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February 16, 2016

**VIA E-MAIL & HAND DELIVERY**

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

ORIGINAL

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**Re:** **DOCKET NO. 466** - The Connecticut Light & Power Company d/b/a Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the Frost Bridge to Campville 115-kilololt (kV) electric transmission line project that traverses the municipalities of Watertown, Thomaston, Litchfield, and Harwinton, which consists of: (a ) construction, maintenance and operation of a new 115-kV overhead electric transmission line entirely within existing Eversource right-of-way and associated facilities extending approximately 10.4 miles between Eversource's existing Frost Bridge Substation in the Town of Watertown and existing Campville Substation in the Town of Harwinton; (b) related modifications to Frost Bridge Substation and Campville Substation; and (c) reconfiguration of a 0.4-mile segment of two existing 115-kV electric transmission lines across the Naugatuck River in the towns of Litchfield and Harwinton within the same existing right-of-way as the new 115-kV transmission line.

Dear Attorney Bachman:

In connection with the above-referenced Docket No. 466, I enclose the original and fifteen (15) copies of the following pre-filed direct testimony:

- Direct Testimony of Raymond Gagnon, Bradley Bentley, and Jason Cabral concerning Engineering, Design, Route Selection, Project Need, Construction, EMF Characteristics, and Outreach;

- Direct Testimony of Louise F. Mango and Matthew E. Davison concerning Environmental Features, Impacts, and Mitigation Measures; and

- Direct Testimony of Julia Frayer concerning Non-Transmission Alternatives.

I also enclose an original and fifteen (15) copies of a volume of resumes of potential witnesses.

Very truly yours,

Anthony M. Fitzgerald

AMF/cf
Enc.

cc: Service List dated January 21, 2016 attached (w/enc.)

LIST OF PARTIES AND INTERVENORS
SERVICE LIST

| Status Granted | Document Service | Status Holder (name, address & phone number) | Representative (name, address & phone number) |
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| Party (Approved on 1/ 21/ 16) | ☒ E-Mail | Office of Consumer Counsel | Lauren Henault Bidra<br>Staff Attorney<br>Office of Consumer Counsel<br>Ten Franklin Square<br>New Britain, CT 06051<br>Lauren.bidra@ct.gov<br><br>Richard E. Sobolewski<br>Supervisor of Technical Analysis<br>Office of Consumer Counsel<br>Ten Franklin Square<br>New Britain, CT 06051<br>Richard.sobolewski@ct.gov |

**STATE OF CONNECTICUT**
**CONNECTICUT SITING COUNCIL**

| | |
|---|---|
| **DOCKET NO. 466** - The Connecticut Light & Power Company d/b/a Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the Frost Bridge to Campville 115-kilovolt (kV) electric transmission line project that traverses the municipalities of Watertown, Thomaston, Litchfield, and Harwinton, which consists of (a) construction, maintenance and operation of a new 115-kV overhead electric transmission line entirely within existing Eversource right-of-way and associated facilities extending approximately 10.4 miles between Eversource's existing Frost Bridge Substation in the Town of Watertown and existing Campville Substation in the Town of Harwinton; (b) related modifications to Frost Bridge Substation and Campville Substation; and (c) reconfiguration of a 0.4-mile segment of two existing 115-kV electric transmission lines across the Naugatuck River in the towns of Litchfield and Harwinton within the same existing right-of-way as the new 115-kV transmission line. | ORIGINAL<br><br>**DOCKET NO. 466**<br><br>February 16, 2016 |

# DIRECT TESTIMONY OF RAYMOND GAGNON, BRADLEY BENTLEY, AND JASON CABRAL ON BEHALF OF THE CONNECTICUT LIGHT AND POWER COMPANY DOING BUSINESS AS EVERSOURCE ENERGY CONCERNING ENGINEERING, DESIGN, ROUTE SELECTION, PROJECT NEED, CONSTRUCTION, EMF CHARACTERISTICS, AND OUTREACH FOR THE FROST BRIDGE TO CAMPVILLE 115-kV PROJECT

## INTRODUCTION

**Q. Please identify yourselves.**

A. [Mr. Gagnon] I am Raymond Gagnon, Director - Transmission Projects, employed by Eversource Energy Service Company (Eversource Service), agent for The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource").

[Mr. Bentley] I am Bradley Bentley, Director – Transmission System Planning, employed by Eversource Service.

[Mr. Cabral] I am Jason Cabral, Project Manager – Transmission & Distribution, employed by Burns & McDonnell Engineering Co., Inc., engineering consultants and project manager for Eversource on this project.

Our professional qualifications and experience are set out in resumes provided in a separate volume along with this testimony..

**Q. What is the relationship of Eversource Service to the applicant, Eversource Energy?**

A. Eversource Service provides administrative and engineering services to Eversource operating company subsidiaries. Eversource Service has provided the in-house resources for the development of the Frost Bridge to Campville 115-kV Project (the "Project").

**Q. Does Eversource expect to call on any other personnel to respond to planning, engineering or other technical issues?**

A. Other Eversource Service employees, including Chris Soderman, and and Paul Melzen, may be called upon to respond to questions relating to analytical, planning

or engineering design topics. Anthony Johnson, may be called to answer questions concerning vegetation management. In addition, Dr. Gabor Mezei of Exponent, Inc. will be available to respond to questions concerning his report, *Research on Extremely Low Frequency Elecric and Magnetic Fields and Health, August 1, 2012 – July 31, 2015,* a copy of which was submitted as Exhibit 7D to the Application. Our resumes and the resumes of other potential witnesses are provided to the Council in a separate volume.

**Q. What responsibility have you had in connection with the Application to the Siting Council?**

A. We have supervised the preparation and submission of the Application and interrogatory responses. The Application was compiled under our supervision by Eversource Service staff and engineering and environmental consultants.

**Q. Do you have any corrections to make to any of the information in the Application?**

A. Yes. There are some inconsistencies in the Application concerning the structure types and heights for the line that is currently on the right-of-way. They are correctly shown in the Cross Section illustrations included with the Application, but Table 3-2 in the Application misstates some of the heights. Table 3-2 also mistakenly states that there are some existing "chair" type H-Frame structures in Segments XS-4 and XS-6 of the right-of-way. We provide a corrected Table 3-2 as Attachment 1 to this testimony. In this corrected table, the corrected numbers appear in bold type. In addition, the reference to "chair" structures in the descriptions of Cross Sections 4 and 6 have been deleted.

**Q. What is the purpose of your testimony?**

A. The purpose of our testimony is to provide a high-level summary of the Project. We will cover the following topics:

1. Overview and General Location of the Project;
2. Substation Modifications;
3. Need for the Project;
4. Cost and Schedule
5. Route Selection;
6. System Alternatives;
7. Construction;
8. Electric and Magnetic Fields;
9. Safety and Security;
10. Municipal Consultations & Outreach; and
11. Statutory Compliance.

In addition, Eversource's environmental consultants, Louise Mango of Phenix Environmental and Matthew Davison of Tighe & Bond, are filing Direct Testimony regarding environmental matters concerning the Project, while Julia Frayer of London Economics International is filing Direct Testimony regarding her analysis of non-transmission alternatives.

## OVERVIEW AND GENERAL DESCRIPTION OF THE PROJECT

**Q. Please describe the Project.**

A. The Project consists of a new 10.4-mile 115-kilovolt (kV) predominantly overhead electric transmission line and associated facilities between Frost Bridge

Substation in Watertown and Campville Substation in Harwinton and related modifications to Frost Bridge Substation and Campville Substation. The new 115-kV line will be constructed overhead for 10.3 miles on an existing Eversource right-of-way ("ROW"), with the remaining 0.1 miles of the route consisting of an underground section located on Eversource property within and adjacent to the Frost Bridge Substation. The Project also includes the reconfiguration of a short segment (0.4-mile) of two existing 115-kV transmission lines that are supported on common structures in the towns of Litchfield and Harwinton near the crossing of the Naugatuck River.

**Q. Please briefly describe the purpose of the Project.**

A. The Project is needed to strengthen the reliability of the electric transmission system serving the Northwest Connecticut (NWCT) Sub-area. The Project will bring the electric supply system in NWCT into compliance with applicable national and regional reliability standards and criteria by eliminating potential thermal overloads and voltage violations identified in studies conducted by Independent System Operator New England (ISO-NE), the independent regional system planning authority.

