the present or proposed use. Sudbury at 219, Needham at 77-78; Woburn-Wakefield at 151-152; East Eagle at 164.

25. In determining whether a proposed project is reasonably necessary for the public convenience or welfare, the Department balances the interests of the general public against the local interest and determines whether the line is necessary for the purpose alleged and will serve the public convenience and is consistent with the public interest. Sudbury at 219, Needham at 77-78; Woburn-Wakefield at 151-152; East Eagle at 164. The Department undertakes "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests that might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964); Sudbury at 219-220, Needham at 77-78; Woburn-Wakefield at 151-152; East Eagle at 164.

VI. NEED FOR THE PROJECT

A. Transmission Planning Standards

26. As a transmission provider, Eversource must maintain its system consistent with the reliability standards and criteria developed by: (1) the North American Electric Reliability Corporation ("NERC"), which sets the minimum standards for electric power transmission for all North America; (2) the Northeast Power Coordinating Council, Inc. ("NPCC"), which sets regional reliability standards for the Northeastern North America region; and (3) ISO-NE, which ensures reliable electricity to New England. The applicable reliability standards and criteria expressly require transmission owners, planners, and operators to design and test their systems to withstand representative contingencies as specified in the criteria. If the area transmission system does not have sufficient capability to serve forecasted load under the conditions specified in these reliability criteria, the Company must plan and implement system additions and upgrades to address the identified performance issues.

27. NERC has national authority to ensure the reliability of transmission systems across most of North America and oversees several regional councils, one of which is the NPCC covering New York, New England and eastern Canada. Within the NPCC, New England is a "control area" subject to the supervision and control of ISO-NE. ISO-NE has responsibility for dispatching generation and for conducting the day-to-day operation of the integrated transmission system. ISO-NE operates the various transmission networks owned by electric utilities in New England as a single transmission system. The standards established by NERC, NPCC and ISO-NE have been developed to ensure that the electric power system serving New England, including Eversource's service territory, is designed, constructed and maintained to provide adequate and reliable electric power to the region. NERC establishes a general set of rules and criteria applicable to all geographic areas. NPCC establishes a set of rules and criteria that are particular to the northeast, which encompass the more general NERC standards. In turn, ISO-NE develops standards and criteria that are specific to New England but are also coordinated with the NPCC. Under these three governing bodies, the Company is required to comply with the following reliability and planning standards when planning its transmission system:

- NERC TPL-001-4, Transmission System Standards;
- NPCC Regional Reliability Reference Directory # 1, "Design and Operation of the Bulk Power System;" and
- ISO-NE Planning Procedure 3 ("PP3"), "Reliability Standards for the New England Area Bulk Power Supply System."

Each of these standards provides applicable limits for voltages and loading, and may levy penalties and fines against the Company where "voltages and loading [are not] within applicable limits" if a solution is not implemented. If identified criteria violations are not addressed, under certain system conditions, transmission equipment could become overloaded and voltage levels could be outside of acceptable operating ranges. The resulting impacts could range from unsafe conditions to equipment damage to widespread line and power outages.

28. In addition to national and regional standards and criteria, the Company complies with its own transmission planning criteria set forth in Eversource Energy Transmission System Reliability Standards ("SYSPLAN-01"), a copy of which is provided as Appendix G. SYSPLAN-01 defines the minimum design criteria to assure the reliability of the Eversource transmission system through coordination of system planning and design. SYSPLAN-01 requires, in part, that Eversource transmission system equipment loadings and voltages be within applicable limits following N-1-1 contingency events (one contingency followed by a second contingency) involving the loss of a DCT.

B. ISO-NE Planning Process

29. Under the Federal Energy Regulatory Commission's ("FERC") regulatory authority, ISO-NE is authorized to perform three critical and interconnected roles for the six New England states: (i) grid operation: keeping electricity flowing over the region's high voltage transmission system; (ii) market administration: designing, running, and overseeing the billion-dollar markets where wholesale electricity is bought and sold; and (iii) power system planning: performing studies, analyses, and planning to make sure New England's electricity needs will be met now and into the future. Together, these core responsibilities help protect the health of the region's economy and the well-being of its residents by ensuring the constant availability of competitively-priced wholesale electricity.

30. In administering the regional system planning process, ISO's primary functions relating to transmission resource include: (i) conducting periodic needs assessments on a system-wide or specific-area basis, as appropriate; and (ii) developing an annual regional transmission plan using a 10-year planning horizon.

31. Needs assessments are designed to identify future system needs on the regional transmission system, or within a subarea of the system, with consideration of available market solutions. Needs assessments examine various aspects of system performance and capability, identify the timing

and details of system needs, and analyze whether pool transmission facilities ("PTFs")[4] in the New England transmission system: (i) meet applicable reliability standards, (ii) have adequate transfer capability to support local, regional and inter-regional reliability; (iii) support the efficient operation of the wholesale electric markets; and (iv) are sufficient to integrate new resources and loads on an aggregate or regional basis. Needs assessments identify the location and nature of any potential problems with respect to PTFs and situations that significantly affect the reliable and efficient operation of the PTFs, along with any critical time constraints for addressing the specified needs to facilitate the development of market responses and the pursuit of a regulated transmission solution.

32. The ISO-NE 10-year transmission plan is referred to as the Regional System Plan ("RSP"). The Company's planning process is integrated with and coordinated by ISO-NE as part of its regional planning process and RSP. The RSP represents a compilation of the regional system planning process activities conducted by ISO-NE and stakeholders and presents the results and findings of the ongoing ISO-NE regional planning process. The RSP addresses system needs and deficiencies as determined by ISO-NE through its periodic needs assessments, with updates occurring on a going forward basis to: (i) account for changes in PTF system conditions; (ii) ensure reliability of the transmission system; (iii) comply with national and regional planning standards, criteria and procedures; and (iv) account for market performance and economic, environmental and other considerations. The regional planning process is carried out by ISO-NE as part of an open and transparent stakeholder process involving the New England Power Pool ("NEPOOL") Reliability Committee, the Environmental Advisory Group and the Planning Advisory Committee ("PAC"). Membership in the PAC includes market participants, public utility commissions, consumer advocates, Attorneys General, environmental

[4] Generally speaking, any transmission facility operating at 69 kV or higher and connected to other transmission lines or transmission systems is considered a PTF. ISO-NE FERC Electric Tariff No. 3, Open Access Transmission Tariff, Original Sheet No. 610.

regulators and other interested parties. The PAC provides input and feedback to ISO-NE regarding the regional system planning process including, in the context of the development and review of needs assessments, the preparation of solution studies and the development of the RSP. Specifically, the PAC serves to review and provide input on: (i) the development of the RSP; (ii) assumptions for studies performed; (iii) the results of needs assessments and solutions studies, and (iv) potential market responses to the needs identified by ISO-NE through a needs assessment or the RSP. Based on input and feedback provided by the PAC, ISO-NE refers issues and concerns to the appropriate technical committees for further investigation and consideration of potential changes to rules and procedures.

33. For major transmission upgrades, the regional transmission planning process includes the following steps: (i) identify system needs through a periodic needs assessment undertaken by ISO-NE subject to stakeholder review and input; (ii) suggest transmission solutions to meet identified system needs; (iii) prepare solution studies to identify the most cost-effective regulated transmission solution; (iv) review and approval of proposed transmission solutions by ISO-NE; and (v) conduct a transmission cost allocation review.

C. ISO-NE SEMA-RI Study

34. The Project is one of 25 individual transmission projects to emerge from an ISO-NE led needs assessment study that evaluated the reliability performance of the transmission system in Subarea 3 for 2026 projected system conditions. To perform the study, ISO-NE established the SEMA-RI Working Group (the "Working Group"), made up of representatives from ISO-NE, Eversource and National Grid. The study was performed in accordance with the reliability, planning standards, criteria and load levels referenced above. Consistent with the reliability criteria established by NERC, NPCC and ISO-NE, the SEMA-RI Working Group assessed the ability of the local area transmission system to

withstand single-contingency (N-1) and one contingency followed by a second contingency (N-1-1) conditions given projections of peak load, generator availability and dispatch conditions.

35. The Working Group examined the reliability performance of the transmission system in the SEMA-RI area for the year 2026 and identified reliability-based transmission needs in six general geographic subareas, one of which is Subarea 3, which runs generally from the area south of Boston to the Massachusetts southern shoreline. Figure 2 above is a map showing the ISO-NE subareas in the existing SEMA-RI area transmission system.

36. In 2016, the Working Group completed its evaluation of needs in the SEMA-RI area under various operating conditions under a 10-year planning horizon out to 2026. The results were presented at the March 22, 2016 PAC meeting and were subsequently memorialized in the Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment Report, issued in May 2016 (the "Needs Assessment") a copy of which is provided as Appendix H.[5] The Needs Assessment, which was based on the 2015 Capacity, Energy, Loads, and Transmission ("CELT") Report forecast (the most recent CELT Report available at the time),[6] concluded that there are numerous thermal and voltage violations on various transmission lines in Subarea 3, a portion of which is the Kingston Load Pocket. As described more fully below, the Needs Assessment determined that certain existing lines serving Subarea 3 would overload under various contingencies at peak load levels, which would lead to unacceptably low voltage in the area. The Needs Assessment demonstrated that low voltage conditions may require load shedding, impacting some of the 44,000 customers in the Kingston Load Pocket, forecasted to be at 178 MW in 2026, and the consequential loss of service to approximately 26,000 customers, forecasted to be at 93

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5 Appendix H has been redacted for the public record in order to avoid disclosure of CEII. An unredacted copy has been provided to the Department under seal and subject to a Motion for Protective Treatment and will be provided to eligible parties who have executed CEII Non-Disclosure Agreements.

6 The 2015 CELT Report, published on May 1, 2015, is available at https://www.iso-ne.com/static-assets/documents/2015/05/2015_celt_report.pdf.

