

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

The Connecticut Light & Power Company d/b/a Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the Southwest Connecticut Reliability Project that traverses the municipalities of Bethel, Danbury, and Brookfield, 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 3.4 miles between Eversource's existing Plumtree Substation in the Town of Bethel to its existing Brookfield Junction in the Town of Brookfield; (b) reconfiguration of two existing 115-kV double-circuit electric transmission lines at Eversource's existing Stony Hill Substation in the Town of Brookfield; and (c) related substation modifications

DOCKET NO. 468

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Applicant's Proposed Findings of Fact

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I. INTRODUCTION

1. Pursuant to Connecticut General Statutes (“CGS”) § 16-50g et seq., on June 29, 2016, The Connecticut Light and Power Company doing business as Eversource Energy (“Eversource”) applied to the Connecticut Siting Council (“Council”) for a Certificate of Environmental Compatibility and Public Need (“Certificate”) for the construction and operation of the Southwest Connecticut Reliability Project, consisting of a new approximately 3.4-mile 115-kilovolt (“kV”) overhead electric transmission line from Plumtree Substation in the Town of Bethel extending through a portion of the City of Danbury to Brookfield Junction in the Town of Brookfield, related modifications to Plumtree Substation and Stony Hill Substation in the Town of Brookfield, and reconfiguration of two existing 115-kV transmission lines (the 1770 Line and the 1887 Line) that presently connect to Stony Hill Substation. These proposed improvements, which would all be located within Eversource’s existing right-of-way (“ROW”) or on Eversource fee-owned property, are referred to collectively as the Southwest Connecticut Reliability Project (“Project”). (Eversource 1, Vol. 1, pp. FR-1, ES-1, 1-1)
2. The purpose of the Project is to provide needed upgrades for the improvement of the reliability of the 115-kV electric system in the Southwest Connecticut (“SWCT”) area generally, and in the Housatonic Valley-Norwalk-Plumtree sub-area (“Housatonic Valley sub-area”) of SWCT. The Project would address thermal overloads and voltage violations identified in studies conducted by Independent System Operator New England, Inc. (“ISO-NE”), the independent regional system planning authority for New England. (Eversource 1, Vol. 1, pp. FR-1, ES-1; Eversource 4, pp. 4-5)
3. The only party to these proceedings is Eversource (the Applicant). (Record)
4. In compliance with CGS § 16-50l(b), Eversource provided service and legal notice of the Application. This included notice to municipalities along the route of the proposed Project, federal, state, local and regional agencies, and elected officials. Eversource also published notice in The Danbury News-Times on June 10, 2016 and June 16, 2016, and provided a separate “Notice of Proposed Construction of a High-Voltage Electric Transmission Line” that was included in one or more monthly bills to Eversource customers within the municipalities of Bethel, Danbury and Brookfield. (Eversource 1, Vol. 1, pp. FR-11 – 12, Affidavits of Notice)
5. Pursuant to CGS § 16-50l(b), Eversource provided notice to landowners abutting Stony Hill Substation and Plumtree Substation. Community groups and water companies were also provided notice consistent with the Council’s Application Guide for Electric and Fuel Transmission Line Facility (“Application Guide”). (Eversource 1, Vol. 1, pp. FR-11 – 12; Affidavits of Notice)
6. Eversource received return receipts from each landowner abutting Stony Hill and Plumtree Substations, except for owners of four abutting properties. Eversource sent an additional notice via first class mail to the four abutters from whom Eversource did not receive return receipts. (Eversource 2, Q-CSC-001)

II. COUNCIL PROCEDURES

7. On June 30, 2016, the Council sent a letter to the State Treasurer, with copies to the Chief Elected Officials of Bethel, Danbury and Brookfield, stating that \$25,000 was received from Eversource as payment to the Municipal Participation Account (the "Fund") and deposited with the State Treasurer's department account. Pursuant to CGS § 16-50bb, subsection (b), the Fund is available to any or all of the municipalities if they become a participant in this proceeding. No municipality has applied for party status in this proceeding. (Municipal Fund Letter, 6/30/16; Record)
8. On August 25, 2016, the Council held a pre-hearing teleconference on procedural matters for parties and intervenors to discuss the requirements for pre-filed testimony, exhibit lists, administrative notice lists, expected witness lists, and the filing of pre-hearing interrogatories. (Pre-Hearing Teleconference Memo dated 8/17/2016)
9. In accordance with Section IX of the Application Guide, on September 6, 2016, Eversource posted eight 4-foot by 6-foot signs notifying the public of the Council's public hearing to be held in Bethel on September 22, 2016. These signs were posted at various locations throughout Bethel, Danbury and Brookfield. (Eversource 4, pp. 38-39)
10. The Council held a public evidentiary hearing on September 22, 2016 at 3:00 p.m., at the Bethel Municipal Center, 1 School Street, Bethel, Connecticut. (Transcript 1, September 22, 2016, 3:00 p.m., p. 4)
11. Pursuant to CGS § 16-50m, the Council, after giving due notice thereof, held a public hearing for citizen comment on September 22, 2016, at the Bethel Municipal Center, 1 School Street, Bethel, Connecticut. The public comment session commenced at approximately 7:00 p.m. (Transcript 2, September 22, 2016, 7:00 p.m., p. 4)
12. The Council and its staff conducted a public field review of the proposed Project route on September 22, prior to the public hearing. (Council Hearing Notice)

III. MUNICIPAL CONSULTATION AND COMMUNITY OUTREACH

13. Eversource began its outreach efforts in March 2016 by providing project overviews to municipal officials in Bethel, Danbury and Brookfield. (Eversource 1, Vol. 1, p. 9-5)
14. Pursuant to CGS § 16-50l(e), in April 2016, Eversource provided a Municipal Consultation Filing ("MCF") to the Chief Elected Official of each of the municipalities (i.e., Bethel, Danbury, and Brookfield) that would be affected by the Project. No other municipalities are located within 2,500 feet of the Project's proposed boundaries. (Eversource 1, Vol. 1, pp. FR-10, ES-1, ES-12)
15. During the 60-day MCF process, Eversource held an open house on May 4, 2016 in the Town of Bethel. (Eversource 1, Vol. 1, p. ES-12, 9-4)

16. The Council did not receive written comments from any municipality or public official regarding this Project. (Record)

IV. STATE AGENCY COMMENT

17. Pursuant to CGS § 16-50j(g), on August 5, 2016, the Council requested the following state agencies to submit written comments regarding the proposed Project: Department of Energy and Environmental Protection (“DEEP”); Department of Agriculture (“DOA”); Department of Public Health (“DPH”); Council on Environmental Quality (“CEQ”); Public Utilities Regulatory Authority (“PURA”); Office of Policy and Management (“OPM”); Department of Economic and Community Development (“DECD”); Department of Transportation (“ConnDOT”); Connecticut Airport Authority (“CAA”); Department of Emergency Services and Public Protection (“DESPP”); and State Historic Preservation Office (“SHPO”). The Council sent a second request for additional agency comments on September 23, 2016. (Record)
18. ConnDOT submitted comments concerning Eversource’s application on August 29, 2016. DEEP submitted comments concerning Eversource’s Application on September 19, 2016. (ConnDOT comments dated August 29, 2016; DEEP comments dated September 19, 2016)
19. The following agencies did not respond with comment on the application: DOA, DPH, CEQ, PURA, OPM, DECD, CAA, DESPP and SHPO. (Record)

V. SYSTEM PLANNING AND MANDATORY RELIABILITY STANDARDS

20. Improvements of the electric transmission system that are required to preserve its reliability are planned in a regional process pursuant to federal authority. Pursuant to the Energy Policy Act of 2005, the Federal Energy Regulatory Commission (“FERC”) has designated the National Electric Reliability Corporation (“NERC”) as a national Electric Reliability Organization (“ERO”) to develop and enforce reliability standards for planning and operations. NERC’s standards are subject to approval by FERC and compliance is mandatory under federal law. (Eversource 1, Vol. 1, pp. 2-3 – 2-4)
21. In addition, the Northeast Power Coordinating Council (“NPCC”) promulgates reliability criteria that apply in New York, the six New England States, and parts of Canada; these criteria must be consistent with the NERC standards. The U.S. systems of the NPCC formed two new power pools, ISO-NE and the New York Independent System Operator (“NYISO”). (Eversource 1, Vol. 1, p. 2-3)
22. In New England, ISO-NE is an independent non-profit entity that has been vested by NERC with responsibility for planning and operating the New England transmission grid. ISO-NE issues its own reliability requirements and planning procedures, which must be consistent with (but may be more stringent than) those of NERC and NPCC. (Eversource 1, Vol. 1, p. 2-4)
23. In conducting planning studies and proposing improvements to the transmission system, all transmission owners in New England, including Eversource, are required to comply with NERC

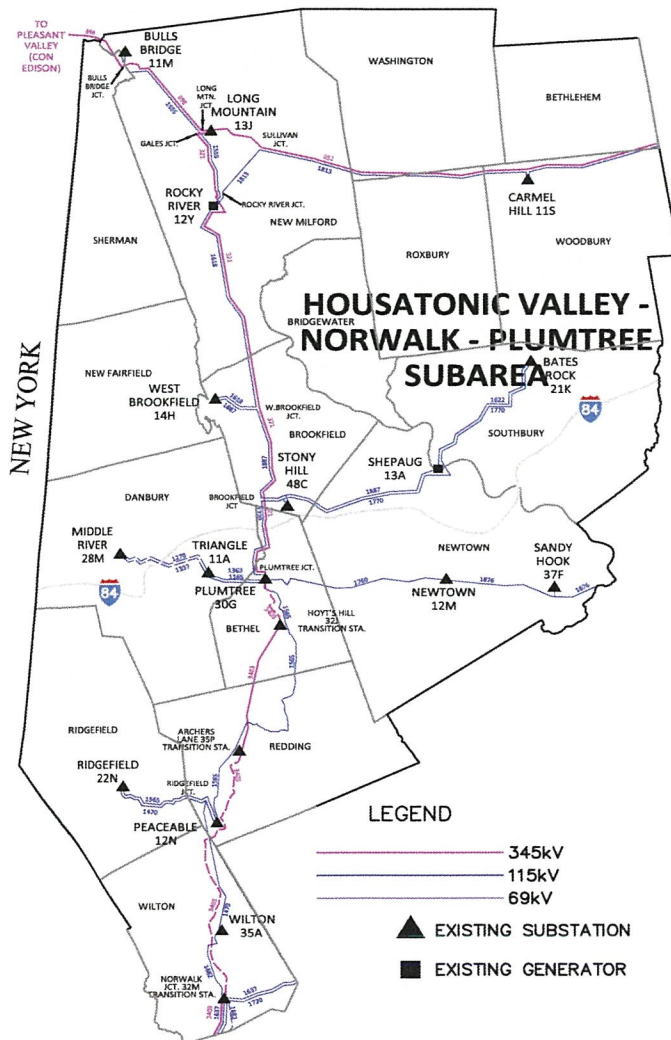
standards, NPCC criteria, and ISO-NE planning procedures. (Eversource 1, Vol. 1, p. 2-4; Eversource 1, Vol. 4, Exh. 3, p. 6)

24. These standards, criteria, and procedures provide for the identification of the need for improvements to the transmission system by performing planning studies that consist of computer simulations of the performance of the system under existing and anticipated future conditions. (Eversource 1, Vol. 1, pp. 2-4 – 2-7)

