STATE OF CONNECTICUT
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November 15, 2012

TO: Parties and Intervenors

FROM: Linda Roberts, Executive Director LRoberts

RE: **DOCKET NO. 424** - The Connecticut Light & Power Company application for a Certificate of Environmental Compatibility and Public Need for the Connecticut portion of the Interstate Reliability Project that traverses the municipalities of Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam, Thompson, and Windham, which consists of (a) new overhead 345-kV electric transmission lines and associated facilities extending between CL&P's Card Street Substation in the Town of Lebanon, Lake Road Switching Station in the Town of Killingly, and the Connecticut/Rhode Island border in the Town of Thompson; and (b) related additions at CL&P's existing Card Street Substation, Lake Road Switching Station, and Killingly Substation.

As stated at the hearing in New Britain on August 30, 2012, after the Connecticut Siting Council (Council) issues its draft findings of fact, parties and intervenors may identify errors or inconsistencies between the Council's draft findings of fact and the record; however, no new information, evidence, argument, or reply briefs will be considered by the Council.

Parties and Intervenors may file written comments with the Council on the Draft Findings of Fact issued on this docket by November 21, 2012.

LR/CMW/laf

Enclosure

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NOTICE OF SERVICE

I hereby affirm that a photocopy of this document was sent to each Party and Intervenor on the service list dated October 4, 2012, with method of service to each party and intervenor listed via e-mail and U.S. mail on November 15, 2012.

Dated: November 15, 2012

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Custodian of Docket No. 424

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DOCKET NO. 424 - The Connecticut Light & Power Company application for a Certificate of Environmental Compatibility and Public Need for the Connecticut portion of the Interstate Reliability Project that traverses the municipalities of Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam, Thompson, and Windham, which consists of (a) new overhead 345-kV electric transmission lines and associated facilities extending between CL&P's Card Street Substation in the Town of Lebanon, Lake Road Switching Station in the Town of Killingly, and the Connecticut/Rhode Island border in the Town of Thompson; and (b) related additions at CL&P's existing Card Street Substation, Lake Road Switching Station, and Killingly Substation.

Connecticut

Siting

Council

October 31, 2012

Draft Findings of Fact

I. INTRODUCTION

1. Pursuant to Connecticut General Statutes (CGS) §16-50g et seq., on December 23, 2011, The Connecticut Light and Power Company (CL&P) applied to the Connecticut Siting Council (Council) for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction, operation and maintenance of the Connecticut portion of Interstate Reliability Project (Interstate). (CL&P 1, Vol. 1,pp. ES-1, ES-7, FR-1)

2. The proposed Interstate project involves the siting of transmission facilities in northeastern Connecticut, northwestern Rhode Island, and south-central Massachusetts. The Connecticut portion of the Interstate project includes new overhead 345-kV electric transmission lines extending between CL&P's Card Street Substation in Lebanon, Lake Road Switching Station in Killingly, and the Connecticut/Rhode Island border in Thompson; and associated additions at the existing Card Street Substation, Lake Road Switching Station and Killingly Substation. (CL&P 1, Vol. 1, pp. ES-1)

3. CL&P is a wholly-owned subsidiary operating companies of Northeast Utilities (NU). The Northeast Utilities Service Company (NUSCO) is another wholly-owned subsidiary of NU that provides centralized and coordinated management and technical services to NU companies. (CL&P 1, Vol. 1, p. ES-1, 2-16)

4. The Narragansett Electric Company and New England Power Company are both wholly-owned subsidiaries of National Grid USA (National Grid). (CL&P 1, Vol. 1, p. ES-1)

5. Parties to these proceedings include CL&P (the Applicant); NRG Energy, Inc. NRG Power Marketing Inc. (including: Connecticut Jet Power LLC; Devon Power LLC; Middletown Power LLC; Montville Power LLC; Norwalk Power LLC; and Meriden Gas Turbines, LLC) (collectively "NRG"); Victor Civie and Richard Civie; EquiPower Reources Corp. (including: Lake Road Generating Company LP; and Milford Power Company LLP) (collectively EquiPower); The United Illuminating Company (UI); Edward Hill Bullard; the Office of Consumer Counsel; Richard Cheney and the Highland Ridge Golf Range, LLC (Highland Ridge); Mount Hope Montessori School, Inc.; and the Independent System Operator – New England, Inc. (ISO-NE). (Record)

6. Pursuant to CGS §16-50*l*(b), CL&P provided service and legal notice of the application. This included notice to municipalities along the proposed route; municipalities within 2,500 feet of the proposed route; federal, state, local and regional agencies, and elected officials; published notice in The Willimantic Chronicle and The Norwich Bulletin on December 9, and December 16, 2011; and a separate "Notice of Proposed Construction of a High Voltage Electric Transmission Line" included in one or more monthly bills to CL&P and The Bozrah Light and Power Company customers within Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam, and Thompson on or after October 31, 2011. (CL&P 1, Vol. 1, pp. FR-9, 10; CL&P 2; CL&P 17, pp. 21, 22)

7. Pursuant to CGS §16-50*l*(e), CL&P began the municipal consultation process by meeting with representatives of each affected municipality in August 2008 and renewed it in July 2011. Prior to filing the application for the Interstate project with the Council, CL&P held more than forty project briefings with municipal officials and/or local boards or commissions. (CL&P 1, Vol. 1, p. FR-7; CL&P 17, p. 19)

8. In June of 2008, CL&P filed its Municipal Consultation Filing for the Interstate project with the expectation of filing its application with the Council toward the end of 2008. However, CL&P delayed its filing of the application because ISO-NE was reanalyzing the project and not support a project that is under reanalysis. Therefore, since the Needs Analysis was completed in April 2011, and the Solutions Analysis was not complete until December 2011, CL&P filed its application for the Interstate project with the Council in December 23, 2011. (CL&P 16, pp. 9, 10)

9. Pursuant to CGS § 16-50*l*(b), CL&P provided notice to owners of property abutting the substations and switching station associated with the interstate project, water companies and community organizations. (CL&P 2; CL&P 17, pp. 21, 22)

10. CL&P developed a project website, email address and hotline through which residents and stakeholders can communicate with project management. (CL&P 17, p. 22)

11. CL&P hosted or participated in a number of meetings including open houses, town public meetings, neighborhood meetings, and landowner meetings. (CL&P 17, p. 21)

12. Open houses were held in 2008 and 2011. (CL&P 17, p. 22)

13. In 2008, open houses were held in four towns including:
    a. Brooklyn on September 24, 2008
    b. Willimantic on September 30, 2008
    c. Mansfield on October 22, 2008
    d. Danielson (Killingly) on November 5, 2008
    (CL&P 1, Vol. 1, pp. 9-6, 9-9)

14. In 2008, the open house had five stations. The first station was a "Welcome" station with information about how to participate in the siting process. The second station was a route locator station to show where the proposed project is located. The third station provided information about the need for the project. The fourth station provided information about how the structures would look. The fifth station included materials about environmental management, electric and magnetic fields, and ROWs. (CL&P 17, p. 22)

15. In 2011, open houses were held in two towns including:
    a. Danielson (Killingly) on August 23, 2011
    b. Mansfield on December 8, 2011
    (CL&P 1, Vol. 1, pp. 9-6, 9-9)

16. The 2011 open house was similar to that held in 2008, with stations including: Needs and Benefits; the Proposed Upgrade; Transmission Construction; Mansfield Hollow; Electric and Magnetic Fields; ROW Information; and Public Participation in the siting process. (CL&P 17, p. 23)

17. On February 1, 2012, the Connecticut Energy Advisory Board held a meeting that included consideration of issuing a request for proposals (RFP) for alternative solutions to the need that would be addressed by the Interstate Reliability Project. The CEAB voted to not issue an RFP for alternatives to the Interstate Reliability Project. (CEAB draft meeting minutes of February 1, 2012; Connecticut Energy Advisory Board Letter to NRG Energy, Inc., dated April 23, 2012)

18. On April 4 and 5, 2012, CL&P posted 22 four-foot by six-foot signs at various locations along the proposed route to notify the public of all three public hearings. The signs were removed on April 25, and 26, 2012. (CL&P 17, pp. 24, 25)

19. Pursuant to CGS §16-50j(h), on February 27, 2012 and August 30, 2012, the following state agencies were requested to submit written comments regarding the proposed Interstate project: Department of Energy and Environmental Protection (DEEP); Department of Agriculture; Department of Public Health; Council on Environmental Quality; Public Utilities Regulatory Authority; Office of Policy and Management; Department of Economic and Community Development; Department of Emergency Management and Homeland Security; and the Department of Transportation (ConnDOT). (Record)

20. ConnDOT commented on the proposed project in a letter dated February 23, 2012. ConnDOT stated that it opposes the installation of any overhead or underground transmission facilities within state highway rights-of-way. (ConnDOT letter dated February 23, 2012)

21. DEEP provided comments on the proposed project in a letter dated June 21, 2012. DEEP supports the need for the Interstate project based on the repeated position taken by ISO-NE that the project is needed to meet regional reliability criteria. (DEEP comments dated June 21, 2012)

22. Pursuant to CGS §16-50m, the Council held public hearings for citizen comment on April 18, 2012 at the Lebanon Fire Safety Complex in Lebanon; April 19, 2012 at the Quinebaug Valley Senior Citizens Center in Brooklyn; and April 24, 2012 at Mansfield Middle School in Storrs. Each hearing commenced at approximately 7:00 p.m. (Transcript 1, April 18, 2012 [Tr. 1], p. 3; Transcript 2, April 19, 2012 [Tr. 2], p. 2; Transcript 3, April 24, 2012 [Tr. 3], p. 2)

23. The Council held public evidentiary hearings on June 4, 5, and 26, 2012; July 31, 2012; and August 2, 2012 at Central Connecticut State University, Institute of Technology and Business Development, 185 Main Street, New Britain, Connecticut and August 28, and 30, 2012 at the offices of the Connecticut Siting Council, Ten Franklin Square, New Britain, Connecticut. (Transcript 4, June 4, 2012 [Tr. 4], p. 6; Transcript 5, June 5, 2012 [Tr. 5], p. 6; Transcript 6, June 26, 2012 [Tr. 6], p. 4; Transcript 7, July 31, 2012 [Tr. 7], p. 6; Transcript 8, August 2, 2012 [Tr. 8], p. 4; Transcript 9, August 28, 2012, [Tr. 9], p. 5; Transcript 10, August 30, 2012 [Tr. 10], p. 5)

24. The proposed project would require permits from the U.S. Army Corps of Engineers (USACE) under the Clean Water Act Section 404, the DEEP for Water Quality Certification under Section 401 of the Clean Water Act, and encroachment permits from the ConnDOT. CL&P filed an application for a 401 Water Quality Certification Stream Channel Encroachment Permit on July 23, 2012. (CL&P 9, R. 26; Tr. 7, p. 14)

Comments

25. The Town of Windham submitted comments on February 23, 2012 stating that the town is opposed to any of the alternative transmission line routes that extend through Windham and supports the proposed transmission route. (Town of Windham Comments dated February 22, 2012)

26. The Windham Region Council of Governments, which includes Chaplin, Columbia, Coventry, Hampton, Lebanon, Mansfield, Scotland, Willington, and Windham, submitted comments dated March 31, 2009. The comment letter recommended 1.) the utility pay for an independent study of non-transmission alternatives be conducted and project alternatives be considered; and 2.) that if the Connecticut Siting Council determines that transmission lines are needed, alternatives to construction in eastern Connecticut be examined. (Windham Region Council of Governments dated March 31, 2009)

27. The Town of Brooklyn First Selectman Austin Tanner submitted comments on April 19, 2012. The First Selectman's comments stated that due to the existing limits of Connecticut's ability to import power, and

CL&P's proposal to use the existing transmission ROW for the routing of the proposed project, the town supports the proposed project route. (First Selectman of Brooklyn Comments dated April 19, 2012; Tr. 2, p. 8)

28. The Killingly Planning and Development Office submitted comments to the Council dated April 19, 2012. The comments stated that they request consideration and use of EMF Best Management Practices near Killingly residences; they request consideration of priority funding for residential areas when implementing EMF BMPs; the Development and Management Plan for the Interstate project:
    a. Be provided to the Killingly Planning Department once completed;
    b. Include a requirement for a meeting with town staff prior to commencement of construction within Killingly;
    c. Include a note in the D&M Plan to all contractors and sub-contractors that local land use permits would be needed for any residence that should request excess project fill;
    d. Use temporary versus permanent construction access roads where possible, with temporary roads restored upon completion of construction; and
    e. Notify the Planning Department when work is planned near vernal pools, wetlands, and state protected species habitat.

    (Killingly Planning & Development Office comments dated April 19, 2012)

29. The Killingly Economic Development Coordinator, Elsie Bisset, stated that she is in support of the proposed route through the Town of Killingly along existing CL&P ROWs as that route would have the least impact to businesses in the area. (Killingly Economic Director comments dated April 19, 2012)

30. The Putnam Economic and Community Development Director, Delpha M. Very, submitted comments dated April 19, 2012. The comments support the proposed route of the Interstate project through Putnam. (Putnam Economic and Community Development comments dated April 19, 2012)

31. The Town of Mansfield submitted comments dated April 24, 2012. The town opposes the proposed route, asserting that alternative transmission routes should have been given more consideration and that the project would result in land use impacts. Specifically, Mansfield recommends:
    a. The relocation of proposed structure No. 39 on Highland Ridge Golf Range property;
    b. The use of the Mansfield Underground Variation and a modified Mount Hope Underground Variation that would move the western end of the variation farther west to a point west of Sawmill Brook Lane between structure Nos. 66 and 67 and move the eastern end of the variation farther west to a point west of Route 195/Storrs Road near proposed structure No. 71;
    c. Use an EMF BMP configuration between Route 195 and Mansfield Hollow;
    d. Relocation of Mount Hope Montessori School;
    e. A land transfer between Diane Dorfer, owner of Green Dragon Day Care, and Northeast Utilities. Exchanging the rear portion of Ms. Dorfer's land, which is crossed by CL&P's ROW, with land east of her property, which is owned by CL&P;
    f. Use of the Hawthorne Lane Alternative;
    g. Use of the No-ROW Expansion option for the proposed transmission lines through Mansfield Hollow;
    h. Minimize impact to farmland that is crossed by the proposed route; and
    i. Locate construction access roads as far from residences as possible.

    (Town of Mansfield comments dated April 24, 2012)

32. The Town of Thompson Conservation Commission provided comments on the proposed project in a letter dated August 4, 2009. The comment letter recommended CL&P consult with the CT DEEP Natural Diversity Database and the CT DEEP Natural History Survey and to protect species associated with sensitive areas along the proposed route. (Thompson Conservation Commission comments dated August 4, 2009)

33. The Town of Thompson Inland Wetlands Commission submitted comments on the proposed project in a letter dated May 29, 2012. The comments stated that the route through Thompson was inspected on April 13, 2012 to identify environmental conditions or problems that may impact wetlands and watercourses during construction and to provide recommendations to minimize impacts. Concerns and recommendations include:

a. The Inland Wetlands Commission recommends use of sediment and erosion controls that incorporate wood chips and slash from clearing at the site into tubular mesh filter socks.
b. Concern with the method of laying construction matting layers until dry access is obtained may result in the mats sinking into the deep organics below and creating a mud wave. The Commission recommends using a floating access road with road stabilization geotextile and geogrid designed to disburse and better distribute loads.
c. Concerns about existing erosion along the access road at various locations. The Commission makes specific recommendations including the use of stormwater diversion, permanent culverts and waterbars.