MW in 2026, in the Duxbury Load Pocket. Thus, the Needs Assessment determined that there was an immediate and substantial need to address reliability issues in Subarea 3 in order to prevent a possible low voltage condition and potential loss of service to some of the 44,000 customers.

37. The SEMA-RI Working Group subsequently performed a solutions study to determine which, if any, upgrades should be implemented to address the needs documented in the Needs Assessment. During this phase of the study, the Working Group found that solutions did not correspond to the initial subareas established in Needs Assessment. Consequently, the study subareas were reconfigured into "solution groups" and the Kingston Load Pocket (referred to as Subarea 3 in the Needs Assessment) became a portion of the area designated as Solution Group 5. The preliminary preferred solutions to meet the needs identified in the Needs Assessment were presented at the December 14, 2016, ISO-NE PAC meeting, and subsequently memorialized in the *Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study*, initially issued in February 2017 and then subsequently revised in March 2017 by ISO-NE (the "Solutions Study"). A copy of the Solutions Study is provided as Appendix I.[7] The Needs Assessment and the Solutions Study, taken together, provide the necessary evaluations and determinations required under the NERC TPL standards.

Needs Assessment Method and Assumptions

38. As part of the Needs Assessment, the SEMA-RI Working Group used load flow analyses to assess the performance of the area transmission system under a series of defined contingency situations, including:

N-1 Single Contingencies

- Loss of one transmission circuit, transformer, generator, bus section or shunt device;
- Opening of a line section without a fault;

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- Loss of two transmission components (circuit, transformer or generator) sharing a common circuit breaker; and
- Loss of two transmission circuits on a multiple circuit transmission tower.

N-1-1 Double Contingencies

- Loss of one major generating unit, transmission circuit or transformer followed by an N-1 contingency as defined above.

39. The primary goal of load-flow analyses is to determine whether the occurrence of a single contingency (N-1), or one contingency followed by a second contingency (N-1-1), would load any transmission element beyond its long-time emergency ("LTE") or short-time emergency ("STE") rating[8] or result in unacceptable voltage levels.[9] Any such contingency would be a violation of the planning criteria in the various applicable standards of TPL-001-4, NPCC Directory #1, ISO-NE PP3 and Eversource SYSPLAN-01. The loading capability of a given transmission element is a function of the element's heat-dissipation capability, and therefore, this analysis is also referred to as a thermal analysis.

Load Levels Tested

40. The Needs Assessment evaluated transmission system reliability over a long-term (ten-year, 2026) planning horizon, based on the 2015 CELT Report. As described below, summer peak 90/10[10] load conditions for the affected Kingston Load Pocket were determined by subtracting estimates for passive demand resources ("DR"), energy efficiency ("EE") and photovoltaic ("PV") generation.

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8 Each transmission element on the system is rated to identify its thermal capability. Specifically, each element has a normal rating, LTE, and STE rating. The normal rating for a transmission element is the continuous operating limit for that element. The LTE rating is the 12-hour capability of the element, which assumes that any emergency loading affecting this line will last no more than 12 hours. Transmission elements may be operated above the normal rating (and below the LTE rating) within a 12-hour period to meet peak-loading conditions. After 12 hours, the line must operate at a normal or lower loading level or it must be taken out of service. Transmission elements may operate above their LTE rating (and below their STE rating) for up to 15 minutes. The STE rating is the 15-minute capability of the element, meaning that the element could operate at this level for no more than 15 minutes and then would have to be operated at the LTE or a lower loading level.

9 Transmission bus voltage levels outside of 0.95 and 1.05 per unit of normal voltage are considered unacceptable.

10 The 90/10 forecasted load level is an extreme weather level and is the peak demand expected once every ten years. The 90/10 extreme peak load level has a 10% chance of being exceeded because of weather conditions.

Passive and Active Demand Resource Assumptions

41. Demand resources, which are resources that reduce end-use demand for electricity from the power system, fall into two general types: (1) Active DR, which is activated only when needed by ISO-NE; and (2) Passive DR, which is designed to save electricity use at all times. Passive and Active DR were modeled as load reductions; that is, the customer load that must be met by dispatching generation resources is reduced by the available DR. Passive DR in the 2015 CELT Report included Passive DR that bid into and were ultimately selected as Forward Capacity Market resources in Forward Capacity Auction ("FCA") #9 conducted by ISO-NE.[11] This amount of Passive DR was combined with forecasted energy efficiency for the study year, as provided in the 2015 CELT Report. Active DR was also modeled at levels that were selected in FCA #9, multiplied by a 75% factor based on historical performance of similar resources. The demand resource assumptions used in the Needs Assessment 2026 load flow base cases are shown in the Needs Assessment. Appendix H, pages 14 and 15. The assumed amount of passive DR, as well as the EE forecast for the stations impacted by the voltage violations, are listed in Table 2 below.

Forecasted Photovoltaic Assumptions

42. The 2015 CELT PV generation forecast included the PV generation that had been installed as of the end of 2014 and provides a forecast, by state, of the total amount of PV generation (by alternating current nameplate) that was expected to be in service by the end of the forecast year for the next 10 years. For years beyond 2024, the rate of PV generation growth from 2023-2024 was used to extrapolate the PV generation forecast. An availability factor of 26% was applied to the values from the PV generation forecast. Table 3-4 of the Needs Assessment (Appendix H) summarizes the PV

[11] FCA #9 covered the capacity commitment period of 2018/2019. These were the most recently available FCA results at the time of the Needs Assessment.

generation used in the study cases for New England. The PV information for the substations within the Kingston Load Pocket is shown in Table 2 below.

43. Table 2 below shows the forecasted summer peak 90/10 loads as well as the various load reductions at each substation in the Kingston Load Pocket.

Table 2: Forecasted Summer Peak 2026 Loads (MW) based on 2015 CELT Report

Substation	Gross Load	Passive DR	PV	EE	Net Load
Kingston	24.0	-1.6	-0.7	-1.1	20.6
Duxbury	55.3	-3.7	-1.6	-2.5	47.5
Marshfield	29.6	-2.0	-0.9	-1.3	25.5
Brook Street	11.5	-0.8	-0.4	-0.5	9.8
West Pond	86.6	-5.8	-2.5	-3.9	74.5
Kingston Load Pocket Totals	**207.0**	**-13.8**	**-6.0**	**-9.3**	**177.9**
Duxbury Load Pocket Totals	**108.9**	**-7.3**	**-3.2**	**-4.9**	**93.6**

Generating Resources Assumptions

44. Generation projects in New England with a Capacity Supply Obligation ("CSO") as of FCA #9 were modeled in service in the study base case. In addition, two generators that received CSOs in FCA #10 in the SEMA-RI area were also modeled in service in the Needs Assessment: Canal #3 (333 MW) and Burrillville Energy Center (485 MW).

45. Generating resources that have been designated as non-price retirements ("NPRs") from FCA #9 were modeled out of service, as well as the one NPR generating resource from FCA #10 in the SEMA/RI area, Pilgrim Nuclear Power Station ("Pilgrim"), which was retired in 2019. Pilgrim was modeled out of service in all cases.

46. There are no generators in the Kingston Load Pocket.

Generation Dispatch Scenarios

47. For the 2026 study year, the SEMA-RI Needs Assessment evaluated 33 generation dispatch cases representing a range of possible generation dispatch and availability conditions under three different load transfer scenarios. Various combinations of one and two generating units out of service were studied. The generation dispatches evaluated are described in Tables 3-8 and 3-9 on pages 21-22 of the Needs Assessment. Appendix H.

48. Varying generation patterns can determine system weakness that may not be detected under a single typical dispatch or power flow between regional interface areas.

D. SEMA-RI Needs Assessment Results

49. As described in more detail below, the Needs Assessment determined that loss of one of the DCT lines serving the Kingston Load Pocket resulted in loading violations under all three load transfer scenarios studied.

50. In addition, the Needs Assessment concluded that other existing 115-kV lines serving the Kingston Load Pocket would overload under various N-1-1 contingencies at projected peak load levels.

51. Per the Needs Assessment, there were no N-1 violations for Lines 117 and 191 that feed the Kingston Load Pocket. However, under N-1-1 conditions, thermal overloads and voltage violations would occur on these 115-kV lines. Table 3 below summarizes the extent by which the loads on Lines 117 and 191 would exceed their LTE ratings under N-1-1 conditions. The overload on Line 191 is the result of two sets of N-1-1 contingencies, one of which does not include a failure of a DCT, and the overload on Line 117 is the result of a N-1-1 contingency that does include a DCT failure. Table 4 identifies the worst-case N-1-1 voltage performance results for Lines 117 and 191.

Table 3: Summary of Thermal Overloads (2015 CELT Report)

Element ID	Element Description	Contingency	Thermal Loading (% LTE)
191 Line	Kingston to Auburn 115 kV Line	N-1-1	121.66
117 Line	Kingston to Brook St 115 kV Line	N-1-1	122.86

Table 4: Lines 117 and 191 Worst Case Voltage Violations (2015 CELT Report)

Bus Name	Base kV	Contingency	Voltage Condition (p.u.)
Brook St	115	N-1-1	0.8931
Kingston	115	N-1-1	0.9023

52. As shown in Table 6-1 of the Needs Assessment, the needs identified above were determined to be time-sensitive needs, i.e., needs that arise within three years of issuance of the Needs Assessment. As a result, ISO-NE, in cooperation with Eversource, the Transmission Owner in the Kingston Load Pocket study area, used the process described in Section 4.2 of Attachment K of its Open Access.

E. DCT Contingencies

53. At the time the SEMA-RI Needs Assessment was developed, PP3 required solutions to address certain N-1-1 contingencies, including a DCT contingency. A revision of PP3 was issued by

ISO-NE on February 10, 2017. Under the revised PP3, only facilities designated as being Bulk Power Supply ("BPS")[12] facilities need to comply with this DCT requirement.