VI. PROJECT NEED

25. The proposed Project is the product of extensive, multi-year planning studies regarding the SWCT region. Studies that were conducted more than 15 years ago led to the construction of major projects approved by the Council in Docket 217 (Bethel-Norwalk 345-kV line), Docket 272 (Middletown-Norwalk 345-kV line), and Docket 292 (Glenbrook-Norwalk 115-kV cables). These projects not only created a 345-kV transmission “loop” that provides 345-kV backbone service, but also addressed numerous criteria violations, which were identified in the planning studies. (Eversource 1, Vol. 1, p. 2-8; Eversource Admin. Notice Items 21, 22, 23)
26. During the planning studies, transmission planners noted that several 115-kV lines in SWCT were near or above their thermal loading limits; that some 115-kV substations in SWCT had low voltage issues; and that these issues would not be fully resolved by construction of the 345-kV loop. (Eversource 1, Vol. 1, p. 2-8)
27. In its Findings of Fact for Docket 272, the Council found that more than 20 thermal overloads identified in the planning studies would remain after completion of the 345-kV loop. It noted that “[t]hese remaining overloads would be addressed locally through substation or transmission line upgrades” to be constructed in the future. (Eversource 1, Vol. 1, p. 2-8; Eversource Admin. Notice Item 22, Finding #62)
28. The need for the Project was identified by a working group (the “Working Group”) led by ISO-NE, which consisted of members from ISO-NE, Eversource, and The United Illuminating Company (“UI”). The Working Group was formed in 2012 to prepare a “10-year look ahead” evaluating the reliability of the transmission system serving the SWCT study area for the projected system conditions in 2022. (Eversource 1, Vol. 1, p. 2-8; Eversource 4, pp. 11-12)
29. The Working Group divided the SWCT study area into the following sub-areas:
- Housatonic Valley-Norwalk-Plumtree;
 - Frost Bridge-Naugatuck Valley;
 - Bridgeport;
 - New Haven-Southington; and
 - Glenbrook-Stamford.
- (Eversource 1, Vol. 1, p. 2-9; Eversource 4, pp. 11-12)

30. The SWCT planning study objective was to assess the reliability performance of the system and to identify reliability-based transmission needs in the area based upon (a) anticipated future growth; (b) reliability over a range of generation patterns and transfer levels; (c) assessment of system compliance with all applicable NERC, NPCC and ISO-NE transmission planning reliability standards; (d) regional and local reliability issues; existing and planned supply and demand resources; and (e) limited short circuit margin concerns in the SWCT study area. (Eversource 1, Vol. 1, p. 2-9)
31. In 2014, ISO-NE published a final SWCT Connecticut Area Transmission 2022 Needs Assessment (*SWCT Needs Report*); the following year ISO-NE published a report identifying preferred solutions for the needs of the entire SWCT study area (*SWCT Solutions Report*), which included the Housatonic Valley sub-area. After further studies, and a positive recommendation by its Reliability Committee, ISO-NE issued a technical approval of the SWCT solutions for all sub-areas on April 16, 2015. (Eversource 1, Vol. 1, p. 2-10; Eversource 1, Vol. 4, Exhibits 1 & 2)
32. The figure below depicts the Housatonic Valley sub-area. (Eversource 1, Vol. 1, p. 2-11)



33. The Housatonic Valley sub-area has four generation facilities, consisting of three hydro-electric facilities (at Rocky River, Bull's Bridge, and Shepaug) and the Kimberly Clark combined cycle plant facility. The available generation from these facilities totals approximately 28.8 megawatts ("MW"). Based on historical data available at the time of its study, ISO-NE determined that the Shepaug and Rocky River generating stations should be modelled as being off line, and that the Bulls Bridge generating station should be modeled as operating at 10% of its nameplate capacity, consistent with the ISO-NE Transmission Planning Technical Guide. (Eversource 1, Vol. 1, p. 2-12; Eversource 2, Q-CSC-008)
34. The Housatonic Valley sub-area's net load for 2022, after demand resources are subtracted, is about 860 MW. Because the generation facilities located within the Housatonic Valley sub-area are inadequate to serve the sub-area's electric demands, it relies on net imports of energy to serve local load. The major transmission elements that presently deliver power into the sub-area are:
- Two Plumtree 345/115 kV autotransformers (Plumtree 1X and 2X);
 - One 115-kV line from Norwalk to Wilton (1682 Line);
 - One 115-kV line from the Stevenson generation facility to Sandy Hook to Newtown (1876 Line);
 - One 115-kV line from Frost Bridge (Watertown) to Carmel Hill (Woodbury) (1238 Line).
- (Eversource 1, Vol. 1, p. 2-12)
35. The *SWCT Needs Report* showed that there were criteria violations in the Housatonic Valley sub-area "load pocket". A load pocket is an area that has insufficient generation and transmission to serve its load. The electric system in the Housatonic Valley load pocket is subject to thermal overloads and voltage violations when the system attempts to serve peak load under many contingent conditions. (Eversource 1, Vol. 1, p. 2-12; Eversource 4, p. 12)
36. All of the criteria violations for the Housatonic Valley sub-area were related to serving load *within* the pocket, as opposed to power transferring through the sub-area to serve another part of the system. When contingencies removed one or more transmission supplies to this load pocket, the remaining transmission connections and local generation in the sub-area were insufficient to serve the load, resulting in thermal overloads and severe low voltage conditions. (Eversource 1, Vol. 1, p. 2-12; Eversource 4, pp. 12-13)
37. The planning studies showed that the Housatonic Valley sub-area had three transmission elements with N-1 thermal violations and six 115-kV buses with N-1 low-voltage violations, as well as two non-Pool Transmission Facility (PTF) buses with N-1 low-voltage violations. Under N-1-1 conditions, there were eight elements with thermal violations, 12 115-kV PTF buses with low-voltage violations, and four non-PTF buses with low-voltage violations. There were no N-0 violations. (Eversource 1, Vol. 1, p. 2-14; Eversource 1, Vol. 4, Exhibit 1, p. 11)
38. The planning studies showed that the worst case violations in the Housatonic Valley sub-area, under various dispatches, arise after the loss of the transmission path that connects Plumtree

Substation to Stony Hill Substation. (Eversource 1, Vol. 1, p. 2-14; Eversource 1, Vol. 4, Exhibit 1, p. 11)

39. Although the year modelled in the *SWCT Needs Report* was 2022, the study showed that the improvements required to meet the identified needs should be constructed as soon as possible. ISO-NE calculates a “year of need” for system improvements by estimating when the “critical load level” for which improvements are needed will be reached. The *SWCT Needs Report* found that the year of need for the Housatonic Valley sub-area improvements was 2013, because the Connecticut net load forecast for 2013 was 7,776 MW, whereas thermal violations began to occur at a 4,163 MW net load; low voltage violations began to occur at a 5,218 MW net load. (Eversource 1, Vol. 1, p. 2-15)
40. The actual 2013 peak net load for Connecticut was 7,128 MW. Although lower than predicted, the load was well in excess of the critical load level. (Eversource 1, Vol. 1, p. 2-15)
41. To evaluate possible interactions between the sub-areas, the Working Group considered both “local” and “global” solutions to the reliability issues in the Housatonic Valley sub-area and Frost Bridge-Naugatuck Valley sub-area. The Working Group ultimately determined that the optimal solution for the reliability issues in the Housatonic Valley sub-area was a “local” solution, i.e., a solution that would address the reliability needs in the Housatonic Valley sub-area separate from those in the Frost Bridge-Naugatuck Valley sub-area. The preferred solution for the Housatonic Valley sub-area is referred to as “Local 2” in the *SWCT Solutions Report*. The components of the Local 2 solution were designed by the Working Group to address all thermal and voltage issues in the Housatonic Valley sub-area. (Eversource 1, Vol. 1, pp. 2-9 – 2-10; Eversource 1, Vol. 4, Exhibit 2; Eversource 4, p. 13)
42. In addition to the solutions defined for the Housatonic Valley sub-area, the *SWCT Solutions Report* recommended improvements in each of the other three SWCT sub-areas studied; namely, the Frost Bridge-Naugatuck Valley sub-area, New Haven-Southington sub-area, and Bridgeport sub-area. However, the proposed solutions in these other SWCT sub-areas are not interdependent with those of the Housatonic Valley sub-area, and were designed to be implemented independently to address criteria violations in each particular sub-area. (Eversource 1, Vol. 1, p. 2-15)
43. The key components of the solution identified by the Working Group are a new 115-kV line between Plumtree Substation and Brookfield Junction, coupled with the reconfiguration of the 1887 Line and the 1770 Line, which would provide a new 115-kV source into the Housatonic Valley sub-area. This new 115-kV line would be available to serve the reliability needs of all customers in the load pocket, including those in Bethel, Danbury, and Brookfield. The new line would also provide an additional system element to share the load that would be automatically redistributed upon the failure of other system elements; and a source to help maintain continuity of supply to the load from external sources in such an event. (Eversource 1, Vol. 1, pp. 2-15 – 2-16; Eversource 4, pp. 14-15)
44. The proposed reconfiguration of the 115-kV line connections at Stony Hill Substation is part of a cost-effective reliability solution; it would eliminate the need to perform other system upgrades that would otherwise be required. Specifically, the reconfiguration work would avoid the need to

reconductor other existing 115-kV transmission lines and install additional reactive compensation in the local area. (Eversource 2, Q-CSC-07; Eversource 4, p. 10)

45. There are other improvements in the Housatonic Valley sub-area referenced in the *SWCT Solutions Report* that are being implemented separately from this Project. However, this Project provides a reliability benefit that is independent from the benefits of the other improvements and, therefore, the Project would proceed even without the completion of these other improvements in the Housatonic Valley sub-area. (Eversource 4, p. 16; Transcript 1, pp. 37-38)
46. As part of the Project, Eversource proposes to reconfigure a capacitor bank at Stony Hill Substation to address the reliability needs identified by the Working Group. Capacitors are installed in substations to support voltage. There are currently three capacitor banks at Stony Hill Substation, two rated at 37.8 MVAR (mega volt amps (reactive)) and one rated at 25.2 MVAR. The two 37.8-MVAR capacitor banks are connected to the “A1” 115-kV bus, while the 25.2-MVAR capacitor bank is connected to the “A2” 115-kV bus. The SWCT planning studies showed that there are contingencies involving these capacitors that would cause low voltage violations at several substations. Reconfiguring one of Stony Hill Substation’s 37.8-MVAR capacitor banks to the same side as the 25.2-MVAR capacitor bank would improve the post-contingent voltage in the area. Therefore, the existing 115-kV capacitor bank connection to the “A1” bus would be removed and the capacitor bank instead would be connected to the existing “A3” bus. (Eversource 1, Vol. 1, pp. ES-6, 1-8, 2-20; Eversource 4, p. 15)
47. 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 would ensure compliance with reliability criteria through 2022. (Eversource 1, Vol. 1, p. 2-20 – 2-21; Eversource 4, pp. 15-16)

VII. PROJECT COST

48. The estimated capital cost for the Project is approximately \$24.4 million; the transmission line accounts for approximately \$18.9 million and substation modifications account for approximately \$5.5 million. (Eversource 1, Vol. 1, p. 3-14; Eversource 4, p. 16)
49. Unless costs are incurred to satisfy local requirements, Eversource expects that the costs of the Project would be regionalized. Assuming all costs are so regionalized, Connecticut’s electricity customers (not just Eversource customers) would pay approximately 25% of the Project costs. (Eversource 4, p. 17)
50. The life-cycle cost for the transmission line is \$32.3 million. The resulting life-cycle cost per mile is \$9.7 million. This is commensurate with the findings of the Council’s 2012 Life-Cycle Cost Studies for Overhead and Underground Transmission Lines (“LCC Report”), which identifies the total LCC for a 115-kV steel “delta” line as \$8.6 million per mile. Differences between the LCC Report and the Project estimated cost are attributable to factors that include vertical construction as opposed to “delta” construction, and costs escalated to 2016 dollars. (Eversource 1, Vol. 1, p. 3-14)

51. Project construction is anticipated to begin in the first quarter of 2018, with a scheduled in-service date by the end of 2018. (Eversource 1, Vol. 1, p. ES-12; Eversource 4, p. 17)

VIII. PROJECT ALTERNATIVES

No Action Alternative

52. One alternative is no action, i.e., no improvement of the electric supply system. The “no action” alternative would not eliminate violations of national and regional liability standards and criteria, and would be inconsistent with Eversource’s obligation to provide reliable electric service. (Eversource 1, Vol. 1, p. 10-1; Eversource 4, p. 22)

Transmission Alternatives

53. The SWCT Working Group evaluated four transmission alternatives for the Housatonic Valley sub-area, including two potential “local solutions” (“Local 1” and “Local 2”) that only involved upgrades in the Housatonic Valley sub-area, and two potential “global solutions” (“Global 1” and “Global 2”) that addressed the reliability issues in both the Housatonic Valley sub-area and the Frost Bridge-Naugatuck sub-area through combined solutions. (Eversource 1, Vol. 1, pp. 10-1 – 10-3; Eversource 4, p. 23)
54. The four transmission alternatives were compared based on system performance, estimated cost, and other key facts such as ease of permitting, constructability and expandability. (Eversource 1, Vol. 1, p. 10-7; Eversource 4, p. 23)
55. All four transmission alternatives would solve the thermal and voltage criteria violations in the Housatonic Valley sub-area, and their operational performance were all comparable. (Eversource 1, Vol. 1, p. 10-7)
56. The two global solutions were eliminated from further consideration based on their substantially higher costs (compared to Local 1 and Local 2), environmental impacts, permitting risks and constructability issues associated with the construction of a new 10-mile transmission line on a “greenfield” right of way between Bunker Hill and Bates Rock substations. In light of these factors, the SWCT Working Group determined that neither of the global alternatives would be a practical solution to the reliability issues in the combined sub-areas. (Eversource 1, Vol. 1, p. 10-8)
57. A comparison of the costs of the two local solutions revealed that the cost of Local 1 would be materially higher than Local 2. Local 1 would require the installation of two synchronous condensers at Stony Hill Substation, but Local 2 would require only one. (Eversource 1, Vol. 1, p. 10-8)
58. The following table shows a comparison of cost estimates among the four transmission alternatives considered by the SWCT Working Group.

