**COMMONWEALTH OF MASSACHUSETTS**
**DEPARTMENT OF PUBLIC UTILITIES**

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| 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 Overhead Transmission Line on an Existing Right-of-Way in the Town of Barnstable | ) | D.P.U. 19-80 |

**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 OVERHEAD TRANSMISSION LINE ON AN EXISTING RIGHT-OF-WAY IN THE TOWN OF BARNSTABLE**

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: (i) separate two circuits that are supported by common double-circuit structures by relocating one of the 115-kilovolt ("kV") electric transmission lines to newly constructed structures for approximately 3.3 miles within existing Eversource right-of-way #343 ("ROW 343") between Shootflying Hill Road and Barnstable Switching Station; and (ii) install approximately 0.5 additional miles of Optical Ground Wire ("OPGW") to replace the existing static wire on existing Eversource ROW 345,[1] is necessary to meet a reliability need, serve the public convenience and is consistent with the public interest (the "Petition").

[1] See Attachment A, Figures 1 and 2 for a depiction of the ROWs being described and Attachment A, Figure 3 for the extent of proposed Project-related activities.

The proposed transmission line and OPGW will be constructed, owned, and operated by Eversource and are collectively referred to herein as the Barnstable Reliability Project, or the "Project." There will be no significant substation work required for the Project at either the West Barnstable Substation or the Barnstable Switching Station because the lines being separated are existing lines with existing terminal equipment.[2] The Project will be located entirely within the Town of Barnstable.[3]

## I. INTRODUCTION

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. As an electric company, Eversource is authorized to file this Petition pursuant to G.L. c. 164, § 72.

2. The Project is part of the Southeastern Massachusetts and Rhode Island ("SEMA-RI") Area suite of reliability projects, a set of transmission projects identified by the ISO-New England, Inc. ("ISO-NE") through its regional planning process, that are 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 is designed to resolve certain identified transmission system reliability issues. More specifically, the Project is needed to address the current risk of consequential load interruption projected to exceed 300 megawatts ("MWs") under certain N-1-1 contingency conditions. The initial study demonstrated the risk of consequential load loss extends through the end of the study

[2] Substation work will consist of switching / isolating the line and resetting relays.

[3] See Attachment A, Figure 1, which is a copy of the United States Geological Survey ("USGS") locus map showing existing ROWs 342, 343 and 345, West Barnstable Substation and Barnstable Switching Station, Attachment A, Figure 2 which is an aerial locus map, and Attachment B for design plans for the Project.

period, 2026. The Company performed an analysis with updated load forecasts and confirmed this need for the Project remains. The Project will eliminate the potential for power outages under certain system conditions that could negatively affect approximately 115,000 Eversource customers, as well as approximately 13,000 National Grid customers on Nantucket.

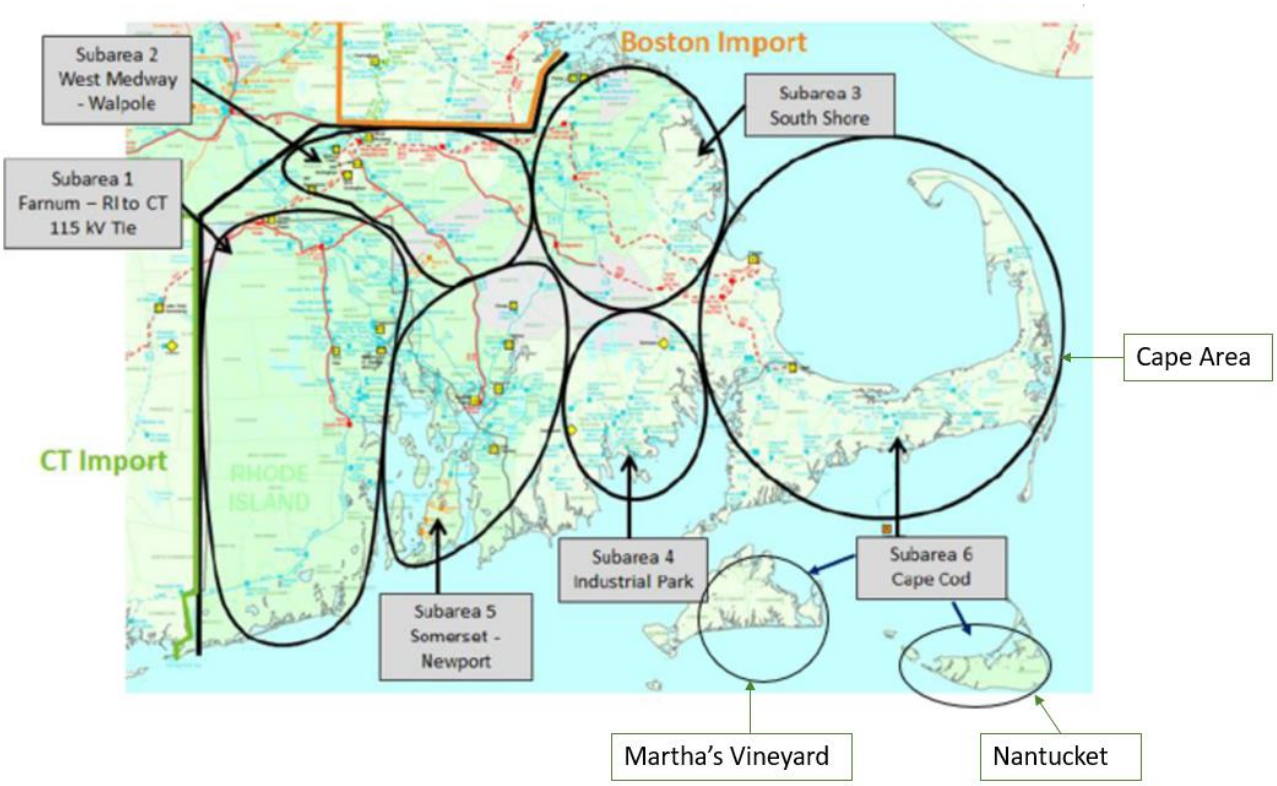
3. The ISO-NE has determined the Project is needed to maintain transmission system capability and the Company has reconfirmed the need based on its updated analysis.

4. The 115-kV circuit separation satisfies the Department's standards under Section 72 because the Project is needed and will serve the public interest by increasing the reliability of the regional electric transmission system.

## II. DESCRIPTION OF EXISTING TRANSMISSION SYSTEM

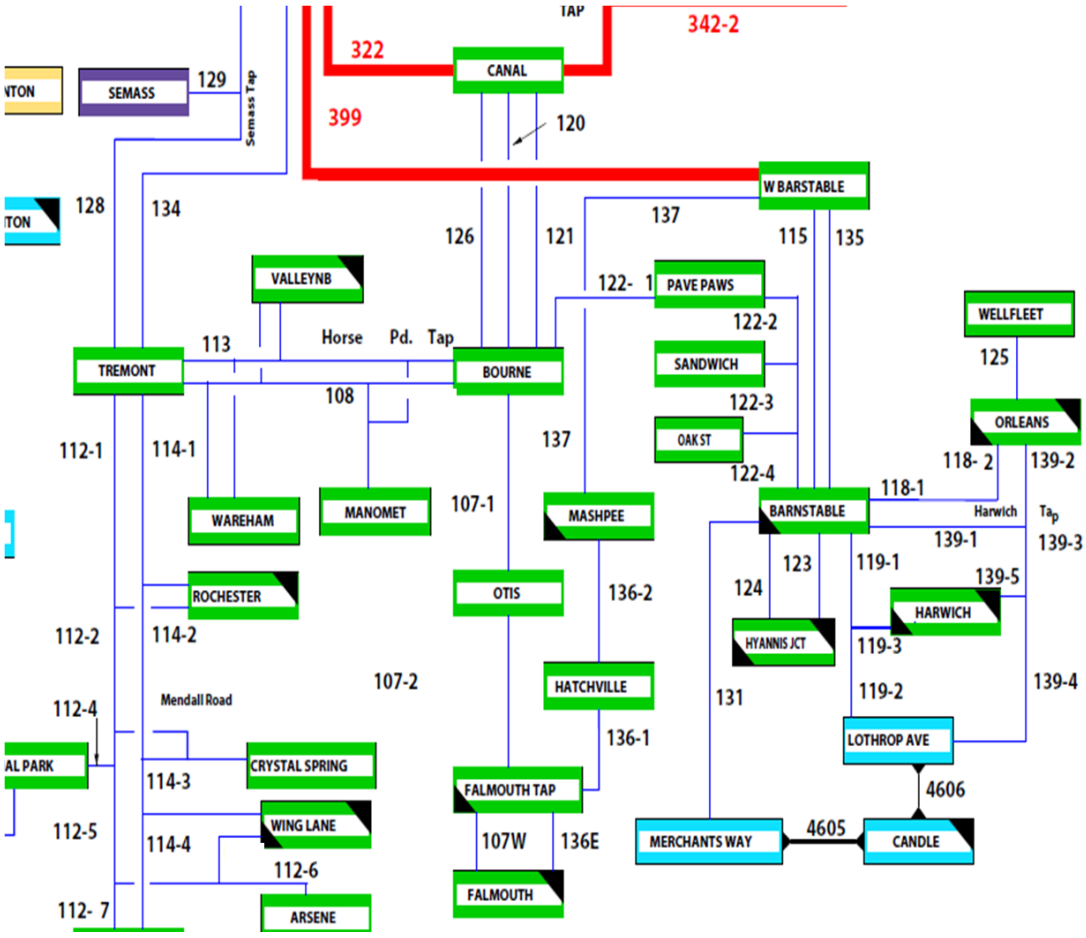
5. The transmission system configuration in the SEMA-RI Area is shown in Figure 1, below. The SEMA-RI Working Group identified six general geographic need areas. Subarea 6 (the "Cape Cod Subarea") includes a southeastern portion of Plymouth County, Cape Cod and the islands of Martha's Vineyard and Nantucket.

**Figure 1 Existing SEMA-RI Area Transmission System**



6. As shown in Figure 2, below, the primary transmission system for the Cape Cod Subarea runs west to east, from Bourne Switching Station to West Barnstable Substation to Barnstable Switching Station to Harwich Tap before continuing eastward to the Orleans Substation. From the Orleans Substation, a single 115-kV overhead transmission line extends to the north to the Wellfleet Substation. Transmission facilities from the Cape Cod Canal, easterly to the Barnstable Switching Station are pool transmission facilities ("PTF"). Transmission facilities to the east of the Barnstable Switching Station are "radial" transmission facilities fed by three 115-kV transmission lines, referred to as local transmission facilities ("LTF"). For approximately 3.3-miles between West Barnstable Substation and Barnstable Switching Station, two of the 115-kV transmission lines (Lines 122 and Line 135) are installed on a double-circuit tower ("DCT") and the third line, Line 115, is on monopole steel structures. An outage consisting of the loss of the single-circuit 115-kV line followed by the loss of the 115-kV DCT, results in a loss of more than 300 MW of load served from the West Barnstable Substation affecting the Eastern Cape and Nantucket.

**Figure 2 Cape Cod Subarea Transmission System Detail**



## III. PROJECT OVERVIEW

### A. Project Description

The following describes the Project elements.