**Q. Please indicate the location of the new 115-kV line.**

A. Figure 1-1, provided as Attachment 2, illustrates the Proposed Route for the Project. The Proposed Route begins at the existing Frost Bridge Substation in Watertown and crosses portions of the towns of Watertown, Thomaston, Litchfield, and Harwinton as it traverses in roughly a northerly direction through Litchfield County before ending at the existing Campville Substation in Harwinton. The Proposed Route is located entirely within Eversource's existing 250-400-foot-wide transmission line right-of-way (ROW), adjacent to other overhead transmission lines.

This ROW has been devoted to utility use for approximately 90 years. Except for a short segment of underground cable on Eversource property at Frost Bridge Substation, the proposed line would be overhead and would be supported on steel monopole structures in either a delta or a vertical configuration.

**Q. How much of the Proposed Route is in each of the four towns traversed by the Project.**

A. The table below shows the portion of the Project in each of these towns, and the width of the ROW in these areas:

| Town | ROW Characteristics | |
|---|---|---|
| | Length (Miles) | Width Range (Feet, Typical) |
| Watertown | 0.1 (UG)<br>0.1 (OH)<br><br>4.5 | Frost Bridge Substation exit<br><br>250 – 400 |
| Thomaston | 2.6 | 250 |
| Litchfield | 1.8 | 250 |
| Harwinton | 1.3 | 250 |
| **Total** | **10.4** | |

**Q. What types of structures will be erected for the new 115-kV line?**

A. Along most of the Proposed Route, the new overhead 115-kV line would be supported on direct embedded monopole structures in a delta or vertical configuration. In certain locations, such as angle or dead-end structures, monopole structures in a vertical configuration on drilled shaft foundations will be used. The new monopole structures would be weathering steel, with typical structure heights of 90 feet above ground for delta configuration structures and 105 feet above ground for vertical configuration.

**Q. How many existing transmission lines are on the ROW now?**

A. The existing 115-kV and 345-kV overhead lines on the ROW are:

- Frost Bridge Substation to Purgatory Junction (Town of Watertown): Line 1238 (115-kV), Line 1191 (115-kV), and Line 352 (345-kV);
- Purgatory Junction (Town of Watertown) to Walnut Hill Junction (Town of Thomaston): Line 1191;
- Walnut Hill Junction (Town of Thomaston) to Naugatuck River crossing (Towns of Litchfield and Harwinton): Line 1191 and Line 1921 (115-kV);
- Naugatuck River crossing (Towns of Litchfield and Harwinton) to Campville Substation (Town of Harwinton): Line 1191 and Line 1921.

These existing overhead transmission lines are supported on various structure types, including double circuit steel monopoles, delta wood laminate monopoles, wood H-frames, and lattice steel towers.

**Q. Will existing structures in the ROW have to be relocated or rebuilt to allow for construction of the new 115-kV line?**

A. With one exception, the existing ROW is sufficiently wide such that the new monopoles would be installed without affecting the existing transmission lines (i.e., without requiring the relocation or rebuilding of existing structures). The only exception is within the ROW directly west of Frost Bridge Substation, where an existing lattice tower will be removed and replaced with a steel monopole in order to make room for an adjacent new structure.

**Q. Please explain why Eversource is proposing an underground design where the new 115-kV line exits from Frost Bridge Substation.**

A. The Frost Bridge Substation connects to nine overhead transmission lines (seven 115-kV lines and two 345-kV lines). This design will minimize conflicts with existing overhead transmission lines and substation equipment at the substation. The new 115-kV line would exit the substation overhead to a transition structure immediately outside of the substation fence. The line would then transition to an underground configuration for approximately 0.1 mile. In this area, which is located entirely within Eversource property inside or directly adjacent to the substation fence, the 115-kV line will consist of a cross-linked polyethylene (XLPE) underground cable encased in a concrete duct bank. Directly outside of the western fence line, the 115-kV underground line will transition to an overhead configuration via a second

new transition structure. To accommodate the new 115-kV line exit from the substation, one existing lattice tower located outside of Frost Bridge Substation that presently supports the 1191 Line will be removed and replaced with a steel monopole structure.

**Q. Are there any route variations to the Proposed Route presented in the Application?**

A. Yes. Because the proposed 115-kV line can be entirely accommodated within the existing ROW, these were the only two potentially viable route variations identified by Eversource. These two route variations involve different alignments and configurations where the new 115-kV line exits (in an underground cable configuration for the Proposed Route) from Frost Bridge Substation. (See Figure 12-1. Attachment 3 to this testimony.) Because this substation presently connects to nine overhead transmission lines, Eversource carefully considered options for extending the new 115-kV line out of the substation, with the goal of avoiding potential conflicts with these lines and the proposed substation modifications. One variation would involve the use of an all-overhead configuration, exiting from the east side of Frost Bridge Substation, and then wrapping around the east and north sides of the substation fence before traversing west across Frost Bridge Road, State Route 8, and Echo Lake Road to connect to the Proposed Route within Eversource's ROW. The other Frost Bridge variation would consist of a combination of underground cable and overhead configurations. Under this option, the new 115-kV line would exit overhead to a transition structure immediately outside the substation fence and then would transition to underground crossing the substation. Immediately outside the

western edge of the substation, the line would transition back to an overhead configuration. Thereafter, the variation would follow the same route as the all-overhead variation, traversing west to the Proposed Route.

Eversource determined that the Proposed Route and the planned 115-kV line exit from Frost Bridge Substation was preferable to either of these route variations because of constructability and environmental issues associated with the two variations.

**Q. Please describe the reconfiguration work you propose on a short segment of existing 115-kV lines, and why you are proposing this work.**

A. The 0.4-mile segment of the two existing transmission lines that would be reconfigured extends across the Naugatuck River (which forms the border between Litchfield and Harwinton), within the same ROW as the new 115-kV transmission line. Along this segment, Eversource proposes to remove the two lattice steel structures that currently support both of the existing overhead 115-kV transmission lines (designated by Eversource as the 1191 and 1921 Lines) at the river crossing, and to relocate each of the transmission circuits onto new steel monopole structures. Upon completion of this work, each of these existing transmission lines then will be supported on its own set of structures for the entire distance between Frost Bridge and Campville substations (in the case of the 1191 Line) and between Thomaston and Campville substations (in the case of the 1921 Line), thereby enhancing the reliability of the transmission system through the elimination of the double circuit configuration.

**Q. Will the Project require that Eversource acquire any expansion of the ROW or the acquisition of additional property at Frost Bridge or Campville Substations?**

A. No, the existing ROW will not have to be expanded, and Eversource will not need to acquire any property at Frost Bridge or Campville Substations. No additional easements would be required for the Project, with the possible exception of off-ROW road easements for access.

## SUBSTATION MODIFICATIONS

**Q. Briefly describe the existing Frost Bridge Substation.**

A. Frost Bridge Substation is located in the southeastern portion of the Town of Watertown and occupies approximately 5.7 acres of a 128.5-acre property owned by Eversource. The substation is situated on the central-western portion of the parcel, east of and adjacent to Frost Bridge Road. The Eversource parcel is bordered by Frost Bridge Road and State Route 8 to the west; an inactive railroad and the Naugatuck River to the east; State Route 262 to the north; and open land and transmission line infrastructure to the south. The Frost Bridge Substation property was acquired for utility use and the substation has been in operation for decades. Seven 115-kV and two 345-kV transmission lines presently connect to the Frost Bridge Substation.

**Q. What modifications to Frost Bridge Substation are planned for the Project?**

A. To interconnect the new 115-kV line to Frost Bridge Substation, Eversource proposes the following modifications:

- Expand the existing one-position 115-kV bay to a two-position bay. The proposed 115-kV line would use an existing, vacant 115-kV transmission line-terminal position. Although a 115-kV line terminal structure exists, there is currently no transmission line exiting the substation in this position. The substation currently has four 115-kV bays, with a total of seven 115-kV lines exiting the substation.
- Install one new 115-kV circuit breaker and connect the new 115-kV transmission line to the existing vacant terminal structure position.
- Install one motor-operated disconnect switch, one ground switch, three lightning arrestors, three capacitor-coupled voltage transformers (CCVTs), and one wave trap. Appropriate junction boxes and yard control boxes would be installed and connected to a pre-existing conduit raceway for control cable.