Cost Comparison of Transmission Alternatives

SOLUTION ALTERNATIVE	COST ESTIMATE ¹
Global 1	\$261.0 million
Global 2	\$331.2 million
Local 1	\$187.4 million
Local 2	\$165.7 million

¹ Note that some of the projects included in these cost estimates would be built by Eversource, while others would be built by UI.

(Eversource 1, Vol. 1, p. 10-7)

59. The Working Group ultimately selected Local 2 because it would be less costly than all of the other alternatives, would achieve comparable performance, and would result in potentially fewer environmental and social impacts than the two global solutions given its use of existing transmission ROWs. (Eversource 1, Vol. 1, p. 10-8 – 10-9)
60. For this Project, Eversource proposes to construct specific elements of Local 2 – the new 115-kV line between Plumtree Substation and Brookfield Substation, the reconfiguration of the existing 1887 and 1170 lines, and the modifications to Stony Hill Substation. Other components of Local 2 in the Housatonic Valley sub-area are the subject of other petitions and exempt modification filings by Eversource before the Council. (Eversource 1, Vol. 1, p. 10-9)

Non-Transmission Alternatives

61. Eversource retained London Economics International, LLC (LEI) to prepare a comprehensive analysis of non-transmission alternatives that could address the need served by the transmission solution. LEI concluded that a non-transmission alternative (“NTA”) solution – whether solely consisting of new generation or new generation in combination with demand reduction – would be far more costly than the Project and therefore economically impractical. (Eversource 1, Vol. 1, p. 10-9 – 10-13; Eversource 1, Vol. 4, Exh. 4; Eversource 4, p. 23; Eversource 5, pp. 6-7)
62. Eversource planners determined that, to alleviate reliability needs in the Housatonic Valley sub-area in lieu of transmission upgrades, a total injection of 247 MW of power would be required at four locations: Stony Hill Substation, West Brookfield Substation in Brookfield, Triangle Substation in Danbury, and Peaceable Substation in Redding. In addition to active power requirements, Eversource planners also determined that these locations would require reactive power regulation. (Eversource 1, Vol. 1, p. 10-10)
63. LEI considered two cases in its analysis: (i) an NTA solution based solely on supply-side resources (“Supply Case”), and (ii) an NTA solution combining demand and supply-side resources (“Combination Case”). Because Eversource planners had determined that demand-side resources alone would be insufficient to address reliability concerns, LEI decided to include a Combination Case in the alternative analysis to determine whether combining both demand and

supply-side resources would lower the costs associated with an NTA solution. (Eversource 1, Vol. 1, p. 10-10; Eversource 1, Vol. 4, Exh. 4; Eversource 5, p. 4)

- 64. In both cases, LEI identified supply-side resources – including slow-discharge batteries, peaker aeroderivatives, and fuel cells – as technically feasible NTA technologies at all four substations serving as injection points. The assessment of technical feasibility included the ability to provide reactive power instantaneously. (Eversource 1, Vol. 1, pp. 10-10 – 10-11; Eversource 1, Vol. 4, Exh. 4; Eversource 5, p. 4)
- 65. In the Combination Case, energy efficiency resources (limited to load availability and load reduction capability) were assumed by default to be part of the NTA solution and would cover a portion of the MW requirement; a supply-side resource would address the remainder of the energy requirement, as well as provide reactive power to ameliorate voltage issues. LEI assumed that all of the considered technologies (including engine-based technologies such as gas-fired generation) would require a synchronous condenser to address the instantaneous nature of the voltage requirement. (Eversource 1, Vol. 1, p. 10-11; Eversource 1, Vol. 4, Exh. 4; Eversource 5, pp. 4-5)
- 66. Although LEI explored the technical feasibility of solar photovoltaic (PV) as an NTA at the considered locations, such technology was excluded from the analysis due to cost, the volume of nameplate capacity needed, and the associated land requirements. Typically, five acres of land is required for each MW of solar electric generation in Connecticut. (Eversource 1, Vol. 1, p. 10-11; Eversource 2, Q-CSC-006; Eversource 5, p. 5)
- 67. The tables below depict the Supply Case and Combination Case list of qualified technologies and requirements for each substation.

Supply Case - List of Qualified Technologies and Requirements for Each Substation

Substations	Stony Hill	West Brookfield	Triangle	Peaceable
Requirements at substation (MW)	50	47	50	100
Requirements at substation (MVAR)	16	15	16	33
NTA Technologies:				
Aeroderivative Peaker (MW)	59	55	59	118
Synchronous Condenser (MVAR)	25	25	25	50

**Combination Case - List of Qualified
Technologies and Requirements for Each Substation**

Substations	Stony Hill	West Brookfield	Triangle	Peaceable
Requirements at substation (MW)	50	47	50	100
Requirements at substation (MVAR)	16	15	16	33
NTA Technologies:				
Energy Efficiency (MW)	8	7	10	5
Aeroderivative Peaker (MW)	49	47	48	111
Synchronous Condenser (MVAR)	25	25	25	50

(Eversource 1, Vol. 1, pp. 10-11 – 10-12)

68. LEI concluded that the least-cost technically feasible NTA solution was the Supply Case, which would entail the development of 291 MW of gas-fired peakers (using aeroderivative technology) across four locations (each peaking facility including a synchronous condenser) at a direct cost to electric ratepayers totaling \$53 million per year. The direct cost to electric ratepayers for the Combination Case was estimated at \$82 million per year. These costs were substantially more than the estimated direct cost of \$2.1 million per year for Project and other solution components in the Local 2 solution selected by ISO-NE in the *SWCT Solutions Report*. (Eversource 1, Vol. 1, p. 10-12; Eversource 1, Vol. 4, Exh. 4; Eversource 5, p. 6)
69. LEI also considered the additional costs associated with the development of the NTAs. The NTA estimates do not include the cost of any electric transmission system upgrades that may be required to interconnect the NTA technologies. For any NTA involving a gas-fired generator, new natural gas pipeline laterals would have to be constructed between the existing pipelines and the four substations where gas-fired generation units would be needed. (Eversource 1, Vol. 1, p. 10-13; Eversource 1, Vol. 4, Exh. 4; Eversource 5, p. 7)
70. No private developer to date has shown interest in bringing to market an NTA that would fit the technological requirements and geographic requirements of the necessary NTA solution for the Housatonic Valley sub-area. (Eversource 5, p. 7)
71. The enormous cost differential between the NTA solutions and the transmission solution in the *SWCT Solutions Report*, along with the practical impediments associated with developing and bringing to fruition an NTA solution, compelled LEI's conclusion that an NTA would not provide a practical alternative to the transmission solution. (Eversource 1, Vol. 1, p. 10-12; Eversource 5, pp. 6-7)

IX. TRANSMISSION LINE ROUTE AND CONFIGURATION ALTERNATIVES

Overview of Route Analysis Process

72. Eversource applied an established set of route selection objectives to identify and compare potential routes for the new 115-kV transmission line between Plumtree Substation and Brookfield Junction. This included the following overarching goals:
- The selection of a cost-effective and technically feasible solution to achieve the transmission system reliability improvements and to interconnect Plumtree Substation and Brookfield Junction;
 - The avoidance, minimization, or mitigation of adverse environmental and cultural effects and minimizing impacts to the community to the extent possible.
- (Eversource 1, Vol. 1, p. 11-2)
73. A Project Study Area for the alternative route analysis was defined, taking into general consideration land use and physical constraints, as well as the distance between Plumtree Substation and Brookfield Junction. The identified Study Area extends approximately 2 miles west and 2 miles east of Eversource's existing ROW, which traverses generally south-north, connecting Plumtree Substation and Brookfield Junction. (Eversource 1, Vol. 1, p. 11-3)
74. Eversource identified and reviewed various existing linear corridors to determine if the new 115-kV line could be co-located within or adjacent to such ROWs. Eversource also assessed regional topographic and land use conditions to determine whether a new 115-kV transmission line could be practically developed along an entirely new ROW. (Eversource 1, Vol. 1, p. 11-3)
75. In this initial review, 10 potential routes were identified. Along these alternative routes, Eversource evaluated the potential alignment of the new 115-kV line in either overhead or underground configurations, or combinations thereof. In total, the analysis resulted in the identification and evaluation of the Proposed Route, five all-overhead routes, one all-underground route, and three combination overhead/underground routes. (Eversource 1, Vol. 1, p. 11-5)
76. The Proposed Route and overhead line design represent the optimal Project configuration for the following reasons:
- The new overhead 115-kV line would be located entirely within Eversource's existing ROW, which is already devoted to utility use and has sufficient unutilized space to accommodate a new line without requiring relocation of the existing lines or the acquisition of additional easements. The co-location of the new line within this existing ROW would be consistent with federal policies regarding linear energy facility siting, as well as with Eversource objectives.
 - Although unavoidable temporary effects and minor long-term impacts to site-specific environmental resources would occur as a result of the construction and operation of the proposed 115-kV line within Eversource's existing ROW, the development of the Project along Eversource's existing ROW would be consistent with state and local land use

policies and would minimize long-term adverse environmental impacts to the maximum extent practical. Further, because the new 115-kV line structures would typically be substantially shorter than the existing transmission line structures on the ROW, the overall visual effects would be minor and inconsequential.

- The Proposed Route and overhead line design represent the most cost-effective alternative to Connecticut consumers and offer the optimal solution to bring a new 115-kV source to the Housatonic Valley sub-area.

(Eversource 1, Vol. 1, p. 11-35; Eversource 4, p. 21)

Underground and Combination Line Routes Considered and Rejected

77. Eversource considered three combination overhead/underground route alternatives for the 115-kV line between Plumtree Station and Brookfield Junction. All of these alternatives were eliminated from further consideration because they would be longer and more costly, and provide no advantages when compared with the Preferred Route in terms of cost, constructability, or social/environmental impacts. (Eversource 1, Vol. 1, pp. 11-27 – 11-29; Eversource 4, pp. 18-19)
78. In addition, Eversource identified an all-underground route alternative, which would be aligned predominantly within road ROWs. However, this alternative would pose significant challenges with respect to constructability issues and consistency with ConnDOT policy regarding co-location within U.S. Route 6. Construction would also be challenged by the route's alignment along narrow and winding local roads. Further, the cable would have to be installed beneath I-84 using horizontal directional drilling (HDD), which would be costly and require staging areas of several acres on either side of the crossing. (Eversource 1, Vol. 1, pp. 11-29 – 11-30; Eversource 4, p. 19)
79. The initial capital cost of the 3.46-mile all-underground alternative (excluding substation modifications) is estimated to be approximately \$51.8 million for 115-kV high-pressure fluid-filled (HPFF) cable and approximately \$76.0 million for 115-kV cross-linked polyethylene (XLPE) cable, as compared to \$18.9 million for the proposed 115-kV overhead line. (Eversource 1, Vol. 1, p. 3-17; Admin. Notice 20, p. 2-6)
80. The life cycle cost for the 3.46-mile all-underground 115-kV line is estimated to be approximately \$88.0 million for 115-kV HPFF cable and approximately \$110.1 million for 115-kV XLPE cable, while the life-cycle cost for the proposed overhead 115-kV line is approximately \$32.3 million. (Eversource 1, Vol. 1, p. 3-17; Admin. Notice 20, p. 9-4)
81. The following table summarizes and compares the Proposed Route to the three combination overhead/underground alternatives and the all-underground route alternative.

