

KEEGAN WERLIN LLP

ATTORNEYS AT LAW
265 FRANKLIN STREET
BOSTON, MASSACHUSETTS 02110-3113

(617) 951-1400

TELECOPIERS:

(617) 951-1354

(617) 951-0586

DAVID S. ROSENZWEIG
E-mail: drosen@keeganwerlin.com

March 10, 2017

M. Kathryn Sedor, Presiding Officer
Energy Facilities Siting Board
One South Station
Boston, MA 02110

Re: NSTAR Electric Company d/b/a Eversource Energy, EFSB 16-02/D.P.U. 16-77

Dear Ms. Sedor:

Enclosed please find the responses of NSTAR Electric Company d/b/a Eversource Energy to the second set of information requests issued by the Town of Needham in the above-referenced proceeding.

I have also enclosed a Certificate of Service. Thank you for your attention to this matter.

Very truly yours,



David S. Rosenzweig

Enclosures

cc: Mark D. Marini, Secretary, Department of Public Utilities
Service List

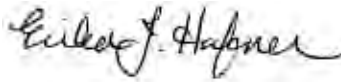
**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

Petition of NSTAR Electric Company d/b/a)
Eversource Energy and New England Power)
Company d/b/a National Grid for Approval to)
Construct, a New 115-kV Overhead/Underground)
Transmission Line in West Roxbury, Dedham, and)
Needham Pursuant to G.L. c 164 § 69J and § 72)

EFSB 16-02/D.P.U. 16-77

CERTIFICATE OF SERVICE

I certify that I have this day served the foregoing upon the Energy Facilities Siting Board and the Service List in the above-docketed proceeding in accordance with the requirements of 980 C.M.R. 1.03 (Siting Board's Rules of Practice and Procedure).



Erika J. Hafner, Esq.
Keegan Werlin LLP
265 Franklin Street
Boston, Massachusetts 02110
(617) 951-1400

Dated: March 10, 2017

**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

NSTAR Electric Company
d/b/a Eversource Energy

)
) EFSB 16-02/D.P.U. 16-77
)
)

AFFIDAVIT OF THERESA M. FEUERSANGER

Theresa M. Feuersanger does hereby depose and say as follows:

I, Theresa M. Feuersanger, on behalf of NSTAR Electric Company d/b/a Eversource Energy, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

**SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 10th DAY
OF MARCH, 2017.**



Theresa M. Feuersanger

**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

NSTAR Electric Company
d/b/a Eversource Energy

)
) EFSB 16-02/D.P.U. 16-77
)
)

AFFIDAVIT OF MICHAEL D. HOWARD, PWS, CWS

Michael D. Howard, PWS, CWS, does hereby depose and say as follows:

I, Michael D. Howard, PWS, CWS, on behalf of NSTAR Electric Company d/b/a Eversource Energy, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

**SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 10th DAY
OF MARCH, 2017.**



Michael D. Howard

**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

NSTAR Electric Company
d/b/a Eversource Energy

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) EFSB 16-02/D.P.U. 16-77
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)

AFFIDAVIT OF CHRISTOPHER M. LONG, Sc.D., DABT

Christopher M. Long, Sc.D., DABT, does hereby depose and say as follows:

I, Christopher M. Long, Sc.D., DABT, on behalf of NSTAR Electric Company d/b/a Eversource Energy, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

**SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 10th DAY
OF MARCH, 2017.**



Christopher M. Long, Sc.D., DABT

**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

NSTAR Electric Company
d/b/a Eversource Energy

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) EFSB 16-02/D.P.U. 16-77
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)

AFFIDAVIT OF JOHN P. McLAUGHLIN, P.E.

John P. McLaughlin, P.E., does hereby depose and say as follows:

I, John P. McLaughlin, P.E., on behalf of NSTAR Electric Company d/b/a Eversource Energy, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

**SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 10th DAY
OF MARCH, 2017.**



John McLaughlin, P.E.

**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

NSTAR Electric Company
d/b/a Eversource Energy

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) EFSB 16-02/D.P.U. 16-77
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)

AFFIDAVIT OF DOMENIC J. NICOTERA, P.E.

Domenic J. Nicotera, P.E., does hereby depose and say as follows:

I, Domenic J. Nicotera, P.E., on behalf of NSTAR Electric Company d/b/a Eversource Energy, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

**SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 10th DAY
OF MARCH, 2017.**



Domenic J. Nicotera, P.E.

**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

NSTAR Electric Company
d/b/a Eversource Energy

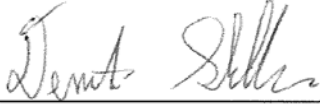
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) EFSB 16-02/D.P.U. 16-77
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)

AFFIDAVIT OF DEMETRIOS SAKELLARIS, P.E.

Demetrios Sakellaris, P.E., does hereby depose and say as follows:

I, Demetrios Sakellaris, P.E., on behalf of NSTAR Electric Company d/b/a Eversource Energy, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

**SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 10th DAY
OF MARCH, 2017.**



Demetrios Sakellaris

**COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD
DEPARTMENT OF PUBLIC UTILITIES**

NSTAR Electric Company
d/b/a Eversource Energy

)
) EFSB 16-02/D.P.U. 16-77
)
)

AFFIDAVIT OF MICHAEL ZYLICH

Michael Zylich does hereby depose and say as follows:

I, Michael Zylich, on behalf of NSTAR Electric Company d/b/a Eversource Energy, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 10th DAY OF MARCH, 2017.



Michael Zylich

Information Request TON-2-1

Please refer to the Greater Boston Area Transmission Needs Assessment, Appendix 2-1 to the Analysis to Support Petition before the Energy Facilities Siting Board at page 3, which states that “[t]he results of the analysis provided in this report have been organized by subareas to facilitate geographic orientation of the information. A set of defined subareas was developed based on a review of the thermal and voltage violations.”

- (a) Please identify each subarea referenced in this document that includes the Town of Needham.
- (b) Please identify all communities included in each subarea identified in response to Part (a) above.
- (c) Please describe the results of the Needs Assessment analysis for each subarea identified in response to Part (a) above.
- (d) Does the Needs Assessment analysis conclude that there are any thermal overloads or unacceptable voltages in any subarea identified in response to Part (a) above? If so, please provide:
 - 1. The number and location of thermal overloads; and
 - 2. The number and location of unacceptable voltages.
- (e) If a Needs Assessment was performed specific to the Town of Needham, please provide the number of thermal overloads and unacceptable voltages found to exist in the Town of Needham.
- (f) Please provide a copy of the Needs Assessment analyses performed for the for each subarea identified in response to Part (a) above and for the Town of Needham specifically.