(Thompson Inland Wetlands Commission comments dated May 29, 2012)

34. On June 19, 2012, the Thompson Inland Wetlands Commission submitted additional comments regarding the crossing of the access road through Wyndham Land Trust's property in Thompson. The Commission is concerned about the underlying depth of muck and loam and recommends test borings in the wetlands where the access road is proposed. (Thompson Inland Wetlands Commission comments dated June 19, 2012)

35. CL&P assessed the roadway through the wetland in Thompson referred to by the Inland Wetlands Commission. The existing CL&P access road crosses this wetland. CL&P proposes to widen this access road for the Interstate project. The road depth is at least 12 to 18 inches deep but potentially three feet deep. To reduce the impact of any mud wave resulting from timber mats on mucky soils, CL&P would install silt fence along the edges of the mats through wetlands. This particular wetland would be crossed using a stable crossing method and erosion and sedimentation controls would be used. (Tr. 6, pp. 18, 19, 27)

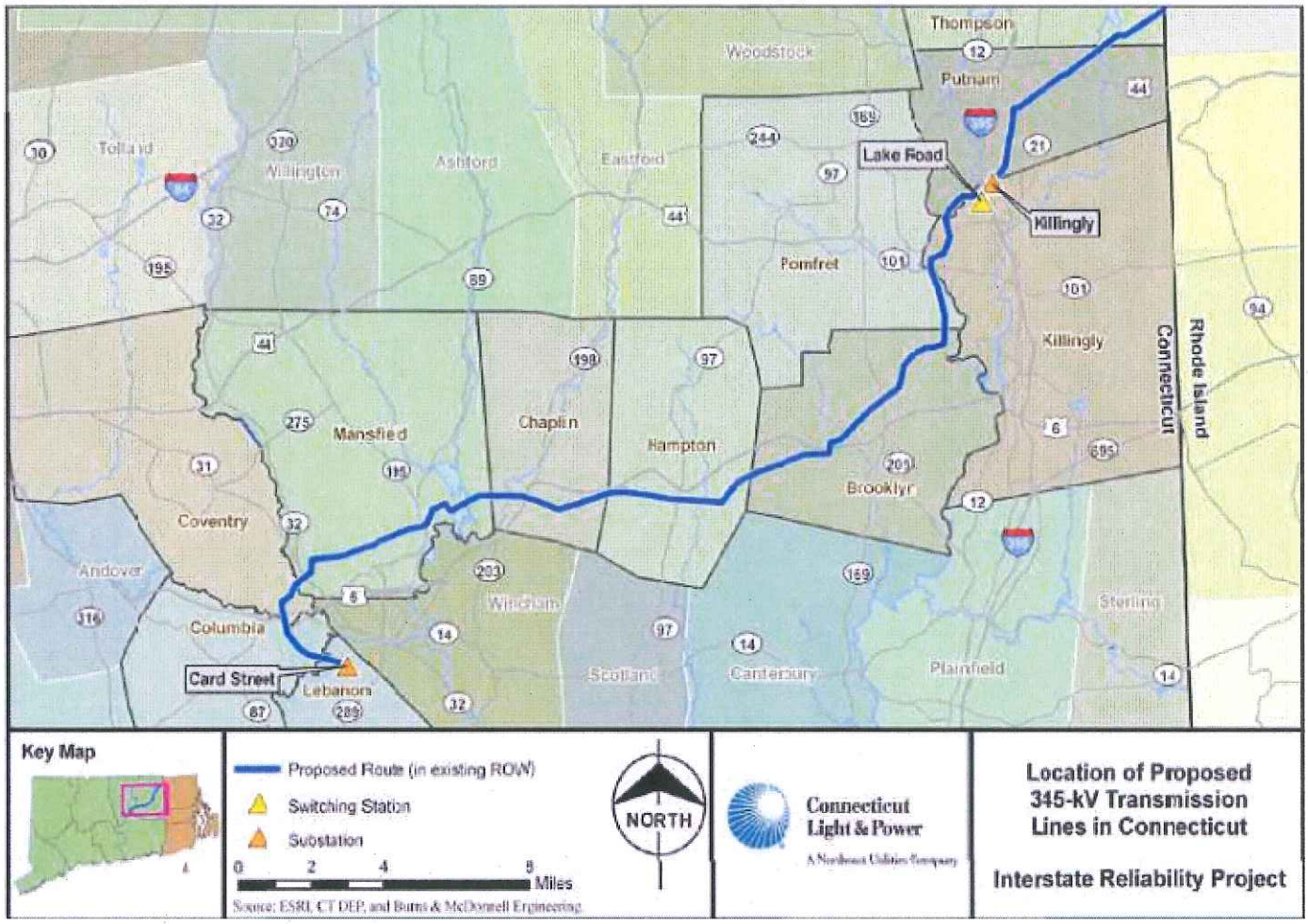
II. PROPOSED ROUTE

Interstate

36. The proposed Interstate project would extend over 75 miles within three states, predominantly within the existing utility rights-of-way (ROW). The project would connect Card Street Substation, Lake Road Switching Station, National Grid's West Farnum Substation in Smithfield, RI, and National Grid's Millbury Switching Station in Milbury, MA. The proposed transmission lines would also extend through but electrically bypass Killingly Substation and would pass by Narragansett Electric's Sherman Road Switching Station in Burrillville, RI. (CL&P 1, Vol. 1, p. 1-2)

37. The Connecticut portion of the Interstate project includes the installation of new 345-kV electric transmission lines and associated facilities extending over approximately 37 miles from CL&P's Card Street Substation in Lebanon to Lake Road Switching Station in Killingly then on to the Connecticut/Rhode Island border in Thompson. (CL&P 1, Vol. 1, pp. ES-3, ES-5)

Figure 1. Location of the Connecticut Portion of the Interstate Reliability Project.



(CL&P 1, Vol. 1, ES-4)

38. The Connecticut portion of the Interstate project would traverse 11 municipalities, including Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam and Thompson. (CL&P 1, Vol. 1, p. ES-6)

39. The Connecticut portion of the proposed project would be constructed, owned and operated by CL&P. CL&P will also initially own the facilities; however, expects that ownership of some of the facilities would be transferred to UI after commencement of commercial operation. The Narragansett Electric Company would own and operate the proposed Rhode Island facilities and New England Power Company would own and operate the Massachusetts facilities. Both Narragansett Electric Company and New England Power Company are owned by National Grid. The Rhode Island portion of the project is under the jurisdiction of the state's Energy Facility Siting Board. The Massachusetts portion of the project is under the jurisdiction of Massachusetts Energy Facilities Siting Board. (CL&P 1, Vol. 1, p. 1-5; CL&P 17, p. 3)

40. The Interstate application was filed with the Massachusetts Energy Facilities Siting Board on June 21, 2012 and with the Rhode Island Energy Facility Siting Board on July 19, 2012. (Tr. 7, p. 31)

41. The proposed 345-kV transmission lines would be constructed overhead adjacent to existing 345-kV overhead transmission lines along existing CL&P ROW. The existing 345-kV electric transmission lines were installed in the early 1970s. Some portions of the ROW also include other overhead transmission lines and distribution lines. (CL&P 1, Vol. 1, p. 1-7)

42. Approximately 35 miles of the proposed transmission lines would be installed within existing CL&P ROWs. The remaining portion of the route would require a ROW expansion through federally owned properties. (CL&P 1, Vol. 1, pp. 1-7, 10-1)

43. The total estimated project cost is $511 million. National Grid's facilities in Rhode Island and Massachusetts are expected to cost approximately $293 million. CL&P's Connecticut facilities are expected to cost approximately $218 million. (CL&P 17, p. 4)

44. The proposed base-design Connecticut portion of the Interstate project would have an incremental retail rate impact of 24 cents per month for a typical 700 kilowatt-hour CL&P residential customer bill. The Rhode Island and Massachusetts portion of the Interstate project would add 30 cents to an average 700 kilowatt-hour CL&P residential customer bill. Therefore, the total impact of the Interstate project on Connecticut's residential electric customers is 54 cents per month. (CL&P 10, R. 25; Tr. 8, p. 8)

45. The projected in-service date for the Project is December, 2015. (CL&P 16, p. 66)

III. NEED

Background (Southern New England Region)
ISO-NE Authority for Planning and Reliability

46. The southern New England (SNE) area includes Massachusetts, Rhode Island and Connecticut and accounts for approximately 80 percent of the entire New England electrical load. The SNE load areas are concentrated in Boston and its suburbs, central Massachusetts, Greater Springfield, Rhode Island, Greater Hartford and southwest Connecticut. (Council Admin. Notice 33, FOF #24)

47. The electric power system in New England became regionalized during the 1960s, when the electric utility companies in New England, including CL&P, developed a plan for a 345-kV transmission grid that would integrate the dispatch of electricity from strategically located generating stations serving loads within and between the New England States and other regions. (Council Admin. Notice 33, FOF #25)

48. ISO-NE is responsible for managing the New England region's bulk electric power system, operating the wholesale electricity market, administering the region's open access transmission tariff, and conducting centralized electrical power planning. (Council Admin. Notice 30, FOF #19)

49. In 1996, the Federal Energy Regulatory Commission (FERC) developed the concept for the Independent System Operator to support competitive electricity markets. The Independent System Operator is required to provide open and fair access to the transmission system; create a non-discriminatory governance structure; enable market-based wholesale electricity rates; and ensure efficiency and reliability in management and operation of the regional bulk power system. (ISO-NE 2, pp. 5, 6)

50. On July 1, 1997, the FERC issued an order establishing the ISO-NE as the operator of the New England bulk power grid and transferring responsibilities previously held by the New England Power Pool. In June 2001, the FERC gave ISO-NE the authority to plan the regional transmission system. Official status as a Regional Transmission Organization (RTO) was granted to ISO-NE in March 2004, with ISO-NE beginning operation as an RTO in February 2005. (ISO-NE 2, p. 6)

51. Since ISO-NE is responsible for system planning in the New England region, it must maintain system reliability that is in accordance with NERC, NPCC, and its own planning standards. (ISO-NE 2, p. 7)

52. ISO-NE's planning process is in compliance with NERC/NPCC Reliability Rules, which are included in its manuals and procedures. NERC oversees regional councils including NPCC. NPCC oversees New York, New England, and parts of Canada. (ISO-NE 2, pp. 9, 10)

53. ISO-NE plans and operates the New England bulk power transmission system in compliance with national and regional reliability standards. In accordance with this mission, ISO-NE produces a yearly Regional System Plan (RSP). ISO-NE uses the RSP to announce the need for system improvements for reliability, when necessary. If the market does not respond with a viable project to address the reliability need, transmission owners such as CL&P and National Grid are required to construct the improvements. (CL&P 16, p. 4)

54. The need for the Interstate Reliability Project was first identified between 2004 and 2008 as part of transmission improvements in Southern New England. In 2008, ISO-NE re-evaluated the project due to changed system conditions. In 2012, ISO-NE again re-evaluated the need for the Interstate project. (CL&P 16, pp. 3, 4)

55. In 2004, ISO-NE began a study to identify system deficiencies in the southern New England electric supply system resulting in the "*Southern New England Transmission Reliability Report (SNETR) – Needs Analysis*, January 2008." A working ground comprised of planning staff of Northeast Utilities Service Company and National Grid served on the team that developed the Needs Analysis. As part of this initial report, the working group identified four separate but related projects to resolve deficiencies in the southern New England transmission system, including:

    a. The Greater Springfield Reliability Project (GSRP) and Manchester to Meekville Junction Project (MMP), which were approved by the Council in Docket No. 370 and Docket No. 370_MR.
    b. The Rhode Island Reliability Project, which was a National Grid project within Rhode Island.
    c. The Interstate Reliability Project, which is the subject of this proceeding.
    d. The Central Connecticut Reliability Project, which is a potential future project for a 345-kV transmission line from North Bloomfield Substation to Frost Bridge Substation in Watertown, Connecticut.

    (CL&P 16, pp. 5, 6)

Planning Criteria and Reliability Standards

56. CL&P is obliged by binding tariff provisions to design and propose transmission improvements that will assure the bulk power supply system complies with applicable reliability standards. (Council Admin Notice 33, FOF #33; CL&P 1, Vol. 1, p. 2-5)

57. ISO-NE's definition of reliability is governed by NERC. NERC's definition of reliability encompasses two concepts: adequacy and security. Adequacy is defined as the "ability of the system to supply the aggregate electric power and energy requirements of the consumers at all times." Security is defined as "the ability of the system to withstand sudden disturbances." (Council Admin. Notice # 34)

58. ISO-NE does not determine whether resource adequacy, that is the amount and availability of generation and load management resources, could solve a given reliability problem more cost-effectively than transmission security. It leaves that "choice" up to the market. If the market fails to bring forward a solution, then ISO-NE is obligated, per NERC planning criteria and reliability standards, to plan a transmission security solution. (Council Admin. Notice 33, FOF #34)

59. A key element in planning for and testing transmission reliability (in the sense of transmission security) is the concept of "contingency" events, wherein certain generation and/or transmission facilities are assumed to be out of service or otherwise unavailable. Potential causes of contingency events are weather; substation, transmission line or generator failure; contingencies occurring elsewhere on the electric system; or a combination of these factors. (Council Admin. Notice 33, FOF #36; CL&P 1, Vol. 1, p. 2-3)

60. In accordance with ISO-NE Planning Procedure 3 (PP3), planners use the terms "N-1" and "N-1-1" to designate the contingency conditions in which the transmission system must be capable of reliable operation. N-1 designates the state of the transmission system following the occurrence of a single contingency. N-1-1 designates the condition of the transmission system following the occurrence of a second contingency, assuming that one element is already out of service. (Council Admin. Notice 33, FOF #37)

61. ISO-NE's reliability standards are designed to comply with PP3. PP3 is a standard that allows for consistent system planning throughout New England. (ISO-NE 2, p. 10)

62. To evaluate compliance with the PP3 reliability criteria, these contingencies are simulated on computer models developed to represent actual and future system conditions. If the simulation shows that transmission lines will overload and/or voltage will not be maintained within specified limits under one or more contingencies, the electric system is judged to be unreliable, and the system must be brought back into compliance within 30 minutes of a first contingency, so that it will be able to operate reliably in the event of a second contingency. (Council Admin. Notice 33, FOF #38)

63. The particular contingencies modeled are simulated for normal loads forecast for the future, extreme weather peak loads, inter-regional power transfers, and "reasonably stressed" conditions, which are generally considered to be the unavailability of generation proximate to load—often with multiple units being unavailable. Requiring the transmission system to operate effectively under such "reasonable stress" recognizes that generation units may be unavailable for many reasons, such as economics, equipment failure, lack of fuel, maintenance requirements, and environmental restrictions. (Council Admin. Notice 33, FOF #39)

64. The increase import capability into Connecticut would allow for protection against generator retirements based on economics, and compliance with environmental regulations. Increased import would also allow Connecticut to achieve Renewable Portfolio Standards by importing renewable generation from New York and Canada. (CL&P 16, p. 40)

65. Major unplanned outages of generating units have occurred in the electric industry. In Connecticut, for instance, outages involving thousands of MWs at a time have happened in 1996, 2003, and 2008. Additionally, from August 12, 2012 through August 23, 2012, Millstone 2 was unavailable due to high water temperatures in Long Island Sound. (Council Admin. Notice 33, FOF # 40; ISO-NE 4, R. Civie-2)

66. Unplanned outages in the Connecticut electric system include, Millstone Unit 2, which was 882 MW that were unavailable from July 3 to July 27, 2010. Also, there were forced system outages on July 22, 2011, resulting in 3,400 MW of reductions during an historic peak load. (CL&P 16, p. 15)

67. The size of an area impacted by an uncontrolled blackout is difficult to predict. Also, an uncontrolled blackout may cause equipment damage that would make the restoration of service more difficult, resulting in a prolonged and more expensive outage. (ISO-NE 2, p. 14)

68. Contingency modeling under "reasonably stressed" conditions is meant to test the strength of the system in general. Planners design improvements to the system that address more than just the specific conditions and contingencies tested in power-flow simulations. Events represented in the simulations serve as proxies for multiple other potential future events that cannot be defined or predicted, but that the system should be able to survive. (Council Admin. Notice 33, FOF #42)

69. The transfer limits of any system are always lower than the individual current-carrying capacity of transmission elements. The design allow the system to remain reliable in the case that there is a contingent loss of an element on the system, and the overlapping loss of a second element on the system within 30 minutes of the first loss. Following the loss of a transmission element, the power flowing on that element flows on the remaining elements of the interface. (CL&P 16, 17)

Electric Transmission Interface

70. "Interfaces" refer to the transmission facilities that reliably transfer power from one defined area to another. The transfer capability across the interface depends on how much power can flow on the transmission system without violations of the system occurring. (CL&P 16, p. 16)

71. The New England East-West Interface is basically in line with the service territories of the major electric utilities, dividing New England in half. (CL&P 16, p. 18)

72. Three 345-kV transmission lines currently cross the New England East-West Interface, including the 380 Line in New Hampshire, the 302 Ling in Massachusetts, and the 330 Line in Connecticut. (CL&P 10, R. 4)

73. The Interstate project is designed to provide adequate transmission transfer capability into Connecticut and across the New England East-West Interface throughout the ten-year ISO-NE planning horizon. The higher transfer capability associated with this project would continue throughout the life of the facility. However, future studies may determine that additions or modifications are needed to the transmission system in the long-term. (CL&P 10, R. 15)

74. System reliability is determined by whether the system able to move power from one side of an interface, where supply is available, to the other side, where there is a demand for the power. (CL&P 16, p. 17)

75. If an interface is constrained, it may not deliver power to the area of the load. New England generally has adequate generation and load-reducing resources to meet electric power demand under normal operating conditions. It is when there are contingency events on the system that the system may have a surplus of generation on one side of the interface that cannot be delivered to the other. (CL&P 16, p. 20)

76. During the mid-1980s and early 1990s, Connecticut was a net exporter of power and the New England East-West Interface was monitored particularly due to constraints in moving significant amounts of power from

generating stations in the western portion to the Boston area in the eastern portion. Beginning in the late 1990s new generation was built in the east and four nuclear generating units were unavailable for multiple years (a loss of approximately 3,260 MW). During this time, transmission was constrained from east to west and Connecticut became a net importer of electricity. In the following years, Connecticut continued to be a net importer of electricity and at times import levels approach the import transfer limit. (CL&P 16, p. 21; Tr. 7, p. 32)

Deficiencies

77. Of the New England states, Connecticut has the least ability to import power to supplement internal supply resources. Even after the completion of the GSRP and MMP, Connecticut would be able to import approximately 33 percent of its peak load, while Massachusetts and Maine can import almost 50 percent of their peak load and New Hampshire, Vermont, and Rhode Island can import 100 percent of their peak load. (CL&P 1, Vol. 1, ES-10; CL&P 16, pp. 39, 40)

78. The average Connecticut import level for the period between June, 2007 and December, 2011 is 887 MW. During this period there were 1,220 hours when Connecticut import exceeded 2,000 MW and 128 hours when the import exceeded 2,500 MW. The highest recorded import level for this period is 2,977 MW, which occurred in the winter of 2008. (CL&P 9, R. 6)

79. The per capita electric usage for northeastern Connecticut (including Andover, Ashford, Bolton, Brooklyn, Canterbury, Chaplin, Columbia, Coventry, Eastford, Ellington, Hampton, Killingly, Lebanon, Mansfield, Plainfield, Pomfret, Putnam, Stafford, Scotland, Somers, Sterling, Thompson, Tolland, Union, Vernon, Windham, Willington, and Woodstock) is 6,845 kW-hr for the year 2000, and 6,260 kW-hr for the year 2010. The per capita electric usage for Connecticut is 8,525 kW-hr for the year 2000, and 8,299 kW-hr for the year 2010. Although there was a decrease in per capita consumption between 2000 and 2010, there was actually an increase in the peak load demand for electricity during the same period. (CL&P 10, R. 23)

80. The projected peak demand for Connecticut is 8,355 MW in 2015, 8,825 MW in 2020 and 9,263 MW in 2025. (CL&P 10, R. 24)

81. The Interstate project is needed to address the following needs:
    a. Reinforcement of the 345-kV system into West Farnum Substation in Rhode Island to address Rhode Island reliability needs.
    b. Increasing the transfer capability of from western New England and Greater Rhode Island to eastern New England.
    c. Increasing the transfer capability from eastern New England and Greater Rhode Island to western New England.
    d. Increasing the transmission transfer capability into Connecticut.