7. Circuit Separation. The Project includes separating approximately 3.3 miles of the existing overhead 115-kV Line 122 and 115-kV Line 135 by moving Line 135 conductors from the DCT to a new set of monopole support structures to be constructed within the existing Eversource ROW from Shootflying Hill Road to the Barnstable Switching Station ("ROW 343"). The existing 115-kV circuits (Lines 122 and 135) are located on the north side of the ROW, and the new structures will be located in close proximity to the existing DCT (see Attachment A, Figures 6 through 9). The line separation will require the addition of 28 new galvanized steel monopole structures on concrete caisson foundations to support the re-located circuit (see Attachment B, Project Plans). The majority of the structures are the same height or lower than their adjacent DCT. Ten structures are up to 12 feet taller than their adjacent DCT. An additional, approximately 0.5 miles of replacement OPGW will also be installed within existing Eversource ROW between where Martha's Way abuts the ROW and Shootflying Hill Road ("ROW 345").[4]

8. West Barnstable Substation and Barnstable Switching Station. There will be no significant station work required for the Project at either the West Barnstable Substation or the Barnstable Switching Station as there are existing 122 and 135 Lines that are connected to the stations with existing terminal equipment.

[4] See Attachment A, Figures 1 and 2 for a depiction of the ROWs being described and Attachment A, Figure 3 for the extent of proposed Project-related activities.

**B. Project Cost**

9. The current cost estimate for the Project is approximately $10.8 million (2019 dollars), estimated at a planning grade level (-25%/+25%).

**C. Construction Schedule**

10. Construction is proposed to occur over an approximate 14-month period, with an in-service date of December 2021. A detailed construction schedule will be prepared in coordination with the construction contractors prior to construction commencement.

## IV. COMMUNITY OUTREACH

11. 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 the overall Project schedule, and explaining the permitting and siting processes, including opportunities for public input. The Company will continue these efforts during the siting and permitting process and will maintain a focused communications program throughout construction, including outreach to municipalities and local businesses along the route with regard to construction staging and laydown plans 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.

12. There are 196 parcels within 300 feet of the ROW, many of which are undeveloped and/or have duplicate property owners. Of the properties directly abutting the ROW, there are 30 with homes or businesses. The Company conducted door-to-door outreach to all these properties

and either spoke directly with property owners about the Project scope and anticipated schedule or left notifications offering individual meetings. In-person meetings were held with businesses utilizing property within and along the edge of the ROW to discuss anticipated impacts and solicit feedback. Based on this feedback, the Company will sequence construction to avoid the peak tourist season. When construction begins, the Company will also reach out to all businesses utilizing the ROW to coordinate traffic flow with deliveries. To date, none of the abutting residents has expressed any specific concerns to the Company regarding the Project.

13. The Company also held a public information session on March 12, 2019 at the Hyannis Golf Course (an abutting property owner) to provide the public with another opportunity to interact with the Project's subject matter experts and discuss their concerns.[5] The information session provided information on the need for and benefits of the Project, the siting process, route selection, Project design and location, schedule and construction activities. Since there was a light turnout, perhaps due to the large amount of undeveloped land along the ROW and the high possibility that residences along the Project route are not occupied year-round, the Company sent out a mailer on May 2, 2019 to property owners providing an overview of the Project scope, the anticipated schedule, and an offer for individual meetings or phone calls with subject matter experts to ask questions and share concerns.

14. The Company has met regularly with municipal officials and other stakeholders in the Town of Barnstable. A list of such outreach meetings is provided in Table 1.

[5] The Company mailed invitations to the public information session to abutting property owners within 300 feet of the Project Route and the referenced substation facilities, and to municipal officials in Barnstable. The introduction letter will also be mailed to all abutting property owners within 300 feet of the Project Route and referenced substation facilities with a notification to Town officials.

**Table 1 Summary of Project Outreach Meetings**

| Date | Group | Topic |
|---|---|---|
| August 10, 2018 | Town of Barnstable Assistant Town Counsel | Discussions about easement rights for the proposed Mid-Cape Reliability Project and an introduction to the proposed Barnstable Reliability Project |
| September 7, 2018 | Hyannis Golf Course Director and Facilities Manager | Provide a Project overview and discuss proposed work on the Town-owned golf course |
| January 22, 2019 | Hyannis Honda | Provide a Project overview and discuss anticipated timeline and impacts to property |
| January 22, 2019 | Shepley Wood Products CFO and Facilities Manger | Provide a Project overview and discuss anticipated timeline and impacts to property |
| January 29, 2019 | Cape Cod Brewery Manager | Provide a Project overview and discuss anticipated timeline and impacts to property |
| January 29, 2019 | Cape Cod Aggregates | Provide a Project overview and discuss anticipated timeline and impacts to property |
| February 8, 2019 | Town of Barnstable Assistant Counsel | Discuss next steps for an easement agreement with the Town in regard to the proposed Mid-Cape Reliability Project and arrange for a meeting to discuss the proposed Barnstable Reliability Project and the impacts on the Town-owned golf course |
| February 22, 2019 | Town of Barnstable Assistant Counsel, Town of Barnstable Engineer, Hyannis Golf Course Director, Barnstable Club Professional Golfer, Hyannis Golf Course Facilities Manager | Provide a Project overview and discuss the timeline and anticipated impacts on the golf course and ways to mitigate them |

15. 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. Institute a toll-free number for the Project Hotline (800-793-2202). The Project Hotline number will be listed in all Project outreach materials, including fact sheets, subsequent mailings, 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 (TransmissionInfo@eversource.com) in all Project outreach materials, including fact sheets, subsequent mailings, 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 the local police of the construction schedule. All notifications will occur as soon as it is practicable. 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

16. G.L. c. 164, § 72 ("Section 72") requires, in relevant part, that electric companies seeking approval to construct a transmission line must file with the Department a petition 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 [D]epartment, 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.

17. The Department considers all aspects of the public interest in making a determination under Section 72. See Boston Edison Co. v. Town of Sudbury, 356 Mass. 406, 419 (1969); NSTAR Electric Company d/b/a Eversource Energy, EFSB 16-02/D.P.U. 16-77, at 77 (2018) ("Eversource Needham"); 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 151-52 (2018) ("Eversource/NEP Woburn-Wakefield"); NSTAR Electric Company, D.P.U. 13-177/13-178, at 41 (2015) ("NSTAR Seafood Way"); NSTAR Electric Company, D.P.U. 13-126/13-127, at 40 (2014) ("NSTAR Electric Avenue"). Section 72, for example, permits the Department to prescribe reasonable conditions for the protection of the public safety. Boston Edison, 356 Mass. at 419-20. All factors affecting any phase of the public interest and public convenience must be weighed fairly by the Department in a determination under Section 72. Town of Sudbury v. Department of Pub. Utils., 343 Mass. 428, 430 (1962).

18. In evaluating petitions filed under Section 72, the Department examines: (1) the need for, or public benefits of, the present or proposed use (see Eversource Needham at 77-78; Eversource/NEP Woburn-Wakefield at 151-52; NSTAR Seafood Way at 41); (2) the environmental impacts or any other impacts of the present or proposed use (see Eversource Needham at 77-78; Eversource/NEP Woburn-Wakefield at 152; NSTAR Seafood Way at 41; NSTAR Electric Avenue at 40); and (3) the present or proposed use and any alternatives identified (see Eversource Needham at 77-78; Eversource/NEP Woburn-Wakefield at 151-52; NSTAR Seafood Way at 41).

19. 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 transmission line is necessary for the proposed purpose, will serve the public convenience and is consistent with the public interest. Save the Bay, Inc. v. Department of Public Utilities, 266 Mass. 667, 680 (1975); Town of Truro v. Department of Public Utilities, 365 Mass. 407 (1974); NSTAR Electric Company, D.P.U. 07-60/07-61, at 2-6 (2008). The Department is required to undertake "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 which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964).

## VI. NEED FOR THE PROPOSED PROJECT

### A. Transmission Planning Standards

20. Eversource must adhere to reliability standards and criteria that are established under the purview of the North American Electric Reliability Corporation ("NERC"), which has authority to ensure the reliability of transmission systems across most of North America. NERC

oversees a number of regional councils, one of which is the Northeast Power Coordinating Council ("NPCC"), which covers 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, and also encompass the more general NERC standards. In turn, ISO-NE develops standards and criteria that are specific to New England but are also coordinated with the NPCC. 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, ('NPCC Directory #1'), "Design and Operation of the Bulk Power System;"
- ISO-NE Planning Procedure 3 ("PP3"), "Reliability Standards for the New England Area Bulk Power Supply System;"[6] and

[6] In 2017, PP3 was revised and renamed as the "Reliability Standards for the New England Area Pool Transmission Facilities." The ISO-NE SEMA-RI area 2026 Needs Assessment and Solution Study that identified the need for the Project were developed prior to issuance of the latest revision of ISO-NE's PP3, which was issued on February 10, 2017. Prior to ISO-NE's revision of PP3, solutions identified to address certain N-1-1 contingencies that include a DCT contingency, which are required to be evaluated to comply with NPCC Directory #1, were included in the ISO-NE's Regional System Plan ("RSP") and their associated costs were recovered via regional transmission rates per the ISO-NE Open Access Transmission Tariff ("OATT"). Under the ISO-NE's revised PP3, such solutions will be included in the "Local System Plan" ("LSP"), the plan developed by the local transmission owner, and their associated costs will be included in the local transmission owner's respective Schedule 21 of the OATT for local service provided by that local transmission owner.

- ISO-NE Planning Procedure 5-3, "Guidelines for Conducting and Evaluating Proposed Plan Application Analyses."

B. ISO-NE Planning Process

21. Under the Federal Energy Regulatory Commission's regulatory authority, ISO-NE, an independent, not-for-profit corporation, is authorized to perform three critical, complex, interconnected roles for the New England region, which encompasses all of 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: doing studies, analyses, and planning to make sure New England's electricity needs will be met now and into the future. Together, these three 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 – today and for future generations.

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

23. Needs assessments are designed to identify future system needs on the regional transmission system, or within a sub-area of the system, with consideration of available market solutions. Needs assessments examine various aspects of system performance and capability, identify the timing and details of system needs, and analyze whether pool transmission facilities ("PTFs") in the New England transmission system: (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.

24. The ISO-NE annual 10-year transmission plan is referred to as the Regional System Plan ("RSP"). The RSP represents a compilation of the regional system planning process activities conducted by ISO-NE and stakeholders during a given year and presents the results and findings of the ongoing ISO-NE regional planning process. The RSP addresses system needs and deficiencies as determined by ISO-NE through its periodic needs assessments, with updates occurring on a going forward basis to: (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 Company's planning process is integrated with and coordinated by ISO-NE as part of its regional planning process and annual RSP.

25. For major transmission upgrades, the regional transmission planning process includes the following steps: (i) system needs are identified through a periodic needs assessment undertaken by ISO-NE subject to stakeholder review and input; (ii) regulated transmission solutions are suggested to meet identified system needs; (iii) solution studies are prepared to

identify the most cost-effective regulated transmission solution; (iv) proposed regulated transmission solutions are reviewed and approved by ISO-NE; and (v) a transmission cost allocation review is conducted.

26. The regional planning process is carried out by ISO-NE as part of an open and transparent stakeholder process involving the NEPOOL Reliability Committee, the Environmental Advisory Group and the PAC. Membership in the PAC includes market participants, public utility commissions, consumer advocates and Attorneys General, environmental regulators and other interested parties. The PAC provides input and feedback to ISO-NE regarding the regional system planning process including, in the context of the development and review of needs assessments, the preparation of solution studies and the development of the RSP. Specifically, the PAC serves to review and provide input on: (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, including but not limited to, the Markets Committee, Reliability Committee and the Transmission Committee, for further investigation and consideration of potential changes to rules and procedures.