54. ISO-NE has historically applied the revisions to PP3 prospectively and has not interpreted the revisions relating to DCT contingencies to affect time-sensitive needs such as those identified in the Needs Assessment, as articulated in correspondence from ISO-NE to the PAC on February 24, 2017 (see ISO-NE Updates to System Studies Memo dated February 24, 2017, provided as Appendix J, page 2).

55. Lines 117 and 191 are Eversource transmission facilities; thus, the Project is necessary to achieve compliance with Eversource SYSPLAN-01, which requires that the Eversource transmission system be designed with sufficient transmission capacity to serve area loads for design contingency events including N-1-1 events that include the loss of a DCT.

56. In general, Eversource design criteria are more stringent than what is now contained in PP3 and compliance with PP3 does not assure that Eversource criteria have been met. While NPCC Directory #1 requires that a DCT contingency be evaluated under N-1-1 testing and mitigation for non-BPS lines like Line 117 and 191 is not mandated, Eversource SYSPLAN-01 requires that the Eversource transmission system be designed with sufficient transmission capacity to serve area loads for design contingency events including N-1-1 events that include the loss of a DCT.

F. ISO-NE SEMA/RI Needs Assessment 2020 Update

57. Given the passage of time, ISO-NE updated its earlier Needs Assessment and presented the results at the April 2020, ISO-NE PAC meeting, in a presentation entitled SEMA/RI 2029 Needs

12 ISO-NE defines BPS as an interconnected electrical system consisting of generation and transmission facilities on which faults or disturbances can have significant adverse impacts outside a local area.

Assessment Update ("2020 PAC Update"), a copy of which is provided as Appendix K.[13] ISO-NE updated its analysis with the 2019-2028 forecasts for load, energy efficiency and solar photovoltaic in the 2019 CELT Report, as well as updated generation assumptions, to determine if needs, previously identified in the Needs Assessment, remained.

58. The 2020 PAC Update was limited to an evaluation of 2029 peak load conditions because the previously identified solution components were developed to address peak load needs. Appendix K at 12. Due to a reduction in net load, along with the other updated system assumptions , the results of the assessments showed somewhat less severe needs in the SEMA/RI area. Nevertheless, ISO-NE confirmed the need for the Carver to Kingston Reliability Project based on remaining voltage violations. Appendix K at 26. Table 5 below shows the worst case voltage violations.

Table 5: Lines 117 and 191 Worst Case Voltage Violations (2019 CELT Report)

Bus Name	Base kV	Contingency	Voltage Condition (p.u.)
Brook St.	115	N-1-1	0.933
Kingston	115	N-1-1	0.940

59. To determine whether the needs remained time-sensitive, ISO-NE adjusted the 2029 loads to estimate 2022 loads. Since the net loads were similar (25,077 MW New England net load in 2029 based on the 2020 PAC Update and 25,499 MW New England net load in 2022 based on the 2019 CELT forecast), ISO-NE determined the need is still time-sensitive. Appendix K at 26, 43.

[13] Appendix K has been redacted for the public record in order to avoid disclosure of CEII. An unredacted copy has been provided to the Department under seal and subject to a Motion for Protective Treatment and will be provided to eligible parties who have executed CEII Non-Disclosure Agreements.

G. Eversource Confirmation of Need

60. In addition to ISO-NE's updated assessment of need, the Company also reassessed and confirmed the need for the Project based on more recent data. The Company used the 2020 Eversource System Planning Forecast for the Cape District ("Eversource Forecast"), which considers energy efficiency and distributed generation based on historical Eversource data as well as econometric data to forecast load. The Eversource Forecast, both for gross and net load, is provided as Appendix L.

61. The Company believes that when assessing the need for transmission resources in a geographic area that constitutes only a small portion of the overall New England transmission system like the Kingston Load Pocket, the Eversource Forecast of its own load better represents the specific characteristics of a particular load area. The ISO-NE CELT forecasts state load coincident with the regional peak load for an extreme summer load day and allocates it to the stations serving an area using the individual utility load forecasts. Overall, this forecast is a good representation of the New England peak coincident load. However, when looking at small areas of the system, such as the Kingston Load Pocket, it is more appropriate to consider the non-coincident peak area load instead of the averaged peaks of the ISO-NE forecast because peaks in a particular load pocket may not be coincident with regional peaks.

62. Besides the actual customer load, there are other offsetting factors considered by ISO-NE and Eversource such as future energy efficiency and distributed generation, largely in the form of PV generation in Massachusetts in determining the net load forecast. ISO-NE CELT forecasts consider each of these individual elements and combine them to develop a peak-coincident forecast for all New England.

63. The Eversource Forecast for net load in 2029 in the Kingston Load Pocket is 172.2 MW. See Table 6 below. This is approximately 3% lower than the 2015 CELT forecast (172 MW compared

to 178 MW) but is approximately 44% higher than the 2020 CELT forecast (172 MW compared to 120 MW).[14] Based on the Eversource Forecast, Lines 117 and 191 would be overloaded and voltage violations would occur under N-1-1 contingencies, as shown in Tables 7 and 8.

Table 6: Forecasted Summer Peak 2029 Loads (MW) (2020 Eversource Forecast)

	Gross Load	Net Load
Kingston	20.5	19.8
Duxbury	48.2	46.7
Marshfield	26.3	25.5
Brook St	9.6	9.4
West Pond	73.1	70.8
Total	177.7	172.2

Table 7: Summary of 2029 Thermal Overloads (2020 Eversource Forecast)

Element ID	Element Description	Contingency	Thermal Loading (% LTE)
191 Line	Kingston to Auburn 115 kV Line	N-1-1	123
117 Line	Kingston to Brook St 115 kV Line	N-1-1	121

Table 8: Lines 117 and 191 N-1-1 Voltage Violations (2020 Eversource Forecast)

Bus Name	Bus kV	Contingency	Voltage Condition (per unit)
Brook St	115	N-1-1	0.89
W. Pond	115	N-1-1	0.88
Kingston	115	N-1-1	0.90
Duxbury	115	N-1-1	0.89
Marshfield	115	N-1-1	0.88

H. Summary of Project Need

64. The need for the Project is based upon conditions studied and analyses performed by ISO-NE and the SEMA-RI Working Group and as documented in the Needs Assessment and the 2020

[14] The 2020 CELT Report, published on April 30, 2020, is available at https://www.iso-ne.com/system-planning/system-plans-studies/celt/.

PAC Update. Eversource also performed its own analysis based upon its more refined forecasts of loads in the Kingston Load Pocket. As described above, both ISO-NE Needs Assessments as well as the Company's own forecasts determined that the Kingston Load Pocket could not be reliably served in the event of certain N-1-1 contingencies. Specifically, the various needs assessments identified reliability issues, including potential thermal overloads and unacceptably low voltages in the event of N-1-1 contingencies. They also conclude the need for the Project is immediate as the potential for voltage violations and thermal overloads occur at levels below the 2020 projected load level.

65. Under all forecasts, voltage violations persist under certain contingencies resulting in a potential inadequate voltage for up to approximately 44,000 customers. In addition, using the 2020 Eversource Forecast of peak loads in the Kingston Load Pocket both Lines 117 and 191 are overloaded under the contingencies studied.

66. Therefore, regardless of forecast vintage or methodology, the needs assessments establish that the Project is needed to insure system reliability, reducing the risk of customer outages in the Kingston Load Pocket. The Project also provides a third source of supply to the Duxbury Load Pocket, improving reliability, providing flexibility to maintain the transmission lines more easily, and preventing the loss of all load in the Duxbury Load Pocket in the event of an N-1-1 contingency.

VII. PROJECT ALTERNATIVES

67. Having identified the original need in 2016 as described above, the Working Group next identified and evaluated four transmission alternative solutions to address the needs in Solution Group 5. The strategies utilized by the Working Group were to create either a new source into the load pocket or increase the capacity of the existing lines that serve the load pocket. The transmission alternatives identified included: (1) reconductoring Lines 117 and 191, (2) installing a new line from Carver Substation to Kingston Substation (the Project), (3) installing a new line from Manomet Substation to

Kingston Substation; and (4) installing a parallel line from Brook Street Substation to Carver Substation. Appendix H at 42. The Solutions Study evaluated the alternatives to ensure that the solution components resolved all the identified time-sensitive criteria violations identified in the Needs Assessment and then compared the alternatives in terms of cost, constructability, environmental concerns and other criteria. Appendix H at 28. As discussed further below, the Project was identified as the preferred solution in the Solutions Study to address the potential for line overloads and low voltage in Solution Group 5. Appendix H at 62.

68. In reviewing potential alternatives to the Project, the Company considered: (1) a no-build approach; (2) the four transmission alternatives analyzed in the Solutions Study; and (3) non-transmission alternatives ("NTAs"), including increased EE, DR, and distributed generation ("DG"), and utility-scale generation. As demonstrated below, the Company determined that the Project, on balance, best meets the identified need, with a minimum impact on the environment, and at the lowest possible cost.

A. The No-Build Alternative

69. The Company determined that although a no-build approach would have no direct environmental or cost implications, this alternative would not address the identified reliability needs under current conditions. Reliance upon the existing system would expose the system to potential N-1-1 thermal overloads, low voltage conditions, and customer outages. Such an outcome is unacceptable to the Company and in violation of its planning guidelines.

70. As a regulated utility, Eversource has an obligation to provide service in accordance with its planning guidelines and with NERC national reliability standards, together with regional criteria as established by NPCC and ISO-NE (as applicable to radial facilities). Under the no-build alternative, the Company would not meet its obligation to provide reliable electric power service to nearly 44,000

customers in the Kingston Load Pocket. The no-build alternative does not meet the Project need and was, therefore, eliminated from any further consideration.