**Q. Would all of the modifications take place within the existing fenced-in area at Frost Bridge Substation?**

A. Yes.

**Q. Briefly describe the existing Campville Substation.**

A. Eversource's Campville Substation is located in the southwestern portion of the Town of Harwinton and currently occupies approximately 1.65 acres of a 42.33-acre Eversource property. The Eversource property is bordered by Wildcat Hill Road on the west, Hayden Road on the south, and private property on the north and east. The substation property was acquired for utility use in 1926, with additional lands acquired in 1928 and 1936. The Campville Substation has been in operation for decades.

**Q. What modifications to Campville Substation are planned for the Project?**

A. Eversource is proposing the following modifications to the Campville Substation to interconnect the new 115-kV line to the substation:

- Expand the existing ring bus to accommodate five new 115-kV breakers and one new transmission line-terminal position. The expansion would require the demolition of one existing breaker and the connection of the new equipment in its place. A new transmission line terminal structure would be required to connect the new 115-kV transmission line from Frost Bridge to the Campville Substation line position. In addition, another existing breaker would be shifted slightly to allow the installation of one new 115-kV circuit breaker adjacent to the relocated breaker.
- Install the new 115-kV line terminal structure, which would be approximately 60 feet tall. Install one motor operated disconnect switch, one ground switch, three lightning arrestors, three CCVTs, and one wave trap. Appropriate junction boxes and yard control boxes would be installed and connected to a new conduit raceway for control cable.
- Install four 115-kV disconnect switches, approximately 60 feet of aluminum tube conductor, six 115-kV breakers, one 60-foot-tall lightning mast, and steel support structures and foundations for all new equipment.
- Extend the existing substation ground grid, grading as necessary to manage stormwater flows, and install an extension of the substation fence.

- Install a new substation enclosure to house additional protection and control equipment.
- Augment the existing protection and control equipment in the existing substation enclosure to accommodate new substation equipment.

**Q. Would all of the modifications take place with the existing fenced-in area of Campville Substation?**

A. No. The proposed modifications would require an extension of the substation fence by approximately 90 feet to the east to enclose the expansion area, which would expand the substation's fenced area by approximately 0.4 acre.

**Q. Will the expansion of Campville Substation require the acquisition of any land?**

A. No. The entire area of expansion is currently owned by Eversource.

## NEED FOR THE PROJECT

**Q. What was the process by which the need for the Project was determined?**

A. The need for the Project was identified by a working group ("the Working Group") led by Independent System Operator-New England ("ISO-NE"), which consisted of members from ISO-NE, Eversource and The United Illuminating Company ("UI"). The Project is the product of nearly a decade of transmission planning studies. In 2005, ISO-NE identified potential future criteria violations on the 115-kV system in the Greater Hartford area in the course of early studies that ultimately resulted in the New

England East-West Solution (NEEWS) Plan, a comprehensive set of 345-kV improvements to the Southern New England transmission system in Connecticut, Rhode Island, and Massachusetts. Initially, these 115-kV problems were considered as part of the NEEWS studies. However, in early 2010, ISO-NE removed 115-kV issues from the scope of the NEEWS studies and initiated the Greater Hartford Area Reliability Study. The Northwest Connecticut (NWCT) sub-area was initially treated as part of the Greater Hartford area for the purpose of this study. In early 2011, the geographical scope of the Greater Hartford Area Study area was expanded and the study was re-named to the Greater Hartford and Central Connecticut (GHCC) Area Study. In this expanded scope, the NWCT sub-area was considered separately from the Greater Hartford sub-area, and the study was combined with other ongoing studies into an assessment of load serving problems in four contiguous electrical sub-areas, including NWCT. The GHCC planning studies conducted by the Working Group showed that there were violations of thermal and voltage criteria in the NWCT "load pocket." A load pocket is an area that has insufficient generation and/or transmission to serve its load. The electric system in the NWCT load pocket is subject to overloads when the system attempts to serve peak load under many contingent conditions.

**Q. How does the proposed 115-kV line address the criteria violations identified in the GHCC planning studies?**

A. Because the planning studies demonstrated that the worst thermal and voltage violations occurred following the loss of two sources that feed the NWCT load pocket, the Working Group determined that a new source into NWCT was needed. The proposed 115-kV line will bring in a new source from a substation just outside the load

pocket to the substation within the load pocket. This new line provides: (1) an additional system element to share the load that is automatically redistributed upon the failure of other system elements; and (2) a source to help maintain continuity of supply to the load from external sources in such an event. With the new 115- kV line in place, the flows on most system elements in the sub-area were reduced sufficiently so that they did not overload in the contingencies modeled in the planning studies.

**Q. Why are you proposing the separation of the 1191 and 1921 lines at the Naugatuck River crossing?**

A. The separation of these circuits will eliminate low voltage conditions and thermal overloads associated with the loss of both lines as currently configured. Along the 0.4-mile segment of ROW at the Naugatuck River crossing (the border between the towns of Litchfield and Harwinton), the 1191 and 1921 lines (both 115-kV lines) are both supported on a single set of lattice steel structures, thus comprising a double-circuit tower (DCT) line. The loss of both lines must therefore be modeled as a single contingency in planning studies. These studies showed that, even with the new 115-kV line, certain design contingencies that include the loss of both the 1191 and 1921 lines will cause voltage violations on several area buses and thermal overloads on other lines in the sub-area. Separation of the 1191/1921 DCT segment will result in each line being supported by its own set of structures for its entire length, which, together with the addition of a circuit breaker at the Campville Substation, eliminates the voltage violations and overloads associated with the DCT contingency.

**Q. Is the Project part of a long range plan for expansion of Connecticut's power grid that serves the public need for adequate, reliable and economic service?**

A. Yes. The Project is a key component of a set of transmission improvements in Connecticut coordinated by ISO-NE that are included in ISO-NE's Regional System Plan and that will ensure compliance with reliability criteria through 2022.

## COST AND SCHEDULE

**Q. What is the estimated cost of the Project?**

A. The estimated capital cost of the Project is approximately $51 million.

**Q. Does Eversource expect that the costs of the Project will be "regionalized"?**

A. Yes, unless there are costs incurred to satisfy local requirements; those costs would likely be localized.

**Q. If the costs are regionalized, then what share would Connecticut's electricity customers pay?**

A. Connecticut's electricity customers (not just Eversource customers) would pay approximately 36% of the Project costs, assuming all costs were to be regionalized.

**Q. What is the anticipated timetable for construction?**

A. Project construction is anticipated to begin in the second quarter of 2017.

**Q. What is the tentative in-service date for the Project?**

A. The tentative in-service date is now June, 2018.

## ROUTE SELECTION

**Q. What were the primary objectives of the routing and configuration process used by Eversource to develop and analyze potential alternatives before deciding on the Proposed Route?**

A. The primary objectives of this process were to identify Project facilities that could be constructed and operated to: (1) comply with state and federal statutory requirements, regulations, and siting policies; (2) minimize adverse effects to natural and human resources; and (3) achieve a reliable, operable, and cost-effective solution.

**Q. What were the primary criteria considered by Eversource in selecting the Proposed Route and the primarily overhead configuration?**

A. Eversource applied the following factors in its evaluation process:

- Availability of existing ROWs within which the proposed facilities could be developed without the need for additional easement acquisition
- Avoidance or minimization of effects on environmental resources
- Avoidance or minimization of effects on significant cultural resources (archaeological and historical)
- Avoidance or minimization of effects on designated scenic resources
- Consideration of visual effects
- Constructability/engineering considerations
- Cost
- Maintenance of public health and safety
- Minimization of the need to acquire property
- Minimization of conflicts with developed areas

**Q. Using these routing criteria, what route alternatives did Eversource select for detailed consideration?**

A. Eversource identified three route alternatives for further analysis:

a. **Overhead 115-kV Transmission Line within Existing ROW**. Alignment of the proposed approximately 10.4-mile 115-kV transmission line in a predominantly overhead configuration within Eversource's existing ROW between Frost Bridge Substation and Campville Substation. (This alternative was ultimately selected as the Proposed Route.)

b. **Underground 115-kV Transmission Cable System along Road ROWs**. Development of approximately 11.2 miles of 115-kV transmission line, predominantly in an underground configuration (cable system) within or adjacent to existing road ROWs between the two substations. This route alternative would be constructed entirely underground, except for an approximately 0.2-mile overhead line segment extending from the Frost Bridge Substation, east across the Naugatuck River to Waterbury Road (State Route 262/848). The overhead line segment would be located primarily on new ROW but between two existing overhead ROWs and would avoid a difficult underground cable installation beneath the Naugatuck River.

c. **Underground 115-kV Transmission Cable System along Road ROWs with Overhead 115-kV Transmission Line Segment in Litchfield / Harwinton.** Development of approximately 9.8 miles of new 115-kV transmission line, predominantly in an underground configuration (cable system), as described in (b), except that the northern end of the route would transition to an overhead configuration in the Town of Litchfield and would be aligned within Eversource's existing ROW for approximately 1.8 miles across State Route 8 and the Naugatuck River to the Campville Substation. Overall, this route alternative would consist of approximately 7.8 miles of underground transmission cable and 2 miles of overhead transmission line.