The Barnstable Reliability Project is part of a larger plan to reinforce the Southeastern Massachusetts transmission system and to bring the system into compliance with applicable national and regional reliability standards. The Project is one of twenty-five individual transmission projects to emerge from a transmission study conducted by the ISO-NE Southeastern Massachusetts and Rhode Island ("SEMA-RI") Working Group, made up of representatives from

ISO-NE, Eversource and National Grid. The study, the SEMA-RI Area 2026 Needs Assessment ("Needs Assessment"), was completed in 2016. The Needs Assessment evaluated system needs under various operating conditions over a 10-year planning horizon (out to 2026). As described more fully below and as documented in the Needs Assessment, certain existing 115-kV lines serving the Cape Cod Subarea would overload under various contingencies at existing peak load levels, which would lead to a voltage collapse and the consequent loss of service. Thus, there is an immediate and substantial need to address reliability issues in the Cape Cod Subarea. Various generation dispatches with one and two generating units out of service were studied. Both N-1 and N-1-1 contingency conditions were evaluated. The Needs Assessment results were presented at the March 22, 2016 Planning Advisory Committee ("PAC") meeting and documented in the written Needs Assessment issued in May 2016, provided as Attachment C. ISO-NE issued a Second Addendum to the Needs Assessment to document the Project need in July 2018.[7]

[7] The Project need was identified during the SEMA/RI Needs Study development in 2016, which was intended to be documented in the original Needs Assessment issued in May 2016. The Project need and several other projects' needs were accidently omitted from the original Needs Assessment report but was considered and documented in the related Solution Study. ISO-NE issued a First Addendum to the Needs Assessment in October 2016. The October 2016 First Addendum to the Needs Assessment documented two omitted needs that were irrelevant to the Barnstable Reliability Project (see Attachment D). ISO-NE issued a Second Addendum to the Needs Assessment to document the Project need in July 2018. The Second Addendum Analysis Report issued in July 2018 is provided as Attachment E to this Petition. Attachments C, D and E have 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.

27. The Needs Assessment includes six general geographic need areas within the larger SEMA-RI area, referred to as "Subareas." The proposed Project is intended to address needs identified in the portion of the Cape Cod Subarea in Figure 2 above, which is defined by the Oak Street, Hyannis Junction, Candle Street, Harwich, Orleans and Wellfleet Substations ("Cape Cod Load Pocket").

28. Once the needs were identified, the Working Group evaluated possible solutions to the identified needs. The preliminary solutions were presented at the December 14, 2016 ISO-NE PAC meeting and were published in the Southeastern Massachusetts and Rhode Island Area 2026 Solutions Study issued in March 2017 by ISO-NE (the "Solutions Study"). A determination on the Proposed Plan Application for the solutions was issued by ISO-NE on May 4, 2017. A copy of the Solutions Study is provided as Attachment F and a copy of the May 4, 2017 ISO-NE determination is included in Attachment G.[8] As described in the Solutions Study, the Project was selected as the preferred solution to address the risk of consequential load interruption in the Cape Cod Load Pocket, which was projected to exceed 300 MW for the duration of the study period under certain N-1-1 contingency conditions. The Project will eliminate the potential for power outages under certain system operating conditions that could negatively affect approximately 115,000 Eversource customers, as well as approximately 13,000 National Grid customers on Nantucket.

[8] Attachment F 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.

29. To identify the needs in SEMA-RI, the ISO-NE Working Group used load flow analysis 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;
  - 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.

30. The primary goal of load-flow analysis 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,[9] or result in unacceptable voltage levels.[10] The loading capability of a given transmission element is a function of the element's heat-dissipation capability, and therefore, this

[9] 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 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.

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

analysis is also referred to as a thermal analysis. In addition, according to ISO-NE Transmission Planning Technical Guide,[11] ISO-NE studies whether N-1 or N-1-1 contingencies could cause consequential load loss approaching or exceeding 300 MW of customer load in load pockets within the system.[12]

B. Summary of Needs Assessment for Cape Cod Load Pocket

31. The Needs Assessment evaluated transmission system reliability over a long-term (ten-year, 2026) planning horizon, based on the 2015 Capacity, Energy, Loads, and Transmission ("CELT") Report,[13] which was the most recent CELT Report available at the time the Needs Assessment was performed. As described below, summer peak 90/10[14] load conditions for the affected Cape Cod Load Pocket were determined by subtracting estimates for passive demand resources ("DR"), energy efficiency ("EE") and photovoltaic ("PV") generation. Under certain contingency conditions, the transmission lines and local generation serving the Cape Cod Load Pocket are not adequate to meet demand.

32. Demand resources reduce end-use demand for electricity from the power system. They include two general types: (1) Active DR (activated only when needed by ISO-NE); and (2) Passive DR (designed to save electricity use at all times). Passive and Active DR were modeled

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[11] ISO-NE Transmission Planning Technical Guide, published on November 14, 2017 is available at https://www.iso-ne.com/static-assets/documents/2017/11/transmission_planning_technical_guide_rev2.pdf.

[12] 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.

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

[14] 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.

as load reductions, that is, the customer load that must be met by dispatching generation resources is reduced by the amount of load represented by DR. Passive DR included Passive DR that bid into and were ultimately selected in Forward Capacity Auction ("FCA") #9 [15] conducted by ISO-NE as Forward Capacity Market ("FCM") resources. This "cleared" 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 cleared FCA #9, multiplied by a 75% factor based on historical performance of similar resources. The 2026 load flow base cases used for the SEMA-RI study had the demand resource assumptions as shown in Attachment C, pages 14 and 15. For the stations affected by voltage collapse, the passive DR and the EE forecasts (Table 3-2 of Attachment C) are taken into consideration when calculating the amount of consequential load loss. The Active DR at these substations is not taken into consideration as that reduction is controlled by ISO-NE and only implemented when the transmission system is operating in a capacity deficiency due to loss of generation.

33. The 2015 CELT PV generation forecast includes the PV generation that has been installed as of the end of 2014 and provides a forecast of the total PV by state and voltage level that is 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.[16] As shown in Table 2 below, the level of consequential loss of load for the

[15] 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.

[16] Per ISO-NE SEMA-RI Area 2026 Needs Assessment, Attachment C at 11.

Cape Cod Load Pocket based on the 2015 CELT data is 373 MW for the 2026 study year.

**Table 2 2026 Forecasted Summer Peak Loads (MVA) for the Cape Cod Load Pocket based on 2015 CELT Report (minus passive DR, EE forecast, PV forecast)**

| Station | Load (MW) | Passive DR | PV | EE | Net Load |
|---|---|---|---|---|---|
| Oak Street | 53.1 | -3.5 | -1.6 | -2.4 | 45.6 |
| Hyannis_J | 100.3 | -6.7 | -2.9 | -4.5 | 86.2 |
| Candle St | 63.4 | -4.2 | -1.8 | -2.9 | 54.5 |
| Harwich | 86.0 | -5.7 | -2.5 | -3.9 | 73.9 |
| Orleans | 88.2 | -5.8 | -2.5 | -4.0 | 75.9 |
| Wellfleet | 42.8 | -2.9 | -1.2 | -1.9 | 36.8 |
| Total | 433.8 | -28.8 | -12.5 | -19.6 | 372.9 |

34. Generation projects in New England with a Forward Capacity Supply Obligation ("CSO") as of FCA #9 were also modeled in the study base case. In addition, two generators that received CSOs in FCA #10 in the SEMA-RI area were also included: (1) QP-449 – Canal #3 (333 MW); and (2) QP-489 – Burrillville Energy Center (485 MW).

35. Non-price retirements ("NPRs") from FCA #9 were included in the base case, as well as the one NPR from FCA #10 in the SEMA/RI area, Pilgrim Nuclear Power Station, which was retired on May 31, 2019. The unit was modeled out of service in all cases. Please see Attachment C, pages 11 and 12, for a complete list of the NPRs modeled in the base case.

36. In the vicinity of the Cape Subarea, generation resources include the Canal 1 and 2 generating units, with nameplate capacity of 568 MW and 558 MW, respectively. The Canal 3 generating unit with nameplate of 425 MW is in construction and scheduled to be on-line in 2019. The dispatch of the existing Canal generating units does not have a significant impact on the need for additional thermal capacity for the supply to the Cape Cod Subarea. This is because these generating units are outside the impacted Cape Cod Load Pocket.

37. Martha's Vineyard and Nantucket each have small diesel generators. On Martha's Vineyard, there are five (5) backup diesels, 2.5 MVA each, with a total capacity of 12.5 MW. Nantucket has two diesel generators capable of 3 MW each. Martha's Vineyard is located outside the Cape Cod Load Pocket. While Nantucket generation is located inside the Cape Cod Load Pocket, these diesel generators are too small to have any significant impact. There is no other generation in the Cape Subarea that can have an effect on the supply limitation to the impacted Cape Cod Load Pocket.

Although the SEMA-RI Needs Assessment evaluated 33 generation dispatch cases representing a range of possible generation dispatch and availability conditions applied to 3 different sets of interface level conditions for a total of 99 cases, generation dispatch has no significant impact on the identified consequential load loss in Table 2 since there is no non-intermittent generation in the Cape Cod Load Pocket except for the small diesel generating units on Nantucket Island.

38. The Needs Assessment presents an evaluation of the Cape Cod Subarea and determined that the Cape Cod Load Pocket could not be reliably served in the event of the N-1-1 contingency. With the existing common transmission lines serving the Cape Cod Load Pocket and a lack of significant generation in the area, the Cape Cod Load Pocket is subject to a potential consequential load loss exceeding 300 MW for the duration of the study period ending in 2026.

39. Since the time of the Needs Assessment, additional CELT forecasts have been published, including, most recently, the 2019 CELT Report. In general, the newer forecasts project lower load growth, due to greater energy efficiency and distributed generation, than did the 2015 CELT Report.

40. The Company updated the Needs Assessment to account for the 2019 CELT Report. The updated assessment demonstrates the potential consequential load loss continues to exceed 300 MW for the duration of the study period and beyond for the same N-1-1 contingency originally assessed. For example, as shown in Table 3 below, the updated forecast level of consequential loss of load for the year 2026 is 319 MW, as compared to the Needs Assessment forecast of 372 MW shown in Table 2. As with the Needs Assessment, generation dispatch continues to have no significant impact on the identified consequential load losses. The Company's updated analysis verifies that the Project is still needed to resolve the consequential load loss identified in the Needs Assessment.

**Table 3 2026 Forecasted Summer Peak Loads (MVA) for the Cape Cod Load Pocket based on 2019 CELT Report (minus passive DR, EE forecast, PV forecast)**

| Station | Load (MW) | Passive DR | PV | EE | Net Load |
|---|---|---|---|---|---|
| Oak Street | 45.7 | -4.4 | 0.0 | -8.3 | 33.0 |
| Hyannis_J | 101.4 | -9.7 | 0.0 | -18.4 | 73.3 |
| Candle St | 87.9 | -5.5 | 0.0 | -16.0 | 66.4 |
| Harwich | 92.1 | -8.8 | -0.3 | -16.7 | 66.3 |
| Orleans | 69.5 | -6.6 | 0.0 | -12.6 | 50.2 |
| Wellfleet | 41.3 | -3.9 | 0.0 | -7.5 | 29.8 |
| Total | 437.9 | -38.8 | -0.3 | -79.6 | 319.2 |

## VII. ALTERNATIVES CONSIDERED

41. With the electric system reliability needs identified by ISO-NE in the 2016 Needs Assessment and documented in the July 2018 Addendum thereto, the Working Group next identified and evaluated alternative solutions to address the needs in Cape Cod Subarea 6. The proposed Project was specifically identified as a preferred solution in the Solutions Study (see Attachment F, Table 1-1, ID 25 on p. 3, "Separate the 122/135-line DCT") to address the potential consequential load loss in the Cape Cod Load Pocket.[17]

42. In reviewing potential alternatives to the Project, the Company evaluated: (1) a "No-Build" alternative; (2) transmission alternatives; and (3) non-transmission alternatives ("NTA"), such as incremental energy efficiency ("EE"), distributed generation ("DG"), demand response, energy storage and new generation. As supported below, the Company has analyzed and confirmed that the proposed Project, on balance, best meets the identified need, with a minimum impact on the environment, and at the lowest possible cost.