    (CL&P 16, pp. 8, 9)

82. The power flow studies included generation, including renewable generation, that has obtained ISO-NE Proposed Plan Application (PPA) approval to interconnect and has cleared a ISO-NE Forward Capacity Auction. (CL&P 10, R. 12)

Needs Studies

83. ISO-NE updates its needs assessments periodically as new resources enter into the Forward Capacity Auction. If during a needs assessment, ISO-NE determines that a transmission project is no longer needed, it would direct the transmission owners to discontinue the planned application. (CL&P 16, p. 6)

84. The 2008 re-analysis of the Interstate project was completed in 2011, when ISO-NE released its *New England East-West Solution (NEEWS) Interstate Reliability Project Component Updated Needs Assessment* in April 2011. The 2011 Updated Needs Report used 2015 and 2020 projected system conditions to analyze the ability of the southern New England transmission system to reliably serve load in western New England, eastern New England, Connecticut and Rhode Island. The result of the 2011 Needs Report found widespread thermal and voltage violations under contingent conditions for the years studied. (CL&P 16, p. 7)

85. The 2011 Needs Report showed that, despite lower load forecasts and the addition of resources on the west side of the interface, the Interstate project is still needed. Due to the addition of generation in the west and the loss of generation in the east, there is a greater need to increase transfer capability across the interface from west to east. (CL&P 16, pp. 21, 22)

86. A Working Group consisting system planning engineers from ISO-NE, National Grid and Northeast Utilities studied transmission planning for southern New England to determine transmission reliability. Transmission reliability is the ability of the system to perform under all design contingency events and remain within the equipment ratings. (ISO-NE 2, pp. 3, 4)

87. ISO-NE is concerned about the reliability of the southern New England electric system due to limited transmission capacity, limited generation in areas where it is needed to serve load, and limited transfer capability into and through the area. (ISO-NE 2, pp. 3, 11)

88. Thermal overloads occur when transmission lines carry current above their design capacity, usually due to the occurrence of a contingency event elsewhere on the system. When lines are carrying too much current they become overloaded and heat builds up beyond temperature limits and the lines sag in an unsafe manner or fail. (ISO-NE 2, pp. 13, 14)

89. Low voltage levels at the consumer level can damage equipment and interfere with appliance operation. Low voltage on transmission lines can result in undesirable protective equipment operation, voltage collapse and loss of load. (ISO-NE 2, p. 14)

90. The ISO-NE Updated Needs Analysis included a number of generators in Connecticut, with up to 1,100 MW of generation together that may or may not retire in the near term. If these generators had been counted as retired, then the need situation in Connecticut could increase. (Tr. 7, pp. 49, 50)

91. The year of need for the Interstate project for Rhode Island is immediately, for transfer capability from western New England and Greater Rhode Island to eastern New England is 2011, for transfer capability from eastern New England and Greater Rhode Island to western New England is between 2017 and 2018, for transfer capability into Connecticut is between 2014 and 2015. (CL&P 16, p. 8; Tr. 7, pp. 59, 60; Tr. 7, p. 85; Tr. 9, pp. 123-127)

92. Beginning in 2010, the New England States Commission on Energy (NESCOE) advised ISO-NE to forecast energy efficiency savings beyond the Forward Capacity Market results across the ten-year planning horizon. (CL&P 30, p. 8)

93. Since filing the application, ISO-NE began another update to its needs assessments for all New England reliability projects, including the Interstate Reliability Project. The new reassessment includes the outcome of the Forward Capacity Auction #6, which was held on April 2 and 3, 2012, as well as any approved changes to the New England electric system. ISO-NE also included changes to its modeling of energy efficiency measures in long-term planning studies. (CL&P 16, p. 10)

94. In July, 2012, ISO-NE drafted a report entitled "Follow-Up Analysis to the 2011 New England East-West Solution (NEEWS) Interstate Reliability Project Component Updated Needs Assessment" (referred to as the 2012 Follow-Up Needs Analysis). (CL&P 30, p. 1)

95. The 2012 Follow-Up Needs Analysis took into account more recent forecasted loads; forecasted energy efficiency measures; the most recent Forward Capacity Auction; and any approved system changes. (CL&P 30, p. 5)

96. The peak load for each year that was modeled was lower for the 2012 Follow-Up Needs Analysis because it included predicted energy efficiency measures. The updated analysis also used a 10-year forecast of predicted load growth beginning in 2012, rather than 2010 as used in the 2011 analysis. This gave the study two additional years of predicted load growth. The two years of additional load growth resulted in an overall increase of 575 MW in system-wide peak load demand. (CL&P 30, p. 6)

97. The 2012 Follow-Up Needs Analysis found the needs of the electric system are similar to that found in 2011 within the 10-year planning horizon. (CL&P 30, p. 2)

Lake Road Generating Station

98. The Lake Road Generating Station is a power generation facility in Killingly, Connecticut, consisting of three combined cycle units with a summer capacity of approximately 750 MW. (CL&P Admin. Notice 26, p. 3)

99. Lake Road Generating Station was connected to the electric system through a new substation on the 345-kV line between Card Street and Sherman Road Substations, thereby creating the 330 Line (between Card Street and Lake Road) and the 347 Line (between Lake Road and Sherman Road). (CL&P Admin. Notice 26, p. 3)

100. The Lake Road Generating Station was determined to be electrically outside of Connecticut by ISO-NE because of its location on the electric system. (CL&P Admin. Notice 26, p. 4)

101. The operation of the Interstate Reliability Project would allow Lake Road Generating Station capacity to be counted toward Connecticut's Local Sourcing Requirement. (CL&P Admin. Notice 26, p. 7; CL&P 16, p. 41)

Cost Allocation

102. The ISO-NE Tariff includes two transmission services: Regional Network Service (RNS) facilities that are part of New England's pool transmission facilities, and Local Network Service (LNS) facilities that are non-pool transmission facilities. RNS facilities allow power to move freely on the New England transmission system. The pool transmission facilities enable power flows throughout the region and are deemed by the Federal Energy Regulatory Commission to benefit all region customers. Therefore, all New England customers share in the cost recovery of the transmission facilities. LNS facilities, deemed to benefit a local area, are charged to local system customers. (CL&P 16, pp. 63, 64)

103. Connecticut's share of the RNS cost is approximately 27 percent. Any additional construction costs that satisfy local requirements are considered "gold plating" and are not typically eligible for RNS cost allocation. (CL&P 16, p. 64)

104. In the transmission cost allocation process, ISO-NE determines if a transmission project uses good utility practice. ISO-NE would look at the lowest reasonable cost for practical construction of a project, if project construction is more expensive than it could have been, the difference is localized. For example, if a transmission line is built underground that could have been practically built overhead at less cost, the additional cost spent on underground line construction would be localized. (Tr. 6, p. 111)

105. Regionalization of transmission line costs means that ratepayers in Connecticut would pay approximately 27 percent of the total reasonable cost of the project. The other New England states would pay the remaining 73 percent of the cost. However, if ISO-NE determines that a portion of the project cost more to construct than it should have, the cost would be localized, in this case meaning that Connecticut ratepayers would have to pay 100 percent of the additional cost above the low-cost base-design project configuration. (Tr. 6, pp. 112-115)

106. The project proponents file a Transmission Cost Allocation application with ISO-NE. ISO-NE and the NEPOOL Reliability Committee review the project elements and associated costs to determine eligibility for regional cost allocation. ISO-NE makes the final determination for cost allocation associated with any transmission project. (CL&P 16, p. 65)

107. Costs that are determined as local are recovered through the appropriate recovery mechanism within the state in which the facility is located. CL&P expects cost increments for underground line construction would be borne by the load that required the line to be constructed underground. (CL&P 16, p. 65)

108. CL&P has designed the proposed facilities to be eligible for regional cost allocation under Schedule 12C of the ISO-NE Inc. Transmission, Markets and Services Tariff and ISO-NE's Planning Procedure No. 4. Regionalized costs would be recovered by all New England load electric companies. The entire Interstate Reliability Project is expected to have an incremental retail rate impact of approximately $0.54 per month for a 700-kWh residential customer. (CL&P 10, R. 25)

IV. PROJECT ALTERNATIVES TO INTERSTATE

No Action Alternative

109. The No Action Alternative would result in no improvements being made to the electric system supplying Southern New England. This alternative was rejected because "it would not resolve the regional electric reliability problems that ISO-NE and the transmission system owners have been studying..." The electric system in the region and specifically in the Connecticut, Rhode Island and Massachusetts area would not comply with national and regional reliability standards and criteria. (CL&P 1, Vol. 1A, p. 12-1)

110. Thermal and voltage reliability criteria are currently violated in Rhode Island at current load levels. The No Action Alternative would allow these violations to continue and possibly be worsened. (CL&P 1, Vol. 1A, p. 12-1)

111. The No Action Alternative would not give the Southern New England electrical system long-term flexibility for efficient and reliable generation dispatch. (CL&P 1, Vol. 1A, p. 12-1)

System Alternatives
Transmission Alternatives

112. Transmission system alternatives were analyzed in phases. First, alternative transmission options were identified by the ISO-NE Working Group. These alternatives would meet the threshold system performance requirements of the Interstate project. Second, the Transmission Owners involved (CL&P and National Grid) evaluated the options and selected a preferred option from those identified by the ISO-NE Working Group. Third, ISO-NE reevaluated the need for the proposed Interstate project in 2010 and 2011. This reanalysis identified a need for a change to the original options that would allow for greater capability for transferring power from west to east across the New England East-West Interface. (CL&P 1, Vol. 1A, pp. 13-1, 13-2)

113. There were five options developed by the in the *2008 Options Analysis* are:
    a. Option A – a new 345-kV transmission line extending from Millbury Switching Station in Millbury, MA to the West Farnum Substation in North Smithfield, RI, to Lake Road Switching Station in Killingly, CT, and finally to Card Street Substation in Lebanon, CT.

b. Option B – a new 345-kV transmission line extending from West Farnum Substation to Kent County Substation in Warwick, RI to Montville Substation in Montville, CT.
c. Option C – a new 345-kV transmission line extending from Millbury Switching Station to Carpenter Hill Substation in Charlton, MA to Manchester Substation in Manchester, CT. Additionally, Option C would require a new 345-kV transmission line from Sherman Road Switching Station to West Farnum Substation.
d. Option D – a new 345-kV transmission line from Millbury Switching Station in Millbury, MA to Carpenter Hill Substation in Charlton, MA to Ludlow Substation in Ludlow, MA. Additionally, this option would include a new 345-kV line from Sherman Road Switching Station to West Farnum Substation as well as reconductoring/rebuilds of an existing 345-kV line extending from Sherman Road to the Connecticut/Rhode Island border and from Ludlow Substation to Manchester Substation. This option also includes a 345-kV line from Ludlow Substation to Agawam Substation in Agawam, MA to North Bloomfield Substation in Bloomfield, CT, which is part of the previously approved GSRP.
e. Option E – a new 1,200 MW high-voltage direct-current transmission line extending Millbury Switching Station and Southington Substation in Southington, CT. The option would also require a new 345-kV line from Sherman Road Switching Station to West Farnum Substation.
(CL&P 1, Vol. 1A, pp. 13-3, 13-4)

114. The Transmission Owners analyzed all options and determined that there are two distinct routes for Option C, referred to as C-1 and C-2. (CL&P 1, Vol. 1A, p. 13-4)

115. Option E was the first to be eliminated because of limits of system integration, performance disadvantages, and excessive cost. Option B was eliminated because it would result in inferior system benefits and have a high cost. Options A, C, and D were then compared in terms of thermal loading, voltage performance, and the ability to transfer power into Connecticut and western New England. (CL&P 1, Vol. 1A, p. 13-7)

116. Option C-1 was determined to be costly and difficult to construct. Option D was determined to be impractical. Option A and Option C-2 were then compared in detail because performance and cost were similar. Finally, the Transmission Owners chose Option A because it "performed better, cost less, and crossed fewer environmentally-sensitive and densely populated areas." (CL&P 1, Vol. 1A, p. 13-9)

117. Following the 2011 Needs Re-analysis, the Options were reconsidered and redesigned. The Working Group eliminated Option B because it did not add a line into Massachusetts, which is needed to strengthen the transmission system into eastern New England. Option B is also more expensive than the alternative options. Option E was also determined to be inferior to Options A and C-2. Additionally, Options C-1 and D were eliminated from consideration because nothing in the updated analysis changed the previous determination to eliminate these options. (CL&P 1, Vol. 1A, p. 13-10)

118. Options A and C-2 were redesigned in accordance with the updated needs analysis. For this redesign, Option C-2 was renamed Option C-2.1. Also, four separate variants of Option A were identified and labeled Option A-1 through A-4. (CL&P 1, Vol. 1A, p. 13-10)

119. Option C-2.1 would add a new 345-kV switchyard at Carpenter Hill to the Option C-2 alternative. (CL&P 1, Vol. 1A, p. 13-11)

120. Each of the four A Options would include:
a. A new 345-kV transmission line extending from Card Street Substation to Lake Road Switching Station.
b. A new 345-kV transmission line from West Farnum Substation to Lake Road Switching Station.
c. A new 345-kV transmission line extending from Millbury Switching Station to either West Farnum Substation or Sherman Road Switching Station.
(CL&P 1, Vol. 1A, p. 13-13)

121. All of the A Options would be the same in Connecticut, the differences lie in Rhode Island and Massachusetts. (CL&P 9, R. 10)

122. Option C-2.1 and all of the A Options were compared. All five examined options would provide electrical system performance that would meet the requirements identified by the NERC, NPCC and ISO reliability standards and criteria. No option performed better than the others in terms of system performance. In the end, Option A-1 was found to provide the most potential for expandability and flexibility. (CL&P 1, Vol. 1A, pp. 13-22, 13-23)

Non-Transmission Alternatives

123. Non-transmission alternatives (NTAs) were investigated by ICF International, Inc. (ICF). ICF ran studies including generation and demand-side resources that could be available within southern New England within the planning horizon of 5 to 10 years. (CL&P 1, Vol. 1A, p. 13-34)

124. NTAs investigated include demand-side resources only, central generation only, and a combination of generation and demand-side resources. The investigation of NTAs was done using power-flow simulations to determine if the NTA would meet the need satisfied by the proposed Interstate project. The deciding factor was the performance of the NTA in eliminating thermal violations. (CL&P 1, Vol. 1A, p. 13-34)

125. The critical load level (CLL) is when the demand on the system in MW is above the level at which reliability violations begin to occur. To remain below the CLL the demand reduction for 2015 would have to be 3,400 MW, which is 15% of the peak load predicted for that year. For 2020, the demand reduction would have to be 5,300 MW, which is 22% of the 2020 predicted peak load. (CL&P 1, Vol. 1A, pp. 13-34 through 13-36)

126. There are "passive" and "active" demand resources. Passive demand resources save electric energy use and are in place at all times. Passive resources include distributed generation. Active demand resources lower electricity use at peak demand times by offering incentives to customers for reducing consumption. (CL&P 1, Vol. 1A, p. 13-36)