These three route alternatives are illustrated in the map at Attachment 4, Figure 11-1.

**Q. Why did Eversource ultimately reach the decision to select the predominantly overhead route on the existing ROW as the Proposed Route over the two other routes described above?**

A. Eversource conducted more detailed analyses of each of these alternatives, taking into consideration environmental and social impacts, constructability, and cost, among other factors. Eversource selected the predominantly overhead 10.4-mile 115-kV line aligned within its ROW between Frost Bridge Substation and Campville Substation as the Proposed Route because it: (1) maximizes the use of existing ROW and avoids the need to acquire additional property for utility use; (2) minimizes environmental and land use effects; (3) achieves a reliable, operable, and cost effective solution; and (4) avoids conflicts with existing overhead lines at the Frost Bridge Substation exit.

**Q. What type of underground cable was assumed for purposes of the analysis of the underground alternatives described above?**

A. Based on the capacity required for this Project and Eversource's experience on other recent projects, a 115-kV cross-lined polyethylene (XLPE) cable was selected as the preferred technology for the underground alternatives.

**Q. What are the estimated costs of the all-underground 115-kV line and the underground 115-kV line with the overhead variation in Litchfield and Harwinton?**

A. The estimated capital costs of those alternatives were $328 million and $264 million, respectively, significantly in excess of the estimated cost of $51 million for the predominantly overhead 115-kV line along the Proposed Route.

**Q. Did Eversource consider other routing alternatives in addition to those described above?**

A. Yes. In addition to the Proposed Route and the underground alternatives discussed above, Eversource evaluated several different options for overhead and

Eversource determined that compared to the proposed monopoles, the use of H-frame structures would result in greater environmental impact (additional forest vegetation clearing and disturbance to water resources), and also would be more costly. As a result, Eversource prefers the 115-kV overhead line design as proposed.

**SYSTEM ALTERNATIVES**

**Q. Did Eversource consider a "no action" alternative?**

A. Yes, but a "no action" alternative was rejected because doing nothing to eliminate violations of national and regional reliability standards and criteria would be inconsistent with Eversource's obligation to provide reliable electric service.

**Q. Were any transmission alternatives considered and evaluated?**

A. Yes, Eversource evaluated two other transmission alternatives to bring a new source into NWCT, one involving the construction of a new 115-kV line between North Bloomfield Substation and Campville Substation, and the other involving a new 115-kV line between North Bloomfield Substation and Canton Substation, but both alternatives were determined to be inferior to the Project. The North Bloomfield to Campville alternative was quickly dismissed because it was much longer than the North Bloomfield to Canton alternatives (approximately 25 vs. 12.8 miles) and therefore far more expensive. Eversource conducted an extensive comparison between Project and the North Bloomfield to Canton alternative in terms of reliability performance, cost, and environmental and social effects. Eversource concluded that the Project was superior because it: (1) provided slightly better system performance in terms of better voltage performance; (2) was approximately $23 million cheaper than the North Bloomfield to Canton alternative; and (3) had lesser environmental and social effects because it was 2.3

miles shorter, traversed through less densely settled areas, and crossed a smaller number of wetlands.

**Q. Did Eversource consider non-transmission alternatives?**

A. Yes, as discussed in Section 10.3 of the Application and in the Prefiled Testimony of Julia Frayer, Eversource retained London Economics International, LLC (LEI) to prepare a comprehensive analysis of non-transmission alternatives. As outlined in detail in LEI's report (see Volume 4 of the Application) and summarized in the Application and Ms. Frayer's testimony, LEI concluded that an NTA solution would be far more costly than the Project and therefore economically impractical.

## CONSTRUCTION

**Q. What construction steps would be followed for the installation of the new overhead 115-kV line?**

A. The primary activities involved in the construction of the overhead transmission line would include the following:

- Survey to stake the vegetation clearing boundaries and proposed structure locations.
- Mark the boundaries of previously delineated wetland and watercourse areas, as well as areas to be avoided (e.g., sensitive cultural or environmental resource areas).
- Establish construction field office(s) and material staging sites (e.g., storage, staging and laydown areas) to support the construction effort. The preferred locations for such areas are typically in the vicinity of the ROW.

underground routes, with potential alignments along various existing ROWs, "greenfield" corridors, and highway and railroad rights-of-way, as well as other underground routes. All of the route alternatives were evaluated against standard Eversource objectives and criteria for overhead and underground transmission lines. The Proposed Route within Eversource's existing ROW, using an overhead transmission line design, was determined to be the preferred alternative because it does not require the acquisition of any additional property or ROW, represents the lowest cost solution, and would avoid or minimize environmental and social impacts. As a result, Eversource eliminated these other overhead and underground route alternatives from further consideration.

**Q. Did Eversource consider alternative structure configurations for the overhead l115-kV line?**

A. Yes, alternative transmission structure configurations were investigated for the proposed 115-kV overhead line. These analyses examined and compared the potential use of delta monopoles, vertical monopoles, or H-frame structures to support the new overhead transmission line. Taking into consideration constructability issues, environmental factors (e.g., amount of forest vegetation clearing), and cost, Eversource identified monopole structures as the preferred structure type. However, during the Municipal Consultation Filing public outreach conducted as part of the Council's pre-filing process, landowners and local representatives in Thomaston requested that Eversource evaluate the use of H-frame structures instead of monopoles along a segment of the ROW. Specifically, the landowners suggested that 10 proposed monopole structures be replaced with 10 H-frame structures, which would be shorter and less visible above the adjacent tree line. After assessing this configuration design alternative,

- Perform vegetation clearing along those portions of the ROW to be used for the construction of the transmission lines.
- Install erosion and sedimentation controls in accordance with best management practices.
- Construct new access roads (and/or improve existing roads) and work pads for structure and conductor installation.
- Construct foundations and erect/assemble new structures. (At the Frost Bridge Substation exit and at the Naugatuck River, remove the existing lattice steel structures and replace with new monopoles.)
- Install conductors and shield wires.
- Restore disturbed sites.

**Q. What construction steps would be followed for the installation of the 0.1-mile underground segment of the new 115-kV line on Eversource-owned property within and adjacent to Frost Bridge Substation?**

A. The 0.1-mile segment of underground transmission cable would be installed by excavating a trench on Eversource property, installing the concrete-encased duct bank, and then pulling the 115-kV XLPE cable into the duct. The cable trench would be backfilled and the area disturbed by cable construction would be stabilized with gravel within the substation and otherwise restored to low-growing vegetation (outside the substation).

**Q. What types of construction activities will occur at Frost Bridge and Campville Substations in connection with the proposed modifications to those facilities.**

A. The modifications to the two existing substations would involve standard construction procedures (e.g., site preparation, implementation of erosion and sedimentation controls, installation of foundations and equipment, and site stabilization with crushed stone or equivalent). The operation and maintenance of the substation modifications would not substantially affect or alter existing practices at these stations.

**Q. Has Eversource identified potential storage and staging areas?**

A. As described in section 4.1.1 of the Application, Eversource has identified several potential material storage or staging sites on Eversource-owned properties in each of the four towns in which this Project is located. However, the construction contractor that Eversource selects for the Project will make final decisions regarding whether these or other staging areas will be used. Thus, because the location of the storage and staging sites will not be finalized until after a construction contractor is selected, final locations would be identified in the Development and Management ("D&M") Plan or submitted directly to the Council for approval before use.