Response

- (a) As identified in the Greater Boston Area Transmission Needs Assessment, it is the results of the testing performed that have been organized by subareas within the Greater Boston study area. Thermal overloads or unacceptable voltages are identified by line or station, which identifies the electrical element, and are not identified by Town. The transmission elements located in the Town of Needham are:

Needham Station
115 kV line 110-522 (partial)
115 kV line 240-510 (partial)
115 kV line 148-522XY (partial)

No thermal overloads that required a system upgrade were identified for lines 110-522 and 240-510; therefore, these lines are not identified in a particular subarea.

The Needs Assessment identified a thermal overload on line 148-522XY. This line was included in Subarea "E," which roughly encompasses a portion of the West Medway, West Walpole and Holbrook geographic area. However, this overload does not require a upgrade project to mitigate since the 148-522XY overloads can be mitigated by operator actions.

Subarea E also identifies unacceptable low and high voltages at Needham Substation. These voltage violations are also included in Subarea E. These unacceptable voltages are being mitigated by upgrades at locations other than Needham Station (Woburn Substation and Stoughton Station).

- (b) As described to the response to subpart (a) above, subareas include transmission elements and are not identified by municipalities.

Needham Substation is located only in the Town of Needham.

Portions of the 115-kV line 110-522 are located in the towns of Needham and West Roxbury.

Portions of the 115-kV line 240-510 are located in the towns of Needham, West

Roxbury, Dover, Natick, Sherborn and Framingham.

Portions of the 115-kV line 148-522XY are located in the towns of Needham, Dover and Westwood.

- (c) In addition to the summary provided above in subpart (a), additional Subarea E Needs Assessment results can be found on pages 54, 70-71, and 98-103 of the 2015 Updated Greater Boston Area Transmission Needs Assessment.
- (d) The following provides the additional voltage violation details associated with subpart (a).

Needham Substation has a low voltage violation for a peak load N-1-1 event resulting in a voltage of 0.8630 per unit. This value exceeds the low bus voltage limit of 0.95 per unit.

Needham Substation has a high voltage violation for a Summer off-peak N-1-1 event resulting in a voltage of 1.0614 per unit. This value exceeds the high bus voltage limit of 1.05 per unit.

Needham Substation has a high voltage violation for a minimum load N-1-1 event resulting in a voltage of 1.0617 per unit. This value exceeds the high bus voltage limit of 1.05 per unit.

- (e) A Needs Assessment was not performed specific to the Town of Needham. The Needs Assessment was performed for the "Greater Boston Area," as defined in the 2015 Updated Greater Boston Needs Assessment, of which the Town of Needham is included in that geographic area.
- (f) This requested Needs Assessment information is included in the items above and throughout the 2015 Updated Greater Boston Area Needs Assessment document.

Information Request TON-2-2

Please refer to the Electric and Magnetic Field (EMF) Modeling Analysis for the West Roxbury to Needham Reliability Project (hereinafter, the “EMF Report”), Appendix 5-8 to the Analysis to Support Petitions before the Energy Facilities Siting Board at page 1 that “EMF impacts were modeled for several representative overhead and underground line cross-sections using projected non-emergency summer peak and average transmission line loadings provided by Eversource for the year 2018.”

- (a) Please provide the maximum design load for each transmission line proposed to be sited through the Town of Needham.
- (b) Please provide the design lifetime of each such proposed transmission.
- (c) For each such proposed transmission line, please provide projections of non-emergency summer peak and average transmission line loadings for the year 2018 and for each year thereafter during the design lifetime of the transmission line.
- (d) For each such proposed transmission line, please provide anticipated bin data for loading levels, i.e., relating to the fraction of time that loading levels will exist at various points between zero and 100% design load.

Response

- (a) The maximum Normal design load for the proposed repositioned new line between West Roxbury and Needham is 1641 amps.
- (b) The expected lifetime for the overhead portion of the repositioned new line between West Roxbury and Needham is 50 to 60 years.

The expected lifetime for the underground portion of the repositioned new line between West Roxbury and Needham is 40+ years.

- (c) It is not expected there will be significant variation in power flows on the new transmission circuit over the 10-year planning horizon timeframe. Year 2018 to 2028 non-emergency summer peak line loading is estimated to be approximately

450 amps. It is difficult to predict the expected line loading beyond the planning horizon because of unknowns such as future system demands, area generation profile, or the introduction of new technologies. There are no projections of load levels beyond the planning horizon, either for New England as a whole or for this transmission line. It is estimated that a ± 20 percent variance of the 450 amp values could occur over the expected life of the circuit. This would translate to a range of 360 to 540 amps.

Year 2018 to 2028 average line loading is estimated to be approximately 200 amps. It is difficult to predict the expected line loading beyond the planning horizon because of unknowns such as future system demands, area generation profile, or the introduction of new technologies. There are no projections of load levels beyond the planning horizon, either for New England as a whole or for this transmission line. It is estimated that a ± 20 percent variance of the 200 amp values could occur over the expected life of the circuit. This would translate to a range of 160 to 240 amps.

- (d) With a maximum Normal design load for the proposed repositioned new line between West Roxbury and Needham of 1641 amps, the following provides an estimated percentage of the time that loading levels will exist at the various points between zero and 100 percent design load.

90% to 100% of design load (1478 to 1641 amps):	0% of the time
80% to 90% of design load (1313 to 1477 amps):	0% of the time
70% to 80 % of design load (1149 to 1312 amps):	0% of the time
60% to 70% of design load (985 to 1148 amps):	0% of the time
50% to 60% of design load (821 to 984 amps):	0% of the time
40% to 50% of design load (657 to 820 amps):	1% of the time
30% to 40% of design load (493 to 656 amps):	2% of the time
20% to 30% of design load (329 to 492 amps):	30% of the time
10% to 20% of design load (165 to 328 amps):	62% of the time
0% to 10% of design load (0 to 164 amps):	5% of the time

Information Request TON-2-3

Please refer to the Electric and Magnetic Field (EMF) Modeling Analysis for the West Roxbury to Needham Reliability Project (hereinafter, the “EMF Report”), Appendix 5-8 to the Analysis to Support Petitions before the Energy Facilities Siting Board.

- (a) Please identify the specific populations that may be exposed to EMF, including the locations of pedestrian traffic ways and residential, educational and commercial structures along the preferred route variations and the proximity of the proposed transmission line and conductors in relation to such ways and structures.
- (b) Is the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guideline used by Gradient alone sufficient to: (1) judge the likelihood of health risks from the projected magnetic EMF levels; and (2) determine if the levels and potential for exposure should be further mitigated?