127. ICF accounted for the demand resources available using those procured through the ISO Forward Capacity Auction process. (CL&P 1, Vol. 1A, p. 13-36)

128. ICF reviewed the draft ISO-NE's 2012 Follow-Up Needs Analysis and found that without the Interstate project, there would be thermal overloads under contingency conditions in Southern New England and that the Interstate project would resolve these violations. (CL&P 31, pp. 4, 5)

Generation

129. ICF referred to the New England Generation Interconnection Queue and found that a total of 2,850 MW of generation is listed. (CL&P 1, Vol. 1A, pp. 13-37, 13-38)

130. After running the study of generation resources, there were many unresolved thermal reliability violations that would be addressed by the Interstate project. (CL&P 1, Vol. 1A, p. 13-38, 13-39)

Combination of Demand-side and Generation

131. ICF analyzed a combination of generation and demand-side resources. First, passive demand-resources were assumed available. Then, generation was added in to address remaining violations. (CL&P 1, Vol. 1A, pp. 13-40, 13-41)

132. Power-flow studies of the combined generation and passive demand-side resources showed that several thermal violations remained. Contingencies on the system may cause overloads on a transmission element. (CL&P 1, Vol. 1A, p. 13-41)

133. The combination NTAs studied resulted in a reduction in the number and severity of violations but did not eliminate all violations. (CL&P 1, Vol. 1A, p. 13-43)

134. The NTA study then added in potentially available active demand resources. The study found that potentially available active demand resources could not fill the gap remaining with the inclusion of generation and passive demand resources. Therefore, the combination NTA solution would not be a feasible alternative to the Interstate project. (CL&P 1, Vol. 1A, p. 13-45)

135. The estimate capital costs of a combination NTA is at least $15 billion. (CL&P 1, Vol. 1A, p. 13-47)

V. PROJECT ROUTE AND DESIGN

Overhead In-Right-of-Way

Interstate

136. The Connecticut portion of the proposed Interstate project would run between Card Street Substation in Lebanon, Lake Road Switching Station in Killingly and the Connecticut/Rhode Island border in Thompson – approximately 36.8 miles. It would be located predominantly within an existing CL&P transmission ROW. (CL&P 1, Vol. 1, p. 3-2)

137. The proposed 345-kV transmission lines would be installed adjacent to an existing 345-kV line (#330) from Card Street Substation to Lake Road Switching Station, then would follow another existing 345-kV line (#3348) from Lake Road Switching Station to Killingly Substation, and from Killingly Substation to the Connecticut/Rhode Island border the proposed transmission line would follow another existing 345-kV line (#347). (CL&P 1, Vol. 1, p. 3-2)

138. The proposed transmission line would also share the ROW with an existing 69-kV line (#800/900) between Card Street Substation and Babcock Junction in Coventry and with an existing 115-kV line (#1505 and #1607) between Day Street Junction and Killingly Substation. (CL&P 1, Vol. 1, p. 3-2)

139. The proposed transmission line would be designated as the 3271 Line between Card Street Substation and Lake Road Switching Station, and the 341 Line between Lake Road Switching Station and the Connecticut/Rhode Island border. The 341 Line would continue to West Farnum Substation in Rhode Island. (CL&P 1, Vol. 1, p. 3-2)

140. The conductors for the new 345-kV overhead line would consist of three bundles of two 1,590-kcmil aluminum conductors with a steel core support (ACSS). Two overhead lightning shield wires that contain optical glass fibers (for communications purposes) would be installed above the 3271 Line between Card Street Substation and Lake Road Switching Station. Two overhead lightning shield wires, one of which contains optical glass fibers, would be installed above the 341 Line from Lake Road Switching Station to the Connecticut/Rhode Island border. (CL&P 1, Vol. 1, p. 3-3)

141. The existing 345-kV lines along the ROW that would be shared with the proposed project are installed mostly on wood-pole H-Frame structures with a typical height of 80 feet. Most of the existing H-frame tangent structures have two poles with three pole structures used at angles. (CL&P 1, Vol. 1, p. 3-3; CL&P 17, p. 7)

142. The proposed base line design supports for the new lines would be steel or laminated wood-pole H-frame structures, typically 85 feet in height. Either guyed structures or self-supported three-pole structures would be installed at ROW angle locations, also typically 85 feet in height. Angle structures are typically guyed unless in residential yards, cultivated farmland, or wetlands or if the guy wires would not meet clearance standards from the guy wires of existing structures. (CL&P 1, Vol. 1, p. 3-4)

143. There is one location along the ROW, in Columbia, that would require a modification to the existing 69-kV double-circuit line (800/900 Line) to meet clearance standards for the construction of the proposed line. At this location there is an almost 900-foot span between the existing 69-kV structures. During high-wind conditions

there would not be sufficient clearance from the proposed 345-kV line. CL&P would install a steel-pole double-circuit structure in the existing 69-kV line. (CL&P 1, Vol. 1, p. 3-5)

144. The existing guy wires of approximately 34 transmission line structures would be temporarily relocated to allow space for construction activities. All relocated guy wires would remain within the existing ROW. (CL&P 1, Vol. 1, p. 3-6; CL&P 10, R. 8)

145. The Windham Airport in Willimantic is approximately 3,700 feet southeast of the proposed project. The Danielson Airport in Killingly is approximately 2,800 feet east of the proposed project. The Federal Aviation Administration (FAA) has issued a Notice of Presumed Hazard (NPH) for five existing and seven proposed structures near Windham Airport and ten proposed structures near Danielson Airport. An NPH designation means that the structures could potentially interfere with flight safety and would require some mitigating measure. (CL&P 1, Vol. 1, pp. 3-6, 3-7)

146. CL&P proposes to coordinate with the FAA to mitigate potential hazards of the existing line to flight safety through modifications to adjacent structures in the proposed line. Potential modifications include height adjustments, marking and/or lighting of structures or marking the proposed shield wires. (CL&P 1, Vol. 1, p. 3-7, 6-68)

147. Currently, the FAA directs the use of low intensity steady state lights on transmission structures that require lighting. (Tr. 6, p. 125)

148. The project design began with structure locations adjacent to the existing 345-kV line structures. The structure locations were then evaluated to account for other factors, including potential environmental effects. Structure locations that would impact environmental resources were adjusted where feasible. Of 57 original structure locations that would have been in wetlands, 33 were shifted to upland locations. (CL&P 1, Vol. 1, pp. 3-8, 3-9)

149. CL&P made an agreement with the Highland Ridge Golf Range, owned by Richard Cheney to use a single 125-foot monopole with vertically configured conductors at structure No. 39. This would add no cost to the project because the vertically configured pole would replace two delta configured poles. (CL&P 24; Tr. 6, pp. 16, 17)

Segment Descriptions

150. There are 15 different segments of the ROW from Card Street Substation to the Connecticut/Rhode Island border. There are also five EMF best management practices (BMP) "focus areas." In three of the BMP focus areas, the proposed overhead line configuration is not H-frame. (CL&P 1, Vol. 1, p. 3-13)

151. Segment 1 is a 2.8 mile section from Card Street Substation to Babcock Hill Junction extending along the existing ROW in the towns of Lebanon, Columbia and Coventry. Along Segment 1, the proposed line would be aligned between the existing 330 Line and the existing 800/900 Line and would be installed on H-frame structures. (CL&P 1, Vol. 1, p. 3-13)

152. Segment 2 includes a 2.3-mile section designated as Focus Area A extending from Babcock Hill Junction to east of Highland Road along the existing ROW in the towns of Coventry and Mansfield. The BMP proposal includes the installation of a delta configuration. (CL&P 1, Vol. 1, p. 3-14)

153. In addition to Focus Area A, Segment 2 includes a 3.3-mile section from Highland Road to Mansfield Hollow State Park in Mansfield. This segment would include the installation of H-frame structures parallel to the existing 330 Line. (CL&P 1, Vol. 1, p. 3-14)

154. Segment 3 is a one-mile section from Mansfield Hollow State Park to Bassetts Bridge Road. This segment includes a 0.9-mile section extending through federally-owned properties of Mansfield Hollow State Park, Mansfield Lake, and the Mansfield Hollow WMA, which has an existing 150-foot wide ROW. To allow for

adequate separation distances between the existing transmission lines and the proposed lines, CL&P proposes to expand the ROW. The remaining 0.1-mile section of this segment is currently 300 feet wide. (CL&P 1, Vol. 1, pp. 3-14, 3-15)

155. Segment 4 is a 0.8 mile section from Bassetts Bridge Road to Shuba Lane in Mansfield and Chaplin. The proposed line would be installed on H-frame structures. (CL&P 1, Vol. 1, p. 3-15)

156. Segment 5 consists of a 0.5-mile section from Shuba Lane through Mansfield Hollow WMA to Willimantic Road in Chaplin. The entire segment is through federally-owned property and has a ROW width of 150 feet. The existing 330 Line is located in the center of the easement, which does not leave adequate space for the proposed H-frame configured lines. CL&P proposes to expand the ROW to the north. (CL&P 1, Vol. 1, p. 3-15)

157. Segment 6 would extend along a 12.6 mile section of the ROW from Willimantic Road in Chaplin, through Hampton, to near White Brook, west of Church Street in Brooklyn. The proposed lines would be installed parallel to the existing 330 Line on H-frame structures. (CL&P 1, Vol. 1, p. 3-16)

158. Focus Area D (near Day Street Junction) is a section of Segment 6 that includes an EMF BMP delta configured line. The focus area consists of a one-mile segment extending from west of Church Street to Day Street in Brooklyn. The proposed line would be installed parallel to the existing 330 Line. (CL&P 1, Vol. 1, p. 3-16)

159. Segment 7 is a 2.3-mile section of the ROW extending from Day Street Junction to Hartford Turnpike in Brooklyn, Pomfret and Killingly. The proposed line would be installed on H-frame structures west of and parallel to the existing 330 Line. (CL&P 1, Vol. 1, p. 3-16)

160. Segment 8 is a 2.6-mile section of the ROW extending from Hartford Turnpike to Lake Road Junction in Killingly and Putnam. The segment would consist of a new line supported by H-frame structures aligned west of and parallel to the existing 330 Line. (CL&P 1, Vol. 1, p. 3-17)

161. Segment 9 is a 0.2-mile section of the ROW extending from Lake Road Junction to Lake Road Switching Station in Killingly. In this segment the proposed locations of two new 345-kV lines would be between the existing 330 Line and 3348 Line. Both new 345-kV lines would be installed in vertical configurations on steel monopoles. (CL&P 1, Vol. 1, p. 3-17)

162. Segment 10 is a 0.7 mile segment of the ROW extending from Lake Road Junction to Killingly Substation. The proposed 345-kV line would be installed on H-frame structures between the existing 345-kV line and two existing 115-kV lines. (CL&P 1, Vol. 1, p. 3-17)

163. Segment 11 is a 1.7-mile segment of the ROW extending from Killingly Substation and Heritage Road in Killingly and Putnam. The proposed line would be installed on H-frame structures aligned parallel to the existing 347 Line. (CL&P 1, Vol. 1, p. 3-17)

164. Segment 12 consists of a 4.5-mile section extending from Heritage Road in Putnam to the Connecticut/Rhode Island border in Thompson, excluding the section adjacent to Elvira Heights Court in Putnam. The proposed line would be installed on H-frame structures parallel to the existing 347 Line. (CL&P 1, Vol. 1, p. 3-18)

165. Focus Area E is a Section of Segment 12 consisting of 0.6 miles near Route 44 and Elvira Heights Court in Putnam. The EMF BMP configuration in this Focus Area consists of construction of the new and existing lines on delta structures. (CL&P 1, Vol. 1, p. 3-18)

Substations

Card Street Substation

166. Card Street Substation is located on 10 acres of a 150-acre CL&P-owned parcel in Lebanon. The proposed modifications to the substation would be contained within the existing fence line. (CL&P 1, Vol. 1, p. 3-21)

167. The proposed modifications to the Card Street Substation include:
    a. Expansion of the existing three-position 345-kV ring bus to a four-position ring bus with one new 345-kV transmission line-terminal position (for the new 3271 Line), for a total of four 345-kV transmission line terminal positions.
    b. Installation of three new 345-kV circuit breakers, one new 345-kV transmission line terminal structure approximately 110 feet in height, and four lightning masts approximately 110 feet in height.
    c. Installation of four disconnect switches, 435 linear feet of bus, 500 feet of control-cable trench, six Capacitance Coupled Voltage Transformers (CCVT), and one wave trap.
    d. Installation new protection and control equipment within the existing relay/control enclosure. (CL&P 1, Vol. 1, p. 3-21)

168. Three wetlands exist on the Card Street Substation property. (CL&P 1, Vol. 1, p. 5-100)

169. The predominant vegetation in the area of Card Street Substation is upland forest, open field/shrub land, and forested wetland. (CL&P 1, Vol. 1, p. 5-101)

170. There are no known federally or state-listed vegetation or wildlife species in the immediate area of Card Street Substation. However, the New England cottontail, which is a federal candidate species, has habitat in Lebanon. (CL&P 1, Vol. 1, pp. 5-101, 5-102)

171. Land uses near Card Street Substation include rural residences, forest and transmission line ROWs. The closest residences are approximately 400 feet from Card Street Substation. (CL&P 1, Vol. 1, p. 5-102, 5-103)

172. Access into Card Street Substation is via Card Street on the south side of the property. (CL&P 1, Vol. 1, p. 5-102)

173. There is one Native American archaeological site within one mile of Card Street Substation. (CL&P 1, Vol. 1, p. 5-102)

Lake Road Switching Station

174. Lake Road Switching Station interconnects the 330 Line and the 3348 Line at Lake Road Generating Station in the northwestern portion of Killingly. The switching station is adjacent to the generating station. The proposed modifications at the switching station include the addition of two new transmission line positions to support the two new proposed 345-kV lines; Lake Road to Card Street (3271 Line) and Lake Road to West Farnum (341 Line) by "completing the existing partial switchyard bay and building and new partial bay. The existing 330 Line to Card Street Substation would be relocated to the new partial bay. The new Card Street line would be installed in the former 330 Line position with new relays." (CL&P 1, Vol. 1, p. 3-22)

175. Modifications to the Lake Road Switching Station would be contained within the fenced in area. CL&P proposes the installation of:
    a. Three 345-kV circuit breakers, six 345-kV disconnect switches, 170 feet of bus, six surge arresters, 10 CCVTs, four PTs, and two wave traps.
    b. Install new protection and control equipment within the existing relay/control enclosure. (CL&P 1, Vol. 1, p. 3-22)

176. There are no water resources within 200 feet of Lake Road Switching Station. There is an approximately 0.6-acre storm-water detention basin south of the Switching Station and west of Lake Road Generating Station. (CL&P 1, Vol. 1, p. 5-105)

177. The predominant vegetation type near Lake Road Switching Station is upland forest and open field/shrub land. (CL&P 1, Vol. 1, p. 5-105)

178. No federally-listed species are known to occur in the vicinity of Lake Road Switching Station. Two state-listed moth species are known to occur, the barrens metarranthis moth (*Metarranthis apiciaria*) and the slender clearwing (*Hemaris gracilis*). Both species were identified along CL&P's ROW, 1,000 feet northwest of the switching station. The proposed modifications to the switching station are not expected to impact these species. (CL&P 1, Vol. 1, p. 5-105)

179. Land uses in the area of Lake Road Switching Station include commercial/industrial facilities, transportation ROWs, and CL&P's transmission line ROWs. (CL&P 1, Vol. 1, p. 5-105)

180. No significant historic resources are known to occur within 0.25 miles of Lake Road Switching Station. (CL&P 1, Vol. 1, p. 5-106)

181. The nearest residentially zoned area to Lake Road Switching Station is approximately 0.25 miles southwest. (CL&P 1, Vol. 1, p. 5-106)

182. Louisa Veins Drive, Old Trolley Road, and Lake Road would likely be the primary roads used to access Lake Road Switching Station during construction activities. (CL&P 1, Vol. 1, p. 6-77)

Killingly Substation

183. Killingly Substation interconnects the 3348 and 347 Lines with an autotransformer that supplies a 115-kV switchyard, and four 115-kV circuits. The substation is located on CL&P-owned land in the northern portion of Killingly, northeast of Lake Road Switching Station. The proposed 345-kV transmission line would traverse through Killingly Substation but would not electrically connect to it. (CL&P 1, Vol. 1, p. 3-22)

184. As part of the proposed project, CL&P proposes to install two new 345-kV transmission line terminal structures at Killingly Substation. The proposed structures would be approximately 110 feet high and similar in appearance to the two existing line termination structures. The proposed additions to the substation would be within the fenced in area and would not require any expansion. (CL&P 1, Vol. 1, pp. 3-22, 3-23)

185. The nearest residence is located approximately 700 feet east of Killingly Substation, on the west side of Tracy Road. Land uses in the vicinity of Killingly Substation include warehouses, a railroad corridor, and I-395. (CL&P 1, Vol. 1, p. 5-107)