Route Alternative Characteristic	Route Alternative				Proposed Route
	6	7	8	9	
LENGTH*					
Total Length (Miles)	5.60	3.82	4.82	3.46	3.34
• Miles Above Ground	2.30	3.32	3.92	0	3.34
• Miles Underground	3.30	0.50	0.90	3.46	0
Length, by Municipality:					
• Bethel	4.11	2.46	2.80	2.30	2.16
• Danbury	0	0.85	0.85	0.81	0.85
• Brookfield	1.46	0.51	1.16	0.34	0.34
ROW CHARACTERISTICS					
Length within Transmission Line ROWs (miles)	1.54	2.23	2.23	1.34	3.34
Length along Local/State Road ROWs (miles)	3.28	1.04	0.61	2.11	0
Length along RR Corridors (miles)	0.70	0	0.47	0	0
Length of greenfield ROW (miles)	0	0.55	1.51	0	0
Need to Acquire New ROW	Yes	Yes	Yes	Yes	No

*Length totals may not be exact due to rounding of segment lengths

(Eversource 1, Vol. 1, p. 11-27)

Alternative Overhead Line Routes Considered and Rejected

82. Five all-overhead route alternatives to the Proposed Route were also identified and evaluated for the new 115-kV line. To the extent practical, these alternatives were routed to optimize the use of linear corridors. Given the extent of land use development in the Study Area, all of the route alternatives involved the use of existing utility ROWs, combined with railroad or highway corridors and, in two cases, new greenfield ROW segments. (Eversource 1, Vol. 1, p. 11-15)
83. Compared to the development of the new 115-kV line along the Proposed Route, Eversource's analyses determined that each of the five overhead alternative routes would be longer, more costly, and less suitable for the development of a new transmission line due to factors such as engineering constraints, geologic conditions, need for new utility easements, and/or the potential for significant environmental, social, or economic effects. (Eversource 1, Vol. 1, pp. 11-15 – 11-16)
84. The following table summarizes and compares the five all-overhead route alternatives to the Proposed Route.

Route Alternative Characteristic	Route Alternative (Number)					Proposed Route
	1	2	3	4	5	
LENGTH*						
Total Length (Miles)	3.66	3.63	5.50	4.36	4.79	3.34
Length, by Municipality (Miles):						
• Bethel	0.63	2.12	0.51	0.51	1.63	2.16
• Danbury	2.59	1.07	4.55	3.41	2.72	0.85
• Brookfield	0.44	0.44	0.44	0.44	0.44	0.34
ROW CHARACTERISTICS						
Length within Transmission Line ROWs (miles)	1.33	2.47	1.70	0.46	2.23	3.34
Length along Local/State Road ROWs (miles)	0.59	0	0	0	0.59	0
Length along RR Corridors (miles)	1.11	0.34	3.72	2.36	1.40	0
Length of greenfield ROW (miles)	0.51	0.82	0	1.53	0	0
Need to Acquire New ROW	Yes	Yes	Yes	Yes	Yes	No

*Length totals may not be exact due to rounding of segment lengths

(Eversource 1, Vol. 1, p. 11-16)

Route Configuration Variation

85. Because the Proposed Route would be located entirely within Eversource’s existing ROW between Plumtree Substation and Brookfield Junction, no alignment variations (i.e., routes that would place portions of the new 115-kV line outside the existing ROW) were identified that would provide environmental, social, or cost advantages. (Eversource 1, Vol. 1, p. 11-32)
86. During the MCF process, certain landowners and representatives of the Town of Bethel requested that Eversource evaluate “shifting” the location of the new transmission line (within the ROW) to the west/north side of the existing 321/1770 line, rather than locating the proposed line along the east/south side of the ROW (as proposed in Eversource’s application). This option was suggested to avoid forest vegetation clearing near certain residences. (Eversource 1, Vol. 1, p. 11-32; Eversource 4, p. 22)
87. In response to the request from Bethel landowners and representatives, Eversource investigated such a shift in the location of the proposed line along an approximately 0.7-mile portion of the ROW that is bordered by residential uses near the Danbury-Bethel boundary. For the analysis of this configuration variation, Eversource took into consideration engineering, environmental impacts, and cost. Because the 321/1770 line structures are not centered within the ROW, there is less unused space on the west/north side of the ROW to accommodate the new 115-kV line. (Eversource 1, Vol. 1, p. 11-33; Eversource 4, p. 22)
88. In order to align the new 115-kV line on the west/north side of the ROW and achieve proper conductor clearances from the existing 321/1770 lines, Eversource would have to acquire easements for approximately 25 feet of new ROW from private property owners on the west/north side of the ROW along the length of the configuration variation. In total, easements for approximately 1.12 acres of additional ROW would have to be acquired from private property owners, and two existing single family homes would encroach onto the expanded

ROW. Eversource determined that, compared to the Proposed Route, this alternative configuration would increase costs and social impacts, and would not result in any environmental, engineering, or constructability benefits. (Eversource 1, Vol. 1, p. 11-33; Eversource 4, p. 22)

X. PROJECT DESCRIPTION

89. The Project would consist of a new, approximately 3.4-mile 115-kV overhead electric transmission line from Plumtree Substation in Bethel to Brookfield Junction in Brookfield. Eversource also proposes to reconfigure the existing 115-kV line interconnections at Stony Hill Substation in Brookfield and make modifications at Stony Hill Substation. All of the proposed Project facilities and modifications would be accommodated within Eversource's existing transmission line ROWs or on Eversource-owned property. (Eversource 1, Vol. 1, p. 3-1; Eversource 4, p. 4)

115-kV Transmission Line

90. The new approximately 3.4-mile 115-kV transmission line would be located entirely within an existing Eversource ROW that is 175-225 feet in width. Currently, the entire 3.4-mile length of the ROW is occupied by an existing 115-kV transmission line (the 1770 Line) and a 345-kV transmission line (the 321 Line). The 1770 Line and 321 Line are supported on double-circuit structures that are typically 150 feet tall. For approximately 0.25 mile heading west from the Plumtree Station exit, the ROW is also occupied by two other 115-kV lines (the 1363 Line and 1165 Line) that extend to Triangle Substation. (Eversource 1, Vol. 1, pp. 1-5, 1-6, 3-1, 3-3; Eversource 4, p. 5)
91. The ROW for the new 115-kV transmission line has been devoted to utility use for decades. (Eversource 1, Vol. 1, p.; Eversource 4, p. 5)
92. The following table summarizes the existing transmission lines sharing ROWs with the proposed 115-kV line.

**Existing Transmission Lines Sharing ROWs with the
Proposed 115-kV Transmission Line**

Existing Transmission Line Number	Line Location Description	Line Voltage / Structure Type
321	Long Mountain Substation to Plumtree Substation	345 kV (Lattice Tower/Steel Monopole)
1770	Plumtree Substation to Stony Hill Substation to Bates Rock Substation	115 kV (Lattice Tower/Steel Monopole)
1363*	Triangle Substation to Plumtree Substation	115 kV (Steel Monopole)
1165*	Triangle Substation to Plumtree Substation	115 kV (Steel Monopole)

* The 1363 and 1165 lines occupy the same ROW as the 321 and 1770 lines for only 0.25 mile, extending west from Plumtree Substation. The 1363 and 1165 lines continue west toward Triangle Substation (located in the City of Danbury), whereas the ROW occupied by the 321/1770 lines diverges north to Brookfield Junction.

(Eversource 1, Vol. 1, p. 3-2)

93. Most of the new transmission line structures would be placed relatively near or adjacent to existing line structures. In certain locations, however, new structure sites would be shifted longitudinally to avoid sensitive environmental or cultural areas, to address constructability and design issues, or to minimize potential impacts to property owners. (Eversource 1, Vol. 1, pp. 1-5, 3-3; Eversource 1, Vol. 5)
94. The proposed new overhead 115-kV line would be aligned east of the existing lines in the ROW on weathering steel monopole structures in a vertical configuration. (Eversource 1, Vol. 1, pp. 1-6, 3-3; Eversource 4, p. 6)
95. The new monopole structures would have typical structure height of 95-135 feet above ground, depending on the terrain, with the exception of the first segment of the new line just west of Plumtree Substation, where four three-pole weathering steel structures in a horizontal configuration approximately 30-40 feet in height would be installed. (Eversource 1, Vol. 1, pp. 1-6, 3-3; Eversource 4, p. 6)
96. The existing Eversource ROW is sufficiently wide to accommodate the new monopoles without requiring the relocation or rebuilding of any existing structures. (Eversource 1, Vol. 1, pp. 1-5, 3-5; Eversource 4, p. 7)
97. The table below summarizes the length of the new 115-kV transmission line in each of the three municipalities along the Proposed Route.

Proposed 115-kV Transmission Line ROW by Municipality

Municipality	ROW Characteristics	
	Length (Approx. Miles)	Width Range (Feet, Typical)*
Bethel	2.2	175-225
Danbury	0.9	175
Brookfield	0.3	175
Total	3.4	

*ROW widths vary; refer to cross-section drawings.

(Eversource 1, Vol. 1, p. 1-6)

Substation Modifications

Stony Hill Substation

- 98. Stony Hill Substation is located in the southern portion of the Town of Brookfield and occupies approximately 1.7 acres of an 18.8-acre property owned by Eversource. The property is bordered to the north by a railroad, to the west by Stony Hill Road, to the south by Deer Trail Drive, and to the east by undeveloped land. The substation property is currently accessible via an access road off Stony Hill Road. (Eversource 1, Vol. 1, p. 3-11; Eversource 4, p. 8)
- 99. As part of modifications to Stony Hill Substation that are part of a separate submission to the Council (Petition 1230), Eversource proposed to expand the substation and to develop a new access road to the station off of Stony Hill Road. The Council approved this petition on June 23, 2016; however, the precise location of this new access road has not yet been determined and is the subject of ongoing review by the Council in Petition 1230. (Eversource 4, p. 8 n.2)
- 100. Stony Hill Substation was constructed approximately 27 years ago. Two 115-kV lines connect to Stony Hill Substation. (Eversource 1, Vol. 1, p. 3-11; Eversource 4, pp. 8-9)
- 101. As part of the Project, Stony Hill Substation and its interconnections to the 1770 and 1887 lines would be modified. The Project would not require the expansion of the substation’s fenced area. (Eversource 1, Vol. 1, p. 3-11; Eversource 4, p. 9)
- 102. Within the substation, the existing 115-kV capacitor bank connection to Bus A1 would be removed and the capacitor bank instead would be connected to Bus A3. This work would include the removal of existing bus-related equipment and support structures and the installation of new bus equipment and support facilities. Lightning arrestors would also be installed at the ends of the new underground cable for the electrical relocation of the capacitor bank. (Eversource 1, Vol. 1, p. 3-11; Eversource 4, p. 11)

103. Outside the substation, the existing 115-kV 1770 and 1887 Lines would be reconfigured at and in the immediate vicinity of Stony Hill Substation. This would include the removal of three existing structures associated with the existing 1770/1887 line interconnections to the substation. The structures to be removed are wood poles with typical heights of approximately 85 feet, which are located on Eversource property north of the substation fence. Two new structures would be installed to re-connect Stony Hill Substation to the 1770 Line (which would be re-designated as the 1268 and 1485 lines). One of these structures would support the newly-designated 1268 Line and consist of an approximately 85-foot-tall direct embedded weathering steel structure; the structure that would support the newly-designated 1485 Line would be an approximately 70-foot-tall engineered steel pole on a caisson foundation. (Eversource 1, Vol. 1, p. 3-12; Eversource 4, p. 10)
104. After completion of the reconfigurations at Stony Hill Substation, the 1887 Line interconnection would be eliminated so that the line would bypass Stony Hill Substation. (Eversource 1, Vol. 1, p. 3-12; Eversource 4, p. 10)