**Q. How would construction vehicles and equipment access the Project ROW?**

A. Construction vehicles would access the Project ROW using the existing public road network along the route.

## 5. ELECTRIC AND MAGNETIC FIELDS

**Q. What are Electric and Magnetic Fields?**

A. Electric fields ("EF") are produced when a voltage is applied to a conductor. The level of an electric field at a given location near to a power line depends

on the magnitude of the voltage applied, the arrangement and spacing of the line conductors and the distance from the conductors to the location.

Magnetic Fields ("MF") are produced when electric current flows on a conductor. The level of a magnetic field at a given location near to a power line depends on the magnitude of the current, the arrangement and spacing of the line conductors, and the distance from the conductors to the location.

EF and MF are collectively referred to as "EMF". Levels of each field fall off quickly as the distance from the conductor source is increased. Objects such as trees or building walls weaken or block electric fields, but magnetic fields are not affected by most materials. In the case of parallel lines of circuit conductors, the levels of EF and MF also depend upon the phasing of the circuit conductors and the directions of current flow.

**Q. Has Eversource evaluated the effect of the Project on the current range of levels of EF and MF along the Proposed Route?**

A. Yes. Section 7 of the Application provides a thorough analysis of the effect of the Project on EF and MF levels.

**Q. Has Eversource considered the Council's EMF Best Management Practices in designing the Project?**

A. Yes. The design of the Project is consistent with the Connecticut Siting Council's Electric and Magnetic Field Best Management Practices ("BMP"), as revised on February 20, 2104.

**Q. What do the EMF BMP require?**

A. Among other things, the BMP require transmission line applicants to adopt "no cost" line designs for lowering magnetic fields from new or reconstructed lines, and to identify "low cost" opportunities for making further reductions. The BMP establish a "benchmark" for "low cost" field reduction measures of 4% of the project cost, including substation costs. "Low cost" measures for reducing magnetic fields are required to achieve at least a 15% reduction in the fields that would be associated with the "base line" construction that would be consistent with standard good utility practice and no-cost field reduction measures.

Another requirement is that an applicant for an electric transmission line needs to present evidence of any new developments in scientific research addressing the potential health effects of transmission line magnetic fields or changes in scientific consensus group positions regarding them.

**Q. Has Eversource provided an analysis of new developments in scientific knowledge concerning potential health effects of MF or position changes regarding MF in its Application?**

A. Yes. Eversource retained scientists at Exponent, Inc. ("Exponent") to perform such analysis. Appendix 7D to the Application includes a report from Exponent with a systematic literature review critical evaluation of epidemiology and *in vivo* studies published from August 1, 2012 to July 31, 2015.

**Q. What was Exponent's conclusion?**

A. Exponent concluded that no recent studies that would alter the conclusions the Council has reached in its EMF Best Management Practices and in its recent transmission line dockets: the scientific evidence does not establish that EMF exposure

is the cause of cancer or any other disease process at the levels we encounter in our everyday environment.

**Q. What are the major sources of EMF associated with the Project?**

A. The multiple existing transmission lines on the existing ROW and the proposed 115-kV line are the major sources of EMF. Transformers and other equipment within the Frost Bridge and Campville Substations are also potential EMF sources, but would cause little or no exposure to the general public. The strength of fields from equipment inside a typical substation decreases rapidly with distance, and reaching very low levels at relatively short distances beyond substation perimeter fences. The exception is where transmission and distribution lines enter the substation property.

**Q. Did Eversource take measurements of existing electric and magnetic field levels along the Proposed Route, as required by the BMP?**

A. Yes. Spot measurements of electric and magnetic fields were taken by Eversource on September 2, 2015 at selected locations along the Proposed Route. The Council's Application Guide requires measurements of existing EMF at the boundaries of adjacent schools, daycare facilities, playgrounds, hospitals and residential areas. There are no schools, daycare facilities, hospitals and residential areas adjacent to the ROW. However, the baseball field at Veteran's Memorial Park in Watertown, which is adjacent to the ROW, qualifies as a playground. Accordingly, measurements were taken at the edge of the baseball field closest to the existing transmission line. In addition, measurements were taken across the ROW, including at boundaries of adjacent properties, at locations where houses are closest to the ROW, specifically, on Walnut Hill Road in Thomaston and on Campville Road in

Litchfield. These areas, as well as the Veteran's Memorial Park baseball field, are referred to as "Focus Areas." The measurements near each of these three Focus Areas were taken at a height of 1 meter (3.28 feet) above ground, in accordance with the industry standard protocol for taking measurements of EMF near power lines.

The measurements are set forth in the table below.

**Measured Electric and Magnetic Fields**

| Location | Magnetic Field (mG) | Electric Field (kV/m) |
|---|---|---|
| Veteran's Memorial Park, Watertown | 1.00 | 0.00 |
| Walnut Hill Road, Thomaston | 12.33-15.95 | 0.075-0.332 |
| Campville Road, Litchfield | 5.11-30.11 | 0.096-0.932 |

**Q. What type of information do these measurements provide?**

A. The measurements of MF are only a snapshot of conditions at a single moment in time at a specific location. Within a day, and over the course of days, months, and seasons, the MF level changes at any given location, depending on the amount and patterns of power supply and demand within the state and surrounding region. In contrast, the EF is quite stable over time.

**Q. Did Eversource provide calculated estimates of EF and MF along the Project route before and after the proposed construction, as required by the Council's BMP?**

A. Yes.

**Q. How were MF and EF calculated for this purpose?**

A. As described more fully in Section 7.3.2 of the Application and Appendix 7C, Eversource estimated (1) annual peak load (APL) conservatively from ISO-NE's projected 90/10 system peak loads, (2) peak-day average loads (PDAL) over 24 hours at 85% of the system's hourly peak load (based on the 90/10 peak-load days) and (3) annual average loads (AAL) based on the annual hourly average loads.

The Application presents calculations of magnetic field levels at 25-foot intervals for the base design and alternative designs at AAL, APL and PDAL, together with associated electric field levels. We consider the AAL case to be most useful reference for predicting field levels for any 'typical' day. Accordingly, we used these levels to develop the profiles and tables presented in the Application.

As required by the EMF BMP, loads projected for the year 2019 (the first summer when the new line would be in service) were used for the "before construction" calculations, and loads projected for 2024 (five years after the line will have been in service) were used for the "after construction" calculations.

**Q. How do the estimated pre-Project electric and magnetic field levels compare to the estimated post-Project electric and magnetic fields?**

A. As shown in the tables below and the graphs in section 7.3.2 of the Application, the calculations based on projected average annual loading conditions (which best represents the time weighted average of exposure) demonstrate that the addition of the new 115-kV line will not substantially increase electric and magnetic fields at the edge of the ROW, and will decrease them in some locations, compared to existing conditions.

**Summary of Magnetic Field Calculations**

| Magnetic Field Calculation Summary (Average Annual Loads, field in mG) | | | | |
|---|---|---|---|---|
| Section | Left Edge of ROW | | Right Edge of ROW | |
| | Pre | Post | Pre | Post |
| Frost Bridge S/S to Purgatory Junction | 23.9 | 23.5 | 41.3 | 40.9 |
| Purgatory Junction to Walnut Hill Junction | 7.3 | 4.2 | 6.1 | 3.9 |
| Walnut Hill Junction to Campville S/S | 20.5 | 12.8 | 0.6 | 1.4 |

*Left and right edges of ROW are defined by looking from Frost Bridge Substation to Campville Substation

**Summary of Electric Field Calculations**

| Electric Field Calculation Summary (Field in kV/m) | | | | |
|---|---|---|---|---|
| Section | Left Edge of ROW | | Right Edge of ROW | |
| | Pre | Post | Pre | Post |
| Frost Bridge S/S to Purgatory Junction | 0.23 | 0.22 | 0.98 | 0.96 |
| Purgatory Junction to Walnut Hill Junction | 0.23 | 0.20 | 0.02 | 0.08 |
| Walnut Hill Junction to Campville S/S | 1.18 | 1.16 | 0.04 | 0.08 |

**Q. What is a Field Management Design Plan?**

A. Under the EMF BMP guidelines, the Council requires an applicant proposing to build an overhead electric transmission line to develop and present a Field Management Design Plan that identifies design features to mitigate MF that would otherwise occur along an electric transmission ROW, particularly where the ROW is near certain land uses, such as playgrounds, residential areas, schools, and licensed day-care facilities.