Response

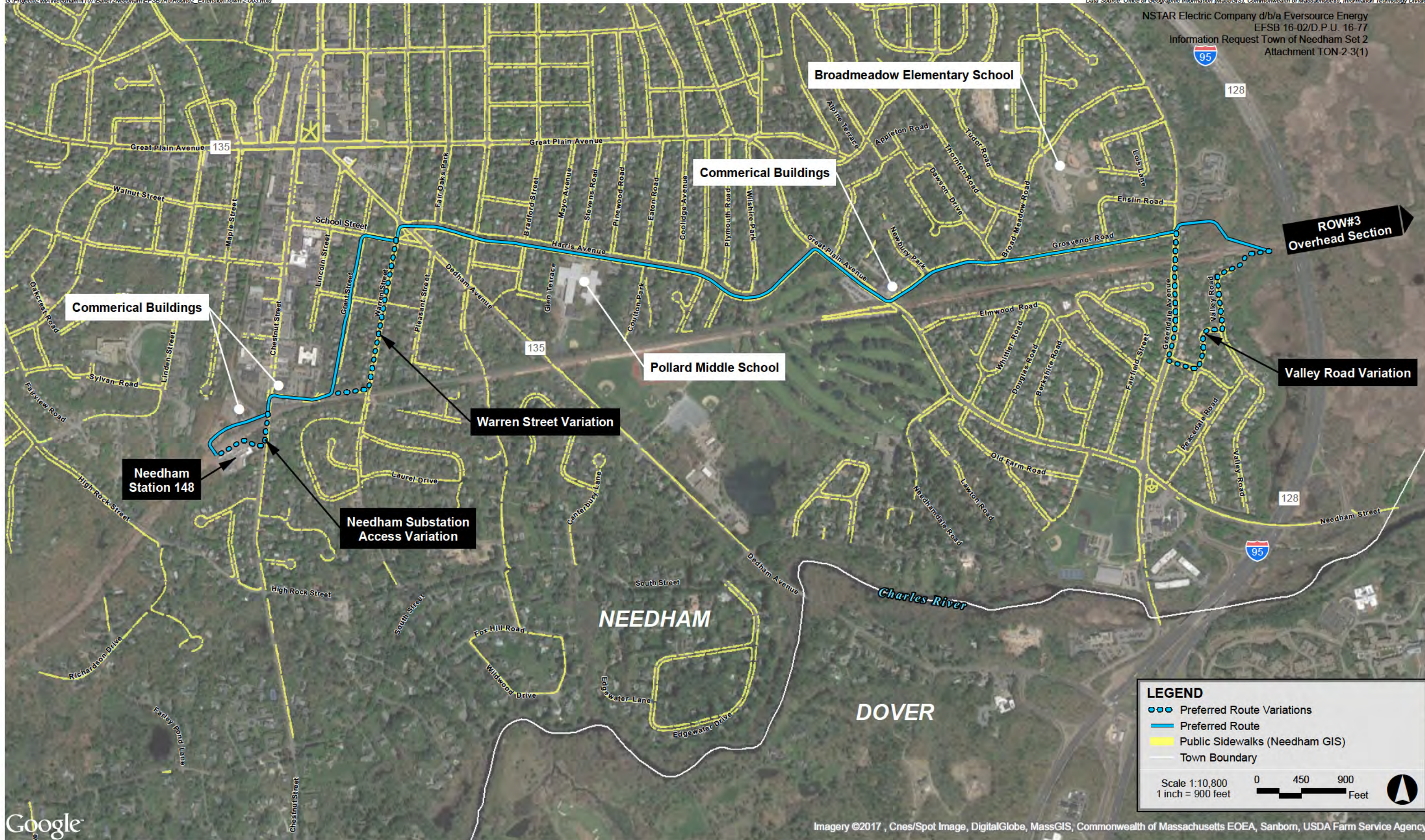
- (a) Please see Attachment TON-2-3(1) for the general locations of pedestrian traffic ways (sidewalks), residential neighborhoods, schools and commercial areas along the Preferred Route and related route variations. For additional detail regarding the proximity of these areas to the proposed underground transmission line, please refer to the Company’s responses to Information Requests MCCARTHY/JONES-1-34, MCCARTHY/JONES-1-35 and EFSB-LU-2.
- (b) Yes, the health-based guidelines issued by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) for allowable public exposure to EMFs (4.2 kilovolts per meter (“kV/m”) and 2,000 milligauss (“mG”)) are key, health-based criteria, but not the only available criteria, for (1) judging the likelihood of health risks from the projected magnetic EMF levels; and (2) determining if the levels and potential for exposure should be further mitigated.

As discussed in the Company’s response to Information Request EFSB-MF-11, an extensive body of research spanning greater than twenty years has been conducted by scientists to examine the adverse-health-effect hypothesis for EMF, i.e., whether exposure to typical environmental levels of power-frequency (60 Hz) EMF can affect biology, alter processes in living cells, or change molecules in such a way as

to increase the risk of cancer or other diseases. These experimental studies have not yielded a plausible mechanism for power-frequency magnetic fields causing biological injury, and public health agencies, including the World Health Organization in its June 2007 monograph summarizing health research on EMF exposure in the extreme low frequency (“ELF”) range, have concluded that the weight of the evidence, with respect to a causal link between EMF ELF exposures and negative health effects, is limited to weak.

A number of public-health agencies do not even address power-frequency EMF-health effects concerns or provide recommendations on EMF exposure guidelines for power-frequency fields. This suggests that, even though the public’s power-frequency EMF exposure is ubiquitous, the threat of a health hazard is not viewed as sufficiently pressing to warrant regulation. For example, the Food and Drug Administration, the Centers for Disease Control, the Agency for Toxic Substances and Disease Registry, the Consumer Product Safety Commission, the Surgeon General’s Office, and the National Toxicology Program (“NTP”) provide no guidelines on EMF exposure limits, even though NTP carried out some of the most thorough laboratory studies on exposure with animal models.

The Company’s response to Information Request EFSB-MF-11 contains a detailed collection of the statements on EMF and health available from a number of public-health agencies.



Information Request TON-2-4

Please refer to page 1-11 of the Analysis to Support Petitions before the Energy Facilities Siting Board, which states that “[t]he proposed underground cable will consist of three 3,500 kcmil XLPE-insulated cables in individual High Density Polyethylene (“HDPE”) conduits. The duct bank will consist of four 8 5/8-inch-diameter Polyvinyl Chloride (“PVC”) conduits, as well as two 4-inch-diameter PVC conduits, and two 2-inch-diameter PVC conduits to carry communications lines and ground continuity conductors.

- (a) Please explain all anticipated uses of the fourth conduit referenced in this statement, which will not be carrying cables.
- (b) Please explain how use of the fourth conduit could affect above-ground levels of EMF associated with the proposed transmission lines.