186. No water resources are located within 200 feet of Killingly Substation. An approximately 1.3-acre storm-water detention basin is located on an adjacent property along the east side of the substation. (CL&P 1, Vol. 1, p. 5-108)

187. Killingly Substation is located in an area that may contain state-listed invertebrate species of moths and butterflies. CL&P consultants observed these species during field surveys of the ROWs, however; the species where found in the ROWs and the substation would not be suitable habitat for these species. (CL&P 1, Vol. 1, p. 5-109)

188. Killingly Substation is within an industrially zoned area. Land uses near the substation include another CL&P substation, Interstate 395, commercial and industrial facilities, undeveloped forest, railroad ROW and electric transmission line ROW. The nearest residence is approximately 700 feet east of the substation, on the west side of Tracy Road. (CL&P 1, Vol. 1, p. 5-109)

189. Tracy Road Trail, which is a one-mile paved walking/biking trail on the east side of Tracy Road between Attawaugan Crossing Road and the Killingly/Putnam border. Intervening vegetation and topography screen Killingly Substation from the trail. (CL&P 1, Vol. 1, p. 5-109)

190. Killingly Substation is accessed via Park Road/Tracy Road on the north side of the site. (CL&P 1, Vol. 1, p. 5-110)

191. No significant historic resources are known to occur within 0.25 miles of the substation. (CL&P 1, Vol. 1, p. 5-110)

192. Killingly Substation is within Windham County, which is in conformance with all National Ambient Air Quality Standards. (CL&P 1, Vol. 1, p. 5-110)

193. The proposed equipment additions at Killingly Substation would not increase noise emissions from the substation. (CL&P 1, Vol. 1, p. 5-110)

General Project Substation and Switching Station Information

194. No blasting is expected. If bedrock is encountered during construction, mechanical methods would be used to install foundations. (CL&P 1, Vol. 1, p. 6-75)

195. Construction activities would conform to an *Erosion and Sedimentation Control Plan* that would be in conformance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* and CT DEEP storm water regulatory requirements. During construction, excess soil resulting from modifications would typically be removed. Additionally, construction activities would be sequenced to minimize the amount of time that soils are exposed. Also, disturbed areas at substations under construction would be stabilized with crushed stone. (CL&P 1, Vol. 1, pp. 6-74, 6-75)

196. None of the proposed substation modifications are expected to be visible from any designated scenic or recreational resources. (CL&P 1, Vol. 1, p. 6-76)

197. There may be localized traffic congestion near the substations during construction of the proposed project. (CL&P 1, Vol. 1, p. 6-77)

Project Cost

198. The estimated capitol cost for the entire Interstate Reliability Project, which includes CL&P and National Grid facilities) is $511 million. Transmission line construction would cost $407 million and substation modifications would cost $104 million. Of the total $511 million, CL&P's portion is $218 million and National Grid's portion is $293 million. (CL&P 1, Vol. 1, p. 3-23)

199. Of the $218 million for the Connecticut portion of the project, $193 million is for new transmission line construction and $25 million is for substation and switching station modifications. Transmission line construction costs include $4.2 million for magnetic field mitigation. As part of the proposed project, CL&P identified three locations for magnetic field mitigation designs. "The total additional cost for all three locations is $8.5 million, or 4% of the total Connecticut Project cost without mitigation. Therefore, the total Connecticut Project cost estimate of $217.8 million would increase by $4.3 million ($8.5 million minus $4.2 million) if all three of CL&P's mitigation proposals were adopted by the Council without change." (CL&P 1, Vol. 1, p. 3-24)

200. The life-cycle cost of the proposed project including capital and operating costs over a 35-year life is determined to be $319 million. Life-cycle costs include "annual carrying charges of the capital cost; annual operation and maintenance costs; cost of energy losses; and cost of capacity." (CL&P 1, Vol. 1, p. 3-24)

Construction Activities

201. Construction of the proposed project would require temporary storage areas, staging areas, and crane pads. CL&P prefers to locate storage and staging areas in the vicinity of the ROW; however, they may not be

immediately adjacent to ROWs. CL&P would attempt to locate storage and staging areas on CL&P-owned property where possible. If CL&P-property is not available or suitable for storage or staging areas, CL&P would investigate the use of areas that have been previously developed or vacant land. Crane pads are at structure locations along the ROW. Staging and storage sites would be identified during the D&M Plan for the proposed project. (CL&P 1, Vol. 1, pp. 4-5, 4-6)

202. Temporary storage areas require approximately two to five acres and are used to temporarily store construction materials, equipment, supplies, mobile construction offices, parking of personal vehicles of construction crew members, parking construction vehicles and equipment, and performing minor maintenance on construction equipment. (CL&P 1, Vol. 1, p. 4-6)

203. Storage areas are typically moved as construction progresses along the ROW. Following use as a storage area, the land would be restored to pre-construction conditions, pursuant to the use agreement with the property owner. (CL&P 1, Vol. 1, p. 4-6)

204. Staging areas typically require less than two acres and are used for temporarily stockpiling materials for transmission line construction, such as erosion and sedimentation control materials, and for temporarily stockpiling materials removed from the ROW during construction. Staging areas could be within or off the ROW. As construction progresses, staging areas would be relocated to be near construction work. (CL&P 1, Vol. 1, pp. 4-6, 4-7)

205. Crane pads are located at each transmission structure location and are the necessary work areas to stage structure components for final on-site assembly. The crane pad is typically a 100-foot by 100-foot area that provides a safe, level work base for the construction equipment used to erect the transmission structure. (CL&P 1, Vol. 1, p. 4-7)

206. The construction of a crane pad includes the removal of vegetation, grading to create a level area, removal of the topsoil and layering of a filter fabric and rock base. A roller is typically used to flatten and compact the pad. In wetland areas, removable timber mats may be used to allow water to flow beneath the pad. As an alternative to timber mats, a large rock base may be used to allow water flow with smaller rock layered on top and a layer of gravel intermixed with soil on top of that. (CL&P 1, Vol. 1, p. 4-8)

207. Crane pads are typically removed following construction and the area would be restored to pre-construction grade to the extent practical and consistent with CL&P's ROW maintenance program. (CL&P 1, Vol. 1, p. 4-8)

208. Construction field offices would be located in existing commercial facilities where feasible. If there is no commercial facility available, trailers, portable sanitary facilities and associated parking would be located, optimally on CL&P-owned property. Following construction, trailers and equipment would be removed and the area would be restored. (CL&P 1, Vol. 1, p. 4-9)

209. Construction-related noise emissions are expected to occur from operation of construction equipment, truck traffic, earth-moving vehicles and equipment, jackhammers, and structure erection equipment (cranes). Construction would typically occur during daytime hours (between 7:00 a.m. to 7:00 p.m.). Work hour specifications would be included in the Development and Management Plan for this docket, if approved. (CL&P 1, Vol. 1, p. 6-72)

210. The highest noise emission levels would come from the use of implosive conductor connectors. CL&P would not propose the use of implosive connectors where homes or buildings are within 300 feet. (CL&P 10, R. 14)

211. CL&P has established a toll-free telephone number, an email address, and a website related to the proposed project, which would continue to be used and update during construction of the project. CL&P would also notify the community prior to the start of construction and continues notification of activities through

construction, this includes residents or businesses adjacent to the project ROW and those that may be visually or audibly affected by construction. (CL&P 10, R. 14)

212. During construction, public access trails would be temporarily blocked for the safety of the public. Trails would typically be closed during tree clearing, critical crane lifts, and installation of implosive connectors. CL&P would attempt to detour trails where possible and would coordinate with the agencies associated with the trails. (CL&P 9, R. 13)

213. The average distance between 345-kV transmission line structures is approximately 575 feet; however, the distance may range from less than 200 feet to over 1,000 feet depending on the presence of geographic and environmental features. (CL&P 9, R. 20)

214. The proposed transmission line has been designed in accordance with Northeast Utilities Design Standards, which takes into account clearance requirements of the National Electrical Safety Code. The base-design H-frame configuration would be installed with the center conductors of the new line 85 feet from the center of the existing 345-kV line. This would leave the two closest conductors of each line approximately 32 feet apart. (CL&P 9, R. 21)

215. Based on initial reviews, there are several small obstructions, including sheds, fences, debris piles, and pools within the ROW. These obstructions are a potential safety concern. CL&P would review the entire route prior to the commencement of construction to determine if the obstructions would have to be removed for safe construction and operation of the transmission lines. (CL&P 9, R. 22)

216. Pulling sites for the installation of conductors and shield wires would be located at one to three mile intervals along the route. Helicopters may also be used for installation of the pulling lines. (CL&P 1, Vol. 1, p. 4-22)

217. The wires would be pulled under tension to avoid contact with the ground or other objects. Then the conductors and shield wires would be pulled to the appropriate tensions and attached to the hardware by linemen in bucket trucks. (CL&P 1, Vol. 1, p. 4-22)

218. Following construction of the proposed project, construction debris and temporary access roads would be removed, final grading of areas affected by construction would occur and the site would be stabilized using revegetation or other measures. (CL&P 1, Vol. 1, p. 4-23)

219. CL&P discourages use of the ROW by those using off-road vehicles such as all-terrain vehicles and snowmobiles. In areas where CL&P holds an easement rather than ownership in fee, CL&P must receive permission from the landowner prior to installing barriers to discourage off-road use. CL&P would provide "no trespassing" signs and would install gates or other barriers at public road crossings at the request of landowners. (CL&P 1, Vol. 1, pp. 4-25, 4-26)

220. CL&P would create a *Material Handling Guideline* document, as necessary, to aid in the proper handling of potentially impacted soils or groundwater and to facilitate the disposal of such materials. (CL&P 1, Vol. 1, p. 4-34)

221. Construction of the proposed project is not expected to result in adverse impacts on groundwater resources or public water supplies. Groundwater encountered during excavations for structure foundations would be pumped from the area and discharged in accordance with applicable local and state requirements. (CL&P 1, Vol. 1, p. 4-35)

222. All construction work would be in accordance with applicable national, electric utility industry, state, and if practical, local codes. (CL&P 17, p. 82)

Clearing

223. One of the first steps in the construction process is ROW preparation, which includes vegetation removal and establishment of erosion and sedimentation controls. (CL&P 1, Vol. 1, p. 4-9)

224. Temporary erosion and sedimentation (E&S) controls would be installed prior to and/or during vegetation clearing in compliance with the 2002 *Connecticut Guidelines for Soil Erosion and Sedimentation Control* and NU's "*Best Management Practices Manual: Construction and Maintenance Environmental Requirements for Connecticut.*" Temporary controls include silt fence, hay/straw bales, and filter socks to be used during any construction that involves soil disturbance. (CL&P 1, Vol. 1, p. 4-9)

225. Additional E&S controls may be used following vegetation removal to demarcate limits of work within environmental sensitive areas. (CL&P 1, Vol. 1, p. 4-10)

226. Since April 7, 2006, CL&P has been required to comply with mandatory vegetation management standards adopted by the North American Electric Reliability Corporation. These standards were developed in response to the August 14, 2003 Northeast blackout and were designed to facilitate the reliable operation of transmission facilities by preventing the growth of trees or invasive vegetation that could interfere with transmission lines or access. Managed portions of the ROW would consist of shrubs, herbaceous species and low-growing species. (CL&P 1, Vol. 1, p. 4-11)

227. On portions of the ROW where the proposed line would be adjacent to one 345-kV line and supported on H-frame structures, the ROW would require an additional approximately 90 feet of new vegetation removal and management. In areas where the proposed line would be constructed on a delta configured structure, approximately 70 feet of additional vegetation removal would be required. (CL&P 1, Vol. 1, p. 4-13)

228. During construction of the proposed project, tall-growing, woody species would be removed from the areas of the ROW near the proposed lines. (CL&P 1, Vol. 1, p. 4-14)

229. CL&P would coordinate with property owners regarding disposition and use of the trees to be removed along the ROW. CL&P would leave firewood and timber portions of the trees on the landowner's property if requested. The wood would be left stacked in upland areas on the edge of the vegetatively managed portions of the ROW. (CL&P 1, Vol. 1, p. 4-16)

230. CL&P would mechanically remove vegetation from the proposed cleared portions of the ROW. For vegetation removal in wetland areas, CL&P would use timber mats or equivalent to provide a stable base for clearing equipment. (CL&P 1, Vol. 1, p. 4-16)

231. CL&P would attempt to retain low growing vegetation along stream banks and within wetlands if possible. (CL&P 1, Vol. 1, p. 4-17)

232. As part of the long-term vegetation management of the transmission corridor, danger trees, which are those adjacent to the managed portion of the ROW that could fall into a conductor, would be trimmed or removed. Vegetation management within the ROW is typically performed every four years, while side-trimming of vegetation encroaching on the edge of the managed portion of the ROW occurs every ten years. (CL&P 1, Vol. 1, p. 4-38)

233. If a "hazard" tree (one that is weak, broken, decaying, or infested) is found on or off-ROW that threatens the integrity of the transmission lines it would be removed or pruned as necessary. CL&P's ability to remove these trees in off-ROW areas is predicated on the language in the easement agreement. If the language does not give CL&P permission to remove hazard trees from outside of the easement area, the company would seek permission from the property owner. CL&P generally notifies the underlying property owner of tree removals regardless of the location of the tree. (CL&P 1, Vol. 1, p. 4-17; CL&P 9, R. 2; Tr. 5, p. 30)

234. CL&P would follow all federal and state requirements in the use of herbicide applications for the maintenance of vegetation within the ROW. CL&P follows a setback distance of ten feet from water within which herbicides are not used for controlling brush. (CL&P 9, R. 18)

235. CL&P would develop an Invasive Species Control Plan that would identify measures for controlling invasive plants listed on the Connecticut Invasive Plant List – October 2011. In wetland areas, invasive plant species would be monitored and controlled on a four-year cycle following the completion of construction of the Interstate project. In upland areas, certain invasive plants would be controlled during routine vegetation management, which also occurs once every four years. (CL&P 9, R. 19; CL&P 15, R. 40)

Access Roads

236. Construction of the proposed overhead transmission lines would not require contiguous access along the ROW; however, access is required to each transmission structure location as well as temporary access to facilitate vegetation removal during construction. (CL&P 1, Vol. 1, p. 3-11)

237. Access roads currently exist along the ROW to reach existing transmission line structures but additional access temporary and permanent access roads and improvements to existing access roads would be necessary to enable the safe passage of construction equipment. (CL&P 1, Vol. 1, p. 3-11)

238. On-ROW access roads would be used during construction to move equipment and material between structure locations. In some locations, to avoid sensitive environmental areas or rugged topography on the ROW, access roads would be developed off-ROW across private property or across CL&P-owned land. (CL&P 1, Vol. 1, p. 4-18)

239. At locations of an access road intersection with a public road, CL&P would install signs to eliminate the use of the road by the public. (CL&P 1, Vol. 1, p. 4-18)

240. The proposed route contains transmission lines and distribution lines that have been in service for approximately 40 years. Since these lines and structures have related operation and maintenance activities, some access roads have been established. (CL&P 1, Vol. 1, p. 4-18)

241. While existing on-ROW access roads would be used for construction of the new transmission lines, many of the roads would have to be improved, widened or modified to be used safely and effectively during construction. (CL&P 1, Vol. 1, pp. 4-18, 4-19)

242. In areas where terrain and the presence of environmental features make linear construction of an on-ROW access road difficult, off-ROW roads would be constructed. Off-ROW access roads would typically use public roads or access roads across private property. (CL&P 1, Vol. 1, p. 4-19)

243. The maximum grade on a typical access road would be approximately 10 percent for heavy equipment. (Tr. 4, p. 141)

Structures

244. H-Frame and guyed structures are typically direct embedded into the ground. Other structure types typically require the construction of a foundation. Excavations for line-structure foundations often use mechanical excavators and pneumatic hammers. (CL&P 1, Vol. 1, p. 4-21)

245. If blasting were required for construction of the structure foundations, CL&P would develop a controlled drilling and blasting plan in compliance with state and local regulations. (CL&P 1, Vol. 1, p. 4-21)

246. Structures would be delivered to the site in sections and assembled with a crane, then insulators and connecting hardware would typically be installed on the structures. The structures that are not self-supported, such as angle and deadend structures, would be guyed and anchored to the ground. Grounding would also be installed on each of the new structures. Grounding type would vary based on electrical characteristics of the soil at each location. (CL&P 1, Vol. 1, pp. 4-21, 4-22)

247. A 345-kV H-frame structure width is approximately 52 feet wide. Spacing between the outside conductors of two separate 345-kV conductors is 35 feet. (Tr. 4, p. 48)

Operation, Maintenance, and Safety

248. Operation of the proposed transmission lines could emit audible noise under certain weather, typically during inclement weather, conditions causing corona on the line conductors or hardware. (CL&P 1, Vol. 1, pp. 6-73, 6-74)