Plumtree Substation

105. Eversource's Plumtree Substation is located in the western portion of the Town of Bethel and currently occupies approximately 4.6 acres of a 13.8-acre Eversource property. The substation was built approximately 44 years ago. Currently, five 115-kV and two 345-kV transmission lines connect to the substation. (Eversource 1, Vol. 1, p. 1-7; Eversource 4, p. 7)
106. As part of the Project, Eversource proposes to connect the new 115-kV transmission line at a spare position within the developed Plumtree Substation site. This spare position already includes equipment and structures to accommodate the new line. The new 115-kV line would be terminated on the existing steel A-frame structure, and would tie into the substation between two existing 115-kV circuit breakers. Terminal equipment, including the line disconnect switch and wave trap, would be upgraded to meet the new 115-kV line capacity requirements. New protection, control, and indication equipment would also be installed. (Eversource 1, Vol. 1, p. 1-7; Eversource 4, p. 8)
107. All of the proposed modifications at Plumtree Substation would take place within its existing fenced area. No expansion of the fenced area would be required. (Eversource 1, Vol. 1, p. 1-5; Eversource 4, p. 8)

XI. GENERAL PROJECT CONSTRUCTION PROCEDURES

108. The proposed Project would be constructed, operated, and maintained in accordance with established industry practices, as well as pursuant to Eversource's specifications. Construction, operation, and maintenance activities also would conform to any conditions identified in the Council's Decision and Order and in federal and state permits obtained for the Project. (Eversource 1, Vol. 1, p. 4-1)

Overhead Transmission Line

109. ROW preparation is one of the first steps in the transmission line construction process. ROW preparation activities typically involve vegetation removal and the associated deployment of erosion and sedimentation (“E&S”) controls. In addition, exclusion fencing or other types of boundary markings are typically installed to demarcate areas of restricted construction access or environmental sensitivity. (Eversource 1, Vol. 1, 4-6)
110. Temporary erosion controls would be initially installed as practicable prior to and/or during vegetation clearing operations, in compliance with the 2002 *Connecticut Guidelines for Soil Erosion and Sedimentation Control* and Eversource’s 2011 Best Management Practices (BMP) manual. (Eversource 1, Vol. 1, p. 4-6)
111. Vegetation typically would be removed from the proposed transmission line construction workspace using mechanical methods. Where necessary, Eversource would encourage the selected vegetation clearing contractor to use low-impact tree clearing means and methods to remove forested vegetation. (Eversource 1, Vol. 1, pp. 4-10 – 4-11)
112. During vegetation removal, timber mats or equivalent would be used to provide a stable base for clearing equipment across or within wetlands along the ROW. This temporary support would minimize rutting in wetlands and would be removed after completion of the clearing activities. (Eversource 1, Vol. 1, p. 4-11)
113. Generally, all tall-growing tree species would be removed from the managed portion of the ROW and low-growing tree species and taller shrub species would be retained, if possible, in the areas outside of the conductor zones. (Eversource 1, Vol. 1, p. 4-10)
114. The stumps of trees located within a work pad/work area would typically be removed. In addition, some stumps may have to be removed to create level access roads. Stumps would be removed using excavation equipment. Any stumps in manicured lawns would be ground, if requested by the landowner. (Eversource 1, Vol. 1, p. 4-11)
115. Access roads would be required during construction. “On-ROW access roads” would be used to move equipment and material between structure locations. “Off-ROW access roads” would be used to access structures that cannot be accessed directly from locations where the ROW traverses public roads or to avoid/reduce impacts to sensitive resource areas. (Eversource 1, Vol. 1, p. 4-12)
116. Along most of the Proposed Route, the ROW has been used for electric transmission purposes for approximately 40 years; as a result of the operation and maintenance of those lines, many access roads are already established. These existing roads would be used for the construction of the Project wherever possible. (Eversource 1, Vol. 1, p. 4-13)
117. Most of the access roads would have to be improved, widened, or otherwise modified in order to be used safely and effectively. Access road improvements typically include clearing adjacent

vegetation and widening roads as needed to provide a minimal travel surface approximately 16 to 20 feet wide. Access roads in uplands would be graveled. (Eversource 1, Vol. 1, p. 4-13)

118. Timber mats would be used where access roads traverse streams, wetlands, or culverts, and would be removed following the completion of work. (Eversource 1, Vol. 1, p. 4-13)
119. In locations where terrain and environmental features make linear construction access along the ROW difficult or impractical, Eversource may use off-ROW access roads as necessary. These access roads would entail the use of public roads or access roads across private property. (Eversource 1, Vol. 1, p. 4-14)
120. Work pads would be required at each transmission structure site, as well as at conductor and optical ground wire (“OPGW”) pulling sites and at locations where temporary guard structures are necessary during conductor installation. (Eversource 1, Vol. 1, p. 4-15)
121. The size and configuration of the work pad at a particular line structure location would vary based on site-specific conditions; however, a typical pad for a tangent structure averages about 100 feet by 100 feet, and for a dead-end structure averages about 200 feet by 100 feet. (Eversource 1, Vol. 1, p. 4-15)
122. Pulling work pads, which are required for conductor and OPGW installation, typically would be 100 feet by 200 feet, but could be as large as 100 feet by 300 feet. (Eversource 1, Vol. 1, p. 4-16)
123. Guard structure work pads would typically be 50 feet by 80 feet, with an associated 16 to 20-foot-wide access road. (Eversource 1, Vol. 1, p. 4-16)
124. To support the construction of the 115-kV transmission line, Eversource would establish temporary storage and staging areas. To the extent practical, material storage and staging areas would be established on Eversource-owned property. Locations along the ROW could also be used, provided sufficient easement rights exist. (Eversource 1, Vol. 1, p. 4-5; Eversource 4, p. 25)
125. Because the locations of the staging sites would not be finalized until after a construction contractor is selected, Eversource would either specify such sites in its Development and Management (“D&M”) Plans for the Project, or submit them separately to the Council for approval prior to use. (Eversource 1, Vol. 1, p. 4-5; Eversource 4, p. 25)
126. Structures would be delivered to installation locations in sections, then assembled and installed with a crane. (Eversource 1, Vol. 1, p. 4-17)
127. The tangent structures would typically be direct embedded; angle and dead-end structures would typically have a drilled shaft foundation. Excavations for line-structure foundations would typically be accomplished using mechanical excavators (drill rigs) and pneumatic hammers. (Eversource 1, Vol. 1, p. 4-16)

128. The installation of overhead line conductors and shield wires requires the use of special pulling and tensioning equipment, which would be positioned at pre-determined locations at intervals of 1 to 3 miles. (Eversource 1, Vol. 1, p. 4-17)
129. Various pulling sites would be established along the transmission line route. These sites, which would typically be approximately 100 feet wide and 100 to 300 feet long, would usually be located within the ROW. Specific conductor pulling sites would be identified by the Project construction contractor, in consultation with Eversource. (Eversource 1, Vol. 1, p. 4-17)
130. Cleanup and restoration activities would include the removal of construction debris, signs, flagging, and fencing, as well as the removal of temporary access roads and work pads. Areas affected by construction would be re-graded as practical and stabilized with vegetation or other measures before removing temporary E&S controls. (Eversource 1, Vol. 1, p. 4-18)
131. In accordance with the Council's requirements, after the certification of the Project, Eversource would prepare and submit for Council approval D&M Plans that would detail the procedures to be used to construct the proposed transmission facilities. The D&M Plans would incorporate the conditions of the Council's Certificate of Environmental Compatibility and Public Need for the Project, as well as the conditions of the permits received from other regulatory agencies, as appropriate. (Eversource 1, Vol. 1, p. 4-21)
132. Eversource anticipates that one D&M Plan would be prepared for the new 115-kV line, and another D&M Plan would be prepared for the Stony Hill and Plumtree substation work and the related 1770/1887 line reconfigurations. (Eversource 1, Vol. 1, p. 4-21, n.36)

Substation Modifications

133. Eversource would establish construction office and material staging sites, likely on its existing Stony Hill substation property. (Eversource 1, Vol. 1, p. 4-28)
134. Temporary E&S Controls would be installed and maintained as necessary around areas of planned soil disturbance. (Eversource 1, Vol. 1, p. 4-29)
135. Additional site preparation work would include removal of minimal vegetation from work areas and equipment staging areas; creation or improvement of temporary access to work sites for heavy construction equipment; grading, if necessary, to create level work areas; and excavation of unsuitable soils. (Eversource 1, Vol. 1, p. 4-29)
136. Work pads would be established for removal and installation of structures. (Eversource 1, Vol. 1, p. 4-29)
137. The foundation installation process would generally involve excavation, form work, use of steel reinforcement, and concrete placement. (Eversource 1, Vol. 1, p. 4-29)

138. After removal of the existing conductors, shield wires, and insulators, the three existing 115-kV wood structures near Stony Hill Substation would be removed and properly disposed of or recycled. (Eversource 1, Vol. 1, p. 4-30; Eversource 4, p. 25)
139. New structures and associated conductors and wires would be installed, as necessary, to connect the new 115-kV facilities at the substation. All substation equipment would be tested and commissioned prior to final connection to the transmission grid. (Eversource 1, Vol. 1, p. 4-30)
140. After the completion of construction, any remaining construction debris would be removed from the substation sites. Temporary erosion controls would be maintained until the disturbed areas are satisfactorily stabilized. (Eversource 1, Vol. 1, p. 4-30)

XII. ENVIRONMENTAL RESOURCES, EFFECTS, AND MITIGATION MEASURES

Geology, Topography, and Soils

141. The Proposed Route for the new 115-kV transmission line is situated mostly within Connecticut's Southern Marble Valley physiographic region, while the Stony Hill Substation is situated within the Connecticut Valley Terrane. (Eversource 1, Vol. 1, pp. 5-2, 5-46)
142. Elevations along the Proposed Route range from approximately 300 feet near Plumtree Substation and in the vicinity of East Swamp and Limekiln brooks to about 520 feet near the midpoint of the Proposed Route on a hill south of U.S. Route 6 in the Town of Bethel. The Project ROW does not traverse any ridgelines or trap rock or amphibolite ridge areas as identified in CGS Section 8-1aaa (1). (Eversource 1, Vol. 1, p. 5-3)
143. Generally, the construction and operation of the new 115-kV transmission line would result in minor and localized changes in elevation only in areas where grading and filling are required, such as at structure sites, pulling pads, and guard structure areas or along access roads that must be improved or developed. Grading would not be required, in most instances, where the terrain along the ROW is relatively level, where no access road improvements or new access roads are needed, or where the conductors span the underlying terrain. (Eversource 1, Vol. 1, p. 6-3; Eversource 6, p. 24)
144. If rock is encountered during the installation of the proposed 115-kV structures, mechanical methods (e.g., excavators, pneumatic hammers) would be the preferred method for removing rock. If the structures cannot be installed using mechanical measures alone, Eversource would use controlled blasting as a supplemental measure, but would first develop a *Blasting Control Plan* in compliance with state, industry, and Eversource standards. Potential impacts from rock removal may include dust, vibration, and noise. (Eversource 1, Vol. 1, pp. 4-25 – 4-26, 6-5)
145. The Project ROW encompasses a variety of different soil types, including those that qualify as Connecticut wetlands. However, no highly erodible soils are present along the Proposed Route. (Eversource 1, Vol. 1, p. 5-5, Table 5-1, pp. 5-6 - 5-7)

146. The proposed modifications at Stony Hill Substation, which would occur in upland areas both within the substation and on adjacent Eversource property, would not affect any highly erodible soils. (Eversource 1, Vol. 1, pp. 5-46 - 5-47, 6-35 - 6-36)
147. The modifications within and outside of Stony Hill Substation would require site preparation work (grading and filling). Mechanical methods would be used to install foundations into bedrock, if rock is encountered: no blasting is expected to be required. (Eversource 1, Vol. 1, p. 6-36)
148. All Project activities involving soil disturbance (e.g., vegetation clearing, grading, excavation) would be performed in accordance with Eversource and state requirements (including Eversource's *Best Management Practices Manual: Connecticut Construction & Maintenance Environmental Requirements (2011)* and the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*, as well as the CT DEEP's *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities*. Eversource would prepare a Project-specific *Stormwater Pollution Control Plan* that would incorporate these requirements, including specifications for the deployment and maintenance of temporary erosion and sedimentation control measures during construction. (Eversource 1, Vol. 1, pp. 6-4 - 6-5, 6-36 - 6-37, 13-1; Eversource 6, pp. 24-25)