B. Transmission Alternatives

71. The second phase of the Working Group's SEMA-RI study evaluated various possible transmission solutions to the needs identified in the Needs Assessment and identified preliminary preferred solutions that were memorialized in the Solutions Study. The Project was specifically identified as the preferred solution in the Solutions Study to address the potential consequential load loss in the Kingston Load Pocket. Appendix H, at 3. The Company subsequently filed a Proposed Plan Application for the Project with ISO-NE and in May of 2018, received a determination that the Project would have no adverse effect on the transmission system. A copy of the approval is provided as Appendix M. The Company's own analysis of constructability, cost and environmental impacts confirmed that the Project was the preferred transmission solution.

72. The Solutions Study considered four transmission solutions to address the identified need. Appendix H at 42-43.

Alternative #1

- Reconductor the 117 Line from Brook Street to Kingston (3.1 miles)
- Reconductor the 191 Line from Auburn to Kingston (15.3 miles)
- Replace terminal equipment at Kingston[15]

Alternative #2 (Proposed Project)

- Install new line from Carver to Kingston (approximately 8.0 miles)
- Install a termination position at Kingston and a termination position at Carver to accommodate the New Line[16]

Alternative #3

- Install new line from Manomet to Kingston (approximately 6.0 miles new, 9.2 miles existing)

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[15] The terminal equipment at Kingston may be replaced as part of an asset condition replacement project to rebuild the substation with a breaker and a half design.

[16] As part of the Project, a termination position, including a circuit breaker with associated disconnect switches, relays and control systems, will be added at Kingston and Carver Substations to terminate the proposed line.

- Install breakers at Manomet to accommodate new line
- Install a termination position at Kingston to accommodate the New Line[17]

Alternative #4
- Install a parallel line from Brook St to Carver (4.9 miles)
- Reconductor the 117 Line from Brook St to Kingston (3.1 miles)
- Replace terminal equipment at Kingston[11]

Alternative #1 – reconductor/rebuild Lines 191 and 117

73. Alternative #1 would reconductor and replace structures on Lines 191 and 117. Approximately 15.4 miles of 336 Aluminum Conductor Steel Reinforced ("ACSR") conductor would be replaced with 954 Aluminum Conductor Steel Supported ("ACSS") conductor on Line 191 and some of the support structures would be rebuilt/replaced to carry the additional conductor weight with adequate clearance to ground.

74. Upgrading Line 117 would consist of replacing approximately 3.1 miles of 336 ACSR conductor with 954 ACSS conductor and rebuilding/replacing approximately 18 support structures.

75. The cost of Alternative #1 is estimated to be $38.4 million, based on an order of magnitude estimate with an anticipated level of accuracy of -50%/+200% percent.

76. Reconductoring and rebuilding structures on both Lines 117 and 191 would require that each line be taken out of service for reconductoring, and would result in time and coordination impacts for switching activities. Even during planned outages, whichever line is under construction would likely need to be put back into service during adverse weather to avoid having the remaining supply interrupted during times of reduced repair crew availability or storm risk. Frequent line switching reduces construction efficiency and increases the length of time for construction.

[17] A termination position, including a circuit breaker with associated disconnect switches, relays and control systems, would need to be added at Kingston Substations to terminate the proposed line. There is an existing open termination position at Manomet Substation.

77. Line 191 crosses numerous waterways and associated wetlands in portions of Kingston, Pembroke, Hanson, East Bridgewater and Whitman. Although wetland impacts for access to existing structures and in-kind structure replacements would be temporary, this alternative would likely require a significant amount of construction matting in wetlands and waterways.

78. This alternative would address ISO-NE and Eversource reliability requirements, however it would leave the Duxbury Load Pocket still supplied by only two transmission lines and susceptible to an area loss of load under certain N-1-1 contingency conditions.

Alternative #2 - Proposed Project

79. The Working Group determined that Alternative #2, the Project, is the preferred transmission solution to address the contingencies identified in the Needs Assessment. It consists of the construction of a new 115-kV transmission line between Eversource's Carver and Kingston Substations, which will parallel Line 116 (from Carver Substation to Brook Street Substation) and Line 117 (from Brook Street Substation to Kingston Substation), all on existing Eversource ROW 240. The New Line will be constructed using a single 1590 kcmil ACSS conductor per phase and one Optical Ground Wire on a combination of steel monopoles, H-frame and three-pole structures. An approximate 1,200-foot section of the New Line will be placed underground using solid dielectric cable to avoid the reliability risk of crossing over 115-kV and 345-kV transmission lines as the New Line passes Brook Street Substation. Going underground will also allow the Project to avoid modifying these existing lines and the outages associated with the modifications.

80. The New Line will originate from an existing spare switching position at Carver Substation. This switching position is arranged to accept an overhead 115-kV transmission circuit. The New Line will terminate at Kingston Substation. An additional termination position, including a circuit

breaker with associated disconnect switches, relays and control system, will be added to the Kingston Substation as part of this Project.

81. The Project does not require the purchase of additional land or land rights.

82. The majority of the New Line can be constructed without taking outages on either Line 117 or Line 191, resulting in reduced reliability risk to the Duxbury Load Pocket. The Project will improve reliability by providing a third transmission supply to Kingston Substation.

83. Most of the ROW for the New Line is cleared of trees from edge to edge, but there will be a few areas where tree cutting will be required in the ROW. In addition, side trimming will be required, for instance at the edge of the ROW and between the Brook Street and Kingston Substations. The ROW has limited areas of open water, wetlands and protected state-listed rare species habitat and has an existing gravel access road along most of its length. Aside from one transmission structure located in a wetland, the Project will result in primarily temporary impacts to wetlands and rare species habitat due to construction matting and access.

84. The cost of Alternative #2, the Project, is estimated to be $33.1 million, based on a planning grade estimate with an anticipated level of accuracy of +25/-25 percent, and includes costs for engineering, project management, siting, permitting, materials, construction and testing.

85. The New Line will alleviate thermal overload conditions and provide voltage support for the Kingston Load Pocket, as well as provide a third 115-kV line to the Duxbury Load Pocket. As a result, the proposed upgrade will serve the public interest by eliminating the potential for consequential load loss to approximately 26,000 customers and equipment damage and low voltage under certain system conditions that could negatively affect approximately 44,000 Eversource customers.

Alternative #3 - Manomet to Kingston Overhead Line

86. This alternative would also bring a third supply into the Kingston Load Pocket. However, it would require the expansion of Manomet Substation in Plymouth with two 115-kV circuit breakers to create a terminal point. From Manomet Substation, a new, 0.3-mile overhead line would need to be constructed on new support structures in or parallel to an existing distribution ROW from the substation to ROW 15, which runs between Pilgrim Station and Jordan Tap. The distribution ROW may require expansion to accommodate the new line. The new line would then follow ROW 15 and parallel the 345-kV Lines 342/355 approximately 2.7 miles to Jordan Tap. At Jordan Tap the new line would be connected to an existing, de-energized conductor on the Line 342 structures within ROW 16 for approximately 9.2 miles between Jordan Tap and Brook Street Substation. At Brook Street Substation, the new line would then be constructed on new support structures on ROW 240 paralleling Line 117 to Kingston Substation for a distance of about 3.1 miles. Total length of Alternative #3 would be approximately 15.3 miles.

87. The cost of Alternative #3 is estimated to be $34.3 million, based on an order of magnitude estimate with an anticipated level of accuracy of -50%/+200% percent.

88. ROW 15 has limited areas of open water and wetlands, so the construction of a new line for Alternative #3 would have temporary wetland impacts similar to Alternative #2, although no permanent wetland fill would be anticipated. The ROW work near the Manomet Substation could result in greater environmental impacts due to tree removal and access road work to install the structures. Limited tree clearing and side trimming will be necessary along ROW 15 to Jordan Road Tap to accommodate the New Line, in addition to the tree clearing and side trimming that are required for Alternative #2 in the ROW from Brook Street Substation to Kingston Substation. Further, this alternative would require more work within state and federal rare species habitat than Alternative #2, which would

likely require additional review and protection measures. Alternative #3 would require construction along an additional 7.0 miles of existing ROW compared to Alternative #2, resulting in greater potential for additional impacts for Alternative #3, such as visual, traffic, noise and access, due to the increased number of abutters, street crossings and access issues.

Alternative #4 - Parallel line from Brook Street o Carver Substations and Reconductoring of Line 117

89. Alternative #4 would require the construction of a new 4.9-mile line between Carver and Brook Street Substations parallel to the existing Line 116. The Company would also need to reconductor approximately 2.3 miles of Line 117 between Brook Street and Kingston Substations for additional capacity. At Brook Street Substation, the Company would need to expand the fence line and reconfigure the terminal arrangement to move the transformer to an end-bus position to open up a line position. Both the new line termination and the transformer relocation may require underground cable installation.

90. This alternative would eliminate the overload on the Line 191 for all the N-1-1 contingencies examined. However, the reconductoring on Line 117 would require that the line be taken out of service, imposing time and coordination impacts for switching activities. In addition, during planned outages, Line 117 would likely need to be put back into service during adverse weather to minimize the risk of having an outage on the remaining supply during times of storm risk or reduced repair crew availability. Furthermore, this alternative would still leave the Duxbury Load Pocket susceptible to an area loss of load under certain contingency conditions. This alternative also would require significantly more substation work than the other alternatives due to the necessary expansion of the Brook Street Substation. The cost of Alternative #4 is estimated to be $34.4 million, based on an order of magnitude estimate with an anticipated level of accuracy of -50%/+200% percent.

91. Alternative #4 would have environmental impacts similar to the Project, because it would require a new line from Carver to Brook Street Substations and would use much of the same access to

reconductor from Brook Street to Kingston Substations. Impacts to rare species habitat would be slightly less with this alternative because there would be no new poles adjacent to Line 117 in rare species habitat.

Conclusion on Transmission Alternatives

92. Alternative #2, the Project, has the lowest overall cost of the transmission alternatives based on the Solutions Study and the Company's updated estimate.