249. CL&P expects to be required to develop an *Invasive Species Control Plan* for the project following consultation with the United States Army Corps of Engineers, CT DEEP, and other agencies. The Invasive Species Control Plan would identify the types of invasive species to be controlled along the project ROW and the overall objectives of the control program. (CL&P 1, Vol. 1, p. 4-38)

250. The proposed project would be constructed in compliance with the National Electrical Safety Code, standards of the Institute of Electrical and Electronic Engineers and the American National Standards Institute, good utility practice, and the CT DEEP PURA regulations that cover the method and manner of high voltage line construction. (CL&P 1, Vol. 1, p. 4-38)

251. High-speed protective relaying equipment would immediately remove from service a transmission lines experiencing a failure. Protective relaying equipment is used a substations and switching stations to immediately remove equipment from service during a station equipment failure. (CL&P 1, Vol. 1, p. 4-39)

252. Fire/smoke detection systems are already in place in the relay and control enclosures at Killingly Substation and Lake Road Switching Station. If fire or smoke is detected, the detection systems would automatically activate an alarm at the Connecticut Valley Electric Exchange (CONVEX), and system operators would take the appropriate action. (CL&P 1, Vol. 1, p. 4-39)

253. New protective relaying and associated equipment, and a Supervisory Control and Data Acquisition would be installed within the existing relay and control enclosures. (CL&P 1, Vol. 1, p. 4-40)

254. An outage or fault on the transmission line or substation equipment would be automatically detected by high-speed protective relaying equipment, which would send a protective trip signal to circuit breakers to isolate the faulted section of the transmission system. CL&P also uses a Supervisory Control and Data Acquisition system for remote control and equipment monitoring by the CONVEX System Operator. (CL&P 17, pp. 82, 83)

Route Considerations

255. An alternative transmission route for the new 345-kV lines would have to interconnect Card Street Substation, Lake Road Switching Station, West Farnum Substation, and Millbury Switching Station. (CL&P 1, Vol. 1A, p. 14-1)

256. Within Connecticut, CL&P identified and compared potential routes for the new 345-kV transmission lines that would extend between Card Street Substation and Lake Road Switching Station and from Lake Road Switching Station to the National Grid owned portion of the transmission line at the Connecticut/Rhode Island border. When considering route alternatives CL&P took into consideration cost, technical feasibility, and minimizing adverse environmental, cultural, and economic effects. (CL&P 1, Vol. 1A, p. 14-1)

257. Potential routes/configurations considered include:
    a. The proposed 345-kV lines along the existing transmission ROW in an overhead configuration between Card Street Substation, Lake Road Switching Station and the Connecticut/Rhode Island border.
    b. An underground 345-kV cable system within the existing transmission ROW between Card Street Substation, Lake Road Switching Station, and the Connecticut/Rhode Island border.
    c. 345-kV facilities, either overhead or underground, along new ROWs with new easements.
    d. 345-kV facilities, either overhead or underground, within or adjacent to other existing linear ROWs such as railroads, roadways or pipelines.
    e. 345-kV transmission lines predominantly overhead along the existing transmission ROW, except for segments of the lines where there would be an underground cable variation or an overhead variation.

    (CL&P 1, Vol. 1A, p. 14-3)

258. CL&P considered and eliminated several overhead transmission line route variations on either new ROWs or other existing linear corridors. Many were found unsuitable because the proposed transmission lines could not be constructed due to engineering constraints, geographic location, or potential environmental, social, or economic effects. (CL&P 1, Vol. 1A, p. 14-6)

259. The only linear pipeline in the project area is the Algonquin Gas Transmission Company natural gas pipeline. CL&P analyzed the potential of installing the 345-kV transmission lines along the pipeline but rejected the option because the pipeline is not located near Card Street Substation or Lake Road Switching Station, and even if it was nearby the unoccupied portion of the pipeline ROW is not wide enough to accommodate the proposed transmission lines. The result would be the transmission line being located close to residences, and may require acquiring some residences. (CL&P 1, Vol. 1A, p. 14-12)

260. CL&P investigated the use of limited access highway corridors for the construction of the proposed transmission lines. The transmission lines would have to be constructed in a vertical configuration, which would require the narrowest amount of ROW at 100 feet in width. That width could be reduced if ConnDOT agrees to share the outer portion of the highway ROW with an aerial easement. (CL&P 1, Vol. 1A, p. 14-13)

261. ConnDOT does not allow the longitudinal collocation of transmission lines in its limited access highways except under certain circumstances. (CL&P 1, Vol. 1A, p. 14-13)

262. The highways that extend in the general direction of the route that would interconnect the substations, switching station and National Grid facilities are U.S. Route 6 (which travels east-west from Willimantic to the CT/RI border) and Interstate 395 (which travels north-south parallel to the CT/RI border). (CL&P 1, Vol. 1A, p. 14-13)

263. Highway route alternatives were eliminated from further consideration because routes would be difficult to construction and there would be an associated need to remove homes and business for construction. (CL&P 1, Vol. 1A, p. 14-15)

264. CL&P investigated the use of railroad ROWs that are in the project area. There are several railroad lines in northeastern Connecticut that are owned and operated by the Providence & Worcester and New England Central Railroad. CL&P found that it would be impractical to align the proposed transmission lines along the existing railroad lines in the area since none are near Card Street Substation, Lake Road Switching Station, or the National Grid facilities at the Rhode Island border. (CL&P 1, Vol. 1A, p. 14-16)

265. Railroad corridors typically have 50 to 100 feet wide ROWs, which are too narrow to accommodate the proposed 345-kV lines. This would require the acquisition of adjacent land on various land uses to expand the ROW area. Additionally, there are safety concerns associated with the construction and operation of a 345-kV transmission line directly adjacent to active railroad lines. (CL&P 1, Vol. 1A, p. 14-16)

Underground Alternatives

266. Underground transmission cable systems are typically used under circumstances where overhead lines may be impractical due to site-specific environmental, social, construction, or regulatory factors. An underground cable system required a continuous trench and underground splice vaults, both of which have to be accessible throughout the life of the system. (CL&P 1, Vol. 1A, p. 14-17)

267. Underground cable systems do not allow for spanning of environmentally sensitive areas as overhead lines. (CL&P 1, Vol. 1A, p. 14-17)

268. CL&P considered two different cable technologies for the proposed project, including High Pressure Fluid Filled (HPFF) and Cross-linked Polyethylene (XLPE). (CL&P 1, Vol. 1A, p. 14-18)

269. HPFF is historically the most common technology used for 345-kV systems in the United States. This technology uses pressurized dielectric fluid within a steel pipe. The system requires pressurization plants and reservoirs that hold thousands of gallons of dielectric fluid. HPFF systems require more maintenance than XLPE; have higher electrical losses, lower capacity for equivalent size conductors, and higher capacitive charging requirements. (CL&P 1, Vol. 1A, pp. 14-18, 14-19)

270. XLPE uses cross-linked polyethylene insulation and each cable is installed within a separate duct within a duct bank. XLPE does not use fluid, has lower electrical losses and higher ratings than HPFF. Therefore, XLPE was the chosen technology for the evaluation of an underground cable system alternative to the proposed project. (CL&P 1, Vol. 1A, p. 14-19)

271. Underground cable systems are typically used for distances of less than five miles in urban environments. (CL&P 1, Vol. 1A, p. 14-19)

272. Since underground cables have a lower current-carrying capacity than overhead transmission lines of the same voltage, multiple underground cables must be installed for each overhead conductor. Typically, three sets or more sets of three cables are necessary. For each set of cables, a splice vault is needed, which results in multiple splice vaults at each splicing location. (CL&P 1, Vol. 1A, p. 14-19)

273. Most medium and long-length underground cable installations require special switching devices and large shunt reactors to compensate for capacitive charging of the underground cables to prevent unacceptable high system voltages during normal operating conditions. These devices add operating complexity, decrease system reliability, and add cost to the project. (CL&P 1, Vol. 1A, p. 14-20)

274. An underground 345-kV cable system would require a two to four-acre transition station the two interconnection points. Typically, for each transition station approximately 1.5 to 2 acres of the 2 to 4-acre required land is developed. The remaining land is typically undeveloped. (CL&P 1, Vol. 1A, p. 14-20)

275. Load-flow and harmonic transient voltage studies are required to determine the maximum length of 345-kV underground cables that could be installed at a particular location on the transmission grid without having an adverse effect on the regional transmission system. (CL&P 1, Vol. 1A, p. 14-21)

276. The cost of an underground cable system is typically five to ten times greater than that of an overhead system on existing transmission ROW. Each transition station may require acquisition of private property and cost several million dollars to construct. For the construction of an underground cable system along the existing CL&P ROW, CL&P would have to acquire additional easement rights from private landowners. Along existing roads, ConnDOT typically requires splice vaults to be located outside of the corridor and therefore would require additional landowner easements. (CL&P 1, Vol. 1A, p. 14-25)

New ROW Underground

277. An underground cable system within a new ROW would still have to extend between Card Street Substation, Lake Road Switching Station, and the Connecticut/Rhode Island border. (CL&P 1, Vol. 1A, p. 14-40)

278. A 40-foot minimum easement width would be required for the construction and operation of the cable system, with additional width needed in the area of splice vaults. If a straight line could be drawn to the necessary substation, switching station, and transmission facilities for interconnection, which is a 28 mile distance, approximately 136 acres of new easement would be required. (CL&P 1, Vol. 1A, p. 14-41)

279. The underground cable would have to be installed beneath major rivers and other watercourses. (CL&P 1, Vol. 1A, p. 14-41)

Along Pipelines or Railroad Lines

280. The installation of a cable system along existing pipeline or railroad corridors is not feasible for the same reasons that overhead transmission lines cannot be installed within these corridors (see FOF #....). Specifically, there is not enough ROW width for the installation of a 345-kV cable system within these corridors. (CL&P 1, Vol. 1A, p. 14-42)

Along Existing Transmission Line ROWs

281. Installing an underground cable system within the existing CL&P transmission line ROW would avoid conflicts with other underground utilities and the potential for traffic congestion. In transmission ROW underground construction would allow duct banks and splice vaults to be installed at uniform depths, and would not require pavement removal or replacement. Additionally, transmission ROW would offer the most direct linear corridor for the construction of such facilities. (CL&P 1, Vol. 1A, p. 14-42)

282. An underground cable system would require crossing varying terrain and water resources, such as the Willimantic, Natchaug, and Quinebaug Rivers and Mansfield Hollow Lake. Construction of such a system would be difficult to get permitted and difficult to construct. (CL&P 1, Vol. 1A, p. 14-43)

283. Underground in-ROW installation would require approximately 122 splice vault locations, assuming a splice vault every 1,600 feet. Installation would directly affect a minimum of 175 acres for the cables only. The required splice vaults and material staging areas would affect additional land. (CL&P 1, Vol. 1A, p. 14-43)

284. Following installation, a permanent 20-foot wide access road would be required along the entire length of the cable system. This would result in the conversion of approximately 88 acres of ROW land to permanent road use, including approximately seven miles through wetlands that would require permanent fill. (CL&P 1, Vol. 1A, pp. 14-43, 14-44)

285. Some obstacles to installation of an underground cable system along the existing transmission ROWs include:
    a. the presence of rough terrain;
    b. long and/or steep grades;
    c. the presence of rock that would require removal;
    d. crossing wetlands and watercourses; and
    e. crossing various state-listed species habitat and sensitive archeological sites.
    (CL&P 1, Vol. 1A, p. 14-44)

Underground along Highway ROWs

286. Installation of an underground cable system within a road ROW would have fewer environmental impacts than installation within a transmission ROW. (CL&P 1, Vol. 1A, p. 14-45)

287. In evaluating the feasibility of installation of an underground cable system within road ROW, CL&P would consider:
    a. the presence of road embankments and elevated portions of the road;
    b. the presence of rock where removal may result in temporary highway closures;
    c. the presence of wetlands and/or watercourses adjacent to the road ROWs;
    d. the potential for traffic delays during construction and maintenance; and
    e. ConnDOT's policy of not allowing the installation of transmission lines within and parallel to limited access highways.

    (CL&P 1, Vol. 1A, p. 14-46)

Combination of Highway and Transmission Line ROW

288. CL&P investigated the potential use of a combination of highway ROWs and transmission line ROWs. The shortest identified potential route includes approximately 38 miles of underground cable consisting of approximately 36.3 miles along road ROWs and 1.8 miles along two segments of existing transmission ROW. The remaining 1.1 mile segment would extend overhead between a new transition station in Thompson and the Connecticut/Rhode Island border. Potential sites for transition stations would be on property owned by CL&P east of Quaddick Town Farm Road and Elmwood Hill Road in Thompson, CT. Transition facilities would also have to be located at Card Street Substation and Lake Road Switching Station, which would require a fence line expansion at both facilities. (CL&P 1, Vol. 1A, pp. 14-46, 14-47)

289. The potential fence line expansion at Card Street Substation could be done on CL&P-owned property, requiring the removal of vegetation in a currently undeveloped portion of the property. CL&P does not own the Lake Road Switching Station property, therefore, expansion of the fenced area would require additional property easements. (CL&P 1, Vol. 1A, p. 14-50)

290. The combination route would follow Route 6 through Windham, which would avoid the route through Mansfield Hollow Lake, Mansfield Hollow State Park and WMA. The route would also travel underground within the transmission line ROW through Putnam and Thompson to decrease the length of the route compared to all in road ROW installation. (CL&P 1, Vol. 1A, p. 14-50)

291. The combination route would allow avoidance of areas that are difficult to construct. Construction along road ROWs would also avoid potential visual effects compared to the proposed overhead route. However, many of the majority of CL&P's easements in Putnam and Thompson do not include underground line rights and would require additional easement rights. (CL&P 1, Vol. 1A, pp. 15-50, 14-51)

292. The combination route would be the best-identified alignment of an all-underground route alternative; it would also result in constructability issues, environmental issues and land-use constraints. In the area of the transmission ROW in Putnam and Thompson, installation of an underground cable system would directly affect wetlands, state-listed species habitat, and vernal pools and amphibian breeding habitats. (CL&P 1, Vol. 1A, pp. 14-53, 14-54)

293. The estimated cost of the combination route alternative is $1.1 billion. The life-cycle cost for an all-underground transmission system is approximately $1.6 billion, compared to approximately $319 million for the proposed overhead transmission lines. (CL&P 1, Vol. 1A, pp. 14-54, 14-55)

Route 44 Underground Variation to Combination Highway/Transmission ROW underground alternative

294. This variation was considered to accommodate the possibility that National Grid's Rhode Island transmission line is constructed underground. The 2.3 mile variation would replace 2.9 miles of the Combination Alternative and would eliminate the need for an overhead line segment in Thompson. (CL&P 1, Vol. 1A, p. 14-56)

295. The variation would deviate from the Combination Alternative at the intersection of Route 44 and Munyan Road in Putnam, and extend underground east along Route 44 to interconnect with a potential Nation Grid underground cable system at the Connecticut/Rhode Island border. The variation would be entirely within Putnam. (CL&P 1, Vol. 1A, p. 14-56)

296. The variation would decrease length of the project by 0.6 miles and eliminate environmental effects and costs associated with developing a transition station in Thompson. However, the variation would have similar issues to the Combination Alternative and would cost more than the proposed overhead project. (CL&P 1, Vol. 1A, p. 14-57)

297. The variation would cost approximately $1.1 billion. (CL&P 1, Vol. 1A, p. 14-57)

Alternative Route Designs and Options Considered

298. CL&P investigated six variations of the proposed project either to avoid the placement of 345-kV overhead transmission line through the federally-owned Mansfield Hollow area; or to avoid the placement of the 345-kV overhead transmission line along the proposed route areas where statutory facilities may be identified. (CL&P 1, Vol. 1A, p. 15-3)

Mansfield Underground Variation

299. The Mansfield Underground Variation would extend underground along the transmission ROW for 0.7 miles to avoid the overhead transmission configuration near residences along Highland Road, Woodmont Drive, and Stone Ridge Road in Mansfield. (CL&P 1, Vol. 1A, p. 15-16)

300. The Mansfield Underground Variation would consist of nine XLPE cables in a common duct bank north of the existing 330 Line. Splice vaults would be required at approximately 1,200 foot to 1,300 foot intervals along the cable route. One splice vault is necessary for each set of three cables. The duct bank would be approximately 15 feet from the outside conductor of the existing 330 Line. (CL&P 1, Vol. 1A, p. 15-18)

301. This variation would require four to eight acres of additional land to be acquired for the construction of two transition stations, one at each end of the underground cable system. CL&P would also have to acquire easement rights to install the cables underground along the easements. (CL&P 1, Vol. 1A, p. 15-18)

302. The western transition station would be surrounded by residential areas along Woodmont Drive, the transmission ROW, forest, and agricultural land. The eastern transition station would be surrounded by upland forest, and Conantville Brook is north and west of the site. (CL&P 1, Vol. 1A, pp. 15-26, 15-27)

303. The underground variation would be constructed in a 40-foot wide construction workspace that would require the clearing of approximately 3.6 acres of land, including 0.2 acres for splice vaults outside of the construction workspace. (CL&P 1, Vol. 15-19)