1. No-Build Alternative

43. Under the No-Build Alternative, the Company would not pursue any new facilities or resources to address the identified transmission reliability need in the area. Although a no-build approach would have no direct environmental or cost implications, the contingency consequential

[17] The limiting N-1-1 DCT contingency addressed by the Project involves lines that are elements of the Bulk Power System; thus, the Project is necessary to achieve compliance with NPCC Directory #1. To comply with NPCC Directory #1 criteria that requires the N-1-1 contingency testing of the system, ISO-NE has determined it must address consequential load loss approaching or exceeding a 300 MW threshold. In addition, ISO-NE applies the revisions to PP3 prospectively and does not interpret the revisions relating to DCT contingencies to affect time-sensitive needs previously identified in the SEMA-RI Study, as articulated in correspondence from ISO-NE to the PAC on February 24, 2017 on page 2 (see Attachment H). Time-sensitive needs are needs that arise within three years of issuance of the SEMA-RI Study. By this definition, the Project need is time-sensitive.

load loss would remain unaddressed, and the transmission system would not meet mandatory transmission reliability planning standards and criteria that support the need for this Project. Because it does not meet the need identified above and would not satisfy applicable transmission planning reliability criteria, the No-Build Alternative was not considered further.

2. Transmission Alternatives

44. Two transmission system alternatives were assessed to address the N-1-1 contingency and reliability need described above: (1) the Project; and (2) the construction of a new transmission line in the same ROW (Transmission Alternative).

45. The Project separates the existing 115-kV Lines 122 and 135 starting at the DCT approximately 0.7 miles east from West Barnstable Substation (the first structure of DCT) for 3.3-miles to Barnstable Switching Station (see Attachment A, Figures 6 and 8). Line 135 would be relocated to new monopole structures adjacent to the DCT in this same segment, as shown in Attachment A, Figures 7 and 9. No new structures are necessary to accommodate Line 135 at either the West Barnstable Substation or Barnstable Switching Station. The existing bus positions at West Barnstable Substation and Barnstable Switching Station will be used for the newly rebuilt Line 135. Existing Line 122 will remain in place on the existing structures.

46. Environmental impacts associated with the Project are minimal and largely restricted to the construction period because: (1) the ROW is already cleared and maintained for electric transmission purposes; and (2) the ROW has wetlands in only two locations and one rare plant species in one location, which will not be altered as a result of Project construction, and the ROW has no waterways or significant archaeological and cultural resources. Similarly, because the Project does not require the acquisition of new property rights and because construction

activities will largely be restricted to the ROW itself, impacts to the human environment, such as traffic congestion, construction noise, and removal of vegetative screening would be limited. Construction of the new structures would represent an incremental increase of an existing land use and would not be expected to represent a significant impact on the community. From a visual perspective, addition of the new structures would occur within an existing ROW and, while it would represent an expansion of an existing use, the ROW would not look significantly different than the existing condition. Lastly, as will be discussed in more detail below, construction-related impacts to land and vegetation within the existing ROW can be offset through implementation of best management practices and appropriate mitigation measures.

47. The Transmission Alternative is a new 4.0 mile, 115-kV line from West Barnstable Substation to Barnstable Switching Station located entirely within the existing Line 122/Line 135 ROW (see Attachment A, Figure 4). It would require a new switching position at both West Barnstable Substation and Barnstable Switching Station. The Transmission Alternative would also require underground transmission connections at both stations as well as the relocation of approximately 0.7 miles of an overhead distribution line between Oak Street Station and Shootflying Hill Road.

48. While the Transmission Alternative meets the defined Project need, the construction of a new transmission line would cost approximately $42.6 million (2019 dollars) (-25%/+50%) and would have additional environmental impacts beyond those associated with the Project. The Transmission Alternative involves building a new 115-kV line along ROW 342 and 343 between West Barnstable Station and Barnstable Switching Station for approximately 4.0 miles. There are no remaining switching positions at either the West Barnstable Station or the

Barnstable Switching Station, therefore this alternative would require expansion of the yards. Specifically, at the West Barnstable Station, the fence would need to be expanded to the west to make room for an air insulated bay of 115-kV circuit breakers and associated terminal equipment. At the Barnstable Switching Station, the fence would need to be expanded to the north to make room for a gas insulated bay of 115-kV circuit breakers and associated terminal equipment.

3. Transmission Alternatives Comparison & Conclusions

49. Each of the proposed transmission alternatives would eliminate the identified N-1-1 contingency and meet the identified need. While the Transmission Alternative is arguably more robust because it would involve adding an additional transmission line beyond what is provided by the Project, such an additional transmission line is not necessary at this time; thus, the two alternatives are considered to be comparable with respect to reliability.

50. The cost of the Project is approximately $31.8 million less than the Transmission Alternative. Therefore, the Project is preferable from a cost perspective.

51. From an environmental perspective, both the Project and the Transmission Alternative involve overhead construction of an electric transmission line within the existing Eversource ROWs 342, 343, and 345. Construction of either project would be designed to fully comply with applicable local, state and Federal environmental regulations and permit/approval conditions, including any necessary restoration measures.

52. A desktop review was performed using the most current, publicly available environmental and social data layers from the Massachusetts Geographic Information System ("MassGIS") website for both the Project and Transmission Alternative. The data layers evaluated include land use, traffic/public roads, noise, aerial orthophoto imagery, wetlands,

hydrography/stream crossings, vernal pools (certified and potential), Natural Heritage Endangered Species Program ("NHESP"), state-listed rare species habitat, Outstanding Resource Waters ("ORWs") including public water supplies, urban boundaries, Massachusetts Department of Environmental Protection ("MassDEP") Tier Classification 21E Sites, MassDEP Oil and/or Hazardous Material Sites with Activity and Use Limitations ("AUL"), Areas of Critical Environmental Concern ("ACEC"), and other MassGIS data layers for which no data exists for the Project ROW. Cultural resource analysis research was conducted at the Massachusetts Historical Commission ("MHC"), both online and at its office in Boston.

53. The Transmission Alternative is slightly longer than the Project, includes the construction of more transmission towers, approximately 0.7 miles of distribution relocations, and requires significant station work at both the West Barnstable Station and the Barnstable Switching Station, as there are no remaining switching positions at either station, thereby requiring expansion of the yards. Additionally, the Transmission Alternative would also require underground transmission connections at both stations. While consistent with the Project, whereby the environmental impacts associated with the Transmission Alternative would largely be restricted to the construction period, the Transmission Alternative would result in greater land disturbance over a longer construction period as a result of the larger number of transmission towers and associated spur roads, distribution relocations, trenching for the underground connections at both stations, and expansions at both yards. However, the Transmission Alternative would result in permanent alterations to land use associated with the expansions at both station yards, which is not required for the Project. As such, impacts to the human environment, such as traffic congestion, construction noise, dust, land use, and removal of vegetative screening would be greater for the

Transmission Alternative as compared to the Project. As a result, the Transmission Alternative costs $31.8 million more than the Project, takes more time to construct and has slightly greater environmental impacts. As a result, the Project is superior when comparing cost and environmental impact.

4. Non-Transmission Alternatives

54. At the outset of the NTA assessment, the Company conducted an analysis to determine the amount of energy injection required (in terms of MW) and location of those energy requirements (new resources), to address transmission reliability needs in the Cape Cod Subarea without constructing the proposed Project. This assessment considered the reliability needs for the transmission system serving the Cape Cod study area under N-1-1 contingency conditions projected for 2026 assuming the 2019 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 project 2026 transmission systems absent construction of the Project.

55. The minimum level of resources necessary to resolve the projected consequential load loss from the N-1-1 contingency addressed by the Project is the 319.2 MW as shown in Table 3. This amount of resources could be located at Barnstable Switching Station, or potentially at other substations further to the east, such as Hyannis, Harwich, Orleans, or Wellfleet.

56. Because viable NTA technologies must address the load loss that results from N-1-1 contingencies as discussed above, the NTA technologies must be capable of supplying the entire load served from Barnstable Switching Station and substations further to the east for the duration of the contingency event. Some NTA technologies are ineffective in this scenario because they

can support the load only temporarily or reduce the load. Therefore, as described below, the Company's NTA analysis focused on technologies that could support load for up to 12 hours. This estimate is based on an assumed 12-hour duration of a transmission contingency, which ensures comparability with how transmission line ratings are developed.

57. In addition to the 118.7 MW of EE and DG that is already included in the 2019 load forecast for the Cape Cod area and in the Company's reassessment of the need for the Project, the Company considered whether known generation and energy storage projects under development on the Cape could be utilized as an alternative to the proposed Project.

58. The Company first considered whether proposed large-scale, transmission-connected generation projects in the ISO-NE Interconnection Queue could be utilized as an alternative to the proposed Project. More specifically, the ISO-NE Interconnection Queue currently contains a proposed 800 MW offshore wind project (Vineyard Wind), which has proposed to interconnect at the Barnstable Switching Station. As of February 11, 2019, Vineyard Wind had completed a System Impact Study and received ISO-NE approval on their Proposed Plan Application.[18] On February 5, Vineyard Wind also obtained a Capacity Supply Obligation of 54 MW in ISO-NE's 13th Forward Capacity Auction. After approval of its Proposed Plan Application, Vineyard Wind will need to execute an Interconnection Agreement with Eversource

[18] Vineyard Wind Proposed Plan Application Approval Letter: https://www.iso-ne.com/static-assets/documents/2019/04/vineyard_wind_generation_and_transmission_i_3_9_letter.pdf.

and ISO-NE prior to starting construction. Vineyard Wind will also need to complete several other milestones, including completing the balance of its environmental permitting and securing all financing necessary to commence and complete construction of the project.[19]

59. In general, many proposed generation projects withdraw at various stages of the ISO-NE interconnection process, and projects that have not received an approved Proposed Plan Application and obtained a Capacity Supply Obligation in a Forward Capacity Auction are not considered in ISO-NE or Company planning studies.[20] However, because Vineyard Wind was selected to enter into long-term Power Purchase Agreements with the Company and the other Massachusetts electric distribution companies,[21] the Company gave further consideration to the impact of Vineyard Wind on the need for the proposed Project.

60. The Company evaluated whether the energy injection from Vineyard Wind could contribute to the NTA injection requirement, and concluded it could not, for several reasons. First, the Project received Proposed Plan Application approval from ISO-NE prior to the initiation of the System Impact Study for Vineyard Wind. As a result, the Project was assumed to exist when the System Impact Study for Vineyard Wind was performed by ISO-NE. Deferring or canceling the Project and pursuing a non-transmission alternative to the Project based on the energy injection provided by Vineyard Wind could invalidate the System Impact Study performed for Vineyard

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[19] Vineyard Wind's petitions to the Energy Facilities Siting Board and Department (EFSB 17-05/D.P.U. 18-18/18-19) to build the Massachusetts components of its offshore wind project were approved on May 10, 2019, thereby enabling Vineyard Wind to complete the balance of its state and local permitting in Massachusetts. The Department approved the Power Purchase Agreements on April 12, 2019 in D.P.U. 18-76/18-77/18-78.