93. Table 9 is an overall comparison of the four transmission alternatives.

Table 9: ISO-NE SEMA/RI Study Solution Comparison Matrix (see Appendix I, Table 7-9)

Key Factors	Alt #1	Alt #2	Alt #3	Alt #4
Cost	✗	✓	✗	✗
Overall System Performance	✗	✓	✗	✗
Expected ease of permitting	✓	✗	✗	✗
Ease of constructability	✗	✓	✗	✗
Fewer and shorter construction outages	✗	✓	✗	✗
Shorter length of time to construct	✗	✓	✗	✗
Reduced environmental impact	✗	✗	✗	✓
Reduced abutter impact	✗	✗	✗	✓
Preferred Solution	✗	✓	✗	✗

Based on the cost, overall system performance, ease of constructability, fewer and shorter construction outages, and shorter length of time to construct, Alternative #2 is the preferred transmission solution. In addition, it will satisfy all NERC, NEPOOL, ISO-NE and Eversource reliability standards and criteria. For these reasons, the Company concluded that the Project, the construction of a new 115-kV line on an existing ROW from Carver to Kingston, is the superior transmission solution for solving the identified system reliability needs with least cost, environmental and constructability impacts.

94. In its 2020 PAC Update, ISO-NE also reviewed the various solution components, previously identified in the Solutions Study, and determined that they were still required to resolve the

revised needs. For the Kingston Load Pocket, ISO-NE concluded that a new 115-kV line from Carver to Kingston Substations remains a valid solution. Appendix K at 26.

C. Non-Transmission Alternatives

95. In addition to the transmission alternatives, the Company also evaluated non-transmission alternatives to the Project.

NTA Methodology

96. At the outset of the NTA assessment, the Company conducted an analysis to determine the amount of energy injection required (in terms of megawatts) and location of those energy requirements (new resources), to address the identified transmission reliability needs in the Kingston Load Pocket without constructing the proposed Project. This assessment considered the reliability needs for the projected 2026 transmission system serving the Kingston Load Pocket under N-1-1 contingency conditions at load levels based on the 2015 CELT forecast. The analysis identified the specific capacity of resources and their specific locations within the transmission system that would be needed to mitigate transmission overloads seen on the current and 2026 transmission system absent construction of the Project.

97. The Company initially determined that the minimum level of resources necessary to resolve the projected transmission overloads from the N-1-1 contingencies addressed by the Project is 50 MW and subsequently confirmed that this injection requirement remained unchanged based on the 2020 CELT forecast. The 50 MW energy injection was determined by adding load reducers at the Kingston Substation until the overload conditions were eliminated. This amount of resources would need to be located at Kingston, Duxbury, or Marshfield Substations. There are currently no resources proposed in the ISO-NE interconnection queue at Kingston, Duxbury, or Marshfield Substations.

NTA Feasibility and Practicality Assessment

98. The Company considered whether NTA technologies could hypothetically be developed as an alternative to the Project. Possible NTA technologies include:

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

99. A technically feasible NTA technology is defined as one that could effectively resolve the transmission need with sufficient performance and response time. When considering whether a specific technology has the operating characteristics (performance and response time) needed to respond to contingency conditions, the Company used a threshold response time of within 30 minutes of the occurrence of the first contingency.[18] The resource must then be able to continue to operate until the failed transmission system element is repaired or until loads decline.

100. Neither active nor passive demand response (EE) is deployable to the scale necessary to mitigate the needs addressed by the Project. For example, future EE is already forecasted to reduce the area load by approximately 5 MW (or a reduction of 5% of area load) by 2026. Thus, in order for EE efforts to produce the needed demand savings, it would require installing *additional* EE measures in the area of the affected load that produce at least 50 MW in demand savings. Based on the Company's experience implementing EE programs, it would be difficult to achieve the magnitude of additional savings needed over and above those from the EE measures already completed or planned.

101. Solar PV technologies alone are not technically feasible due to the inability of solar to cover the duration of the overload. Likewise, energy storage technologies alone are not feasible due to

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

the lack of transmission capacity available to provide energy for storage to charge in the off-peak hours. Based on the Company's analysis, which considered the historical load curve and dispatch patterns, the Company determined that the projected overload duration of the N-1-1 contingency conditions is 23 hours, out of 24 hours in each daily load cycle. This would only leave 1 hour of charging that would be available and would not be enough time to recharge an energy storage device in preparation for the next daily load cycle. However, both technical limitations could be overcome when solar PV is paired with storage.

102. Although solar PV paired with storage, as well as conventional generation, are technically feasible NTA technologies, there are several practical challenges that would prevent these NTA technologies from being developed. These challenges include the necessary development time, land requirements and infrastructure requirements.

D. Challenges for Technically Feasible NTAs

103. In order to provide a reliability benefit comparable to the Project, any NTA would need to enter service by 2022 (the planned in-service year of the Project). To date, the Company is not aware of any generation or energy storage project, or collection of projects, of sufficient size that has been proposed by any developer at the necessary location. Development of a conventional generation or paired solar and energy storage project as part of an NTA solution would entail, among other requirements, identification of an appropriate site in proximity to Kingston, Duxbury, or Marshfield Substation, timely completion of permitting and siting processes, timely completion of the required interconnection studies with ISO-NE, securing an available fuel supply (in the case of a conventional generation project) and contracting with equipment suppliers and construction vendors. These hurdles make it impractical to develop a generation project within the same time frame as the Project. As an example, Canal Unit 3 in the Town of Sandwich entered the ISO-NE interconnection queue in March of

2014, completed interconnection studies more than one year later (in June of 2015), and went into service in July of 2019. Canal Unit 3 was developed at the site of an existing generator, and the Company would expect a lengthier development time for a conventional generation or paired solar PV and energy storage project in the vicinity of Kingston Substation because a greenfield site would be required.

104. A generating facility or solar plus battery solution would need to be developed in the vicinity of Kingston, Duxbury, or Marshfield Substations and would require an amount of land in that area appropriate for each technology. For example, the availability of a large amount of unencumbered land is a prerequisite for developing a large installation of solar PV and energy storage facility. In order to install a solar PV array and energy storage facility that would resolve the need described above, at least 4,932 acres would be required; over 768 times the size of Kingston Substation. For conventional generation, such as a gas-fired generator, available land compatible with the required zoning requirements for a generating facility would be necessary, as well as the need to acquire land or leasehold rights for a gas supply lateral to the nearest natural gas pipeline. Additionally, both of these technologies would likely require land acquisitions or leasehold interests to complete access to a transmission ROW in order to interconnect the facility to the transmission system. As described above, the expected land impacts from any of the NTA technologies would significantly exceed the land requirements associated with the Project.

105. Both NTA technologies would require additional accommodating infrastructure. A gas supply lateral to the closest natural gas pipeline would need to be constructed for any new gas-fired generation, and upgrades to existing pipelines could be required to ensure enough pressures and volumes for any gas-fired generator. A dual-fuel generator would also require a backup supply (such as a storage tank for fuel oil onsite), which could increase the costs, further complicate the permitting process, and increase land requirements. Any generation project, including a paired solar PV and energy storage

project could require additional transmission upgrades in order to interconnect with the transmission system. Such transmission upgrades are determined through the ISO-NE process and could include a number of system investments, including the expansion of Kingston, Duxbury, or Marshfield Substations, to allow for interconnection of a generator or energy storage device, plus possible transmission system upgrades (e.g., reconductoring) to allow for delivery of the energy.

106. While noting the significant practical challenges associated with development of both of the technically feasible NTA technologies, the Company also considered the potential costs of developing a technically feasible NTA as an alternative to the proposed Project. The Company concluded that the potential costs of any technically feasible NTA would be significantly higher than the cost of the proposed Project. For example, the least expensive NTA would utilize frame peaker gas turbine technology, and the Company estimates that the net levelized costs to install and operate one turbine of sufficient size would be approximately $6M per year, compared to the Project which is estimated at $3.7M per year. Additional costs associated with acquisition of land, siting and permitting, site preparation, and other necessary activities are not factored into this estimate. Likewise, a combined solar and battery storage solution would also incur these additional costs.

Conclusion on Non-Transmission Alternatives

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

108. Active and passive demand response are not deployable to the scale necessary to mitigate the needs addressed by the Project. Neither solar PV nor storage alone is feasible due to technical limitations. Conventional generation would need to overcome challenges including the necessary

development time, land requirements, and infrastructure requirements and therefore would not be practical.

109. In its 2020 PAC Update, the ISO-NE also confirmed that non-transmission options would not be adequate to relieve the reliability criteria violations in the SEMA/RI area, nor are there elective transmission upgrades with a capacity commitment from the ISO-NE Forward Capacity Auction that would resolve the violations. Appendix K at 42.

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

D. Conclusion on Project Alternatives

111. After considering the reliability, cost, constructability, and environmental impacts of both transmission and non-transmission alternative solutions to address the identified need, the Company concluded that the Project will provide the most reliable solution to the identified need at a lower cost and with fewer environmental impacts than alternative approaches.

VIII. IMPACTS OF THE PROJECT

112. Eversource has identified and evaluated the potential environmental effects from the construction and operation of the Project and has proposed measures to avoid, minimize or mitigate these effects, as described below.