**Q. Did Eversource provide a Field Management Design Plan in the Application, as required by the Council's BMP?**

A. Yes, Eversource's Field Management Design Plan is included in Section 7 of the Application at Appendix 7B. In accordance with the BMP guidelines, the proposed new Frost Bridge to Campville 115-kV line has been designed so that it will have very little effect on magnetic field levels within and along the ROW. The Project's base overhead design incorporates "no cost" magnetic field reduction measures. Specifically,

these measures include arranging the conductors in a compact triangular "delta" configuration and arranging the phases of the new 115-kV line to achieve better cancellation with the magnetic field from the existing transmission lines on the ROW.

**Q. Did Eversource consider "low cost" magnetic field mitigation measures at the three Focus Areas, specifically, at Veteran's Memorial Park and the residential areas along Walnut Hill Road in Thomaston and Campville Road in Litchfield?**

A. Eversource reviewed other mitigation measures for the three Focus Areas in developing the Field Management Design Plan, including the installation of an underground segment at these locations. However, none of the measures considered were "low cost" options, and none would achieve substantial reduction in MF levels. Therefore Eversource does not recommend the use of additional MF mitigation measures at any of the three Focus Areas.

**Q. Has Eversource complied with all of the requirements in the relevant provisions of the statutes concerning EMF and the Council's BMP?**

A. Yes, Section 7 of the Application and the documents in Appendix 7 fully comply with all of the requirements in the relevant provisions of the statutes concerning EMF and the Council's BMP.

**Q. Please summarize EVERSOURCE's efforts to comply with the statutory and BMP requirements concerning EMF.**

A. Eversource has complied with the statutory and the BMP requirements regarding EMF by::

- providing an update of scientific research and authoritative positions concerning potential adverse health effects of MF;
- providing measurements and calculations that were developed in accordance with the BMP; and
- preparing a Field Management Design Plan with a base design that incorporates standard utility practice with no-cost MF mitigation design features.

**Q. Has Eversource complied with published MF guidelines?**

A. Yes, the IEEE International Committee for Electromagnetic Safety ("ICES") and the International Commission on Non-Ionizing Radiation Protection ("ICNIRP") have issued guidelines for long-term public exposures to MF. The ICES reference level is 9,040 mG; the ICNIRP reference level is 2,000 mG. Projected MF levels for the Project are well below these guideline levels.

## 6. SAFETY AND SECURITY

**Q. Would the proposed new 115-kV line, substation modifications, or reconfiguration of existing 115-kV lines pose any safety risk to the public?**

A. No. The construction of the proposed line, the modifications to Frost Bridge and Campville Substations, and the reconfiguration of a short segment of existing 115-kV lines in Litchfield and Harwinton would not pose a safety threat or create any undue hazard to the general public, including persons or property. All work would be designed and constructed in accordance with all applicable national, electric utility industry, state and, to the extent practical, local codes.

**Q. What would happen if an outage or fault occurred on the transmission or substation equipment?**

A. High-speed protective relaying equipment would automatically detect abnormal system conditions (e.g., a faulted overhead transmission line) and would send a protective trip signal to circuit breakers to isolate the faulted section of the transmission system. Protection would also be provided by a Supervisory Control and Data Acquisition system ("SCADA"). The SCADA system allows for remote control and equipment monitoring by the Connecticut Valley Electric Exchange ("CONVEX") System Operator.

**Q. What fire protection systems are maintained at the Frost Bridge and Campville Substations?**

A. Fire/smoke detection would automatically activate an alarm at CONVEX and the system operators would then take appropriate action.

**Q. Is the physical security of the Frost Bridge and Campville Substations, as modified for this Project, consistent with the Council's *White Paper on the Security of Siting Energy Facilities,* as amended, initially adopted in the Council's Docket 346 ("White Paper").**

A. Yes. As outlined in detail in the Application, the Project modifications will be consistent with the Council's *White Paper* Guidelines, including the focus on security issues associated with planning, preparedness, response, and recovery.

## 7. MUNICIPAL CONSULTATIONS & OUTREACH

**Q. Has Eversource complied with the municipal consultation requirement of section 16-50*l*(e) of the General Statutes?**

A. Initial briefings were provided to the Towns of Watertown, Thomaston, Litchfield, and Harwinton in the spring of 2015. We initiated the formal municipal consultation process with these towns in early September 2015, more than 60 days before the Application filing. On this same date, Eversource also initiated the municipal consultation process with the City of Waterbury and the Town of Plymouth, both of which have borders within 2,500 feet of the Project.

**Q. Has there been any dialogue with the municipal representatives after the municipal consultation filing?**

A. Yes. The Project team engaged with municipal officials in different ways depending on the preference of the town. In Thomaston, the Project team made a presentation to the Board of Selectman, and officials attended the local Open House held on September 30. In Harwinton, the Project team made a presentation to the Board of Selectman. In Litchfield, officials attended the local Open House held on September 29. Watertown declined the offer of a meeting as did Plymouth and Waterbury.

**Q. Please summarize Eversource's contacts with Connecticut stakeholders, including government entities, interested organizations, landowners, and other individuals interested in or concerned about the Project, since you began your public outreach efforts.**

A. Over the past year, Eversource has implemented a comprehensive outreach strategy to inform elected federal, state, and local officials, municipal department heads, municipal Commissions and Agencies, residents, business organizations and other stakeholders about the Project and to solicit feedback.

This outreach has included group and individual meetings and presentations, written communications, two Open Houses and phone calls.

**Q. What federal and state agencies has Eversource consulted with in connection with the Project?**

A. In connection with the permits and approvals that would be required for the construction and operation of the Project, Eversource consulted, and is continuing to consult with, the following federal and state agencies:

- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- Connecticut Department of Environmental Protection
- Connecticut Historic Preservation Office
- National Park Service

## STATUTORY COMPLIANCE

**Q. What measures were undertaken by Eversource to inform the public and property owners along the routes of the Project, and to obtain their input?**

A. Eversource sponsored an open house on September 29 and 30, 2015 at the Northfield Volunteer Fire Company firehouse in Litchfield and the Thomaston Town Hall. As required by section 16-50*l*(b) of the General Statutes, bill inserts with Project information were mailed to customers. Notices were provided to community organizations and water companies as required by the Council's Application Guide, and to abutters of the Frost Bridge and Campville Substations, as required by section 16-50*l*(b). Legal notices of the Application were published in three local newspapers, Litchfield County Times, Waterbury Republican-American, and Torrington Register

Citizen, as required by section 16-50*l*(b). Copies of the Municipal Consultation Filing were placed in the local libraries and on the Project website www.eversource.com. A project hotline (1-800-793-2202) and transmission project email address (TransmissionInfo@eversource.com were established through which residents and other stakeholders can communicate with Project management.

**Q. How was information presented at the open houses?**

A. The information was presented using a series of informational kiosks. The Project team subject matter experts were present to address questions from attendees about the proposed Project.

**Q. Were signs posted informing the public of the Council's public hearing to be held in Litchfield on March 1, 2016, in advance of the hearing?**

A. Yes. On February 9, 2016, 4-foot by 6-foot signs notifying the public of the hearing were posted by members of the Project team at the locations below: (See Attachment 5)

1) Frost Bridge Substation, Frost Bridge Road, Watertown, CT;
2) Echo Lake Rd, Watertown, CT;
3) 320 Park Rd, Watertown, CT;
4) 6 Chimney Rd, Watertown, CT (near Nova Scotia Hill Road);
5) 866 Thomaston Road (Route 6), Watertown, CT;
6) 400 Branch Rd (Route 109), Thomaston, CT
7) 455 Walnut Hill Road, Thomaston, CT;
8) Route 254 Crossing, Northfield Rd, Thomaston, CT
9) 92 Hopkins Road, Northfield, CT

10) 115 Campville Road, Northfield, CT

11) 43 Wildcat Hill Road, Harwinton, CT

12) Campville Substation: near 350 Wildcat Hill Rd, Harwinton

## CONCLUSION

**Q. Please summarize your testimony.**

A. Eversource proposes to construct the Project in compliance with all statutory requirements, the Council's regulations and applicable industry codes and standards. The new 10.4-mile predominantly overhead 115-kV line will strengthen the reliability of the electric transmission system serving NWCT and would be constructed within an existing ROW using best construction practices, thereby minimizing the impacts of the Project.