304. The access road would be 20 feet wide and extend along the existing ROW. Vehicles and equipment would have to use Highland Road to reach the on-ROW access road. (CL&P 1, Vol. 1A, p. 15-19)

305. Each transition station would consist of an above-ground 345-kV line-terminal structure, a control building, and related equipment within a fenced-in area. The station would be graded and surfaced with crushed stone. (CL&P 1, Vol. 1A, p. 15-20)

306. The Mansfield Underground Variation would extend across two perennial watercourses, including a tributary to Cider Mill Brook and a tributary to Conantville Brook. Both watercourses have an A water quality classification. (CL&P 1, Vol. 1A, p. 15-22)

307. Along this variation, there are approximately 0.3 acres of palustrine-forested and 0.6 acres of scrub-shrub wetlands along the portion of the ROW that would be affected by the variation. The same wetlands would be spanned by the proposed overhead transmission lines. (CL&P 1, Vol. 1A, p. 15-22)

308. The variation would disturb approximately 11.6 acres of vegetation, including 9.1 acres that are forested (both upland and wetland) and 2.5 acres are scrub-shrub. The cable route would extend through approximately 200 feet of upland deciduous forest and 50 feet of forested wetlands. The transition stations would be on upland deciduous forested land. (CL&P 1, Vol. 1A, p. 15-24)

309. There is one state-listed Species of Special Concern butterfly, Horace's duskywing (*Erynnis horatius*), near the underground variation. However, Lepidoptera field surveys did not identify any Horace's duskywing individuals or host plants near the variation route. (CL&P 1, Vol. 1A, p. 15-25)

310. There are no significant historic resources within 500 feet of the variation, but two archaeological sites are within 1 mile of the variation. (CL&P 1, Vol. 1A, p. 15-27)

311. Approximately 74 percent of the 0.7-mile variation was considered sensitive for Native American archaeological sites. One Native American site was identified as potentially eligible for the NRHP/SRHP. (CL&P 1, Vol. 1A, pp. 15-27, 15-28)

312. Most environmental effects associated with the underground variation would be temporary and related to construction; however, some effects would extend throughout the operation of the project. All land within the workspace would be cleared, graded and filled to allow for a level workspace for duct bank and splice vault installation. Installation of the duct bank may also require disturbance of wetlands and watercourses. (CL&P 1, Vol. 1A, p. 15-29)

313. The capital cost of the Mansfield Underground Variation is approximately $58.2 million. The cost of the same section using the proposed overhead configuration is approximately $4.7 million. (CL&P 1, Vol. 1A, p. 15-18)

Mount Hope Underground Variation

314. The Mount Hope Underground Variation was developed within 300 feet of the Mount Hope Montessori School and the Green Dragon Day Care, both of which are on Bassetts Bridge Road in Mansfield, as well as Come Play with Me Day Care, which is on Storrs Road in Mansfield. Come Play with Me Day Care is no longer a licensed child day care facility. (CL&P 1, Vol. 1A, pp. 15-39, 15-49; CL&P 17, p. 74)

315. A new line transition station would be located approximately 1,600 feet west of Storrs Road. The underground cable system would extend from that transition station east along the CL&P ROW then north across Bassetts Bridge Road and east staying on the ROW. The second new line transition station would be located 800 feet north of Bassetts Bridge Road on a site that partially is owned by CL&P and partially privately-owned and would have to be acquired. (CL&P 1, Vol. 1A, p. 15-41)

316. Both transition stations would be located on undeveloped and forested property portions of which would be on private property. The western transition station would be on forested upland with surrounding residential areas along Sawmill Brook Lane, Beech Mountain Road, and Mountain Road. The eastern transition station would be located partially on CL&P property with surrounding land uses that include forested wetlands, residences on Hawthorne Lane and Bassetts Bridge Road, and Mansfield Hollow State Park. (CL&P 1, Vol. 1A, p. 15-50)

317. The Party Civie has a planned residential development west of Storrs Road. The Civies requested that if the proposed project is approved, the Mount Hope Underground Variation be approved with an extension of the underground cables to the west past proposed Structure Nos. 9067 and 9066. (Civie 3; Tr. 10, p. 20)

318. Mount Hope Montessori School is a 501(c)(3) corporation located at 48 Bassets Bridge Road in Mansfield. The school requested the burial of the proposed transmission line in the segment near its property or the relocation of the school through a land exchange or other reasonable solution. (Mount Hope Montessori School 1)

319. Relocating the western transition station farther west and the eastern transition station to the west side of Storrs Road would require the construction of both transition stations in rough terrain, which would require significant grading, and the potential removal of significant amounts of bedrock. (CL&P 17, p. 36)

320. Since Come Play with Me Day Care is no longer licensed, CL&P could relocate the westerly transition station farther east and locate the facility on CL&P-owned land. (CL&P 17, p. 74)

321. The underground variation would extend approximately 1.1 miles along the ROW, north or west of the existing 330 Line between structure #s 9068 and 9078. (CL&P 1, Vol. 1A, p. 15-42)

322. The cable system would consist of nine XLPE cables in a duct bank with three splice vaults at each splicing location. (CL&P 1, Vol. 1A, p. 15-42)

323. Construction of this variation would disturb approximately 13.7 acres of land for the duct bank, splice vaults, access road, and line transition stations. The installation of just the duct bank would disturb approximately 5.3 acres. (CL&P 1, Vol. 1A, p. 15-43)

324. Access to the on-ROW access road would be via Storrs Road and Bassetts Bridge Road. (CL&P 1, Vol. 1A, p. 15-43)

325. The underground variation would traverse areas of Prime Farmland Soils and Farmland Soils of Statewide Importance. (CL&P 1, Vol. 1A, p. 15-44)

326. The variation would cross two un-named, intermittent watercourses. Three manmade ponds are nearby, one of which would be immediately adjacent to the workspace areal (CL&P 1, Vol. 1A, p. 15-44)

327. Seven wetlands are within or adjacent to the ROW that would be affected by the Mount Hope Underground Variation. Three of the seven wetlands would be directly along the variation while the remaining four are within the ROW but outside of the variation route. The wetlands along the variation route include 0.1 acres of palustrine forested wetland, 0.1 acres of scrub-shrub wetland, and less than 0.1 acres of emergent marsh wetland. Each of these wetlands would be along the proposed overhead route as well. (CL&P 1, Vol. 1A, pp. 15-46, 15-47)

328. One state-listed species of special concern, the frosted elfin butterfly (*Callophryus irus*), may be present near the underground variation. This butterfly feeds exclusively on wild lupine (*Lupinus perennis*) and wild indigo (*Baptisia tinctoria*). Transmission line ROWs are considered important habitat for these species. (CL&P 1, Vol. 1A, p. 15-48)

329. Nine Native American archaeological sites within one mile of the variation, two of which are within 300 feet. Approximately 69 percent of the variation was considered sensitive for potential Native American archaeological sites. During field investigations, two Native American sites were found, one is potentially eligible for the NRHP/SRHP and it is undetermined of the other is eligible. Further reconnaissance is needed to determine potential effects of the underground variation on sensitive locations. (CL&P 1, Vol. 1A, p. 15-51)

330. Four Euro-American archaeological sites that have not been determined eligible for the NRHP, are within one mile of the variation. The Mansfield Historic District boundary is approximately 500 feet east of the variation with the nearest historic structures approximately 1,000 feet from the variation. (CL&P 1, Vol. 1A, p. 15-51)

331. Environmental effects related to the underground variation would be similar to those listed above for the Mansfield Underground Variation in FOF # XX. (CL&P 1, Vol. 1A, p. 15-52)

332. The capital cost of the Mount Hope Underground Variation is approximately $65 million. The cost for the same section of overhead H-frame configuration is $5.4 million. (CL&P 1, Vol. 1A, pp. 15-42, 15-61)

Brooklyn Variations

333. In Brooklyn, the proposed route would extend overhead along the existing transmission ROW. Near Day Street Junction, which is in northeastern Brooklyn, the existing ROW extends near residences along Church Street, Darby Road, Hickory Lane, and Meadowbrook Lane. From approximately 0.2 miles west of Church Street to approximately 0.3 miles east of Church Street, there is a segment of the ROW that is within 100 feet of nine homes including one child day care facility. Within 300 feet of this ROW segment, there are 24 homes (including the nine within 100 feet). On Hickory Lane, there is a child day care facility within approximately 500 feet of the ROW. On the south side of this segment, there are five additional homes within 300 feet of the ROW, two of which are within 100 feet. (CL&P 1, Vol. 1A, p. 15-63)

334. The proposed base design for the Interstate project in Brooklyn is the installation of horizontally-configured H-frame structures north of the existing 330 Line from Hampton to existing structure No. 9209. From Structure No. 9210 to Day Street Junction, the proposed line is a delta configuration on steel monopoles, which is CL&P's EMF BMP design for Focus Area D. North of Day Street Junction, the proposed configuration is H-frame structures with horizontally-configured conductors. (CL&P 1, Vol. 1A, pp. 15-63, 15-64)

Brooklyn Overhead Variation

335. The Brooklyn Overhead Variation would extend approximately 3.3 miles through portions of Brooklyn and Pomfret and would replace 3.4 miles of the proposed route. The variation would include a new "greenfield" corridor that would extend form the existing CL&P ROW approximately 0.2 miles east of Route 169 in Brooklyn (near existing structure 9201). The new overhead line would then extend north for approximately 2.1 miles through primarily forested areas then crossing into Pomfret. In Pomfret, the line would turn east and continue for approximately 1.2 miles crossing Spaulding and Searles Roads and rejoining the existing CL&P ROW near Structure Nos. 9229 and 9230. (CL&P 1, Vol. 1A, pp. 15-68, 15-69)

336. Assuming a 150-foot wide ROW over the 3.3 miles variation, new easement rights would be required on approximately 58.8 acres of land. (CL&P 1, Vol. 1A, p. 15-69)

337. The variation would be approximately one mile west of the Quinebaug River and would traverse three perennial watercourses, including White Brook in Brooklyn, Barrett Ledge Brook and White Brook in Pomfret. The route would traverse the 100-year Federal Emergency Management Agency (FEMA) designated floodplains associated with Barrett Ledge Brook and White Brook. (CL&P 1, Vol. 1A, p. 15-72)

338. The overhead variation would cross five wetland areas. These wetlands consist of approximately 2.1 acres of palustrine-forested wetland, 1.2 acres of palustrine scrub-shrub wetland and 1.1 acres of emergent marsh. (CL&P 1, Vol. 1A, pp. 15-72, 15-73)

339. The variation would be aligned through forested land, lawn areas associated with rural residential development, and agricultural fields. Of the 58.8 acres that would be disturbed by this variation, 47.6 acres are mature mixed upland forest, 2.1 acres are forested wetland, 3.1 acres of agricultural land, 1.8 acres of commercial/industrial land, 1.5 acres of open field/shrub lands, 0.4 acres of road ROW, 1.2 acres of scrub-shrub wetlands, and 1.1 acres of emergent wetlands. (CL&P 1, Vol. 1A, p. 15-73)

340. At the eastern end of the route variation, there is known habitat for the wood turtle, a state-listed species of special concern. (CL&P 1, Vol. 1A, p. 15-74)

341. The variation would cross an existing 23-kV electric distribution line ROW in Brooklyn, south of Barrett Hill Road. (CL&P 1, Vol. 1A, p. 15-75)

342. No reported archaeological sites are within one mile of the Brooklyn Overhead Variation. Approximately 80 percent of the variation route appears sensitive for Native American archaeological sites. No significant historic sites were found within approximately 0.25 miles of the variation. (CL&P 1, Vol. 1A, p. 15-75)

343. CL&P calculated the MF levels for the Brooklyn Overhead Variation assuming H-frame structures centered on a 150-foot wide ROW. The Post-NEEWS MF calculations at both ROW edge is 30.9 mG. (CL&P 1, Vol. 1A, p. 15-79)

344. The capital cost of the Brooklyn Overhead Variation is approximately $27.4 million. The proposed overhead segment that this variation would replace would cost approximately $16.9 million. (CL&P 1, Vol. 1A, p. 15-59)

Brooklyn Underground Variation

345. CL&P identified a Brooklyn Underground Variation that would be located entirely within Brooklyn and would replace 1.4 miles of the proposed overhead transmission line route. The Variation would begin northeast of line Structure No. 208 and extend underground along the existing ROW to end near line structure No. 222, which is north of Day Street Junction. A transition station would be located approximately 0.8 miles west of Church Street to a transition station located on CL&P property approximately 0.2 miles north of Day Street Junction. (CL&P 1, Vol. 1A, pp. 15-84, 15-85)

346. This variation would disturb approximately 15 acres of land including the installation of the duct bank, four sets of splice vaults, an access road and two line transition stations. (CL&P 1, Vol. 1A, p. 15-86)

347. The underground variation would cross three perennial streams including White Brook, Creamery Brook, and an un-named watercourse. The route would cross the FEMA-designated 100-year floodplains associated with White Brook and Creamery Brook. An additional un-named watercourse is adjacent to the western boundary of the western line transition station. (CL&P 1, Vol. 1A, p. 15-89)

348. The variation would traverse several wetland areas, including a 1,615-foot crossing of a wetland area. The underground variation would affect approximately 0.1 acres of palustrine-forested wetland, approximately 0.7 acres of scrub-shrub wetland, and approximately 1.2 acres of palustrine-emergent wetland. The same wetlands would be spanned by the proposed overhead configuration. (CL&P 1, Vol. 1A, p. 15-89)

349. Two vernal pools are located within the CL&P ROW along the underground variation and an additional area of amphibian-breeding habitat was identified. (CL&P 1, Vol. 1A, p. 15-91)

350. There is no known federal or state-listed species habitat along the underground variation. (CL&P 1, Vol. 1A, p. 15-92)

351. Residences are located near the CL&P ROW along Darby Road, Church Street, Meadowbrook Drive, and Hickory Lane. One home child day care facilities are near the underground variation in the vicinity of Church Street. (CL&P 1, Vol. 1A, p. 15-92; Tr. 7, p. 13)

352. The underground variation would cross Church Street. (CL&P 1, Vol. 1A, p. 15-93)

353. No reported archaeological sites are located within one mile of the variation, and no significant historic resources are within approximately 500 feet of the variation. Approximately 77 percent of the variation route was identified as sensitive for Native American archaeological sites. Field surveys identified five Native American sites potentially eligible for the NRHP/SRHP. (CL&P 1, Vol. 1A, p. 15-93)

354. The capital cost of the underground variation would be approximately $82 million. The proposed overhead configuration that would be replaced would cost approximately $8.2 million. (CL&P 1, Vol. 1A, pp. 15-85, 15-8)

Willimantic South Variations

355. CL&P investigate two Willimantic South Variations, one overhead and one underground. The variations were designed to avoid construction of a new 345-kV line across the federally-owned Mansfield Hollow State Park and Mansfield Hollow WMA in Mansfield and Chaplin. (CL&P 1, Vol. 1A, p. 15-107)

Willimantic South Overhead Variation

356. The Willimantic South Overhead Variation would consist of an approximately 9.6-mile route that would replace the westernmost 11.9 miles of the proposed route. The variation would extend from Card Street Substation including 0.3 miles on that property, then southeast adjacent to an existing 115-kV transmission line for 0.7 miles, then along a new corridor for approximately 8.6 miles. The variation would reconnect with the proposed route on the existing CL&P ROW near Route 6. (CL&P 1, Vol. 1A, p. 15-114)

357. For the 8.6 mile new ROW CL&P would have to acquire easements from landowners to development a 150-foot wide ROW for a new 345-kV overhead transmission line. Along the remaining one mile of the variation route, CL&P would locate the transmission line on an existing 125-foot wide ROW that would need to be expanded by 15 feet on the eastern side. The existing transmission ROW is occupied by two 115-kV transmission lines on H-frame structures and a 23-kV distribution line. (CL&P 1, Vol. 1A, p. 15-115)

358. The variation would include conductors supported on steel-monopole structures along the 0.7-mile segment of the existing ROW in Lebanon. The new 8.6 mile corridor would include 85 to 90-foot H-frame structures. (CL&P 1, Vol. 1A, p. 15-115)

359. CL&P would have to acquire easement rights over approximately 156 acres of mostly privately-owned land. (CL&P 1, Vol. 1A, p. 5-116)

360. The overhead variation would cross 15 watercourses, the largest of which are Jordan Brook and the Shetucket River. The variation would traverse the FEMA-designated 100-year floodplains associated with Jordan Brook and the Shetucket River. (CL&P 1, Vol. 1A, p. 15-118)

361. The variation would traverse 22 wetlands with a total of approximately 26.8 acres. The wetlands consist of approximately 16.1 acres of palustrine forested, 5.5 acres of palustrine scrub-shrub, 3.2 acres of palustrine emergent, and 2 acres of open water or riverine. (CL&P 1, Vol. 1A, pp. 15-122, 15-124)