[20] ISO-NE Transmission Planning Technical Guide: https://www.iso-ne.com/static-assets/documents/2017/03/transmission_planning_techincal_guide_rev4.pdf [Page 43].

[21] Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid ("National Grid") and Fitchburg Gas and Electric Company d/b/a Unitil ("Unitil").

Wind, potentially leaving Vineyard Wind unable to interconnect. This would require an additional study to identify the transmission upgrades that would be needed to allow for the reliable interconnection of Vineyard Wind. Even if such upgrades could be developed, the length of time to develop, plan, and obtain approvals for such upgrades could delay the in-service date for Vineyard Wind.

61. Aside from whether the Project is necessary to facilitate a reliable interconnection of the Vineyard Wind project, the Company evaluated whether Vineyard Wind by itself could serve as a partial NTA to the Project. If Vineyard Wind were included in the Solutions Study, it would be assumed to operate at an output level of 160 MW (20% of its nameplate capacity) under the ISO-NE Transmission Planning Technical Guide. While this would not meet the full NTA injection requirement, it would cover slightly more than one half of the requirement, leaving a remaining requirement of 159.2 MW.

62. Beyond Vineyard Wind, the Company is aware of three distribution-connected energy storage projects under development on Cape Cod, Martha's Vineyard, and Nantucket. These include two battery storage projects that the Company itself is developing on the Outer Cape and on Martha's Vineyard. The Company anticipates that the projects will be approximately 25 and 14.7 MW, respectively, with the Martha's Vineyard project constructed in two phases.[22] The

[22] See NSTAR Electric Company and Western Massachusetts Electric Company each d/b/a Eversource Energy, D.P.U. 17-05, at 459-465 (November 30, 2017). On November 30, 2018, pursuant to G.L. c. 40A, § 3, the Company submitted a petition to the Department of Public Utilities seeking exemptions from the Town of Oak Bluffs Zoning Bylaws in connection with the Company's proposed battery storage project on Martha's Vineyard. See NSTAR Electric Company d/b/a Eversource Energy, D.P.U. 18-155.

third project is being developed by Nantucket Electric d/b/a National Grid.[23] The Company understands that this project will add approximately 6 MW of net injection on Nantucket. All three projects are being developed to address distribution reliability needs.

63. Of these three projects, the Martha's Vineyard project has no impact on the need for the proposed Project, because it is electrically connected to the Cape in Falmouth, west of Barnstable Switching Station. While the Nantucket and Outer Cape projects could contribute approximately 31 MW towards meeting the NTA injection requirement, additional power injection of approximately 128.2 MW would still be required, even in combination with the power injection supplied by Vineyard Wind. All proposed resources beyond the mentioned projects do not have approved contracts, such as CSOs or Power Purchase Agreements, and therefore do not fit the criteria to be a solution.

64. In addition to the known proposals from the distribution utilities and applicable projects in the ISO-NE interconnection queue, the Company considered whether further, hypothetical projects could be developed to meet the remaining NTA injection requirement. Possible NTA technologies include:

- Combined-cycle gas turbines;
- Simple-cycle gas turbines (aero-derivative combustion turbines, and large-frame combustion turbines);
- Utility-scale solar, with and without storage;
- Distribution-scale solar, with and without storage;
- Active demand response; and
- Passive demand response (energy efficiency).

[23] National Grid Local System Plan: https://www9.nationalgridus.com/oasis/non_html/pdf/National%20Grid%20Local%20System%20Plan%202018.pdf.

65. There are a number of practical challenges that would prevent any of these NTAs from being developed. These challenges include the necessary development time, land requirements and infrastructure requirements.

66. The development time for any additional generation connected in the vicinity of Barnstable would likely be lengthy, as additional generation would not be able to move through the ISO-NE Interconnection process until the completion of the interconnection studies for earlier queued projects (including Vineyard Wind, which will likely require the Project in order to interconnect). 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 is anticipated to go into service sometime in 2019. Canal Unit 3 was developed at the site of an existing generator, and the Company would expect a lengthier development time for a large generation project in the vicinity of Barnstable, as a greenfield site would be required.

67. Any NTA would need to be developed in the vicinity of Barnstable Switching Station, or at substations further to the east, and would require an amount of land in this 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, as a practical matter, land compatible with industrial uses would be preferable for a gas-fired generator. For example, if the remaining NTA injection MW need was to be met entirely with battery storage, the Company estimated that at least 20 acres, which is approximately five times the size of the Barnstable Switching Station, would be required for the storage housing alone.

68. Finally, some NTA technologies would require additional accommodating infrastructure. A gas supply lateral to the closest natural pipeline would need to be constructed for any new gas-fired generation, and upgrades to existing pipelines could be required to ensure sufficient 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.

69. While noting the significant practical challenges associated with development of each of the various NTA technologies, the Company also considered the potential costs of developing a hypothetical NTA as an alternative to the proposed Project. The Company concluded that the potential costs of any hypothetical NTA would be significantly higher than the cost of the proposed Project. For example, a battery sized to meet the remaining NTA requirement of 128.2 MW, after the consideration of Vineyard Wind and other projects under development, would cost approximately $420M. There would also be additional costs associated with the acquisition of land, siting and permitting, site preparation, and other necessary activities that are not factored into these estimates. In the Company's experience, these costs often add an additional 35 percent to 50 percent, on top of the cost of a battery storage system. Finally, a battery storage system would require ongoing maintenance, capital replacement and warrantee costs that would exceed those of the Project. Accordingly, the Company concluded that a battery storage system would likely be more costly than the Project.

70. Similar to a battery storage system, the potential costs of other hypothetical NTAs, including turbines, utility-scale and distribution-scale solar, and demand response, would also be significantly higher than the cost of the proposed Project. The least expensive NTA would utilize

fast-start aeroderivative gas turbine technology, and the Company estimates that the cost to install one turbine of sufficient size would be approximately $235 million. All other potential hypothetical NTAs would also have additional costs associated with acquisition of land, siting and permitting, site preparation, and other necessary activities that are not factored into these estimates.

71. The practical challenges related to development of generation in the Project area make NTAs inferior alternatives to the Project. The Company's analysis shows that, while these NTAs hypothetically could meet the identified need, even after accounting for generation under development, they would be unprecedented in scope, costly, and difficult to implement, particularly with an in-service date comparable to that of the Project. Additionally, generation under development in the Project area will require the construction of the Project in order to interconnect to the transmission system. Some NTAs, such as active or passive demand response would have limited to no impact on the environment, while others, such as solar or natural gas-powered generation may have very significant impacts to land, water, and air quality, along with substantial physical disturbances and property rights acquisition. Further, the higher cost to customers of any NTA to the Project,[24] 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. Overall, the Project 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.

[24] The least-cost NTA would be a fast-start aeroderivative turbine, which the Company estimates to be approximately $235 million.

5. Conclusion on Project Alternatives

72. The Company's analysis, as presented herein, demonstrates that the Project will best address the identified need with minimum environmental and construction impacts at the lowest possible cost. In reaching this conclusion, the Company evaluated a No-Build Alternative, transmission alternatives and NTAs.

73. Consistent with the findings of the ISO-NE SEMA-RI Working Group, the Company concluded that the existing system cannot be resolved or mitigated by relying on the existing transmission facility configuration. Accordingly, the No-Build Alternative was dismissed from consideration.

74. Similarly, no feasible or practical NTA or combination of NTAs to this Project would adequately address the identified need. The Company's analysis showed that any potential NTA solution to the identified need would be unprecedented in scope, prohibitively expensive, difficult to implement, present substantial impacts to the environment depending on the NTA selected and would be less flexible and robust in operation than the proposed Project.

75. The Project, on balance, best meets the identified need, with a minimum impact on the environment, and at the lowest possible cost.

## VIII. IMPACTS OF THE PROPOSED PROJECT

76. The following section provides a detailed description of the existing conditions of the Project area and the potential impacts that the Project may have on environmental, cultural and scenic resources. It describes the Project, its relevant environmental impacts, and the methods and measures the Company has identified to avoid, minimize, and/or mitigate the impacts associated with the construction and operation of the Project.

77. The Project has been designed and planned to reduce impacts to the human and natural environment. Specifically, the Company will: (1) construct and operate the Project within an existing maintained transmission line ROW in Barnstable, thereby avoiding the need for new public or private property rights; (2) use the existing double-circuit monopoles for one of the existing circuits; (3) reduce the footprint of the new structures through the use of steel monopole structures with a single foundation; (4) employ existing ROW gravel access roads and will construct new spur roads between approximately 10 feet and 75 feet long within the ROW to access the structures, and (5) implement the Company's construction BMPs, along with federal, state, and local permit requirements and conditions applicable to the Project.

1. ROW Description

78. The Project ROWs (343 and part of 345) are approximately 3.8-miles long, run in an east/southeast direction and are located entirely in the Town of Barnstable. The Project ROWs are approximately 210 - 270 feet in width. The ROWs have been maintained from edge to edge and are generally vegetated with low-growing shrubs and grasses. There are few wetlands or waterways within and/or adjacent to the ROWs. In addition to the Lines 122/135 DCT, ROW 343 is currently occupied by two additional 115-kV overhead transmission lines (Line 115 (wood H-frame structures) for the entire Project route and Line 131 (steel monopole structures) for an approximate 0.6-mile segment of the route), as well as by two 23-kV overhead distribution lines (#80 and #84, for the entire Project route). The portion of ROW 345 involved in this Project is occupied by Line 135 (steel monopole structures), to which OPGW will be added, as well as the 115-kV Line 115 (wood H-frame structures). Crushed stone access roads run the length of the

ROW. The majority of the public road crossings are fenced and gated. See Attachment A, Figures 1 and 2, USGS Locus Map and Aerial Locus Map and Attachment I for representative photographs of the ROW.

2. Construction Phases

79. One circuit on the existing overhead 115-kV line structures will move to a new set of structures that will be constructed south of the existing DCT structures and north of Line 115 along ROW 343. The new structures will be located in close proximity to the existing DCT structures (see Attachment A, Figures 6 through 9). OPGW will be strung for approximately 0.5 miles above Line 135 on ROW 345, as shown in Figure 3 in Attachment A. Limited tree clearing, vegetation removal, side trimming and/or mowing will be required to execute the work and to meet the Company's Vegetation Standards for clearance.[25] All construction activities will occur within the existing ROW or lands upon which Eversource currently has property rights for access. Access for inspections and maintenance is provided via existing crushed stone access roads, which run the length of the ROW; the access roads will need to be smoothed out and re-graded in select locations to facilitate the safe passage of larger construction equipment. Some minor spur roads to structures may be required. Existing easements allow for the construction of the new 115-kV facility and no new property rights are needed.

[25] Eversource's Rights-of-Way Guidelines are publicly available at https://www.eversource.com/content/docs/default-source/Tranmission/rights-of-way-guidelines.pdf and includes guidelines for vegetation clearing and maintenance for transmission rights-of-way.

80. Construction Sequencing. The Company will separate the existing overhead 115-kilovolt ("kV") Line 122 and Line 135 DCT in stages, some overlapping in time. The following summarizes the activities, materials, and equipment used for the separation and installation of new monopole structures:

- Perform pre-construction activities (e.g., conduct soil borings at proposed structure locations).
- Survey and stake the planned structure locations, ROW boundaries, limits of regular clearing and maintenance of vegetation, and identification of any danger trees.
- Refresh wetland flagging adjacent to planned work areas.
- Establish a field construction yard at location to be determined by contractor and approved by the Company, typically including space for office trailer(s), equipment storage and maintenance, sanitary facilities and parking, as well as staging and laydown areas.
- Perform regular vegetation removal, side trimming, mowing or removal of danger trees.
- Install erosion and sediment controls and construction mats, as needed.
- Perform improvements to the existing access road, as necessary.
- Prepare level work pads at each structure site and at conductor pull areas.
- Install concrete foundations
- Erect new structures compliant with Federal Aeronautics Administration ("FAA") requirements
- Install new Line 135 conductors and lightning shield wires on the new structures and trench in counterpoise wires.
- Remove old Line 135 conductors and support arms from the existing double-circuit monopole structures.
- Perform site clean-up and restoration, including re-vegetation of any disturbed areas.