Water Resources

149. The proposed modifications at Stony Hill Substation would not affect any watercourses, wetlands, or floodplains. (Eversource 1, Vol. 1, pp. 5-47, 6-36 - 6-37, Vol. 5, Ex. 1 and 2; Eversource 6, p. 25)
150. The Project is located within the Still River regional drainage basin, which is within the major Housatonic River Basin. (Eversource 1, Vol. 1, p. 5-8)
151. The Proposed Route crosses seven watercourses and one un-named pond, all in Bethel and Danbury. Of the seven streams, four are perennial, including Limekiln Brook and East Swamp Brook, and three are intermittent. The pond is located along the ROW in Berkshire Corporate Park in Bethel. (Eversource 1, Vol. 1, pp. 5-10 - 5-11, Vol. 5, Ex. 1 and 2)
152. The channels of Limekiln Brook and East Swamp Brook vary in width from approximately 6 to 25 feet and 10 to 15 feet, respectively. (Eversource 1, Vol. 1, p. 5-10)
153. None of the watercourses along the Proposed Route are classified as navigable and none are designated as National Wild and Scenic Rivers under the National Wild and Scenic Rivers Act. (Eversource 1, Vol. 1, pp. 5-10, 5-11)
154. All of the seven watercourses and the pond are already spanned by Eversource's existing transmission lines. (Eversource 1, Vol. 1, p. 5-11)
155. During construction, temporary access would be required across two of the seven watercourses: East Swamp Brook and a stormwater channel, both in Bethel. (Eversource 1, Vol. 1, p. 6-8; Vol. 5, Exhibit 2B, Mapsheets 2 and 11; Eversource 6, p. 27)

156. Eversource would implement mitigation measures to minimize the potential effects of construction activities in or near watercourses. (Eversource 1, Vol. 1, pp. 4-24 - 4-25, 6-9)
157. The Project ROW encompasses six federal and state jurisdictional wetlands. (Eversource 1, Vol. 1, pp. 5-13 - 5-14; Vol 2; Vol. 5, Ex. 1 and 2)
158. The wetlands along the ROW consist of palustrine emergent marsh and palustrine scrub-shrub habitats within the managed portions of the ROW and typically palustrine forested habitat within the unmanaged portions of the ROW. An invasive species, common reed (*Phragmites australis*), was observed in all wetlands along the ROW and in most cases represents the dominant cover type. (Eversource 1, Vol. 1 pp. 5-13 - 5-14; Vol. 2)
159. Of the six wetlands within the ROW, one (designated as wetland W-1) is a large wetland complex associated with East Swamp and Limekiln brooks. The southern portion of the Proposed Route extends for approximately 1.3 miles through this wetland complex. (Eversource 1, Vol. 5; Eversource 6, p. 17)
160. Field investigations determined that no vernal pools are located in the Project area. (Eversource 1, Vol. 1, p. 5-21; Vol. 3, Ex. 2; Eversource 6, p. 30; Transcript 1, pp. 52-54).
161. Along the Project ROW, 11 new 115-kV transmission line structures would be placed in wetland W-1, resulting in a total of approximately 0.03 acre of permanent fill. (Eversource 1, Vol. 1, pp. 6-10 - 6-11; Eversource 6, p. 26)
162. The Project would result in an estimated 4.5 acres of temporary impacts to wetlands as a result of the placement of timber mats to create temporary access roads and work pads during construction. (Eversource 1, Vol. 1, pp. 6-10 - 6-12; Eversource 6, pp. 26 - 27)
163. Approximately 2.6 acres of tree clearing would be required in forested wetlands along the Proposed Route. These forested wetlands would be permanently converted to scrub-shrub or emergent wetlands, representing a long-term cover type change to wetland habitat, but not a net loss of wetlands. (Eversource 1, Vol. 1, pp. 6-10 - 6-12; Eversource 6, p. 26)
164. To minimize or avoid potential impacts to wetlands, Eversource would require construction activities to conform to the Council's certificate and federal and state permits pertaining to wetlands and to the various mitigation measures identified by the Company. These measures would be incorporated into the Project D&M Plans or similar Project documents. (Eversource 1, Vol. 1, pp. 4-23 - 4-24, 6-12 - 6-13; Eversource 6, pp. 18, 28)
165. The Proposed Route does not cross and would not affect any CT DEEP-designated Aquifer Protection Areas ("APAs"). The nearest APA, Chimney Heights APA, is located approximately 0.8 mile east of and upgradient from the Proposed Route near existing Structure 10257. Further, no public wells or private groundwater supplies would be affected by the Project. (Eversource 1, Vol. 1, pp. 5-15 to 5-17, 6-13)
166. As indicated by Federal Emergency Management Agency ("FEMA") mapping, the ROW extends across the 100-year floodplain and floodway associated with East Swamp Brook and

Limekiln Brook. These two watercourses, which extend through wetland W-1, share the same floodplain and to some extent the same floodway. (Eversource 1, Vol. 1, p. 5-12; Vol. 5, Exhibit 1C, Exhibit 2; Eversource 6, pp. 18-19)

167. Due to the extent of the floodplain / floodway along the ROW, 12 new transmission line structures would be located within the East Swamp Brook / Limekiln Brook 100-year floodplain; of these 12 structures, five would be within the FEMA-designated floodway. (Eversource 1, Vol. 1, pp. 6-14 - 6-15; Vol. 5; Eversource 6, pp. 27-28)
168. Based on the results of hydrologic/hydraulic modeling analyses, the proposed new structures would have minimal adverse effects on flood storage capacity within the floodplain and floodway, causing a maximum increase in the flood elevation of 0.002 feet. (Eversource 1, p. 6-15; Eversource 2, Q-CSC-005; Eversource 6, pp. 27-28)
169. Eversource expects to coordinate with CT DEEP regarding the floodplain / floodway and to apply mitigation / compensation measures as appropriate. (Eversource 6; p. 28)

Vegetation

170. The Project area is dominated by forest fragments, non-forest, and edge forest that surrounds small core (<250 acres) forest. The ROW does not coincide with any core forest or edge forest of medium or large core forest. (Eversource 1, p. 5-23)
171. Eversource's 3.4-mile ROW encompasses approximately 95 acres and is characterized by a variety of vegetative habitat types. Approximately 16.9 acres (17.8%) are mixed deciduous forest upland and approximately 7.6 acres (8%) are palustrine forest. Eversource typically performs vegetation management along a 100- to 150-foot-wide area to maintain clearances from the existing 321/1770 lines; accordingly, shrub and herbaceous species predominate in the areas where the vegetation is managed. (Eversource 1, Vol. 1, pp. 5-17 - 5-19, 6-16; Vol. 5; Eversource 6, p.16)
172. Within the ROW, approximately 8.4 acres of forested vegetation (5.8 acres of upland and 2.6 acres of wetland) would be removed for the Project and converted to shrubland or other low-growth habitat. Most of the forest vegetation removed would be trees diameter breast heights greater than 5-6 inches. (Eversource 1, Vol. 1, pp. 4-9 to 4-12, 6-16 - 6-17; Eversource 6; pp. 28-29)
173. The conversion of these presently forested areas to shrubland would have a long-term positive effect on the wildlife species that rely on this habitat for food, cover, and nesting, since shrubland habitat is otherwise declining in New England. In Connecticut, transmission line ROWs are a major source of shrubland habitat. (Eversource 1, Vol. 1, pp. 6-17; Eversource 6, pp. 29-30)
174. As part of the restoration phase of construction, Eversource would typically seed areas disturbed by work activities. Vegetative species compatible with the use of the ROW for transmission line purposes are expected to regenerate naturally over time. (Eversource 1, Vol. 1, p. 4-19, 6-17 - 6-18)

175. Eversource would manage the entire ROW in accordance with its well-established vegetation management program. (Eversource 1, Vol. 1, pp. 6-18 - 6-19).
176. Stony Hill Substation is located on an 18.8-acre Eversource property; outside of the developed substation site and adjacent 1770 / 1887 line ROW, the site is characterized primarily by forested land. (Eversource 6; pp. 15-16)
177. The modifications to Stony Hill Substation and the 115-kV interconnections to the substation would not require any significant forest vegetation removal, and would only affect a small patch of trees (less than 0.02 acre) that would have to be cleared to accommodate work pads for structure removal and replacement outside the substation. (Eversource 1, Vol. 1, pp. 6-37; Eversource 6, p. 29)

Wildlife and Fisheries

178. The vegetative communities found along and in the vicinity of the Eversource ROW provide habitat for a variety of wildlife. (Eversource 1, Vol. 1, pp. 5-19 - 5-20)
179. The CT DEEP stocks both East Swamp Brook and Limekiln Brook with trout. None of the other watercourses along the ROW support fisheries. (Eversource 1, Vol. 1, p. 5-20 - 5-21)
180. The results of research regarding breeding birds indicate that 66 species may potentially breed in areas along or near the ROW. (Eversource 1, Vol. 1, p. 5-23; Vol. 3, Ex. 1)
181. The development of the new 115-kV transmission line would result in both temporary and permanent alteration of wildlife habitat along the ROW. However, these effects would be localized to the ROW and vicinity and would generally be short-term (during construction) or minor due to the availability of undisturbed habitat types, similar to those found on the ROW, in adjacent areas and in the region as a whole. (Eversource 1, Vol. 1, p. 6-20)
182. The Project would have a long-term beneficial effect on certain wildlife species, including birds that use shrubland habitat. (Eversource 1, Vol. 1, pp. 6-20, 6-22 - 6-23)
183. The Project would not have a significant effect on fishery resources since no temporary access would be required across Limekiln Brook and only one temporary crossing of East Swamp Brook would be needed during Project construction. The temporary access road across East Swamp Brook would be removed following the completion of line installation and any site restoration. (Eversource 1, Vol. 1, p. 6-20).
184. Within a 25-foot-wide area adjacent to watercourses, lower-growing riparian vegetation along the ROW would be maintained, where possible, to provide cover and shading for fish. (Eversource 1, Vol. 1, p. 6-21).

Threatened, Endangered, or Special Concern Species

185. Based on the results of research and field studies and coordination with the U.S. Fish and Wildlife Service, the Project would not affect the two federally-designated threatened species

(both species also are listed as Connecticut endangered species) initially identified as having a potential to occur in the area. (Eversource 1, Vol. 1, pp. 6-23 - 6-24, 6-38; Eversource 6, pp. 19 to 20)

186. Based on review of Natural Diversity Data Base information and consultations with CT DEEP, two state-listed species (a plant and a reptile) were identified as potentially occurring in the vicinity of the Project. Subsequently, field surveys of the Project ROW confirmed the presence of habitat for the reptile and the location of the plant species. (Eversource 6, p. 20; Transcript 1, pp. 9, 21)
187. In consultation with CT DEEP, Eversource would identify measures to protect or otherwise to minimize potential effects on the state-listed species. (Eversource 1, Vol. 1, pp. 6-25 - 6-26)
188. Two state-listed bird species also may potentially occur in the Project area: Brown Thrasher and American Kestrel. However, both of these species use shrubland habitats; thus, long-term effects on these species are expected to be positive due to the increase in shrubland habitat associated with the vegetation management in the vicinity of the new transmission line. (Eversource 1, Vol. 1, p. 6-25)