**Q. Does this conclude your testimony?**

A. Yes.

Attachments

Attachment 1 – Revised Table 3-2

Attachment 2 – Figure 1– 1

Attachment 3 – Figure 12-1

Attachment 4 – Figure 11-1

Attachment 5 – Hearing Notice Sign

**Attachment 1 to Testimony of Raymond Gagnon et al**

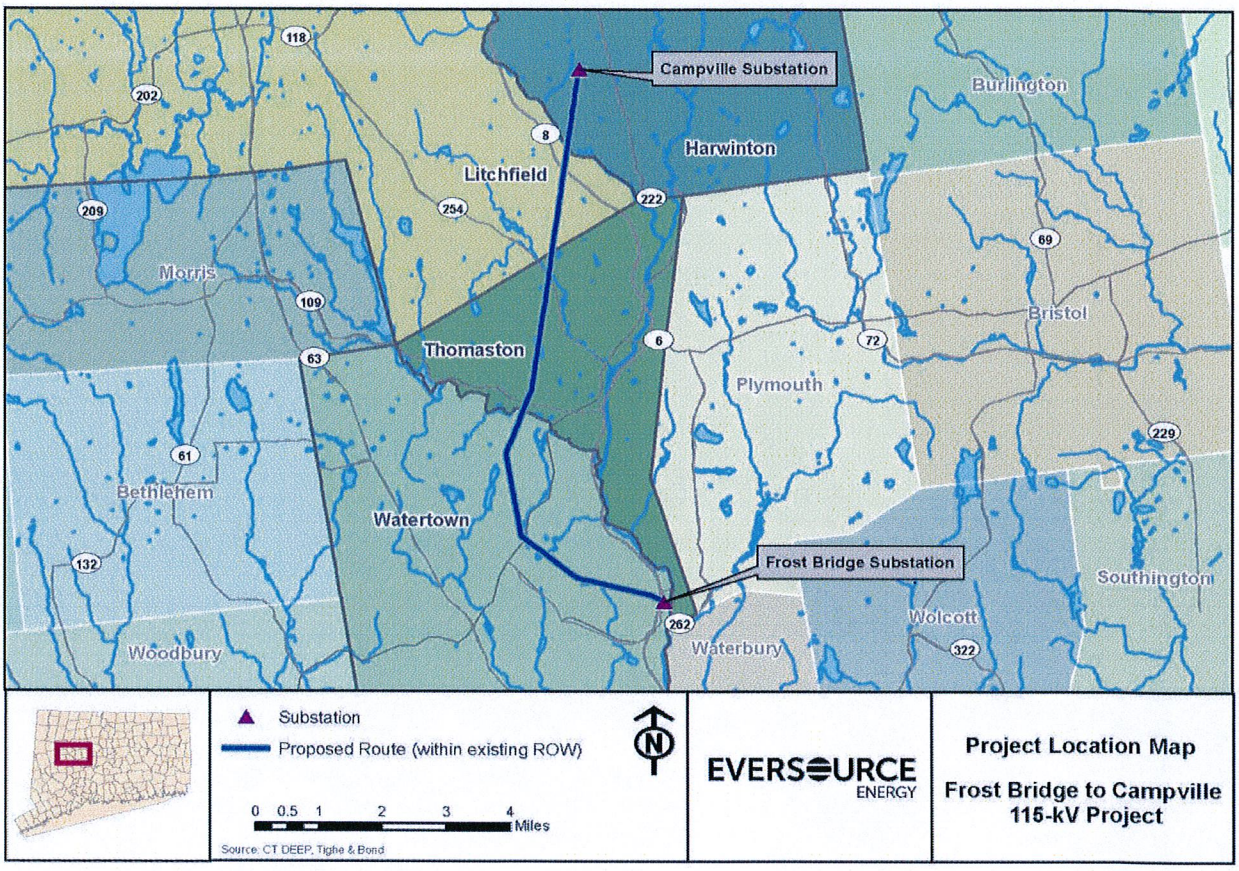
Revised Table 3.1 from Application

(Corrected Figures in Bold Font)

| Transmission Line By Cross-Section (Municipality) | Approx. ROW Mileage | Existing Line Configurations and Typical ROW Width | | Proposed 115-kV Transmission Line Configurations and Typical ROW Width | |
|---|---|---|---|---|---|
| | | Typical Structure Type and Height (above ground) | ROW Width (feet) | Typical Configuration, Structure Type, and Height (above ground) | Typical ROW Width (feet) |
| XS-1 (Watertown) | 0.2 | (Includes 0.1 mile of UG and 0.1 mile OH) | N/A | Install one 115-kV circuit in a underground cable system configuration<br>Install two transition structures and one115-kV circuit exiting the Frost Bridge Substation to the transition structure. | Entirely within Eversource-owned property. |
| XS-2 (Watertown) | 2.5 | One 345-kV circuit supported on wood-pole H-frame structures; heights vary, ranging from **65** to 90 feet, with a typical height of 80 feet.<br>One 115-kV circuit supported on wood pole H-Frame chair structures; heights vary, ranging from 50 to 80 feet, with a typical height of 60 feet.<br>One 115-kV circuit supported on steel double circuit vertical monopole structures; heights vary, ranging from 65 to 110 feet, with a typical height of 90 feet. | 400 | Install one 115-kV circuit on steel vertical monopole structures between existing 115-kV H-Frame and 345-kV H-Frame structures; heights vary, ranging from 75 to 125 feet, with a typical height of 105 feet. | 400 (No additional ROW required) |
| XS-3 (Watertown & Thomaston) | 3.8 | One 115-kV circuit supported on wood pole H-Frame structures; heights vary, ranging from **40 to 65** feet, with a typical height of **50** feet. | 250 | Install one 115-kV circuit on steel delta monopole structures east of existing 115-kV H-Frame structures; heights vary, ranging from **45** to 125 feet, with a typical height of 90 feet. | 250 (No additional ROW required) |
| XS-4 (Thomaston & Litchfield) | 2.5 | One 115-kV circuit supported on wood pole H-Frame structures; heights vary, ranging from **45 to 70** feet, with a typical height of **55** feet.<br>One 115-kV circuit supported on steel delta monopole structure; heights vary, ranging from **45 to 90** feet, with a typical height of **75** feet. | 250 | Install one 115-kV circuit on steel delta monopole structures east of existing 115-kV delta structures; heights vary, ranging from 70 to 110 feet, with a typical height of 90 feet. | 250 (No additional ROW required) |
| XS-5 (Litchfield & Harwinton) | 0.4 | Two 115-kV circuits supported on double circuit steel lattice structures, typical height of 155 feet. | 250 | Remove existing lattice structures and install two pairs of 115-kV single circuit steel vertical monopole structures; with a typical height of 155 feet, **and two 115-kV single circuit steel delta monopole structures; with a typical height of 155 feet.** | 250 (No additional ROW required) |
| XS-6 (Harwinton) | 1.0 | One 115-kV circuit supported on wood pole H-Frame structures; heights vary, ranging from **40 to 65** feet, with a typical height of **55** feet.<br>One 115-kV circuit supported on steel delta monopole structures; heights vary, ranging from **60 to 90** feet, with a typical height of **75** feet. | 250 | Install one 115-kV circuit on steel delta monopole structures east of existing 115-kV delta structures; heights vary, ranging from 75 to 120 feet, with a typical height of 90 feet. | 250 (No additional ROW required) |