81. As described above, prior to vegetation removal activities, the boundaries of wetlands will be clearly marked to prevent unauthorized encroachment into wetland areas. For a map of currently delineated wetlands, see Attachment B, Project Plans. After construction is complete, disturbed areas will be allowed to re-vegetate with grasses, herbaceous flowering plants, and low growing scrub-shrub species, similar to the existing vegetation within the maintained ROW.

82. Vegetation Removal. Since the Project will be constructed and operated within the existing fully-maintained Eversource transmission line ROW 343, mowing and vegetation removal will only be required within the maintained ROW to facilitate access to the structures for the installation of work pads and to facilitate the safe passage of equipment. Small trees and shrubs within the ROW will be mowed as necessary with the intent of preserving roots and 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.

83. Any tall-growing trees just outside the maintained ROW edge will be assessed for their potential to damage the transmission lines. To ensure reliability, these "danger trees" may have to be pruned or removed.

84. Installation of Erosion and Sediment Controls. Following vegetation removal activities, temporary erosion and sediment control devices (e.g., silt fence, hay/straw bales, filter socks, mulching or temporary seeding), alone or in combination with one another will be installed in accordance with Eversource's BMP Manual for Massachusetts and Connecticut, September 2016 (provided as Attachment J) and with approved plans and permit requirements including the permits issued by federal, state and local authorities. The temporary erosion and sediment control devices may provide the dual function of minimizing the potential for erosion and sedimentation in areas where soils have been disturbed and will also serve as a physical boundary to delineate resource areas and to contain construction activities within approved areas. The erosion and sediment control devices will be monitored regularly. As required by the National Pollutant

Discharge Elimination System ("NPDES") Construction General Permit, administered by the United States Environmental Protection Agency ("U.S. EPA"), the Company will prepare and implement a Storm Water Pollution Prevention Plan ("SWPPP") for the Project.

85. Access Roads. Access roads along the ROW are required to construct, inspect, and maintain the existing and proposed transmission line facilities. The Company will utilize existing gravel access roads within the ROW for the primary access for construction work. Some new spur roads will be constructed within the ROW to connect the existing access roads to proposed structure locations and to provide contiguous access along the ROW where possible. Existing access roads may also be improved by adding gravel and/or minor grading to facilitate the safe passage of vehicles and large construction equipment.

86. Construction access to the ROW will be from locations where public roadways cross or run parallel with the ROW and via adjacent existing private or public off-ROW access roads and parking lots. Construction parking, staging, and laydown areas may be provided within the ROW. Alternately, prior to the start of construction, the Company's contractor may 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) would 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 would have dumpsters and containers specifically for collecting and recycling shipping and crating material

and scrap metals from packaging or equipment. The staging area(s) would also act as meeting point(s) for crew assembly. Upon Project completion, all related construction materials, trailers and equipment would be removed and the property restored, per land owner agreements.

87. Work Pads and Pull Pads. Construction work pads and pull pads will support the construction equipment needed to install new structures and conductors and remove existing conductors and support arms from the existing double-circuit monopole structures. A workspace of approximately 100 feet by 100 feet will be established at each of the structure locations for foundation work and structure assembly. These work pads could be slightly smaller or larger depending on terrain, equipment, and overall site conditions at each work site. Thirteen (13) potential pull areas have been identified for the installation of the conductors and lighting shield wire. The actual configuration of these areas will be determined and refined in the field based on site-specific conditions. Work pads will be installed at structure and pull area locations by grading or adding gravel or crushed stone to provide a level work surface for construction equipment and crews. Once construction is complete, stone and construction mats, if used, will be removed and the work pad locations will be stabilized as required and mulched to allow vegetation to re-establish.

88. The Company has designed the Project to avoid wetland resource areas to the maximum practicable extent. The Project will not result in any filling or clearing within wetlands. The Project will be located within buffer zones to Hathaway Pond South, its continuous wetlands, and one additional isolated wetland existing partially upon the ROW (south of new Structure 325) (see Attachment B, Project Plans, Pages 7 through 9 of 12); however, work within buffer zone is limited to the use of existing ROW access roads and construction of a portion of the temporary

work pad for Structure 319, totaling less than 14,000 square feet of temporary matting in the buffer zone. No permanent impacts to wetlands or waterways are anticipated. The proposed structure locations, work pads, and pull pads, are shown in Attachment B.

89. Foundation Installation. The new steel structures will be installed on reinforced concrete foundations. Engineered 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 ("spread footing"). If shallow bedrock is encountered during pole installation, a drill rig may be used to core into the rock to securely set the structure. The drilled caisson approach is typically used in medium to heavy angle structures as well as for dead-end steel structures.

90. 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.

91. In general, any excess material generated from the project will be re-used along the existing ROW (spread in an upland area and stabilized). However, if this is not feasible, then the soils will be characterized for proper off-site re-use and/or disposal.

92. For new steel structures that would be directly embedded, culvert casings would be used to support the sides of excavations.

93. Dewatering may be necessary during excavations for foundations near wetlands or high groundwater areas. At all times, dewatering will be performed in compliance with applicable permits and approvals and the Company BMPs. If there is adequate vegetation in upland areas to

function as a filter medium, the water generally will be discharged to the vegetated land surface. Where vegetation is absent or where slope prohibits, the water will be pumped into a silt sack surrounded by a straw bale/silt fence settling basin which will be located in an upland area. The pump intake will not be allowed to rest on the bottom of the excavation throughout dewatering to prevent clogging the pump intake with sediment. The basin and all accumulated sediment will be removed following dewatering operations and the area will be seeded and mulched.

94. Structure Assembly/Installation: Structure sections, structure components and hardware would be delivered to the individual structure locations using flat-bed trucks and assembled on-site using a crane and bucket trucks. Once the structure would be properly positioned and plumbed within the hole, the excavation would be backfilled with clean gravel of three-quarter inch and finer gradation and tamped to provide structural integrity. Hand-held equipment, including shovels and vibratory tampers, would be used during the backfilling of foundations and pole structures.

95. Conductor and Shield Wire Installation. The "tension stringing" method will be employed to install the conductors and lightning shield wire. Using this method, the conductor is unreeled under tension and is not allowed to contact the ground. The conductor is delivered on reels to the staging area (work pads) within the ROW. One end of a pulling line is threaded through the travelers and attached to a winch, and the other end is connected to a reel of conductor. This pulling line is then used to pull the conductor from the reels through the travelers. Tension is maintained on the conductor during the process to maintain a safe minimum height above the ground. Once the conductors are strung, they must be properly "sagged" to the pre-determined conductor design tension. While under tension, the conductor is "clipped-in" place by removing

the stringing blocks and replacing them with clamps and connectors, which attach and secure the conductors to the insulator strings. This process is repeated for the installation of the shield wire. Thirteen (13) potential pull areas are identified on the map set provided in Attachment B. The final configuration of these areas will be determined in the field based on site specific conditions and space limitations.

96. 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. or later when the length of daylight permits to minimize the length of calendar time that temporary construction impacts affect the area, following consultation with the Town of Barnstable. 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 wire stringing operations.

97. ROW Restoration. Restoration efforts, including final grading will be completed following the construction activities. All construction debris will be removed from the Project site and disposed of in accordance with applicable laws and regulations. Disturbed areas around structures and other work locations will be seeded with an appropriate seed mixture and mulched or graveled to stabilize soils in accordance with applicable regulations. Temporary erosion and sedimentation control devices will be removed following final stabilization of disturbed areas; though straw bales may be removed or left in place after the stakes are pulled and

the strings cut. Pre-existing drainage patterns, ditches, roads, walls and fences will be restored to pre-construction condition. Where necessary, permanent gates and access road blockades will be installed to prevent access onto the ROW by unauthorized persons or vehicles.

98. Compliance Monitoring. The Company will adhere to the conditions of all permits and approvals. The Company and its contractors will apply for and obtain coverage under the U.S. EPA NPDES Construction General Permit. A SWPPP will be prepared prior to applying for coverage under the U.S. EPA NPDES Construction General Permit.

99. Construction activities will be overseen by an Environmental Monitor, a qualified environmental professional designated by the Company who can capably monitor on-site construction conditions in relation to environmental permit and regulatory requirements. In addition, the Construction contractor will designate a Construction Supervisor or equivalent who will be responsible for daily inspections of work areas during the construction period and will address potential issues related to the environment (i.e., erosion and sedimentation), but also monitor compliance with all Project regulatory approvals and conditions. The Construction Supervisor or equivalent will be on-site daily during work to perform required inspections, and will have the authority to stop work, if necessary, due to an observed or reported non-compliance condition. Additionally, the Construction Supervisor or equivalent will be responsible for providing appropriate training and direction to the other members of the construction crew regarding work methods as they relate to permit compliance and construction mitigation commitments.

100. Prior to the start of the work, 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 are trained to recognize and respond to changing field conditions as they relate to protecting wetland resource areas, rare species habitat, and preventing sedimentation and storm water runoff. Compliance with these conditions will be reviewed and discussed with the contractor at the weekly Project meetings.

3. Evaluation of Environmental Impacts

101. In order to assess impacts associated with the construction and operation of the proposed Project, data was compiled for each of the following parameters:

- Land Use/Acquisition;
- Traffic;
- Noise;
- Aesthetics/Visual;
- Wetlands/Water Resources;
- Groundwater Protection Areas;
- Rare species;
- Oil and/or Hazardous Materials ("OHM");
- Vegetation Removal;
- Historical and archaeological resources;
- Air quality; and
- Electric and Magnetic fields.

For each of these parameters, the following subsections: (i) characterize the existing conditions; (ii) identify potential construction and operational impacts of the Project; and discuss impact avoidance, minimization, and/or mitigation measures.

102. Land Use/Acquisition. Land uses within 300 feet of the ROW were identified using MassGIS land use data layers (see Table 4). An overview of the land uses along the Project route is depicted in Figure 5 included in Attachment A and is shown in detail in Table 4. Land use

within the existing ROW is predominantly open land, most of which is cleared and maintained pursuant to the operation of the existing lines. Land uses immediately adjacent to the ROW include forested land, open water, and transportation, residential, commercial and industrial including mining (sand and gravel), and municipal recreational uses.

**Table 4 Summary of Land Use within 300 feet of Project ROW**

| Land Use Type | Area (Acres) |
|---|---|
| Commercial | 8.88 |
| Cranberry Bog | 1.07 |
| Forest | 156.77 |
| Industrial | 12.64 |
| Very Low Density Residential | 1.22 |
| Low Density Residential | 8.96 |
| Medium Density Residential | 7.64 |
| Mining | 25.72 |
| Open Land | 1.78 |
| Pasture | 0.87 |
| Transitional | 3.72 |
| Transportation | 36.22 |
| Urban Public/Institutional | 0.8 |
| Water | 6.22 |
| Municipal Recreational | 23.77 |

103. The Project crosses several different properties under the protection of Article 97. However, the Project will not preclude or otherwise limit the continued use of the properties for their continued Article 97 purposes upon completion of the Project. The Company has an existing fee interest within the ROW through the Article 97 areas and as such no Article 97 disposition review is required for the Project.