Land Use, Recreation, and Cultural Resources

189. The Project is not located within the state-designated coastal boundary. (Eversource 6, p. 22)
190. The Project does not traverse any designated wild and scenic or protected rivers, Connecticut Heritage Areas, national scenic trails, ConnDOT scenic land strips, federal or state park or forest lands, or state- or federally-designated scenic roads. (Eversource 1, Vol. 1, p. 5-28; Eversource 6, p. 22)
191. The new 115-kV transmission facilities would be aligned within a long-established Eversource ROW in Bethel, Danbury, and Brookfield. The approximately 3.4-mile ROW extends for approximately 0.9 mile (26%) across properties that Eversource owns in fee simple. Another 0.8 mile (24%) of the ROW would traverse public lands (e.g., road ROWs such as Interstate 84, or state or locally owned lands such as the East Swamp Wildlife Management area. (Eversource 1, Vol. 1, p. 5-29; Eversource 6, pp. 13-14)
192. After extending through the large wetland complex (wetland W-1) in the vicinity of and north of Plumtree Substation, the ROW is bordered principally by suburban / urban areas, with land uses consisting primarily of residential and commercial uses. (Eversource 1, Vol. 5, Ex. 1 and 2; Eversource 6, p. 15)
193. The Project would be consistent with existing and future municipal and state land use plans, as well as with federal guidelines for collocating new transmission lines on existing ROWs. (Eversource 1, Vol. 1, pp. 5-32 to 5-33, 6-25 - 6-26; Eversource 6, p. 30)
194. The new 115-kV transmission line would be aligned within Eversource's ROW across from or adjacent to undeveloped portions of six designated recreational / open space areas (all in Bethel),

including the East Swamp WMA, Bennett Park, Meckauer Park, and Bethel Land Trust parcels. A proposed off-ROW access road, planned for location on Eversource property, would cross the Bethel Land Trust's Enchanted Trail. (Eversource 1, Vol. 1, pp. 5-34 - 5-36; Vol. 5, Ex. 1 and 2; Eversource 6, pp. 12, 21)

195. The new 115-kV transmission line would be consistent with the existing utility use of the Eversource ROW that already extends across these recreational areas and thus would not result in significant adverse effects on the public uses of such areas. Eversource would coordinate with the owners or managers of the recreational areas to develop measures to maintain public safety during construction, while also avoiding or minimizing short-term impacts to recreational uses. (Eversource 1, Vol. 1, pp. 6-27 - 6-28; Eversource 6; pp. 31-32).
196. Eversource would work with landowners and agencies to discourage unwarranted access onto and use of its ROW. (Eversource 1, Vol. 1, pp. 4-20, 6-29 - 6-30)
197. Eversource commissioned cultural resource research concerning the Project. The results of these investigations demonstrated that there are no previously identified historic structures, archaeological sites, or National or State Register of Historic Places sites situated within 500 feet of the proposed Project. Eversource also consulted with Tribal Historic Preservation Officers and conducted field testing of portions of the ROW for the potential presence of archaeological sites. Based on the results of these analyses, the Project would have no adverse effect on cultural resources. (Eversource 1, Vol. 1, pp. 5-41 - 5-42, 6-32 - 6-33, 6-39; Vol. 3, Ex. 3; Eversource 6, pp. 10, 22 - 23)

Visibility

198. The Project is not located within the viewshed of any designated scenic or visual sites, but is near several areas that have scenic attributes, such as protected open space and parks. In addition, the Project ROW crosses the Washington-Rochambeau Revolutionary Route, a National Historic Trail ("NHT"); at the ROW crossing, this NHT coincides with, and is not distinguishable from, Stony Hill Road (US Route 6). Eversource's existing overhead transmission lines presently already extend near all of these areas. (Eversource 1, Vol. 1, pp. 36-37, Vol. 3, Ex. 4; Eversource 6, pp. 21-22)
199. The impacts of the new 115-kV transmission line on the visual environment would be minor, since the ROW is already occupied by the 321/1770 lines and the heights of the new 115-kV line structures would typically be 15- to 55-feet shorter than the existing transmission line structures. (Eversource 1, Vol. 1, pp. 6-28 - 6-29; Vol. 3, Ex. 4; Eversource 6, p. 22)
200. The proposed modifications to Stony Hill Substation, which would be located entirely on Eversource property and would be set back from Stony Hill Road, would slightly alter the appearance of the substation and the nearby 115-kV structures within the Eversource ROW adjacent to the substation. These modifications would be minimal and would generally be similar in appearance to the existing substation facilities. The modifications at Plumtree Substation would also be minimal and are all within the existing fenced area. (Eversource 1, Vol., 1, p. 6-38; Vol. 5, Ex. 1 and 2)

Transportation, Access, and Utility Crossings

201. The Project region is characterized by a well-developed transportation network, consisting of roads, railroads, and the Danbury Airport. (Eversource 1, Vol. 1, pp. 5-38 - 5-40, Vol. 5, Ex. 1 and 2)
202. Construction of the proposed transmission facilities would cause minor, short-term, and localized effects on transportation patterns as a result of additional construction traffic on roads in the Project vicinity. (Eversource 1, Vol. 1, pp. 30 - 31; Eversource 6, p. 33)
203. Eversource would require its construction contractors to employ personnel as necessary to direct traffic at construction work sites where the ROW crosses public roads and to erect appropriate traffic signs to indicate the presence of construction work zones. (Eversource 1, Vol. 1, pp. 4-20 - 4-21, 6-31; Eversource 6, pp. 33 - 34)
204. Eversource would seek a permit from ConnDOT in connection with the crossings of U.S. Route 6 and Interstate 84. (Eversource 6, p. 33)

Noise

205. Construction of the Project would cause localized, short-term, and generally minor increases in ambient noise levels in the immediate vicinity of work sites. Construction contractors would be required to properly maintain vehicles to prevent excessive noise emissions. The operation of the new Project facilities would not affect the noise environment. (Eversource 1, Vol. 1, pp. 6-34 - 6-35; Eversource 6, pp. 33 - 34)
206. Eversource anticipates that Project construction activities would be implemented in compliance with local noise ordinances, except in special situations during which continuous construction activities may be required. Construction work hours would be defined in the Project's D&M Plans, which must be submitted to and approved by the Council. (Eversource 1, Vol. 1, p. 6-35)

Air Quality

207. Air-quality effects associated with the construction of the Project would be short-term, minor, and highly localized. No long-term effects on air quality would result from the operation of the Project. (Eversource 1, Vol. 1, p. 6-33)
208. To minimize short-term effects to air quality during construction, access roads and other sites would be watered as necessary to suppress fugitive dust emissions, and crushed stone aprons would be installed at all access road entrances to public roads. (Eversource 1, Vol. 1, p. 6-33)
209. To minimize emissions from construction vehicles, Eversource's contractors would be required to properly maintain construction equipment and vehicles, and to conform to Connecticut's vehicular anti-idling regulations. (Eversource 1, Vol. 1, p. 6-33)

Vegetation Clearing

210. Eversource's ROW clearing standards for construction are based on the NERC requirements and the National Electrical Safety Code. Eversource's clearing standard for a project of this type would require 25 feet of vegetation clearing from the centerline of construction (which is 10 feet more than is cleared presently). (Eversource 2, Q-CSC-004)
211. Following the heavy snow storm of October 2011, 22 Connecticut transmission circuits were interrupted by falling trees, many of which were located within Eversource's ROWs. (Eversource 2, Q-CSC-004)
212. Following the October 2011 snow storm, the NERC and FERC staff prepared a *Report on Transmission Facility Outages During the Northeast Snowstorm of October 29-30, 2011: Causes and Recommendations* (May 31, 2012). This report recommended that utilities take targeted steps to address off ROW danger trees and employ best practices in managing vegetation on full ROWs. In particular, the report found "that about 25% of the confirmed vegetation-related transmission line outages during the October storm were caused by trees that fell into transmission lines from within a utility's full ROW. These on-ROW trees were all located outside the utility's maintained ROW." Thus, the report recommended that: "to the extent a utility manages vegetation only on maintained ROWs rather than full ROWs, it should work toward reclaiming the full ROW width where feasible." (CSC Administrative Notice List - D.8, p. 47: Eversource 2, Q-CSC-004)
213. In 2015, Eversource began implementing an enhanced ROW vegetation management program in Connecticut, in response to the October 2011 snow storm and subsequent NERC and FERC recommendations. (Eversource 2, Q-CSC-004)
214. As illustrated on the Project cross-sections, for the construction and operation of the proposed 115-kV transmission line, an additional 25 feet of vegetation (located along the eastern or southern portions of the ROW, outside of the portions of the ROW that Eversource presently manages¹) would be cleared and subsequently maintained in low-growth species consistent with overhead transmission line clearance requirements. Thus, vegetation would be removed and managed to the full width of the southern edge of the typical 175-foot-wide ROW, in conformance with the NERC and FERC recommendations. (Eversource 1, Vol. 1, p. 4-9, Vol. 5, Ex. 4, Appendix 4A, XS-1 and XS-2; Eversource 2, Q-CSC-004)
215. As part of this Project, Eversource would not perform vegetation clearing to the full width of the northern edge of the ROW (i.e., west or north of the existing 321/1770 line structures) unless required for access or work pads. (Eversource 1, Vol. 5, Ex. 4, Appendix 4A, XS-1 and XS-2)

¹ To accommodate the construction of the new 115-kV line, vegetation (mostly shrub-scrub) also would have to be removed along portions of the ROW where Eversource presently manages vegetation consistent with the operation of the 321/1770 lines. (Eversource 1, Vol., 1, p. 4-9, Table 4-1 note)

216. If, for this Project, Eversource did not implement the enhanced vegetation management program (pursuant to NERC and FERC recommendations) only 10 feet of new vegetation clearing would be performed along the eastern/southern portion of the Project ROW, rather than the 25 feet of new clearing, as proposed. (Eversource 2, Q-CSC-004)
217. As illustrated on the Project mapping, Eversource proposes to implement the enhanced vegetation management program along the eastern and southern portions of the typically 175-foot-wide ROW. Where Eversource owns property in fee that encompasses more than this standard 175-foot-width, Eversource proposes to remove vegetation only in accordance with this standard width, and not to the full edge of its fee-owned property. Thus, any forested vegetation on fee-owned property beyond the 175-foot-width would remain within Eversource property in these areas. (Eversource 1, Vol. 5, Appendix 2B, Mapsheets 1-8)

D&M Plans

218. After Council certification of the Project, Eversource would prepare D&M Plans for the Project, consistent with the Council's requirements. Eversource expects that it would prepare a D&M Plan for the new 115-kV transmission line, as well as a separate D&M Plan for the Stony Hill and Plumtree substation modifications and the 1770/1887 line reconfiguration. The D&M Plans would include details regarding environmental mitigation measures, and would reflect the incorporation of conditions of the Council's approval. Each D&M Plan would be submitted to the Council for review and approval. (Eversource 6, pp. 35 - 36)
219. Eversource representatives would monitor the conformance of Project construction activities to the D&M Plans and to other federal and state regulatory requirements. (Eversource 6, pp. 36 - 37)

XIII. ELECTRIC AND MAGNETIC FIELDS

220. Transmission lines are common sources of electric and magnetic fields ("EMF"), as are other components of electric power infrastructure. There are no state or federal laws or regulations concerning transmission line EMF. (Eversource 1, Vol. 1, p. 7-4)
221. In February 2014, the Council revised its "Electric and Magnetic Field Best Management Practices for Transmission Lines in Connecticut" ("EMF BMP"), originally issued in 1993. The Council's EMF BMP addresses concerns regarding potential health risks from exposure to EMF. (Eversource 1, Vol. 1, p. 7-4; Eversource 4, p. 27)
222. Electric fields ("EF") and magnetic fields ("MF") are two forms of energy that surround an electrical device. Transmission lines are a source of both EF and MF. (Eversource 1, Vol. 1, pp. 7-1, 7-4)
223. EF are the result of voltages applied to electrical conductors and equipment. EF are measured in units of volts per meter (V/m) or kilovolts per meter (kV/m). As the weight of scientific evidence indicates that exposure to EF, beyond levels traditionally established for safety, does

not cause adverse health effects, and as safety concerns for EF are sufficiently addressed by adherence to the National Electrical Safety Code, as amended, health concerns regarding EMF focus on MF rather than EF. (Eversource 1, Vol. 1, p. 7-1, App. 7A-1)