Response

- (a) The fourth conduit is a spare conduit that will remain empty unless it is needed for replacement of a section of cable in an emergency (e.g., cable failure).
- (b) As long as the fourth conduit remains empty, there will be no impact on above-ground levels of EMF associated with the Project. Should the fourth conduit be needed in an emergency event, the impacts to the above-ground levels of EMF would be negligible. The EMF levels could potentially be fractionally lower because of two of the phase conductors being on the deeper row of the ductbank as opposed to the more shallow row; however, this configuration would also have a minor impact on the heat profile of the ductbank.

Information Request TON-2-5

Please refer to Section 4.5.2.2 of the Analysis to Support Petitions Before the Energy Facilities Siting Board. On page 4-61, it is stated that “[t]he Company developed scoring for each of the Candidate Routes and their Variations using a standardized approach.” Please identify the source for the standardized approach referenced in this statement.

Response

The scoring methodology is “standardized” in two primary ways:

- In past decisions, the Siting Board has found various types of criteria to be appropriate for identifying and evaluating route options for transmission lines and related facilities. These types of criteria include a combination of natural resource issues, land use issues, community impact issues, cost and reliability. Western Massachusetts Electric Company, EFSB 08-2/D.P.U. 08-105/08-106, at 46-47 (“GSRP Decision”), citing New England Power Company, 4 DOMSB 109, at 167 (1995). The Siting Board has also found for similar electric transmission line projects the specific design of scoring and weighting methods for chosen criteria to be an important part of an appropriate route selection process. For the Project, the Company developed numerous screening criteria, which it used to evaluate the routing options. These criteria generally encompass the types of criteria that the Siting Board previously has found to be acceptable and appropriate. The Company also developed a quantitative system for ranking routes based on a compilation of weighted scores across all criteria. This is a type of evaluation approach the Siting Board previously has found acceptable and appropriate. Recent Company examples that employed a similar scoring approach accepted by the Siting Board include the NSTAR Lower SEMA 345-kV Transmission Line Project (EFSB 10-2/D.P.U. 10-131/10-132) and the NSTAR Stoughton to Boston 345-kV Transmission Line Project (EFSB 04-1/D.T.E. 04-5/04-7), as well as several other projects that are pending before the Siting Board.
- In addition to the above, the potential routes were scored in a “standard” or consistent manner in order to make it possible to compare the relative potential impacts of one route to another.

Information Request TON-2-6

Please refer to Section 4.5.2.3 of the Analysis to Support Petitions Before the Energy Facilities Siting Board.

- (a) Please refer to Table 4-3 on page 4-69, which presents a “Total Raw Ratio Score” for each alternative evaluated. Please describe the objective factors for each component of the Total Raw Ratio Score, and explain how each component was assigned a value. For example, what criteria were used to distinguish a raw value of 1 versus a value of 0.5, for each component to which a value was assigned?
- (b) Please describe the objective factors for each assigned weight within each criterion set forth in Section 4.5.2.3. For example, and by way of clarification only, what is the basis for determining that historic resources have an assigned weight of 1 and high impact crossings have an assigned weight of 3?
- (c) Please refer to page 4-69, where it states that “the majority of scoring criteria reflect the evaluation of temporary, rather than permanent, impacts.” Please explain why permanent impacts are not reflected in the analysis with respect to portions of the route in densely residential areas. Please explain why the weighted score of criteria should not be more affected by impacts of longer duration than impacts of shorter duration.

Response

- (a) To clarify, the raw ratio scores were generated by the data collection efforts relative to each of the referenced criteria. After gathering data for each Candidate Route (see Petition, Vol. II, at Appendix 4-1 (Summary of Raw Data for Candidate Route Scoring Analysis) and Appendix 4-2 (Backup Data for Traffic Congestion and Utility Density Scoring Criteria)), the Company assessed each criterion and identified the Candidate Route that had the largest number for that criterion. All other routes/designs were then compared against this number to arrive at a “raw ratio score” (i.e., no weighting factor) for each Candidate Route on a scale of 0 to 1. Wherever possible, quantifiable data was used to assign scores for each criterion (i.e., the actual number of residential units, commercial and industrial structures, sensitive receptors, public transit facilities, historic resources, route length, etc.). For example,

if Candidate Route X passed by five residential units, Candidate Route Y passed by 10 residential units, and Candidate Route Z passed by 15 residential units, the raw ratio scores would be calculated as shown in the following table:

Candidate Route	No. of Residential Units	Raw Ratio Score
<i>Candidate Route X</i>	5	$5 \div 15 = \mathbf{0.33}$
<i>Candidate Route Y</i>	10	$10 \div 15 = \mathbf{0.66}$
<i>Candidate Route Z</i>	15	$15 \div 15 = \mathbf{1.00}$

With regard to certain criteria (*i.e.*, potential for traffic congestion, high-impact crossings, potential to encounter subsurface contamination, trenchless crossings, etc.), there are a greater number of uncertainties in assigning a raw score because these involve potential impacts that may be mitigated a variety of ways, including in the engineering design of the Project. Accordingly, the Company based its scoring on experience in other, similar projects. For example, with regard to trenchless crossings, if Candidate Route X involved two potential trenchless crossings, Candidate Route Y involved four potential trenchless crossings, and Candidate Route Z involved six potential trenchless crossings, the raw ratio scores would be calculated as shown in the following table:

Candidate Route	No. of Potential Trenchless Crossings	Raw Ratio Score
<i>Candidate Route X</i>	2	$2 \div 6 = \mathbf{0.33}$
<i>Candidate Route Y</i>	4	$4 \div 6 = \mathbf{0.66}$
<i>Candidate Route Z</i>	6	$6 \div 6 = \mathbf{1.00}$

In either scenario, the lowest ratio score would equate to the lowest potential for impact. The “total raw ratio score” is simply the summation of all the raw ratio scores calculated for all the criteria associated with each route. For each criterion, the ratio score was then multiplied by its assigned weight to produce a “weighted ratio score” that magnified the criterion by its relative importance, as explained in further detail in part (b), below. The ratio scoring process is an important tool for objectively comparing alternative routes on relevant criteria.