113. Construction Phases. Construction of the proposed transmission line will occur in phases, as described in the next sections. Some phases may occur in parallel, depending on location.

a. *Staging and Laydown Areas*. Prior to the start of construction, Eversource's contractor will secure arrangements for one or more temporary staging areas in the general vicinity of the Project. Locations typically utilized for this purpose include an existing contractor's yard or unused space at a

commercial or industrial facility. The staging area(s) will function as a storage laydown area for equipment and materials needed for the Project and may also be used for construction office trailers, temporary sanitation facilities and worker parking. The storage yard will have dumpsters and containers specifically for collecting and recycling shipping and crating material and scrap metals from packaging or equipment. The staging areas will also act as meeting points for crew assembly. Upon Project completion, all related construction materials, trailers and equipment will be removed and the property will be restored, per landowner agreements.

b. *Tree and Vegetation Removal*. While the Project will be constructed and operated within an existing Eversource transmission line ROW that has been largely cleared from edge to edge, there will be a few areas where tree cutting will be required. In addition to side trimming at the edge of the ROW to meet clearance requirements, mowing and vegetation removal will be required in some areas within the ROW to facilitate access to the structure locations for construction activities and to facilitate the safe passage of equipment. Incompatible tree species and shrubs within the ROW will be removed as necessary with the intent of preserving low-growing vegetation to the extent practical. Brush, limbs and cleared trees will either be chipped and removed from the site or left in place, depending on site conditions and permitting requirements. Any trees just outside the ROW edge that may pose a hazard to the New Line will be assessed and to ensure reliability, these "hazard trees" may have to be pruned or, if the property owner provides permission, removed. The Project team will work with individual property owners to address these concerns.

c. *Access Roads*. Construction access to the ROW will be from locations where public roadways cross or run parallel with the ROW. The eight-mile stretch of ROW for the Project crosses several public roads in Carver, Plympton and Kingston. Major roads cross the ROW and will be utilized for Project access to the ROW, including Main Street (Carver, Route 58), Brook Street (Plympton) and

Pembroke Street (Kingston). The Project will also cross Route 44 in Carver, but Route 44 will not be used to access the ROW. Additional access to the ROW will be provided via adjacent existing private or public off-ROW access roads and parking lots. Within the ROW, the Company will utilize existing gravel access roads. Some new spur roads may be constructed within the ROW to connect existing access roads to proposed structure locations. Existing access roads may also be improved by adding gravel and/or minor grading using dump trucks, backhoes, or loaders to smooth out depressions. In wetland areas, temporary construction mats will be utilized for wetland crossings.

d. *Work Area Preparation*. Preparation of the structure sites may be required to provide safe and level work areas for construction equipment and personnel. Erosion and sedimentation ("E&S") controls will be installed as necessary and as required by permits obtained for the Project. Work at each structure location may require some vegetation removal in the form of mowing and shrubbery/tree trimming as well as minor grading of the ground surface. These activities will establish a work area of approximately 100 feet by 100 feet will be established at each of the structure locations to enable the foundation work, structure embedment, and structure assembly. The work area size may vary slightly depending on terrain, equipment needs, and the overall site conditions, with an estimated maximum work area of 100 feet by 120 feet at the three-pole angle structure locations. Temporary construction mats will be utilized at structure locations in wetlands and lawn area and to facilitate safe access to the work site and will be removed upon Project completion. Construction mats may also be used in uplands to create level work areas where topography is uneven and in other resource areas where additional soil protection is warranted. Eighteen potential pull pad locations have been identified for the installation of the conductors and lightning shield wire. The actual configuration of these areas will be determined and refined in the field based on site-specific conditions. The proposed structure locations, work pads and pull pads are shown in Attachment E.

e. *Structure Foundation Installation.* The three-pole dead-end and angle structures, as well as the transition structures outside of Brook Street Substation, will be constructed on poured concrete foundations, with tangent H-frame and monopole structures being directly embedded. The three-pole angle structures on Line 117 will be constructed on poured concrete foundations.

Concrete foundations for poles are typically drilled piers, also known as drilled caissons, with diameters varying from 7 to 10 feet, depending on the height and load conditions for the pole, with depths ranging from 15 to 30 feet. In areas with shallow rock or ledge, the pier may be installed on a buried reinforced concrete mat. If shallow bedrock is encountered during pole installation, a drill rig may be used to core into the rock to securely set the structure.

Direct-embedded structure holes will be created using a drill auger or an excavator, depending on site specific conditions. The majority of direct embedded structures will be constructed with a casing and backfilled with compacted material. In limited circumstances, vibrated casings may be used if soil conditions require.

Equipment typically used during the installation of concrete caisson foundations and pole structures includes excavating equipment such as backhoes and excavators, rock drills/augers, cranes and concrete trucks. Hand-held equipment, including shovels and vibratory tampers, would be used during the backfilling of foundations and pole structures.

In parallel with the structure work, the counterpoise or grounding wire (part of the line's lightning protection) will be buried within the ROW using standard trenching equipment. Blasting is not anticipated for this Project.

f. *Structure Assembly/Installation*. From the staging area(s), work crews will transport individual structures or structure segments, along with insulators and associated hardware, to each structure location in the ROW utilizing a flat-bed truck. The structures will then be assembled at each

structure work area and lifted in place by a crane. The davit arms or crossarms will be individually hoisted and framed to the structures. Insulators, clamps, travelers (stringing blocks, consisting of urethane-lined sheaves or pulley wheels), and other hardware will then be installed using bucket trucks.

g. *Conductor and Shield Wire Installation*. Following structure assembly, the conductors and shield wire will be pulled into place utilizing the "tension stringing" method where the conductor will be unreeled under tension from cable trucks positioned in the ROW at designated pulling areas and will not be allowed to contact the ground. One end of a pulling line will be threaded through travelers/pully and attached to winches, and the other end is connected to a reel of conductor to be pulled. The pulling line will be then used to pull the conductor from the reels through the travelers. Tension will be maintained on the conductor during this process to maintain a minimum height above the ground. Once the wire is strung, it will be "sagged" to the appropriate tension and permanently attached to the structures utilizing clamps and connectors, which attach and secure the conductor to the insulator strings. This process is repeated for the installation of the shield wire. During tension stringing operations, equipment will be positioned at strategic locations, such as street crossings, to safeguard against an unanticipated sag. When it is necessary to establish pull pads within a wetland, construction mats will be used to support the equipment and minimize disturbance in wetlands.

h. *Substation Equipment and Underground Line Segment Installation*. In parallel with the work for the New Line described above, the Company will execute the modifications required at both the Carver Substation and Kingston Substation, which include installing a new breaker, terminal equipment and control and protection equipment. All work will occur within the existing fenced area of the substations and no expansion is required at either substation as part of this Project. The New Line will transition to an underground line for approximately 1,200 linear feet at the Brook Street Substation. As previously mentioned, the underground segment will require a new transition structure on the south

side of the substation with conduit running to the eastern side of the of the station, crossing under Brook Street and returning to an overhead design at a second transition structure to be located just north of Brook Street.

i. *Construction Schedule and Work Hours*. Construction will be performed to limit the impact to abutters to the ROW and the community to the maximum extent practical. The Company expects that construction will be conducted using a six-day per week schedule, generally during the hours of 7:00 a.m. to 7:00 p.m., following consultation with the Towns of Kingston, Plympton and Carver. There are certain operations that due to their nature or scope, must be accomplished outside the specified working hours. Such work generally consists of activities that must occur continuously, once begun, such as concrete foundation pours and conductor stringing operations. The construction effort is anticipated to last approximately ten months. The Company plans to place the Project in service by fourth quarter 2022.

j. *Site Restoration*. Restoration efforts will begin in sequence with completion of work at each structure. Disturbed areas around structures and other work locations will be seeded and mulched, as needed, with an appropriate mix to ensure stabilization of soils and prevent sediment transport in accordance with applicable regulations and permit conditions. E&S controls will remain in place until the restoration area is properly stabilized. Upon removal of construction mats, wetland areas will be allowed to re-vegetate, as the existing seed stock in the soils will remain intact. Additional restoration efforts will be implemented, if necessary, per permit conditions or at the discretion of a wetland scientist, including smoothing or raking of any ruts, addition of wetland soils, seeding with a wetland seed mix or addition of straw mulch. Final restoration efforts will be completed following construction. All construction debris will be removed for the Project work areas and disposed of in accordance with

applicable laws and regulations. Pre-existing drainage patterns, ditches, roads, stone walls and fences will be restored to their former or better conditions.

k. *Compliance Monitoring*. The Company will adhere to the conditions of all permits and approvals. Prior to the start of construction, all construction personnel will undergo pre-construction training on appropriate environmental protection and regulatory and non-regulatory compliance obligations for the Project. Company and contractor field staff will be trained to recognize and respond to changing field conditions as they relate to protecting wetland resource areas, rare species habitats and preventing sedimentation and storm water runoff. Compliance with these conditions will be reviewed and discussed with the Project team, including contractors and Company personnel at weekly Project meetings.

114. Land Use. Construction and operation of the Project will have no permanent effect on the existing pattern of land use along the Project route. Land use adjacent to the ROW includes lower density residential areas intermixed with commercial cranberry operations, industrial sand and gravel operations and municipal conservation land on the northern end of the Project route in Kingston. The ROW crosses over a distribution line ROW north of Surrey Drive and Route 44 in Carver. Two solar farms abut the ROW to the south of the Brook Street Substation, in the vicinity of Plympton Sand and Gravel. The Project will be located entirely within the existing maintained ROW, which is occupied by other existing transmission and distribution overhead lines and will utilize existing access to the ROW. Accordingly, no impact to existing adjacent land uses is anticipated.

115. Wetland Resource Areas. The Project ROW contains freshwater wetland resources and crosses four perennial streams and two open water bodies. Structure locations for the Project were designed to minimize impacts to wetland resources to the extent possible. Only one of the 63 proposed new structures will be located within a wetland resource area (Bordering Vegetated Wetland ("BVW")),

which will result in approximately 30 square feet of permanent impacts. The Project will result in 39,015 square feet of temporary impacts to BVW, which are limited to matting. Only eight new structures will require construction matting for access, work pads or pull pads. Approximate temporary impacts are outlined in Table 10 below and depicted in the Kingston Reliability Project Plan Set (Appendix E):

Table 10: Wetland Impacts (in square feet)

Structure Number	Permanent BVW Impacts	Temporary BVW Construction Mat Work Areas	Temporary BVW Construction Mat Access	Total Temp. BVW Construction Mat Impact
13	30	10,000	3,983	13,983
14		2,408	197	2,606
14 (pull pad)		8,311		8,311
18			3,051	3,051
29			481	481
42		1,717		1,717
43		2,348		2,348
47		4,123		4,123
48		2,395		2,395
TOTAL	30	31,302	7,713	39,015

116. Wellhead Protection, Water Supply Resource Areas, Surface and Groundwater. There are no Outstanding Resource Waters, Areas of Critical Environmental Concern, Surface Water Protection Areas, or Massachusetts Department of Environmental Protection ("MassDEP") Zone I Wellhead Protection Areas within the vicinity of the Project. A limited portion of the Project between Brook Street in Plympton and Wapping Road in Kingston lies within a Zone II wellhead protection area, including a total of ten proposed structures.