224. MF are produced by the flow of electric currents. The MF at any point depends on the characteristics of the source, including the arrangement of conductors, the amount of current flow through the source, and the distance between the source and the point of measurement. MF are typically measured in units of milliGauss (mG). (Eversource 1, Vol. 1, p. 7-1, App. 7A-1)
225. Although there are no binding regulations limiting EMF exposures, guidelines have been developed by the international scientific community; in particular the International Committee on Electromagnetic Safety (“ICES”), a committee of the Institute of Electrical and Electronics Engineers, and the International Council on Non-Ionizing Radiation Protection (“ICNIRP”), a specially chartered independent scientific organization. ICNIRP established a level of 2,000 mG as an acceptable exposure level for the general public. ICES calculated a guideline of 9,040 mG for exposure to workers and the general public. (Eversource 1, Vol. 1, App. 7d-7)
226. “Research on Extremely Low Frequency Electric and Magnetic Fields and Health: Eversource Energy Transmission Projects Update”, a report by Exponent, Inc., systematically evaluates peer-reviewed research and reviews by scientific panels published from August 1, 2012 to July 31, 2015 to determine if there are new developments that might alter the current scientific consensus as articulated in the Council’s 2014 EMF BMP. The review concluded that no recent studies provide evidence to alter the conclusion that the scientific evidence suggests EMF exposure is not the cause of cancer or any other disease process, at the levels we encounter in our everyday environment. (Eversource 1, Vol. 1, p. 7-14; Appendix 7D, p. 52; Eversource 4, p. 28)
227. The Council requires transmission-line planners to provide a baseline design (the Field Management Design Plan or “FMDP”) – with cost estimates – against which effective mitigations can be measured. Further, the EMF BMP requires 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 measures should aim for an approximately 15 percent reduction from baseline MF. “Low cost” is defined as approximately four percent of the Project’s baseline cost (including related substation work). (Eversource 1, Vol. 1, p. 7-5, App. 7A-4; Eversource 4, p. 27; Council Administrative Notice Item 17, p. 4)
228. Eversource prepared initial calculations of the existing and predicted MF from the transmission lines along the ROW for the Proposed Route. As required by the Council’s EMF BMP, loads projected for the year 2018 (the first summer when the new line would be in service) were used for the existing transmission lines, and loads projected for 2023 (five years after the line would be placed in service) were used for the proposed transmission line. (Eversource 1, Vol. 1, p. 7-10; Eversource 4, p. 31)
229. The tables below reflect the MF and EF calculations for pre- and post-construction of the new 115-kV line.

Summary of Magnetic Field Calculations

Magnetic Field Calculation Summary (Average Annual Loads, field in mG)	Left Edge of ROW		Right Edge of ROW	
	Pre	Post	Pre	Post
	9.85	12.91	12.24	14.02

*Left and right edges of ROW are defined by looking from Plumtree Substation to Brookfield Junction

Summary of Electric Field Calculations

Electric Field Calculation Summary (Field in kV/m)	Left Edge of ROW		Right Edge of ROW	
	Pre	Post	Pre	Post
	0.17	0.16	0.17	0.22

(Eversource 1, Vol. 1, pp. 7-10 – 7-11; Eversource 4, p. 32)

230. On the ROW from the Plumtree Substation to Brookfield Junction, the proposed new 115-kV line would be adjacent to the existing 345-kV 321 Line, a heavily-loaded circuit that is now and would remain the dominant magnetic field source on the ROW. In addition, the new line would be built adjacent to the existing 115-kV 1770 Line, and would share with that line the load transmitted between Plumtree Substation and Brookfield Junction. As a result, the addition of the proposed new 115-kV line to the Plumtree Substation to Brookfield Junction ROW would have very little effect on the magnetic fields as compared to the pre-existing edge of ROW magnetic fields. (Eversource 1, Vol. 1, p. 7-6; Eversource 4, pp. 28-29)
231. Because of the dominance of the existing 345-kV transmission line as a source of electric and magnetic fields, most of the usual “lost cost” options did not result in a 15% target reduction of magnetic fields at the edges of the ROW; many resulted in increases relative to the proposed Project. (Eversource 1, Vol. 1, App. 7B-5)
232. The table below summarizes the field management design options (note: a “negative” reduction means that fields increased). The only option that resulted in field reductions of 15% or more was the “split phase” option.

**Summary of Magnetic Field Calculations from Field Management
Design Options (Average Annual Load)**

Design Option	West/North ROW Edge		East/South ROW Edge	
	MF (mG)	% Reduction	MF (mG)	% Reduction
Pre-Project	9.9	--	12.2	--
Proposed	12.9	--	14.0	--
New Line UG	13.4	-4.2%	16.7	-18.9%
Proposed +10 feet	12.9	-0.1%	14.6	-4.4%
Proposed +20 feet	12.9	-0.3%	15.2	-8.3%
"Split Phase"	7.8	39.8%	12.7	9.6%
Far Side	11.2	13.0%	16.2	-15.8%

(Eversource 1, Vol. 1, App. 7B-5)

233. The Council’s Application Guide requires measurements of existing EMF at the boundaries of adjacent schools, daycare facilities, playgrounds, hospitals, youth camps, and residential areas. There are no schools, daycare facilities, hospitals, playgrounds, or youth camps adjacent to the ROW. (Eversource 1, Vol. 1, p. 7-7, App. 7B-7; Eversource 4, p. 29)
234. Eversource identified two groups of homes that might be considered to be residential areas adjacent to the ROW. Accordingly, measurements were taken across the ROW, including boundaries of adjacent properties, at two locations where houses are closest to the ROW, specifically, in the Hearthstone Drive/Chimney Drive area in Bethel and in the Lexington Meadows condominium complex near the Danbury/Bethel line. Each of these locations is referred to as a “Focus Area”. (Eversource 1, Vol. 1, p. 7-7; Eversource 4, p. 29)
235. Hearthstone Drive/Chimney Drive in Bethel run parallel to the Eversource ROW in which the new 115-kV transmission line would be located. There are 29 residences along a section of approximately 3,000 feet along the Proposed Route. (Eversource 1, Vol. 1, App. 7B-8)
236. The Lexington Meadows condominium complex is situated parallel to the Eversource ROW in which the new 115-kV transmission line would be located. In particular, 24 residences within the complex are located within 300 feet of the Proposed Route, along an approximately 1,000-foot segment of the ROW. (Eversource 1, Vol. 1, App. 7B-7)
237. The measurements near each of the Focus Areas were taken at a height of 1 meter (3.28 feet) above ground, in accordance with the industry standard protocol for taking measures of EMF near power lines. (Eversource 1, Vol. 1, p. 7-7; Eversource 4, pp. 29-30)
238. The table below summarizes the EMF spot measurements taken along Hearthstone Drive/Chimney Drive and at Lexington Meadows on May 12, and 20, 2016.

Measured Electric and Magnetic Fields

Location	Magnetic Field (mG)	Electric Field (kV/m)
Hearthstone Drive/Chimney Drive, Bethel	22.33	2.3
Lexington Meadows, Bethel/Danbury	3.2	0.03

(Eversource 1, Vol. 1, pp. 7-7 – 7-9; Eversource 4, p. 30)

239. The measurements of MF are only a snapshot of conditions at a single moment in time at a specific location. MF levels change at any given location, depending on the amount and patterns of power supply and demand within the state and surrounding region. However, the EF remains quite stable over time. (Eversource 1, Vol. 1, p. 7-7; Eversource 4, p. 30)
240. Eversource reviewed mitigation measures for the two Focus Areas in developing its FMDP; however, none of the measures considered were “low cost” options, and only the split phase

design would achieve substantial reduction in MF levels. (Eversource 1, App. 7B-8 – 9; Eversource 4, p. 33)

241. Utilizing a split phase design along Hearthstone and Chimney Drives and at the Lexington Meadows condominium complex would increase the Project cost by a total of \$3.92 million and \$3.22 million, respectively. Both of these expenditures would significantly exceed the Council’s guideline of four percent of total project costs (approximately \$1 million for this Project) for “low cost” mitigation measures. (Eversource 1, Vol. 1, App. 7B-8 – 9; Eversource 4, p. 33)
242. Based on the MF levels resulting from the project’s “no cost” MF reduction measure of optimized phasing and on the results of its evaluation of potential mitigation measures, Eversource does not recommend employing additional MF mitigation measures at either of the Focus Areas. (Eversource 1, Vol. 1, App. 7B-3; Eversource 4, p. 33)

Compliance With Statutory and BMP Requirements

243. 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 new certain land uses such as playgrounds, residential areas, schools, and licensed day-care facilities. (Eversource 1, Vol. 1, p. 7-5; Eversource 4, p. 32)
244. In accordance with the Council’s EMF BMP guidelines, the proposed 115-kV transmission line has been designed so that it would have very little effect on MF levels within and along the ROW. The Project’s base overhead design incorporates “no cost” MF reduction measures. Specifically, the base design incorporates “optimum phasing”, i.e., arranging the phases of the new 115-kV line to achieve a better cancellation with the magnetic field from the existing transmission lines on the ROW. (Eversource 3, pp. 32-33)
245. Eversource has complied with the statutory and the EMF BMP requirements regarding EMF, as follows:
 - a. Eversource has provided an update of scientific research and authoritative positions concerning potential adverse health effects of MF;
 - b. Eversource has provided measurements and calculations that were developed in accordance with the BMP; and
 - c. Eversource has prepared a Field Management Design Plan with a base design that incorporates standard utility practice with no-cost/low cost MF mitigation design features as applicable.

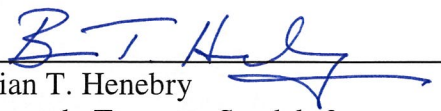
(Eversource 1, Vol. 1, p. 7-14; Eversource 4, p. 34)

XIV. SAFETY AND SECURITY

246. The proposed Project would be constructed in full compliance with the National Electrical Safety Code (NESC), standards of the Institute of Electrical and Electronic Engineers (IEEE), and the American National Standards Institute (ANSI), good utility practice, and the CT DEEP PURA regulations covering the method and manner of high voltage line construction. (Eversource 1, Vol. 1, p. 4-31)
247. The design of the Project incorporates high-speed protective relaying equipment to automatically detect abnormal system conditions and send a protective trip signal to the associated circuit breaker(s) at each end of a line to isolate the faulted section of the transmission system. (Eversource 1, Vol. 1, p. 4-31; Eversource 4, p. 35)
248. Smoke detection equipment is in place at both Plumtree and Stony Hill substations. These systems would automatically activate an alarm at CONVEX and the system operators would then take appropriate action. (Eversource 4, p. 35)
249. The existing access roads to Plumtree and Stony Hill substations are gated and the perimeter of each substation is entirely enclosed with a 7-foot high chain-link fence topped with an additional foot of barbed wire to discourage unauthorized entry and vandalism. (Eversource 1, Vol. 1, p. 4-32)
250. Lighting is installed within the substation yards to facilitate work at night under emergency conditions and during inclement weather. The substations also have low-level lighting for safety and security purposes. (Eversource 1, Vol. 1, p. 4-32)
251. During Project construction, access to both substations would be controlled, with the substation gates kept closed and locked when unattended. All substation gates would be padlocked at the end of each workday during the construction phase, and at all times after the Project is completed. (Eversource 1, Vol. 1, p. 4-32)
252. Eversource seeks to work with landowners and agencies to discourage unwarranted access onto and use of its ROWs, and typically installs signs warning the general public of the overhead hazards posed by contact with high voltage transmission lines. With landowner approval, Eversource would install fences, gates, barricades, or berms to discourage access onto the ROW. (Eversource 1, Vol. 1, p. 6-30)
253. The physical security of Plumtree and Stony Hill substations is consistent with the Council's "White Paper on the Security of Siting Energy Facilities," as amended. (Eversource 1, Vol. 1, p. 4-32; Eversource 4, p. 36)
254. The construction of the proposed line, the modifications to Plumtree and Stony Hill substations, and the reconfiguration of existing 115-kV interconnectors at Stony Hill Substation 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. (Eversource 4, p. 35)

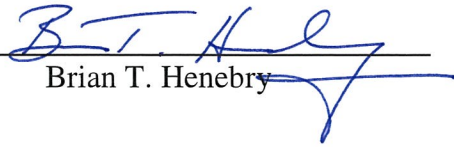
Respectfully submitted,

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CERTIFICATION

I hereby certify that a copy of the foregoing Applicant's Proposed Findings of Fact has been electronically mailed / sent by U.S. Mail on this 24th day of October, 2016 upon all parties and intervenors as referenced in the Connecticut Siting Council's Service List dated August 1, 2016.


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