- (b) The rationale behind the proposed weighting scheme is reflected in the description of each criterion described in the Petition, Vol. I, at pages 4-62 through 4-68. As explained therein, weights were developed for each scoring criterion to reflect the relative importance of the various criteria. These assignments were made by the Company based on experience with similar projects, and following consultation with the Town of Needham, as well as relevant state agencies (e.g., MassDOT, MBTA), to determine which criteria were of greatest concern (e.g., extent and duration of work proposed in residential neighborhoods, extent and duration of work proposed in commercial areas along Chestnut Street, potential for traffic congestion during construction, and work proposed near sensitive receptors such as schools). The Company endeavored to select scoring criteria and weights that were as consistent with the Siting Board's standards and precedent and the interests of the Town of Needham and other stakeholders. Use of a 1-to-3 scale for weighting was considered appropriate to reflect the degree of importance of each criterion specific to this particular project. Additional detail in support of the proposed weighting scheme for each of the identified criteria is provided in the following table:

Criteria	Assigned Weight	Rationale Behind Proposed Weights
HUMAN ENVIRONMENT		
Residential Structures	3	Residents along a Candidate Route could be subject to temporary traffic disruption, noise and/or dust. The vast majority of the Candidate Routes pass through primarily residential neighborhoods. The residential criterion therefore received the highest weight of "3" because it represents a significant land use type potentially affected by construction of the Project. If the Candidate Routes passed through less developed, remote areas, the assigned weight for this criterion could potentially have been a "1" or "2" depending on the density of residential development relative to the proposed work and the potential for impacts during construction based on site specific consideration.
Commercial and Industrial Structures	3	Commercial/industrial land use areas exist in primarily two locations within the routing study area: (1) near the MBTA Hersey Station entrance on Great Plain Avenue; and (2) along Chestnut Street near the Needham Substation

Criteria	Assigned Weight	Rationale Behind Proposed Weights
HUMAN ENVIRONMENT		
		facility. Chestnut Street is a heavily travelled road and passes through the center of Needham's downtown district. Given the significance of Chestnut Street to Town officials and local businesses and the potential for construction impacts in the form of traffic disruption, customer and pedestrian access, noise and/or dust, this criterion received the highest weight of "3." While the commercial/industrial land use areas associated with the Candidate Routes are limited to the two discrete locations identified above, the Company nonetheless assigned a weight of "3," as opposed to a weight of "1" or "2," given the potential for significant, albeit short-term, impacts to business owners and residents during construction. The Company also received feedback from Town officials that construction on Chestnut Street should be avoided and minimized to the maximum extent practicable as it was an important part of its business district and the concern for potential impacts to the business community.
Sensitive Receptors	2	Sensitive receptors directly abutting the Candidate Routes are relatively few and include two schools, one daycare facility, one hospital, one place of worship and one emergency response facility (police). Most of these sensitive receptors are clustered in one general area around Chestnut Street (<u>see</u> Petition, Vol. I, Figure 4-7). Two schools directly about the Candidate Routes (Pollard Middle School on Harris Avenue and St. Sebastian's School on South Street/Great Plain Avenue), with a third school located near, but not directly abutting, the Preferred Route (Broadmeadow School on Broadmeadow Street). Not unlike residential and commercial areas, these sensitive receptors could be affected by temporary construction impacts such as traffic disruption, property access, noise and/or dust. It is important to maintain

Criteria	Assigned Weight	Rationale Behind Proposed Weights
HUMAN ENVIRONMENT		
		emergency access at all times and minimize disruptions to users of these facilities by constructing the Project efficiently in these areas, including limiting work to certain prescribed time periods (e.g., when school is out of session during summer months) or certain hours (e.g., after pick-up and drop-off at schools, night work or Saturday work, etc). Access to schools and activities on school grounds would be maintained throughout construction. That said, these sensitive receptors exist in few locations within the routing study area. The proposed work in the vicinity of these sensitive receptors would be short in duration and coordinated to avoid or minimize impacts. Given these factors and considerations this criterion was assigned a mid-weight of “2.” Acknowledging the importance of sensitive receptors to any given community, it was the Company’s opinion that a weight of “1” was not appropriate for this type of utility installation work; similarly, a higher weight of “3” was considered but in this case was ultimately not selected given the few sensitive receptors present within the study area; the proximity of work to these parcels (relatively close in select locations but not crossing the parcels per se); and a clear understanding of the construction mitigation measures that would ordinarily be required to avoid or minimize impacts during construction in light of the Company’s experience successfully constructing other similar underground transmission line projects in public roads.
Public Transit Facilities	1	Public transit facilities in the routing study area include two MBTA commuter rail stations (Junction Street and Hersey). The nearest bus stop is MBTA Bus Route #59 (Needham Junction – Watertown Square via Newtonville) located at the Needham Junction Station and further north along Chestnut Street. This criterion was assigned a lower

Criteria	Assigned Weight	Rationale Behind Proposed Weights
HUMAN ENVIRONMENT		
		weight of “1” recognizing that none of the Candidate Routes involved work on the Hersey Station property (with only limited work considered in front of the station entrance); and that only a short stretch of the Candidate Route(s) passed through the Needham Junction property; and that there is only one segment of a MBTA bus route located in the routing study area. Moreover, during the pre-filing consultation meetings with the MBTA, no significant concerns were raised with regard to installing the transmission line or coordinating the work to minimize impacts to the facilities during construction. For these reasons, this criterion was assigned a lower weight of “1.” If the proposed work had the potential to result in a long-term shutdown of these facilities, or loss of commuter parking spaces, or the potential for significant schedule disruptions to users of the MBTA commuter rail, the Company would likely have assigned a higher weight of “2” or “3” to this criterion depending on the extent and scope of anticipated impacts.
Historic Resources	1	The probability of encountering archaeological resources and/or affecting other cultural resources by installing the transmission line below grade in developed roadways where municipal utilities currently exist was considered low. Accordingly, this criterion was assigned a lower weight of “1.” The weight for this criterion could potentially have been a “2” or “3” if, for example, the proposed underground transmission line followed a new “greenfield ROW” where the potential to encounter significant archaeological resources during construction was greater. Although even under this scenario, it is the Company’s experience that such resources are generally avoidable or can otherwise be adequately mitigated in consultation with the Massachusetts Historical

Criteria	Assigned Weight	Rationale Behind Proposed Weights
HUMAN ENVIRONMENT		
		Commission.
Potential for Traffic Congestion	3	The potential for traffic congestion impacts during in-street construction and related inconveniences to the residents while the work is occurring is an important and primary consideration of any construction project whether the work is proposed in residential areas or commercial/industrial areas. Accordingly this criterion received the highest weight of “3.” If the Candidate Routes passed through less developed areas with less vehicular traffic and a reduced potential for traffic congestion, the weight could potentially have been a “1” or “2” depending on the nature of the roadway network and the scope of proposed work.
High Impact Crossings	3	From a scoring perspective, potential high-impact crossings associated with this Project are limited to railroad bridge crossings located on Greendale Avenue and Great Plain Avenue where a self-supporting utility bridge may be necessary to install the cable over the tracks. Depending on site-specific conditions, this type of work can take an extended period of time to complete and, in this case, in relatively close proximity to residences and/or businesses. These crossings could cause a disruption to the public associated with construction noise, visual impacts, traffic, dust generation and the use of road shoulders to support construction. Accordingly, this criterion was assigned the highest weight of “3.” A lower weight of a “1” or “2” could potentially apply in circumstances where the high impact crossing is located in a remote location, is relatively straightforward to implement and is of shorter duration with less potential to adversely affect nearby residences and businesses.