117. The Project has limited potential to affect groundwater and drinking water supplies. All vehicle re-fueling and all major equipment maintenance will be performed outside of wetland resource areas/buffer zones and any drinking water supply protection area with the exception of large, less mobile

or fixed equipment (cranes, drill rigs, excavators) that will be refueled, as necessary, on the ROW. Spill containment equipment and absorption materials will be readily available at all work sites and maintained for immediate use in the event of any inadvertent spills or leaks. The contractor will be required to have a spill kit available at all locations where work is taking place.

118. Visual Effects. The ROW already contains existing transmission lines and distribution lines and the installation of the Project will result in some change in views of the ROW from abutting property owners. The existing Line 116 from Carver Substation to Brook Street Substation is supported on galvanized steel monopole structures and range in height from 78-feet to 121-feet above grade. The New Line in this segment of the ROW will be supported on galvanized steel H-Frame structures, three-pole structures and monopoles. The New Line structures will range in height from 52 feet to 106 feet above grade. As the New Line in this segment will be constructed on generally shorter structures than those for existing Line 116 and be of the same finish, visual impacts in this segment of the ROW will be limited.

119. From Brook Street Substation to Kingston Substation, existing Line 117 is supported primarily on wood H-frame structures ranging in height from 40-feet to 65-feet above grade. The first structure on Line 117 immediately adjacent to Brook Street Substation is galvanized steel. The New Line in this segment of the ROW will consist primarily of weathering steel monopole structures ranging in height from 79-feet to 107-feet above grade. The Company may use galvanized steel for the structures adjacent to Brook Street Substation to match the existing finish of the Line 117 structure there. The Line 117 angle structures being replaced as part of the project will be replaced with weathering steel structures. The proposed taller structures in this segment are located predominantly in a wooded stretch of the ROW, and therefore the visual impacts to abutting residences are anticipated to be few. Further, by installing weathering steel structures in this segment of the Row, the finish will better match the existing wood

structures and better blend in with the wooded surroundings, which the Company anticipates will help minimize the visual impact of the taller structures.

120. As no expansions are planned at the substation locations, no change in the visual effects of the substations is anticipated.

121. Noise. Noise impacts from the Project will be temporary in nature and will be limited to construction activities, with no permanent noise-generating equipment being installed. The Towns of Carver, Kingston and Plympton do not have specific regulations pertaining to noise in their respective bylaws, however Carver's Bylaws contain a general disturbance provision which allows temporary construction noise.[19] The Company will comply with MassDEP's Air Quality Regulation 310 C.M.R. 7.10 Noise Regulation and consult with the towns to address any noise concerns.

122. Construction noise will be generated during preparation of access roads and work areas, delivery of materials, foundation construction, structure assembly and during line stringing. Work crews will not be at any one job site continuously for the duration of the Project. As a result, construction noise at any specific location will be brief and intermittent over the construction period. Specific work hours, including potential weekend work, will be determined in coordination with local authorities, as required. In certain instances, the Company may seek approval from the municipality to work at night or on weekends, particularly if a construction task cannot be interrupted until completed. As indicated above, examples of construction tasks that must be continued until completion include pouring concrete foundations and pulling conductor. The Company will endeavor to complete as much of this work as possible during regularly scheduled work hours.

123. Sound levels for the Project will be similar to other construction projects. The Company will implement, where appropriate, construction methods that reduce construction noise. Table 11

[19] Town of Carver Bylaws Section 3610.

summarizes noise level data compiled for various types of typical construction equipment and measured at 50 feet from the source.

Table 11 Noise Ranges of Typical Construction Equipment

Equipment	Levels (L_{eq} dBA) at 50 feet[20]
Backhoe	73-95
Compressors	75-87
Concrete Mixers	75-88
Concrete Pumps	81-85
Cranes (moveable)	75-88
Cranes (derrick)	86-89
Front Loader	73-86
Generators	71-83
Jackhammers	81-98
Paver	85-88
Pile Driving (peaks)	95-107
Pneumatic Impact Equipment	83-88
Pumps	68-72
Saws	72-82
Scraper/Grader	80-93
Tractor	77-98
Trucks	82-95
Vibrator	68-82

124. Air Quality. The main sources of potential construction-related air quality impacts are emissions from construction equipment and motor vehicles and fugitive dust emissions from disturbed soil surface areas. Construction contractors will be contractually required to adhere to all applicable regulations, including those related to the control of dust and emissions. All diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days

[20] Modern machinery equipped with noise control devices or other noise-reducing design features do not generate the same level of noise emissions as shown in this table. Source: U.S. EPA Office of Noise Abatement and Control, 1971 and U.S. Department of Transportation, Federal Highway Administration (http://www.fhwa.dot.gov/environment/noise/construction_noise/special_report/hcn06.cfm, updated 5/20/2010). Note: Leq is the equivalent constant sound level for a varying sound level measured over a period of time. It is also referred to as the *Equivalent Average Sound Level* and is the standard measure of the sound pressure level that approximates the sensitivity of the human ear at moderate sound levels. A-Weighted Sound Level de-emphasizes high and low frequencies because the ear poorly perceives these.

over the course of Project construction will have United States Environmental Protection Agency ("USEPA") verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine. Dust will be controlled at the construction site by use of appropriate best management practices (e.g., maintaining reasonable construction vehicle speeds during dry conditions, application of water, etc.) as per the Eversource Energy Best Management Practices ("BMP") Manual for Massachusetts and Connecticut, September 2016. At areas where construction vehicles are exiting onto public roads, regular road sweeping will be used to remove tracked out soils. If deemed necessary, stone tracking pads will be installed to help remove soil from the truck tires prior to accessing public roads.

125. Public Safety. The Company proposes to construct the proposed transmission facility and substation modifications consistent with its system requirements and current industry standards including, but not limited to, the American National Standards Institute, Occupational Safety and Health Act, and the National Electrical Safety Code and 220 CMR 125, "Installation and Maintenance of Electric Transmission Lines." Eversource will coordinate with local public safety officials during construction, where applicable.

126. Traffic and Transportation. The Project will have minimal impacts to local traffic and will not require the use of any municipal services other than police details, as required. The volume of traffic generated during construction is not expected to be large enough to significantly affect traffic flow on public ways along the Project route. There may be temporary traffic impacts associated with material deliveries and large equipment mobilization to the ROW and with conductor stringing across public and private roadways, but these are not anticipated to be significant. Any necessary closures at roadway crossings will be temporary and a traffic detail will be used to ensure the safety of the public. During

construction, the Company will also adhere to the State Highway Access Permit requirements issued by the Massachusetts Department of Transportation for the Route 44 crossing. The Project also crosses the MBTA Commuter Rail near Grove Street in Kingston. The proposed structures are located outside of the rail corridor; however, Eversource will coordinate with the MBTA regarding the aerial crossing and timing of this activity.

127. Electric and Magnetic Fields. The Company modeled electric and magnetic field ("EMF") levels associated with the proposed transmission facilities under average annual loading conditions. Existing and proposed levels of EMF were calculated using equations from the *Electric Power Research Institute AC Transmission line Reference Book – 200kV and Above (3rd Edition; 'EPRI').* This method has been shown to accurately predict EMF levels measured near transmission lines. The EMF levels were calculated at one meter (3.28 feet) above ground, consistent with the published EPRI protocol. Eversource obtained base-case system power-flow models from ISO-NE representing the expected New England transmission topology for the year 2022, with all lines in service. These base cases include transmission system changes that already have been approved by ISO-NE and are in their system models. The results of the modeling along the New Line ROW are presented below:

Table 12: Calculated Electric Field Levels

Section	Configuration	Electric Field (kV/m)(-) Edge of ROW	Electric Field (kV/m) Max on ROW	Electric Field (kV/m) (+) Edge of ROW
Carver SS to Spring Street SS	Existing: Proposed:	0.07 0.26	1.34 1.27	0.38 0.35
Spring Street SS to Brook Street SS	Existing: Proposed:	0.09 0.04	1.34 1.34	0.38 0.42
Brook Street SS to Kingston SS	Existing: Proposed:	0.09 0.04	1.25 1.25	0.35 0.39

Table 13: Calculated Magnetic Field Levels at Annual Average Loads

Section	Configuration	Magnetic Field (mG) (-) Edge of ROW	Magnetic Field (mG) Max on ROW	Magnetic Field (mG) (+) Edge of ROW
Carver SS to Spring Street SS	Existing: Proposed:	6.3 10.5	74.8 57.3	46.7 29.8
Spring Street SS to Brook St. SS	Existing: Proposed:	5.9 6.6	74.9 33.8	46.7 6.0
Brook St SS to Kingston SS	Existing: Proposed:	6.7 2.9	46.7 29	6.4 14.9

Table 14: Calculated Magnetic Field Levels at Annual Peak Loads

Section	Configuration	Magnetic Field (mG) (-) Edge of ROW	Magnetic Field (mG) Max on ROW	Magnetic Field (mG) (+) Edge of ROW
Carver SS to Spring Street SS	Existing: Proposed:	8.6 14.3	100.9 78.8	63.0 40.1
Spring Street SS to Brook Street SS	Existing: Proposed:	7.6 8.3	101 74.4	62.9 41.3
Brook Street SS to Kingston SS	Existing: Proposed:	10.3 4.5	67.2 38.6	9.3 19.9

The reference levels for whole body exposure by the general public to 60-Hz fields is summarized in the following table.[21]

Table 15: Reference Levels for whole body exposure by the general public to 60-Hz fields

Organization, recommended limit	Magnetic fields	Electric fields
ICNIRP, reference level[22]	2,000 mG	4.2 kV/m
ICES, maximum permissible exposure[23]	9,040 mG	5 kV/m[24] 10 kV/m[25]

[21] Both organizations concluded that evidence for effects from long-term exposure was insufficient for setting exposure standards.