104. Once the transmission line is operational, vegetation along the ROW will be managed as it is today to ensure adequate clearance between vegetation and electrical conductors and supporting structures so that safe, reliable delivery of power to consumers is assured; and to

provide access for necessary inspection, repair, and maintenance. All vegetation maintenance will continue to be carried out in accordance with Eversource's approved Vegetation Management Plans ("VMP").[26] More specifically, as described in the VMP, Eversource employs an integrated vegetation management ("IVM") approach to control targeted plant species through a combination of manual, mechanical, chemical and biological methods. These integrated methods allow for the development of low growing, early successional plant communities while also ensuring the safe and reliable operation of the electric system

105. No expansion of the ROW 343 is required. All construction activities will occur within the existing, maintained Eversource ROW or lands upon which Eversource currently has property rights for access, avoiding the need for public or private property rights. The existing ROW 343 was established in 1968. Construction and operation of the Project will not result in any permanent change on the existing pattern of land use in the Project area

106. Traffic. Traffic impacts associated with the Project will be temporary in nature and confined to the period necessary to construct the Project and limited to access to and from the ROW. Construction access will be gained at locations where public roadways cross or run parallel with the ROW and via adjacent existing private or public off-ROW access roads and parking lots. There may be situations when a road must be temporarily blocked for a short duration to install guard structures, move equipment and/or material to the ROW or complete wire stringing work

[26] Eversource Energy's approved Eastern MA Five Year Vegetation Management Plan for Cape Cod and Martha's Vineyard (Barnstable and Dukes Counties) 2018-2022 is available at https://www.mass.gov/files/documents/2019/01/31/Eversource-Eastern-MA-VMP-2018-2022Cape-n-MarthasVineyard-Accepted-Revision_0.pdf. A copy of the January 29, 2019 Commonwealth of Massachusetts Department of Agricultural Resources approval letter is included in Attachment K.

over roadways. The ROW transects the following roadways: Shootflying Hill Road, Iyannough Road, Old Strawberry Hill Road, Phinneys Lane, and Kidd's Hill Road. Wire stringing work over roadways will occur during off-peak commuter hours with police details and an approved traffic management plan. In other cases where traffic must be temporarily delayed, a police detail will be utilized to control traffic. Because the construction tasks will occur at different times and locations over the course of the construction, Project-related traffic will be intermittent at these entry roadways. Construction equipment will range from pick-up trucks to large cranes. Project-related traffic movements are not expected to significantly affect transportation patterns or levels of service on public roads and the Project will work with the Town to minimize disruptions to vehicular traffic along public roads. The construction contractor will be responsible for posting and maintaining construction warning signs along public roads near work sites and for coordinating the use of flaggers or police personnel to direct traffic, as necessary.

107. Noise. Noise impacts from the Project will be temporary in nature and will occur only during construction. Construction noise will be generated by preparation of work areas, delivery of materials, grading, foundation and monopole construction, and line transfer. 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 5 summarizes noise level data compiled for various types of typical construction equipment and measured at 50 feet from the source.

**Table 5 Noise Ranges of Typical Construction Equipment**

| Equipment | Levels ($L_{eq}$ dBA) at 50 feet[27] |
|---|---|
| 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 |

108. Construction-generated noise will be localized to the vicinity of construction work sites along the ROW. Construction-related noise could potentially raise ambient sound levels at certain receptor locations near work sites, including residences and recreational areas. The potential for noise impacts from construction is a function of the specific receptors near the Project site as well as the equipment used and hours of operation. Construction equipment proximity to

[27] 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: $L_{eq}$ 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.

noise-sensitive land uses will vary along the transmission line route. The closest noise-sensitive receptors include the Hyannis Golf Course and abutting residences adjacent to ROW on Cranberry Lane and Shallow Pond Drive. The remainder of the ROW passes through commercial, industrial, and undeveloped lands that would be less sensitive to construction noise.

109. Construction is anticipated to occur during typical work hours, though in specific instances, the Project may seek municipal approval to work at night. Construction of the new utility poles and separation of the transmission lines will occur over approximately 3.3 miles. Construction will take place over a 14-month construction period; however, construction will not be continuous in any one location for more approximately one week to two months at a time. Construction-related noise will be short-term, lasting only for the duration of the construction period. As such, potential impacts from the Project are considered low.

110. Aesthetics and Visual. Construction of the Project will occur in an existing overhead electric transmission ROW populated with several existing circuits on both monopole and H-frame structures. The ROW is maintained edge to edge and additional ROW needs to be cleared in order to construct the Project. The new structures proposed for use by the Project are steel monopoles, at comparable heights to the existing structures on the ROW and would visually represent the continuation of an existing land use exhibiting an incremental increase of development within an already developed ROW. Photo-simulations of the new monopole structures from representative locations on the ROW are included in Attachment L and provide

typical views of the ROW following Project construction. The addition of the new structures within the existing ROW does not present a marked difference in the existing land use and views along the ROW and would not have a negative effect on nearby abutters along the existing ROW.

111. Wetlands and Water Resources. Baseline research and field studies were conducted to delineate freshwater wetlands and waterways along the ROW. Review of United States Fish and Wildlife Service ("USFWS") National Wetland Inventory mapping, MassDEP Wetlands Mapping, and United States Department of Agriculture//Natural Resources Conservation Service Soil Surveys were undertaken to determine areas where wetlands would likely be found in the Project area.

112. There are few wetlands and waterways within and adjacent to the existing ROW. Hathaway Pond South, its continuous wetlands, and one additional isolated wetland existing partially upon the ROW, south of new structure 325, are the only wetlands and waterways located within the ROW along the Project length. No direct impacts to these features are required to construct or operate the Project. The Project will be located within buffer zones to the above-listed wetland resource areas; however, work within buffer zone is limited to the use of existing ROW access roads and construction of a portion of the temporary work pad for Structure 319, totaling less than 14,000 square feet of work in buffer zone. Prior to vegetation removal activities, the boundaries of wetlands will be clearly marked to prevent unauthorized encroachment into wetland areas. E&S controls will be installed as necessary to protect resource areas and will be monitored regularly. E&S controls will mitigate potential construction-related erosion and sedimentation and will also serve as a physical boundary to delineate resource areas and to contain construction

activities within approved areas. No filling or clearing within wetlands is required and given that the Project will be constructed within the existing maintained ROW, no permanent impacts to wetlands or waterways are anticipated.

113. During construction, certain heavy construction equipment will be fueled and lubricated as necessary. These activities will be completed outside of wetlands, and to the extent practicable, outside of wetland buffer zones on the ROW. Spill containment gear and absorption materials will be maintained on-site for immediate use in the event of an inadvertent spill or leak.

114. According to the currently effective Flood Insurance Rate Map ("FIRM") and Federal Energy Management Agency ("FEMA") data from MassGIS, no part of the ROW and Project are located within 100-year flood zones.

115. One certified vernal pool is located over 50 feet from the southern edge of the ROW. This certified vernal pool will not be subject to impacts as a result of construction or operation of the Project because the Project will not involve work outside of the ROW.

116. Groundwater Protection Areas. The Project ROW passes through a MassDEP approved Zone II Wellhead Protection Area for the majority of the length of the Project. Zone II's are defined as the area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). The ROW does not pass through any Zone I Wellhead Protection Areas nor any Zone A, B, or C Surface Water Protection Areas.

117. Rare Species. According to the most recent edition of the Natural Heritage Atlas of Priority Habitats and Estimated Habitats (issued August 1, 2017), the proposed Project route crosses one area mapped by the Massachusetts Division of Fisheries and Wildlife ("MADFW")

NHESP as Priority Habitat for State-Protected Rare Species and Estimated Habitats for Rare Wildlife (Priority Habitat ("PH") 313). The mapped habitat on the ROW (Priority Habitat ("PH") 313) is associated with one plant species.

118. Additionally, two Watch Listed ("WL") plant species have also been reported from this vicinity. The Company's consultant, Oxbow Associates, Inc. ("OA"), conducted surveys for the above species with NHESP authorization on September 21, 2018. The Study Area was surveyed for ecological and physical characteristics which would indicate the potential presence of state-listed species. During the survey, the NHESP identified state-listed plant species was not observed nor were the two WL species previously reported in this vicinity, however, a population of a third WL species was observed. A Massachusetts Endangered Species Act ("MESA") Project Review Checklist including the results of habitat assessment were filed with NHESP on December 21, 2018.

119. Work within mapped Priority Habitat 313 is limited to the use of existing ROW access roads. Specifically, two sections of existing access road, totaling an approximate area of 0.2 acres, intersect the Priority Habitat on the southwestern portion of the ROW. No alterations are anticipated within this area, however, there is the potential that in-situ maintenance may be required along the existing access roads. Modifications to the existing access road will consist of hardening and/or re-grading to facilitate the safe passage of construction vehicles. All other work is located outside of the subject Priority Habitat. As such, it is not anticipated that any habitat critical or important to the support of state-listed species will be lost or altered during construction or operation of the Project.

120. Based on NHESP's review of the MESA Project Review Checklist, figures depicting the limit of work, and other required materials, under G.L. c. 131A, the Massachusetts Endangered Species Act, NHESP determined in a letter dated January 23, 2019 (provided in Attachment M), that as proposed, the Project will not result in a prohibited Take of state-listed rare species.

121. Avoidance and protection measures for the population of the third Watch Listed species will be implemented during construction. Specifically, the population will be isolated from construction vehicles and personnel by way of the installation of temporary orange construction fencing or similar between its perimeter and adjacent work areas. Based on survey results and subject to ongoing consultation with the NHESP, it is anticipated that the proposed work will not have an adverse effect on the state-listed species nor result in a Take, as such terms are used under MESA.

122. The Project is not located in an Area of Critical Environmental Concern ("ACEC").

123. Oil and/or Hazardous Materials. To determine the potential for encountering soils contaminated from historic site activities or former land development practices during construction of the Project, the MassDEP reportable release database was reviewed for spills at active sites located within 300 feet of the Project ROW. There were no releases reported in the ROW or within 300 feet of the Project ROW. Soil disturbance will be limited to excavations for the steel monopole foundations, surficial grading associated with improving existing access roads and temporary access roads and temporary work pads and pull areas. If applicable, any contaminated soils encountered during construction will be managed pursuant to the Utility-Related Abatement Measure ("URAM") provisions of the Massachusetts Contingency Plan ("MCP"). As required by

the notification requirements pursuant to 310 C.M.R. 40.046, a URAM will not be undertaken by the Company until proper notification to the MassDEP is made. The Company will use its Licensed Site Professional ("LSP") or will contract with an LSP as necessary for conditions encountered at the Project site consistent with the requirements of the MCP at 310 C.M.R. 40.0460 et seq. If suitable, existing topsoil removed during construction will be segregated, stockpiled and re-used as part of site restoration. Excess material will be re-used on the ROW in a suitable upland area or removed and disposed of at an approved off-site disposal/re-use facility, depending on the characteristics of the soil.

124. Vegetation Removal. The existing ROW is generally maintained as scrub-shrub and herbaceous cover types pursuant to Eversource's 5-Year Vegetation Management Plan ("VMP"). Any tall-growing trees just outside the maintained ROW edge will be assessed for their potential to damage the transmission lines. To ensure reliability, these "danger trees" may have to be pruned or removed. In addition, there will be selective trimming to facilitate sight lines for wire pulling during construction.