Criteria	Assigned Weight	Rationale Behind Proposed Weights
HUMAN ENVIRONMENT		
Article 97 Lands	3	As explained in the Massachusetts Executive Office of Energy and Environmental Affairs (“EEA”) “Article 97 Land Disposition Policy,” land disposition of certain conservation and recreation lands is generally not supported unless EEA and its agencies determine that exceptional circumstances exist. Exceptional circumstances include a determination that all other options to avoid the Article 97 disposition have been explored and no feasible and substantially equivalent alternatives exist (monetary considerations notwithstanding). The purpose of evaluating alternatives is to avoid using/affecting Article 97 land to the extent feasible. Given the high-bar established in the referenced Policy, this criterion was assigned the highest weight of “3.” A lower weight of “1” or “2” was considered by the Company because the portion of Article 97 land that would potentially be crossed with the underground design option at the Valley Road transition point is currently occupied by ROW #3 and is thus located within the active overhead transmission line corridor. As such, this portion of the ROW currently exists in an altered and developed state as an active, maintained utility easement and would continue to do so following construction of the underground line. Ultimately, the Company opted to apply the highest weight of “3” to this criterion given the significance of the Commonwealth’s disposition policy.

Criteria	Assigned Weight	Rationale Behind Proposed Weights
NATURAL ENVIRONMENT		
Wetland Resource Areas and	1	The potential for impacts to wetlands is low when the work is confined to the roadway limits. Sedimentation and erosion control measures, stockpile locations and

Criteria	Assigned Weight	Rationale Behind Proposed Weights
NATURAL ENVIRONMENT		
Buffer Zone Crossings		dewatering protocols are often implemented during construction to avoid impacts. Resource areas overlaying the roadway limits (e.g., floodplain, riverfront area) are restored to their former condition following construction with only temporary, short term impacts. Accordingly, this criterion was assigned a lower weight of “1.” A higher weight of “2” or “3” would potentially apply if the proposed work required significant open-cut trench crossings or permanent fill in sensitive wetland resource areas located outside the roadway layout including, for example, work within vernal pools or other Outstanding Resource Waters (e.g., tributary to drinking water supply) or a unique plant community cover type (e.g., Atlantic white cedar swamp).
Presence of Public Shade Trees	1	Underground installation within public roadways was assumed to require no shade tree removal for scoring purposes. However, installing the cable in the street or in sidewalks includes an inherent risk that trees and/or tree roots may be inadvertently damaged. The Company would employ reasonable precautions to avoid such damage; however, the chance of affecting a shade tree is greater in locations that have more shade trees. Given the low potential for impacts to shade trees during construction this criterion was assigned a lower weight of “1.” A higher weight of “2” or “3” would potentially apply if it was determined that the majority of Candidate Routes could not be constructed within the roadway limits and required the direct removal of significant mature shade trees adjacent to the roadway network.
Potential to Encounter Subsurface	1	Subsurface contamination could add complexities to construction. An online search of the MassDEP Waste Site List was performed to determine the potential for

Criteria	Assigned Weight	Rationale Behind Proposed Weights
NATURAL ENVIRONMENT		
Contamination		each Candidate Route to encounter subsurface contamination from historical releases or former land development practices. Given the predominantly residential neighborhoods that the routes pass through and the few identified waste sites, the potential to encounter subsurface contamination was considered low and/or could otherwise be managed routinely during construction following standard MassDEP protocols. Accordingly, this criterion was assigned a lower weight of “1.” A higher weight of “2” or “3” would potentially apply if the proposed work had a greater potential to encounter subsurface contamination and/or was known to pass through contaminated sites requiring significant oversight and monitoring by qualified personnel and specialized construction and soil or groundwater handling procedures during construction.

Criteria	Assigned Weight	Rationale Behind Proposed Weights
EASE OF CONSTRUCTION		
Route Length	1	Length is a factor in project costs and duration of construction, and could be assigned one of the higher weighting factors. That said, route lengths for the Project do not vary significantly given the relatively condensed nature of the routing study area between Valley Road and the Needham Substation located on Chestnut Street. Accordingly, this criterion was assigned a lower weight of “1.” A higher weight of “2” or “3” would potentially have been considered by the Company (in response to increased costs and impacts from a longer duration of construction) if there was significant variability in the length of each Candidate Route in response to the presence of unique routing constraints necessarily resulting in more circuitous

Criteria	Assigned Weight	Rationale Behind Proposed Weights
EASE OF CONSTRUCTION		
		routing in order to reach either substation facility and separate the DCT circuits.
Existing Utility Density	2	The number of existing utilities in the roadway determines the available below-grade space to physically accommodate an underground transmission line. All of the Candidate Routes evaluated were determined to be feasible for construction and are generally homogenous from a an existing utility density perspective; however, for public roadway routes, increased utility density could hamper the construction process and increase construction duration and attendant traffic disruption and noise impacts. For these reasons this criterion was assigned a mid-weight of “2.” A lower weight of “1” would potentially apply if the proposed Candidate Routes passed through less developed areas serviced with fewer utilities (<u>e.g.</u> , homes serviced with private wells and septic systems in lieu of sewer and water lines). Similarly, a higher weight of “3” would likely have been considered if the Candidate Routes passed through more heavily developed areas with significant utilities present within the roadways where it was determined that installation of the transmission line would be uniquely challenging and potentially requiring the relocation of numerous existing utilities to create sufficient work space to install the line.
Route Bends (>30 degree intersections)	1	For underground transmission line installation, hard angles produce bends in the cable that can increase construction difficulty and risk of cable damage. Although hard angles can complicate construction, all of the routes were determined to be technically feasible. Accordingly, this criterion was assigned a lower weight of “1.” A weight of “1” would also apply if the Candidate Routes located between the substation facilities were all

Criteria	Assigned Weight	Rationale Behind Proposed Weights
EASE OF CONSTRUCTION		
		generally straight. A higher weight of “2” or “3” would potentially apply if it was readily apparent that a number of the Candidate Routes had multiple very sharp bends and turns and these bends and turns were located in close proximity to one another (as might be the case in a more developed urban roadway network), but this was not the case with this particular study area.
Street Width (<22 feet)	2	Planning utility construction on narrow streets can under certain circumstances present special challenges from a traffic and pedestrian management perspective as well as limited available space for construction and staging of equipment and stockpiling of materials. These constraints can often be mitigated through proper implementation of traffic and construction management plans and sequencing of work. For perspective, the average street width of the Candidate Routes was approximately 26 feet with only approximately 10 percent of the streets analyzed (measured) being less than 22 feet in width. Some of the fewer, wider streets comprising the Candidate Routes exceeded 30 to 40 feet of pavement. Accordingly, this criterion was assigned a mid-weight of “2.” If the majority of streets comprising the Candidate Routes were exceedingly wide (30 to 40 feet) this criterion would potentially receive a weight of “1”; similarly, if the majority of streets comprising the Candidate Routes were exceedingly narrow (20-feet or less, as an example) this criterion would potentially receive a weight of “3” given the challenges of obtaining suitable workspace and minimizing impacts to pedestrians and vehicular traffic during construction.
Trenchless Crossings	1	The Company recognized the potential for extended and significant construction impacts in locations where it may