[22] ICNIRP Guidelines for Limiting Exposure To Time-Varying Electric And Magnetic Fields (1Hz-100kHz) prepared by the International Council on Non-Ionizing Radiation Protection and published in Health Physics 99(6):818-836; 2010

[23] ICNIRP Guidelines for Limiting Exposure To Time-Varying Electric And Magnetic Fields (1Hz-100kHz) prepared by the International Council on Non-Ionizing Radiation Protection and published in Health Physics 99(6):818-836; 2010

[24] Maximum permissible exposure at and beyond the ROW edges

[25] Maximum permissible exposure exception within the transmission right-of-way

The calculated EMF levels after construction of the Project are significantly lower than published international guidelines. In most locations, exposures to magnetic fields are being reduced. It is reasonable to conclude that the Project will not have a significant change in EMF, as it pertains to exposure levels to the public.

128. Cultural Resources. The Company completed a preliminary cultural resources review in August of 2019 to determine whether any archaeological sites, pre-contact sites, historic properties or historic districts were located in the vicinity of the Project. On October 10, 2019, the Massachusetts Historical Commission ("MHC") provided a comment letter in response to the Company's Environmental Notification Form filing and requested that an intensive (locational) survey be conducted in archaeologically sensitive areas. The Company is in the process of filing an application with MHC to conduct the intensive survey and will submit the results to MHC when the survey is completed. The Company will continue to coordinate with MHC to further evaluate potential impacts to archaeological resources prior to construction and to identify areas that should be avoided or which, if not able to be avoided, would necessitate measures to be undertaken by the Project to protect the cultural resource.

129. Flood Zone. The ROW intersects with four 100-year flood zones as designated by the Federal Emergency Management Agency. The Flood Zones are associated with an unnamed waterbody located between High Street and Rt. 44 in Carver, the Annasnappet River, an unnamed waterbody located north of Spring Street in Plympton, and the Jones River in Kingston. One structure is proposed at the outer limit of the floodplain associated with the unnamed waterbody in Carver. The installation of this structure will have an insignificant effect on the flood storage volume of the floodplain due to the minimal fill proposed in contrast to the total volume of flood storage in this area. Excavated materials will be transported outside of the flood zone and soils will be stabilized upon Project completion. There are no structures proposed within the other three flood zones.

130. Protected Species and Habitat. In compliance with the Massachusetts Endangered Species Act, G.L c. 131A and its implementing regulations, an Information Request was sent to the Natural Heritage and Endangered Species Program ("NHESP") Division of Fisheries and Wildlife for regulatory review of the Project and Project route (NHESP tracking No. 12-30869). Based on NHESP review, the Project crosses through two priority habitat areas, one near John's Pond Road in Carver and the other between Brook Street in Plympton and Wapping Road in Kingston. Additionally, a certified vernal pool is located just outside of the ROW near Center Street in Carver. Eversource has been coordinating with NHESP regarding the intersections with rare species habitat. Based on preliminary discussions, it was determined that the Project will not impact the habitat associated with John's Pond Road; however, the Company continues to coordinate with NHESP regarding the Project's potential impacts to the habitat area between Brook Street in Plympton and Wapping Road in Kingston.

131. The Project route was also reviewed for the presence of federally-listed rare species. Based on an online review of the United States Fish and Wildlife Service ("USFWS") database, the Information for Planning and Conservation Report ("IPAC") listed the Northern long-eared bat (*Myotis septentrionalis)* as a threatened species potentially affected by activities in the Project route. Through a review of the state mapping, it has been confirmed that there are no known Maternity Roost Trees or Hibernaculum located within 0.25 miles of the Project limits. Therefore, no impacts to the Northern long-eared bat are anticipated as a result of this Project. The IPAC also list the Plymouth Redbelly Turtle (*Pseudemys rubriventris bangsi*) as an endangered species potentially located in proximity to the Project area, however, Project work is not within a critical habitat of the Redbelly Turtle. Eversource will continue to coordinate with the USFWS through the IPAC process and as part of the United States Army Corps of Engineers Section 404 General Permit.

132. Stormwater Management and Erosion/Sedimentation Control. The Project will be constructed in compliance with the USEPA National Pollutant Discharge Elimination System ("NPDES") Construction General Permit and a Stormwater Pollution Prevention Plan ("SWPPP") will be developed and implemented involving a series of construction BMPs to reduce the risk of erosion and sedimentation disturbances due to construction activities. Additionally, the Project will be constructed in compliance with the Massachusetts Wetlands Protection Act and the MassDEP Stormwater Regulations. The only applicable standard for the Project is Standard #8 - Construction Period Pollution Prevention and E&S Controls. To comply with this requirement and the developed SWPPP, Eversource will install E&S controls and employ dewatering as needed for new pole installations. E&S controls may include straw wattles, silt fence, straw bales or other similar products. Furthermore, daily inspections of all work areas and erosion controls will be conducted by construction crews and weekly inspections will be performed by an experienced environmental scientist. Compliance with MassDEP's Stormwater Management Standards will be demonstrated in the local Notice of Intent filings, as necessary.

133. Waste, Debris and Soil Management. Project earthwork will be limited to excavations for the structure foundations, counterpoise and some grading work to construct and improve access roads and prepare work areas. The MassDEP reportable release database was reviewed by the Company on December 10, 2018, to determine the potential for encountering contaminated soils during Project construction from historical releases or former land development practices. No reportable sites were identified within the ROW at the time of review. Excavated soils will be used to backfill around each new structure and any excess will be spread within the ROW outside of any sensitive environmental areas.

134. Conclusion on Impacts on the Proposed Project. Based upon the above, the potential environmental impacts associated with the proposed Project will be minor and/or temporary in nature and will be avoided or minimized to the maximum extent possible through the use of best management practices and compliance with federal, state and local rules and regulations.

IX. PERMITS REQUIRED

135. The Company will adhere to the conditions of all Project permits and approvals. On September 13, 2019, the Company submitted an Environmental Notification Form ("ENF"), pursuant to the Massachusetts Environmental Policy Act ("MEPA") and its regulations (301 C.M.R. 11.00). On October 25, 2019, the Secretary issued a Certificate on the ENF. The ENF and the Secretary's Certificate thereon are provided as Appendix N and Appendix O respectively.

136. Table 16 provides a list of the permits, approvals and authorizations the Company anticipates are necessary to construct, operate and maintain the Project:

Table 16: Anticipated Permits, Reviews and Approvals

Permit	Agency	Status
Federal		
Section 404 General Permit (Self-Verification)	Army Corps of Engineers	To be filed
Coverage under NPDES General Permit for Discharges from Construction Activities	Environmental Protection Agency	To be filed
Review under Federal Aviation Administration regulations (Part 77 Obstruction Standards) and Form 7460-1 (Hazards to Navigation)	Federal Aviation Administration	To be filed
State		
Individual 401 Water Quality Certification	MassDEP	To be filed
Non-Vehicular Access Permit for Aerial Crossing of State Roads	Massachusetts Department of Transportation	To be filed

License for Entry	Massachusetts Bay Transit Authority	To be filed
Environmental Notification Form in compliance with M.G.L c. 30A	Massachusetts Environmental Policy Act	Filed on September 13, 2019 Certificate issued October 25, 2019
State and Federal Historic Preservation Acts (Ch. 254 and Section 106)	Massachusetts Historical Commission	Concurrent with Section 404 review
MESA Checklist	Natural Heritage & Endangered Species Program	To be filed
Chapter 91 License (Minor Modification)	MassDEP	To be filed
Local		
Orders of Conditions	Carver, Plympton and Kingston Conservation Commissions	To be filed
Grants of Location	Carver, Plympton, Kingston, Boards of Selectmen	To be filed

WHEREFORE, Eversource respectfully requests that, pursuant to G.L. c. 164 § 72, and after due notice and a public hearing, the Department determine that the construction of the Project is necessary for the purposes stated and will serve the public convenience and be consistent with the public interest, and authorize Eversource to construct, maintain, and operate said facilities.

Respectfully Submitted,

NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY

By its attorneys,

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Dated: June 5, 2020

APPENDIX LIST

Appendix A: Existing Transmission Line Diagram (Confidential CEII)

Appendix B: USGS Locus Map of Route

Appendix C: Aerial Photograph of New Line

Appendix D: Proposed Transmission System Diagram (Confidential CEII)

Appendix E: Project Plan Set (general location, layout, dimensions and configuration of New Line structures)

Appendix F: Cross-Section Plans

Appendix G: SYSPLAN-01 Transmission System Assessment Procedure

Appendix H: Southeastern Massachusetts and Rhode Island Area 2026 Needs Assessment Report, issued May 2016 (Confidential CEII)

Appendix I: Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study (revised in March 2017) (Confidential CEII)

Appendix J: ISO-NE Updates to System Studies Memo dated February 24, 2017

Appendix K: SEMA/RI 2029 Needs Assessment Update (April 2020) (Confidential CEII)

Appendix L: 2020 Eversource System Planning Forecast

Appendix M: ISO-NE Proposed Plan Application Approval

Appendix N: Environmental Notification Form

Appendix O: Secretary's Certificate