125. Historical and Archeological Resources. A review of the Massachusetts Historical Commission ("MHC") Inventory of the Historic and Archaeological Assets of the Commonwealth (MHC Inventory) and the Massachusetts Cultural Resource Information System ("MACRIS") files were performed to identify previously recorded historic and archaeological resources within the Project's Area of Potential Effect ("APE"), and in 2015, an intensive archaeological survey of the Project ROW was completed, which yielded no historic or archaeological resources. In January 2016, the MHC made a finding of No Adverse Impact to historic or archaeological resources, including the Old King's Highway Regional Historic District, which is present to the north of the

ROW (see Attachment N). Based on the in-field and desktop analyses and response from the MHC, Project construction and operation are not expected to have any short- or long-term effect on archaeological or cultural resources in the Project area.

126. Air Quality and Dust Control. 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. To minimize the amount of dust generated by Project activities, the extent of exposed/disturbed areas at any one time will be minimized. Construction contractors will be contractually required to adhere to all applicable regulations regarding control of dust and emissions.

127. Construction will comply with state law (G.L. Chapter 90, Section 16A) and regulations (310 C.M.R. 7.11(1)(b)), which limit vehicle idling to no more than five minutes with permissible exceptions for vehicles being serviced, vehicles making deliveries that need to keep their engines running and vehicles that need to run their engines to operate accessories such as mobile cranes or bucket trucks. Only necessary equipment will run during construction in order to minimize engine noise and associated emissions.

128. All diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction will be Tier IV or have U.S. EPA 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. In addition, vehicle idling will be minimized in accordance with Massachusetts' anti-idling laws and regulations, G.L. c. 90, § 16A, G.L. c. 111, §§ 142A – 142M, and 310 C.M.R. 7.11. Dust generated from earthwork and

other construction activities will be controlled by spraying with water as needed. If necessary, other dust suppression methods will be implemented to ensure minimization of the off-site transport of dust. There also will be regular sweeping of the pavement of adjacent roadway surfaces to construction entrances during the construction period to minimize the potential for vehicular traffic to produce dust and particulate matter. A sediment tracking pad and gravel construction entrance will be installed at the entrance and exit of each access road with area roadways to minimize the tracking of sediment onto area roadways and to minimize dust generated by construction traffic entering and exiting the Project site.

129. Electric and Magnetic Fields. The Company retained Gradient Corporation to model electric and magnetic field ("EMF") levels associated with separating Lines 122 and 135 using projected non-emergency summer peak and normal average transmission line loadings for the year 2021, which is the expected in-service date for the Project. Existing and proposed levels of EMF were calculated using equations that have been shown to accurately predict EMF levels measured near transmission lines. The electric and magnetic field levels were calculated at one meter (~3 feet) above ground, in accordance with the standard protocol.

130. For this assessment, the EMF modeling included all overhead transmission and distribution lines within the ROW 343 cross-sections due to the potential for the electric and magnetic fields from the non-Project lines to interact with the EMF associated with the separated Line 135 conductors.

131. EMF impacts were modeled for two representative overhead line cross-sections[28] (cross-section #1 consists of a 2.1-mile stretch of ROW 343 between Shootflying Hill Road and National Grid's Merchants Way Substation, and cross-section #2 consists of a 0.6-mile stretch of ROW 343 between National Grid's Merchants Way Substation and Eversource's Barnstable Switching Station #958). Two cross-sections were modeled because this portion of the ROW 343 is currently occupied by additional 115-kV overhead transmission lines (Line 115 for the entire Project route, and Line 131 for an approximate 0.6-mile segment of the route). The only difference between the two cross-sections is the additional presence of the 115-kV Line 131 within cross-section #2. Two 23-kV overhead distribution lines (#80 and #84) are also present in the ROW and were also included in the EMF modeling using non-emergency summer peak and normal median loadings.

132. The results of the modeling Without-Project and With-Project edge-of-ROW electric fields for the two representative overhead line cross-sections (Cross-section #1 – Shootflying Hill Road to National Grid's Merchants Way Substation, and Cross-section #2 – National Grid's Merchants Way Substation to Eversource's Barnstable Switching Station #958) are presented in Table 6. Table 7 depicts Without-Project and With- Project modeled edge-of-ROW magnetic fields for the two representative overhead line cross-sections at the two modeled system loads. Table 8 provides a summary of Without-Project and With-Project modeled peak edge-of-ROW and Within-ROW magnetic field values. A copy of the EMF Report is included in Attachment O.

[28] See Attachment A, Figures 6 through 9 for representative cross sections of ROW 343.

## Table 6 Modeled Edge-of-ROW Electric Field Values for the Barnstable Reliability Separation Project

| Cross-section/Route Segment | Northern Edge-of-ROW Electric Fields (kV/m) | | Southern Edge-of-ROW Electric Fields (kV/m) | |
|---|---|---|---|---|
| | Without-Project | With-Project | Without-Project | With-Project |
| #1: Shootflying Hill Road to National Grid's Merchants Way Substation | 0.48 | 0.43 | 0.11 | 0.11 |
| #2: National Grid's Merchants Way Substation to Eversource's Barnstable Switching Station #958 | 0.48 | 0.42 | 0.13 | 0.13 |

Notes:
kV/m = Kilovolts Per Meter; ROW = Right-of-Way.
(1) Separate electric field results are not shown for the two load conditions because electric fields have little dependence on load, and are instead dependent on voltage and the spatial configuration of the conductors. There are only minor differences in line voltages for the two loading scenarios (see Attachment O, Table 3.1) that do not result in any significant differences in electric field results. Results are shown for the normal (average) load scenario where line voltages, and thus electric field results, are slightly higher as compared to the non-emergency summer peak load scenario.

## Table 7 Modeled Edge-of-ROW Magnetic Field Values at Two System Loads for Two Representative Overhead Cross-Sections of the Barnstable Reliability Project

| Load Scenario | Cross-section/Route Segment | Northern Edge-of-ROW Magnetic Fields (mG) | | Southern Edge-of-ROW Magnetic Fields (mG) | |
|---|---|---|---|---|---|
| | | Without-Project | With-Project | Without-Project | With-Project |
| Non-emergency summer peak | #1: Shootflying Hill Road to National Grid's Merchants Way Substation | 39.9 | 23.8 | 25.1 | 25.7 |
| | #2: National Grid's Merchants Way Substation to Eversource's Barnstable Switching Station #958 | 39.3 | 23.4 | 24.3 | 24.9 |
| Normal (average) | #1: Shootflying Hill Road to National Grid's Merchants Way Substation | 22.4 | 12.2 | 10.2 | 10.6 |
| | #2: National Grid's Merchants Way Substation to Eversource's Barnstable Switching Station #958 | 22.1 | 12.0 | 9.8 | 10.2 |

Notes: mG = Milligauss; ROW = Right-of-Way.

**Table 8 Summary of Without-Project and With-Project Modeled Peak Edge-of-ROW and Within-ROW Magnetic Field Values by Overhead Cross-Section and Load Scenario**

| Load Scenario | Cross-section/Route Segment | Northern Edge-of-ROW Magnetic Fields (mG) | | Southern Edge-of-ROW Magnetic Fields (mG) | | Within-ROW Maximum Magnetic Fields (mG) | |
|---|---|---|---|---|---|---|---|
| | | Without-Project | With-Project | Without-Project | With-Project | Without-Project | With Project |
| Non-emergency summer peak | #1: Shootflying Hill Road to National Grid's Merchants Way Substation | 39.9 | 23.8 | 25.1 | 25.7 | 80.6 | 77.0 |
| | #2: National Grid's Merchants Way Substation to Eversource's Barnstable Switching Station #958 | 39.3 | 23.4 | 24.3 | 24.9 | 76.5 | 72.9 |
| Normal (average) | #1: Shootflying Hill Road to National Grid's Merchants Way Substation | 22.4 | 12.2 | 10.2 | 10.6 | 49.7 | 47.6 |
| | #2: National Grid's Merchants Way Substation to Eversource's Barnstable Switching Station #958 | 22.1 | 12.0 | 9.8 | 10.2 | 47.5 | 45.4 |

Notes:
mG = Milligauss; ROW = Right-of-Way.

133. As shown on Table 8, the Project will result in reduced magnetic fields at the northern ROW edge and a *de minimis* increase in magnetic fields at the southern ROW edge. All values are well below current health-based guidelines (see Table 9, below).

**Table 9 Reference Levels for whole body exposure by the general public to 60-Hz fields**

| Organization, recommended limit | Magnetic fields | Electric fields |
|---|---|---|
| ICNIRP, reference level[29] | 2,000 mG | 4.2 kV/m |
| ICES, maximum permissible exposure (MPE)[30] | 9,040 mG | 5 kV/m<br>10 kV/m |

4. Conclusion on Environmental Impacts of the Project

134. The potential impacts of construction and operation of the Project are largely temporary and will be minimized through the use of existing transmission line corridors; thoughtful selection of structure locations; use of best management practices; and compliance with federal, state, and local rules and regulations. Impacts that cannot be avoided will be mitigated in accordance with applicable federal, state, and local rules and regulations and the Company's BMPs. Construction of the Project as described herein will result in a reliable supply of energy for Eversource's customers with a minimum impact on the environment at the lowest possible cost.

135. All new transmission line structures would be located within the existing ROW and Project construction would be completed on lands owned or controlled by the Company. The Project will not result in any direct or indirect impacts to wetlands or watercourses. Impacts to rare species habitats will be avoided or minimized through the implementation of BMPs during construction. No permanent, long-term impacts will occur to cultural resources, air quality, noise or traffic, and the permanent visual character of the area will be only modestly affected by the

[29] International Commission on Non-Ionizing Radiation Protection; ICNIRP Guidelines For Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100 kHz); Health Physics 99(6):818- 836; 2010.

[30] IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz; IEEE International Committee on Electromagnetic Safety on Non-Ionizing Radiation, Institute of Electrical and Electronics Engineers, October 2002, New York, NY.

installation of new structures. The construction of the Project is not expected to have any disruption or generation of contaminated media; however, if oil and/or hazardous materials are identified along the route, the Company would develop specific plans for handling and managing such materials. Finally, EMF levels associated with the Project are projected to be somewhat reduced on the northern ROW edge, were largely unchanged on the southern ROW edge, and, in all cases are well below current health-based guidelines.

## IX. APPROVALS REQUIRED

136. In addition to the Department's approval requested herein, the Project will require a number of other permits. A full listing of required permits is provided below. Additionally, based on review of the Massachusetts Environmental Policy Act ("MEPA") environmental review thresholds, the Project as designed does not meet or exceed any MEPA review threshold and therefore the Project does not require a MEPA filing (see Attachment P).

| REGULATORY AGENCY | PROGRAM / PERMIT |
|---|---|
| **FEDERAL** | |
| Environmental Protection Agency ("U.S. EPA") | NPDES General Permit for Storm Water Discharges from Construction Activities |
| Federal Aviation Administration ("FAA") | FAA consultation to determine potential for obstruction to air navigation |
| **STATE** | |
| Department of Public Utilities ("DPU") | G.L. c. 164, § 72, approval to construct ("Section 72 Petition") |
| Massachusetts Natural Heritage & Endangered Species Program ("NHESP") | Massachusetts Endangered Species Act ("MESA") Project Review Checklist |
| Massachusetts Historical Commission ("MHC") | Determination of effect on historic and archaeological properties, G.L. c. 9, § 27C |

| REGULATORY AGENCY | PROGRAM / PERMIT |
|---|---|
| Massachusetts Department of Transportation ("MassDOT") Aeronautics Airspace Review | Airspace review to determine potential for obstruction to air navigation |
| **LOCAL** | |
| Barnstable Conservation Commission | Massachusetts Wetlands Protection Act ("WPA") and municipal bylaw Notice of Intent ("NOI") or Request for Determination of Applicability ("RDA"), as necessary |

## X. CONCLUSION

137. **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**

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