Criteria	Assigned Weight	Rationale Behind Proposed Weights
EASE OF CONSTRUCTION		
		be infeasible to install the underground cable using traditional open-cut trench methods (e.g., MBTA railroad crossings, stream crossings or utility easements). In these locations, alternative methods such as jack-and-bore or horizontal directional drilling could be required. These types of crossings require greater time and logistical coordination and are generally more expensive than conventional open trench construction. That being said there are relatively few locations along the Candidate Routes where such construction could potentially occur (end of Valley Road and adjacent to Needham Substation facility). Accordingly, this criterion was assigned a lower weight of “1.” A higher weight of “2” or “3” would potentially apply if it was readily apparent that trenchless crossings had a greater potential for impacts during construction including, for example, having to shut down roads or a section of active railroad track during normal operating hours or potentially involving a particularly long crossing of a sensitive/major waterbody (e.g., Charles River) with greater potential for environmental impacts.

(c) Please refer to the Company’s response to Information Request EFSB-RS-5. In addition, by transitioning from overhead transmission line construction to underground transmission line construction in the Valley Road area prior to the densely-developed residential neighborhoods abutting the ROW to the west, the Company specifically avoids permanent impacts to the residential neighborhoods to the extent practicable by installing the line underground beneath the public streets. Moreover, the length of the route is an indicator of the overall construction duration; all other factors being equal, the shorter the route, the shorter the duration of construction and disruption to the public and local businesses. The Preferred Route and related route variations identified by the Company in the Petition are, in fact, the shortest identified Candidate Routes. With regard to assigned weights for the scoring of criteria associated with the duration of construction, the Company did consider the

duration of construction both directly and indirectly in its analysis. As the Company explained in the Petition, Vol. I, at page 4-62, residents along a Candidate Route could be subject to temporary traffic disruption, noise and/or dust. The longer the duration of construction, the longer these potential impacts persist. As noted in part (b), above, the routes analyzed pass through areas with a great majority of single family homes, with only minimal mixed-type neighborhoods or multi-family or apartment complexes. The “residential unit” criterion received the highest weight of “3” (see Petition, Vol. I, Table 4-2 at page 4-68). Similarly, other criteria directly affected by or attributed to the duration of construction received weights ranging from “1” to “3” depending on the particular criteria (e.g., high impact crossings, potential for traffic congestion, route length, existing utility density, street width, etc.) (see Petition, Vol. I, at pages 4-62 through 4-69).

NSTAR Electric Company d/b/a Eversource Energy
Energy Facilities Siting Board
EFSB 16-02/D.P.U. 16-77

Information Request: **TON-2-7**

March 10, 2017

Person Responsible: Michael D. Howard

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Information Request TON-2-7

Please provide all documents that show how the raw and weighted scores were assigned to all criteria presented in Section 4.5 of the Analysis.

Response

The requested data can be found in the Petition, Vol. II, at Appendix 4-1 (Summary of Raw Data for Candidate Route Scoring Analysis) and Appendix 4-2 (Backup Data for Traffic Congestion and Utility Density Scoring Criteria).

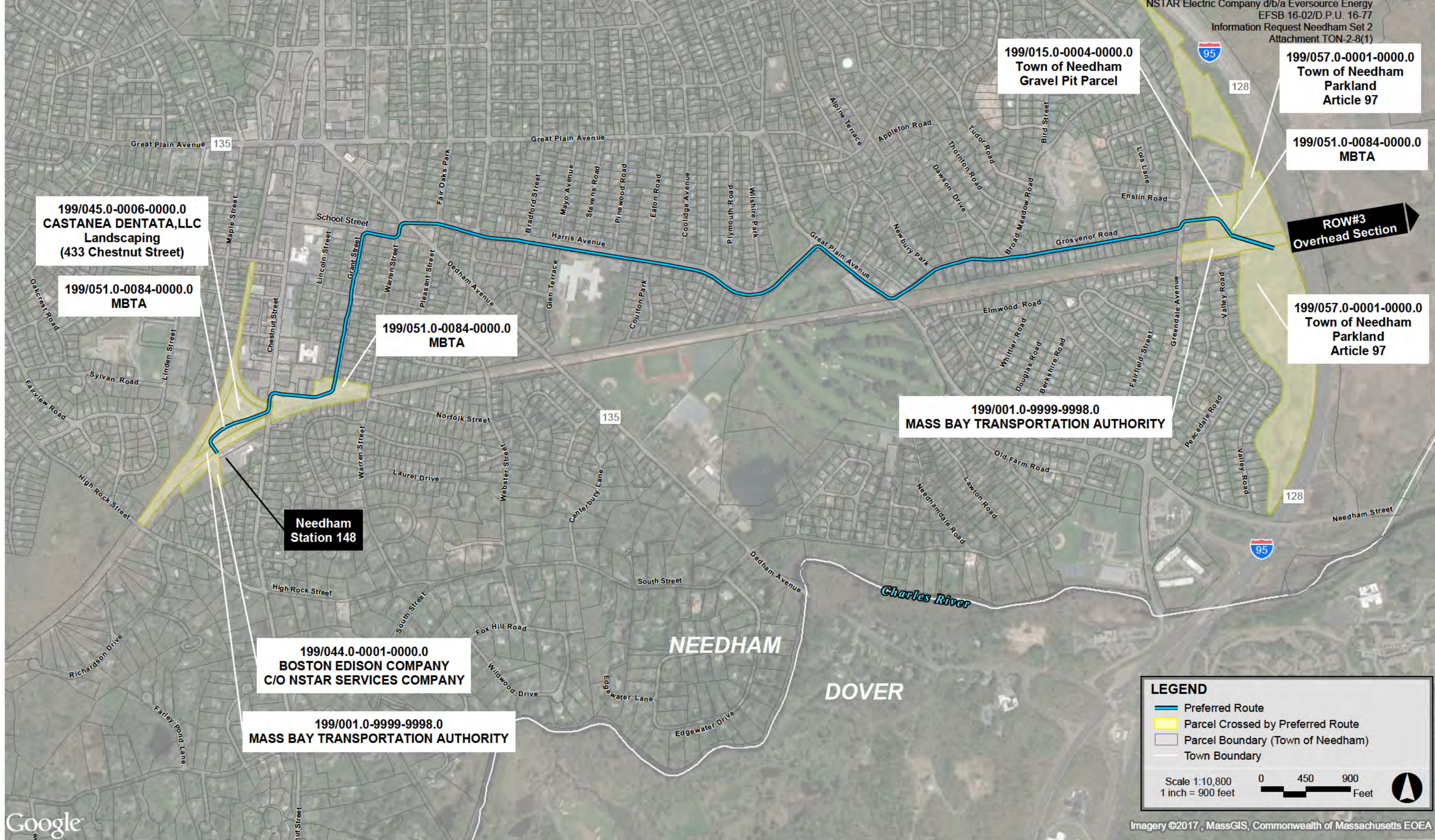
Information Request TON-2-8

Please identify, by lot reference to the Assessors Maps of the Town of Needham, the record owners and current uses of all parcels of land located in the Town of Needham through which the Company's preferred transmission route will pass.