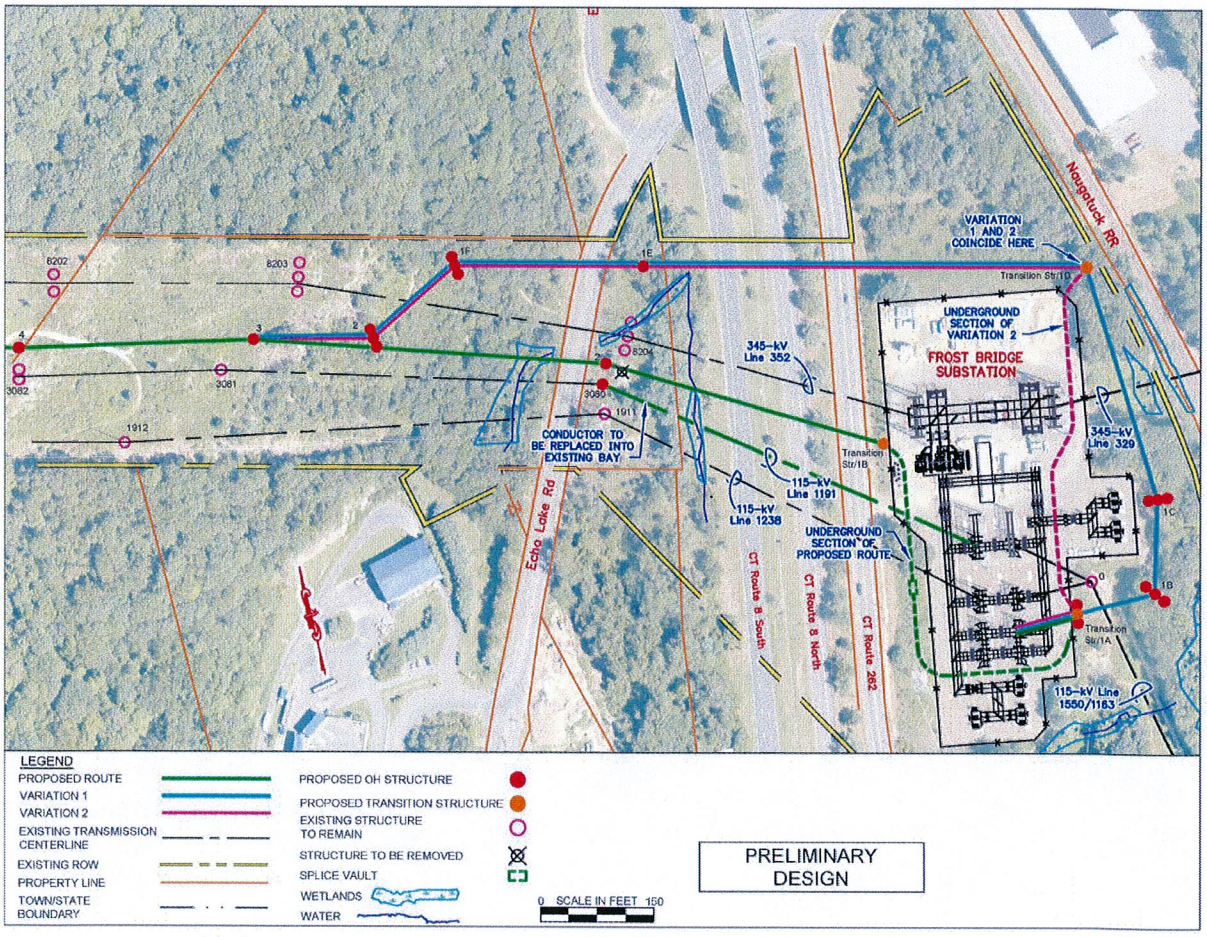
**Attachment 2 to Testimony of Raymond Gagnon et al**

Copy of Application Figure 1-1 Project Location Map



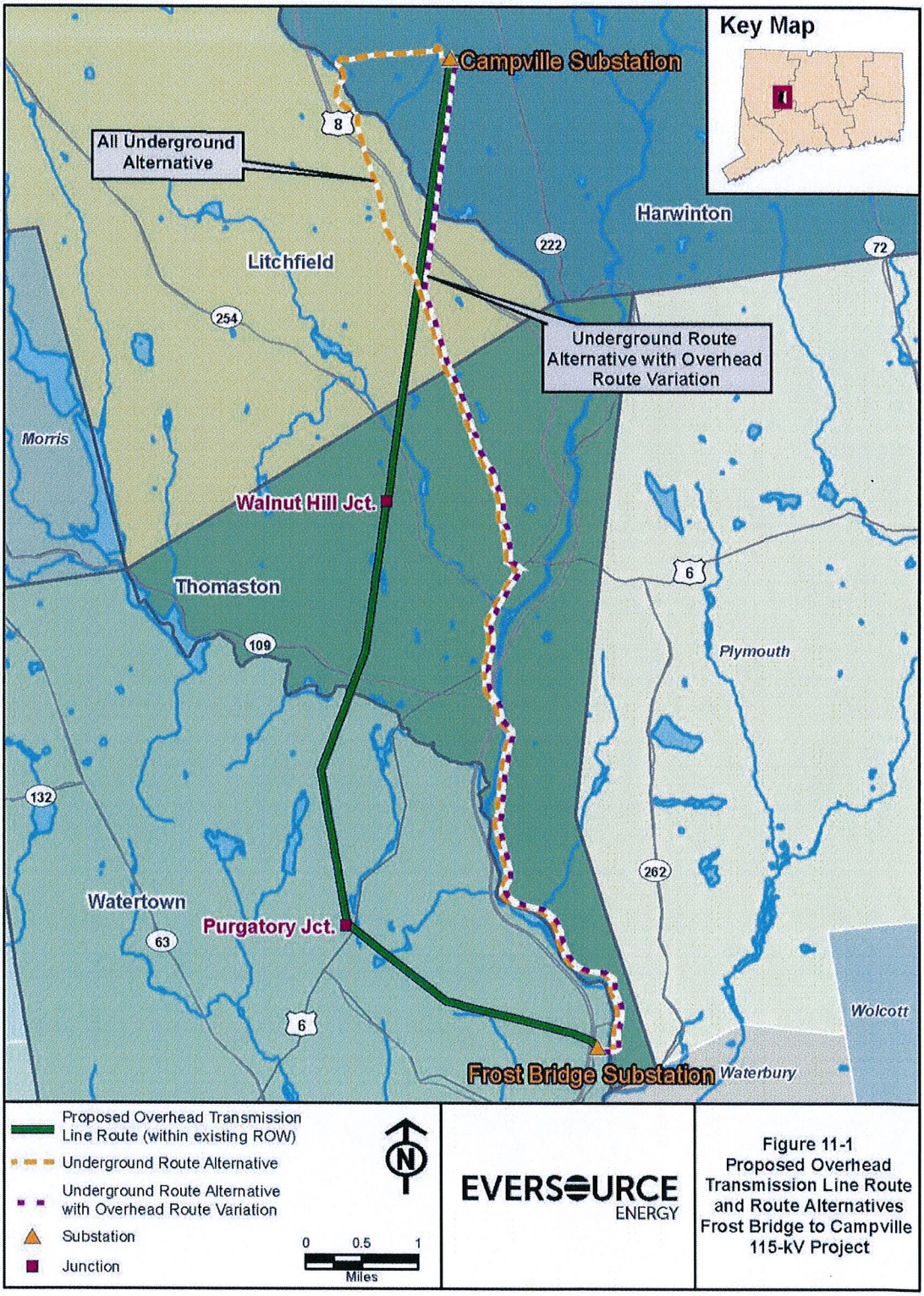
**Attachment 3 to Testimony of Raymond Gagnon et al**

Copy of Application Figure 12-1 Frost Bridge Substation Line Exit



**Attachment 4 to Testimony of Raymond Gagnon et al**

Copy of Application Figure 11-1 Proposed Overhead Transmission Line Route and Route Alternatives



**Attachment 5 to Testimony of Raymond Gagnon et al**

**Hearing Notice Sign**

# PUBLIC NOTICE

**Applicant:** The Connecticut Light and Power Company
doing business as Eversource Energy
**Type of Facility:** Electric Transmission Line

## Public Hearing Date:

Tuesday, March 1, 2016
3:30 PM and 6:30 PM
Northfield Volunteer Fire Department
12 Knife Shop Road
Litchfield, CT 06759

Applicable Documents for the Frost Bridge to Campville 115-kV Transmission Project are available at: http://www.ct.gov/csc under Pending Proceedings - Docket 466 or the public libraries in Watertown, Thomaston, Litchfield, and Harwinton.

**Connecticut Siting Council information:**
(860)827-2935 or http://www.ct.gov/csc or siting.council@ct.gov
10 Franklin Square, New Britain, Connecticut 06051