- (a) For all such parcels of land, please identify by lot reference to the Assessors Maps of the Town of Needham all parcels subject to Article 97 of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts;
- (b) Please provide a map that displays the Company's preferred transmission route and shows the lot references on the Assessors Maps of the Town of Needham.

Response

The requested information for the Preferred Route is depicted on the map provided in Attachment TON-2-8(1).



Information Request TON-2-9

Please identify, by lot reference to the Assessors Maps of the Town of Needham, the record owners and current uses of all parcels of land located in the Town of Needham through which the Company's preferred transmission route variations will pass.

- (a) For all such parcels of land, please identify by lot reference to the Assessors Maps of the Town of Needham all parcels subject to Article 97 of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts;
- (b) Please provide a map that displays the Company's preferred transmission route variations and shows the lot references on the Assessors Maps of the Town of Needham.

Response

The requested information for the Preferred Route Variations (3 total) is depicted on the map provided in Attachment TON-2-9(1).



Information Request TON-2-10

Please identify, by lot reference to the Assessors Maps of the Town of Needham, the record owners and current uses of all parcels of land located in the Town of Needham through which the Company's noticed alternative transmission route will pass.

- (a) For all such parcels of land, please identify by lot reference to the Assessors Maps of the Town of Needham all parcels subject to Article 97 of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts;
- (b) Please provide a map that displays the Company's noticed alternative transmission route variations and shows the lot references on the Assessors Maps of the Town of Needham.

Response

The requested information for the Noticed Alternative Route is depicted on the map provided in Attachment-TON-2-10(1). Please note the Company has not proposed any route variations associated with the Noticed Alternative Route.



Information Request TON-2-11

Please identify all easements, including sub-easements, that the Company expects to acquire from the Town of Needham for each of the following:

- (a) The preferred transmission route;
- (b) The preferred transmission route variations; and
- (c) The noticed alternative transmission route.

Response

Potential easements required from the Town of Needham for the Preferred Route, Preferred Route Variations and Noticed Alternative Route and other identified Candidate Routes are described in the Petition, Vol. I, Table 4-5 at pages 4-73 and 4-74. As explained therein, the Company would require the following easements from the Town of Needham:

Route	Easements from Town of Needham
Preferred Route (Grosvenor Road)	Easement across the municipal gravel pit parcel to reach Greendale Avenue.
Preferred Route (Grosvenor Road) with Warren Street Variation	Easement across the municipal gravel pit parcel to reach Greendale Avenue.
Preferred Route (Grosvenor Road) with Needham Substation Access Variation	Easement across the municipal gravel pit parcel to reach Greendale Avenue.
Preferred Route (Grosvenor Road) with Valley Road Variation	Easement across the municipal park land to reach Valley Road.
Noticed Alternative Route (South Street Route with High Rock Street Variation)	Easement across the municipal park land to reach Valley Road.

Information Request TON-2-12

Please identify all easements, including sub-easements, that the Company expects to acquire from an entity other than the Town of Needham for each of the following:

- (a) The preferred transmission route;
- (b) The preferred transmission route variations; and
- (c) The noticed alternative transmission route.

Response

Potential easements required from an entity other than the Town of Needham for the Preferred Route, Preferred Route Variations and Noticed Alternative Route and other identified Candidate Routes are described in the Petition, Vol. I, Table 4-5 at pages 4-73 and 4-74. As explained therein, the Company would require the following easements from entities other than the Town:

Route	Easements from Entities Other than Town of Needham
Preferred Route (Grosvenor Road)	MBTA (Junction Street & #433R Chestnut Street adjacent to Needham Substation) Landowner at #433 Chestnut Street adjacent to Needham Substation
Preferred Route (Grosvenor Road) with Valley Road Variation	MBTA (Junction Street & #433R Chestnut Street adjacent to Needham Substation and potentially over the railroad tracks at Greendale Avenue if a self-supporting utility bridge structure is proposed in order to span the tracks) Landowner at #433 Chestnut Street adjacent to Needham Substation

NSTAR Electric Company d/b/a Eversource Energy
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Information Request: **TON-2-12**

March 10, 2017

Person Responsible: Theresa M. Feuersanger

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Preferred Route (Grosvenor Road) with Warren Street Variation	MBTA (Junction Street & #433R Chestnut Street adjacent to Needham Substation) Landowner at #433 Chestnut Street adjacent to Needham Substation
Preferred Route (Grosvenor Road) with Needham Substation Access Variation	MBTA (Junction Street)
Noticed Alternative Route (South Street Route with High Rock Street Variation)	None Anticipated

Information Request TON-2-13

Please refer to Section 1.9, p. 1-12, of the Analysis to Support Petitions Before the Energy Facilities Siting Board, generally describing the project's public benefits. Please describe specifically whether, and in what manner, the project will directly benefit the Town of Needham or its ratepayers.

Response

The benefits to the Town of Needham and its ratepayers, both direct and indirect, include, but are not necessary limited to, the below items:

Reliability Benefits:

- Helps to effectively manage system disturbances
- Removes bottlenecks; power can flow where needed, when needed
- Lowers risk of dangerous, costly blackouts
- Improves system resiliency during storm events

Economic Benefits:

- Enhances competition among resources; lower-cost power plants can compete across region, which has directly led to lower costs to consumers
- Lowers congestion and related costs
- Lowers special "on call" payments to generators that would not otherwise be used
- Enables retirement of older, less efficient power plants

Environmental Benefits:

- Builds the transmission backbone required to move to the next stage in the evolution toward a greener, hybrid grid
- Supports the connection of renewable energy

Tax Benefits:

- For Needham, it is expected that the Project will generate about \$600,000 in annual property taxes. (This tax estimate may change based on what actually gets built within the Town and the mil rate in place at the time.)