362. The variation would have an approximately 172.5 acre footprint, 127.7 acres of which are forested (upland and wetland). (CL&P 1, Vol. 1A, p. 15-124)

363. The New England cottontail (*Sylvilagus transitionalis*), a federally-listed candidate species for federal protection is known to occur in Lebanon. The variation would not traverse areas that are known habitat for state-listed species; however the route is directly south of Natural Diversity Database areas along the Shetucket Rive and near Lake Marie, both in Windham. (CL&P 1, Vol. 1A, p.; 15-125)

364. The variation would extend for approximately 0.5 miles across Pomeroy State Park in Lebanon and approximately 0.3 miles of the route would be adjacent to Beaver Brook State Park in Windham and Chaplin. The variation would also traverse approximately 0.6 miles of property owned by the Fin, Fur and Feather Club, Inc. in Chaplin. (CL&P 1, Vol. 1A, p. 15-125)

365. The primarily land uses near the overhead variation are forested land, residential and commercial development, scrub-shrub lands, and agricultural areas. The variation would encompass approximately 26.8 acres of

wetlands, 19.2 acres of open field/shrubland, 2.1 acres of ROWs, 111.6 acres of mature mixed forest, 3.3 acres of agricultural lands, 2.2 acres of house/yard, and 7.5 acres of commercial/industrial. (CL&P 1, Vol. 1A, p. 15-126)

366. There are 22 residences within 300 feet of the ROW edge in the vicinity of Plains Road, North Road, and Ballamahack Road in Windham, and Chewink Road in Chaplin. (CL&P 1, Vol. 1A, p. 15-127)

367. The variation would cross 14 roads, including Routes 289, 32, and 14/203. Portions of Route 14 and Route 203 are state-designated scenic highways. Windham Airport is approximately two miles west of the variation. Additionally, the variation would cross two railroad lines. (CL&P 1, Vol. 1A, pp. 15-12, 15-129)

368. Four reported Native American archaeological sites within one mile of the variation, none of which are adjacent to or within the route variation. Approximately 72 percent of the route variation appears sensitive for possible Native American sites. (CL&P 1, Vol. 1A, p. 15-129)

369. Three reported Euro-American sites were identified within one mile of the variation route, one of which is traversed by the corridor. (CL&P 1, Vol. 1A, p. 15-129)

370. Four significant historic resources are within 0.25 miles of the variation, including the Dr. Chester Hunt Office and the Windham Center Historic District in Windham, and the Chewink and Old cemeteries in Chaplin. (CL&P 1, Vol. 1A, p. 15-129)

371. The capital cost of the Willimantic South Overhead Variation is approximately $79.3 million. The cost of the section of ROW it would replace using an H-frame configuration is $59.6 million. The cost of that section of ROW using delta structures for EMF BMP Focus Area A and delta structures through Mansfield Hollow State Park is $62.3 million. (CL&P 1, Vol. 1A, pp. 15-117, 15-140)

Willimantic South Underground Variation

372. The Willimantic South Underground Variation would extend approximately 10.7 mile underground cable system that would replace the westernmost 11.6 miles of the proposed overhead route. The cable system would extend through portions of Lebanon, Windham, and Chaplin. The cables would be primarily installed beneath or adjacent to paved roadways. (CL&P 1, Vol. 1A, p. 15-143)

373. The underground variation would begin at Card Street Substation and extend north along Card Street to Pleasant Street, then follow Pleasant Street east to Plains Road. From Plains Road, the variation would cross the Shetucket River and continue to the intersection of Route 14 and 203 in Windham Center, then turn north and follow Route 203 to Route 6. From Route 6 the route would extend to the intersection of the transmission ROW and follow the ROW for approximately 0.6 miles where a transition station would be developed, approximately 100 feet east of Park Road in Chaplin. (CL&P 1, Vol. 1A, pp. 15-143, 15-144)

374. The route variation would extend approximately 10.1 miles beneath roads. Alignment of the remaining 0.6 miles of cables within the existing CL&P ROW would require acquisition of easements from private landowners. An additional four acres of land would have to be acquired from private landowners for the construction of a transition station on the eastern end of the underground variation. (CL&P 1, Vol. 1A, p. 15-144)

375. The capital cost of the Willimantic South Underground Variation is approximately $325.9 million. The cost of the section of ROW that would be replace, if constructed in an overhead configuration with H-frame structures through Focus Area A and delta structures through Mansfield Hollow State Park would cost approximately $58.1 million. The cost for the same section of ROW with the proposed project constructed with delta structures in Focus Area A and delta structures through Mansfield Hollow State Park is $60.8 million. (CL&P 1, Vol. 1A, pp. 15- 145, 15-172)

376. The installation of the underground cable system would require approximately 60 acres, including approximately 4.2 acres for splice-vault installation. Within the 0.6 mile segment within the CL&P ROW, approximately 3.6 acres would be cleared of vegetation and graded. Access to this portion of the underground cables would extend from Willimantic Road (Route 6) or Park Drive. (CL&P 1, Vol. 1A, p. 15-146)

377. An additional four acres would have to be acquired, cleared and graded for the development of a transition station at the eastern end of the cable route. The potential transition station location is on private property near Natchaug State Forest and Fin, Fur, and Feather Club, Inc. land. (CL&P 1, Vol. 1A, p. 15-146)

378. Transition facilities on the western end of the cable system would be installed at Card Street Substation. (CL&P 1, Vol. 1A, p. 15-146)

379. The underground variation would cross 17 watercourses, the largest of which are the Shetucket River and Potash Brook. The variation would traverse FEMA-designated 100-year floodplains of the Shetucket River and Potash Brook. Also, the variation would extend along Pleasant Street and the Stream Channel Encroachment Line (SCEL) of the Willimantic River and along Plains Road, and the SCEL of the Shetucket River both within Windham. (CL&P 1, Vol. 1A, p. 15-150)

380. The variation would cross one wetland within Card Street Substation property and five wetlands along the variation route within the CL&P ROW. An additional 28 wetlands would be crossed by the underground route variation that are traversed or adjacent to the associated road ROWs. (CL&P 1, Vol. 1A, p. 15-152)

381. Of the 60 acres of land that would be disturbed by the underground variation,45.8 acres are road ROWs, 6.7 acres are upland forest, 0.2 acres are forested wetland, 0.1 acre is agricultural land, 3.1 acres of house/yard, 0.1 acres of emergent wetland, 0.9 acres of scrub-shrub wetland, and 0.4 acres of commercial/industrial uses. (CL&P 1, Vol. 1A, p. 15-157)

382. Seven vernal pools and one amphibian breeding habitat were identified along the portion of the underground variation that would be located within CL&P ROW in Chaplin. (CL&P 1, Vol. 1A, p. 15-155)

383. The New England cottontail (Sylvilagus transitionalis), a candidate species for federal protection, is known to occur in Lebanon. The portion of the variation near the Shetucket River in Windham, Route 6 in Windham and Chaplin, and the CL&P ROW in Chaplin, is within known habitat of six state-listed species, including the endangered banded bog skimmer dragonfly (Williamsonia lintneri); three threatened species, the frosted elfin (Callophryus irus), Harris' checkerspot (Chlosyne harrisii), and the moustached clubtail (Gomphus adelphus); and two species of special concern, Horace's duskywing (Erynnis horatius) and the bog copper butterfly (Lycaena epixanthe). All but two of these species (the banded bog skimmer dragonfly and the bog copper butterfly) are also present along the proposed overhead route. (CL&P 1, Vol. 1A, pp. 15-155, 15-156)

384. The variation would be within 300 feet of six Statutory Facilities. In Windham, the Statutory Facilities include a residential child day care facility adjacent to Plains Road, the Windham Center School and playground, and North Windham Elementary School and playground. In Chaplin, the Statutory Facilities include Carelot Children's Center, adjacent to Route 6 and Old Willimantic Road. (CL&P 1, Vol. 1A, p. 15-157)

385. The variation would also traverse adjacent to residential developments. The most densely developed residential areas are along Pleasant Street and Plains Road in Windham and Route 6 in Windham and Chaplin. (CL&P 1, Vol. 1A, p. 15-157)

386. In Windham, recreational land uses near the variation route include the American Legion athletic fields, the Willimantic Camp Meeting Association property, town open space and ball fields, the Windham Center School playground, and the Windham Elementary School playground. Additionally, the variation would cross the Airline State Park Trail, Northern Section. The variation would also cross the Mansfield Hollow State Park and WMA in Windham and Chaplin; be located 300 feet south of the Natchaug State Forest; and be located adjacent to Fin, Fur, and Feather Club, Inc. land. (CL&P 1, Vol. 1A, p. 15-158)

387. The road ROWs used for the variation would all be two lane roads. The variation would also cross one rail line (the New England Central Railroad) and would be located approximately one mile east of the Windham Airport. (CL&P 1, Vol. 1A, p. 15-159)

388. Sixteen Native American archaeological sites are located within one mile of the Willimantic South Underground Variation, none of which are within the construction workspace for the variation. Approximately 71 percent of the unpaved areas along the associated roadways appear sensitive for possible Native American sites and undocumented disturbance may have occurred. (CL&P 1, Vol. 1A, p. 15-159)

389. Sixteen Euro-American archaeological sites have been previously reported within approximately one mile of the variation. (CL&P 1, Vol. 1A, p. 15-160)

390. Seven significant above-ground historic properties are within 500 feet of the variation. All of these properties are within Windham including, Willimantic Armory; Willimantic Elks Club; Willimantic Footbridge; Windham Road Bridge (No. 01850); Dr. Chester Hunt Office; Windham Historic District; and North Windham Cemetery. (CL&P 1, Vol. 1A, p. 15-160)

391. The Shetucket River would likely require crossing using subsurface techniques such as jack and bore or horizontal directional drill. These techniques would require staging areas on both sides of the river. (CL&P 1, Vol. 1A, p. 15-164)

VI. ENVIRONMENT

392. CL&P would fund an independent environmental inspector to monitor the project construction on a weekly basis and report to the Council, CL&P and the Chief Elected Officials of the towns traversed by the proposed route, if ordered by the Council. (CL&P 1, Vol. 1, p. 6-3)

393. Following construction of the proposed project, CL&P would implement a post-construction monitoring program for restoration activities. (CL&P 1, Vol. 1, p. 6-3)

394. The widening of the maintained portion of CL&P's ROW would result in the conversion of 273 acres of forested habitat to open field and scrub-shrub habitat. The open field and shrubland created would benefit many wildlife species that are currently declining in Connecticut and the region, specifically bird species. The value of this habitat would be maximized if herbicide applications and clearing activities occurred between mid-September and the beginning of April, which is typically the non-nesting season. (DEEP comments dated June 21, 2012, p. 3)

Topography

395. Topography along the proposed route is characterized by hills and valleys with elevations ranging from approximately 210 feet National Geodetic Vertical Datum (NGVD) to approximately 600 feet NGVD. The proposed route would not traverse any traprock ridge or amphibolite ridge and would generally not parallel ridgelines. (CL&P 1, Vol. 1, pp. 5-4, 5-5)

396. The depth to bedrock along the proposed route generally exceeds 60 inches, however, some stones and boulders are present on the surface in most places and bedrock is often present along steep hill slopes and stream cuts. (CL&P 1, Vol. 1, p. 5-6)

397. The proposed route would cross two drumlins (an elongated hill composed of glacial drift). Both drumlins are in Mansfield, one along Highland Road, and the other approximately 2,000 feet west of Storrs Road (Route 195). (CL&P 1, Vol. 1, pp. 5-6, 5-7)

398. Some locations along the proposed route would require grading or filling for construction. These locations would typically be restored to pre-construction grade after construction is completed. (CL&P 1, Vol. 1, p. 6-4)

Soils/Agriculture

399. Several areas along the proposed route contain soils identified by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) as "Prime Farmland" soils or "Farmlands of Statewide Importance." (CL&P 1, Vol. 1, p. 5-7)

400. "Prime Farmland" soils are those used for producing food, feed, forage, fiber, and oilseed crops. "Farmlands of Statewide Importance" soils are almost prime farmland and could economically produce as well as prime farmland if it is treated and managed. (CL&P 1, Vol. 1, p. 5-7)

401. The CL&P easements within which the proposed route would be located contain approximately 24 acres of prime farmland soils and approximately 30 acres of soils that are farmlands of statewide importance. Most of the prime farmland soils along the Proposed Route occur in Pomfret (9.4 acres), Hampton (4.6 acres) and Columbia (4.5 acres). The CL&P easement through Putnam traverses approximately 12 acres of soils that are considered to be farmlands of statewide importance. (CL&P 1, Vol. 1, p. 5-8)

402. CL&P would address protection of active farmland in its Development and Management Plan for the Interstate project, if approved. (CL&P 17, p. 39)

403. The Party Edward Hill Bullard owns the property comprising 57 Shuba Lane in Chaplin, which is crossed by the existing and proposed transmission lines. Mr. Bullard's property is a hayfield and an adjoining overgrown field under restoration. Mr. Bullard asked that excess subsoil from excavations be disposed of off-site and that the agricultural property is restored to pre-construction conditions and seeded. Mr. Bullard has also requested reasonable reimbursement for lost crops during the construction process. (Bullard 1; Tr. 10, p. 13)

404. On the 57 Shuba Lane property, CL&P would access the proposed route via the existing ROW, rather than crossing the property off-ROW. (Bullard 1)

405. If construction of the proposed line were to occur in an agricultural area during growing season and the underlying property owner had a right to cultivate specified in the easement language, then CL&P would compensate the landowner for lost crops. (Tr. 4, p. 137)

406. Any crane pads used on agricultural land during construction would be removed following construction. The typical crane pad used would be approximately 100 feet by 120 feet. CL&P would work with landowners in agricultural property to assess preservation of the agricultural soils. (Tr. 5, p. 91)

407. Typically, on an agricultural property, the contractor would remove the topsoil and stockpile it temporarily away from the construction area. Construction activities would then be performed on subsoil. Following construction, the crane pad and access road would be removed, the soil would be decompacted, and the topsoil would be spread over the areas from which it was removed. (Tr. 5, pp. 91, 92)

408. The CL&P easements along which the proposed route would be located contains approximately 242 acres of hydric soils. Hydric soils are those present in wetland areas. (CL&P 1, Vol. 1, p. 5-9)

409. Soils in the area of the proposed route may be disturbed for construction, or construction-related purposes. In areas of soil disturbance, temporary erosion and sedimentation control measures would be in place to minimize the potential for erosion or sedimentation outside of work limits and into wetlands or watercourses. Temporary erosion and sedimentation controls would be removed after restoration has been deemed complete. (CL&P 1, Vol. 1, pp. 6-5, 6-6)

Wetlands and Waterbodies

410. The proposed route is within the Thames River drainage basin, which includes the Natchaug River, Shetucket River, Willimantic River, Quinebaug River, and Fivemile River. (CL&P 1, Vol. 1, p. 5-11)

411. The proposed route would cross 104 watercourses, including 54 perennial lakes, streams, or rivers and 50 intermittent watercourses. Of the watercourses, there are existing culverted crossings at five perennial streams and seven intermittent watercourses. (CL&P 1, Vol. 1, p. 5-13)

412. The proposed route would cross the Quinebaug River three times, in Killingly, Pomfret and Putnam. The Quinebaug River would be crossed by the proposed route at the Pomfret/Killingly border north of Route 101, the Killingly Putnam border north of Lake Road and the Putnam/Killingly border west of Interstate 395. (CL&P 1, Vol. 1, p. 5-13)

413. None of the watercourses that would be crossed by the proposed route are considered navigable pursuant to the Rivers and Harbors Act. All watercourse crossings are presently spanned by the existing electric transmission lines. (CL&P 1, Vol. 1, p. 5-13)

414. Of the 54 perennial water crossings, 13 are lakes or ponds including an approximately 600-foot span across Mansfield Hollow Lake in Mansfield and an approximately 800-foot span across Lester Williams Pond in Brooklyn. The additional unnamed ponds or lakes include four in Chaplin, one in Hampton, four in Brooklyn, and two in Putnam. (CL&P 1, Vol. 1, p. 5-13)

415. None of the rivers crossed by the proposed route are designated as a National Wild and Scenic River under the National Wild and Scenic Rivers Act. (CL&P 1, Vol. 1, p. 5-14)

416. There are 227 wetlands within the CL&P ROW and Mansfield Hollow expansion area along which the proposed route would be aligned, 222 of which are also classified federal jurisdictional wetlands. (CL&P 1, Vol. 1, pp. 5-14, 5-15)

417. The wetlands located near the proposed route account for approximately 271 acres (19%) of the total 1,397 acres contained within the limits of the existing CL&P ROWs. (CL&P 1, Vol. 1, p. 5-18)

418. In the ROW of the proposed route from Card Street Substation to the Connecticut/Rhode Island border, 47 existing 345-kV structures are located in wetland areas. (CL&P 1, Vol. 1, p. 5-19)

419. Of the proposed 36.8 mile proposed route, 7 miles would extend across federal or state wetlands (approximately 6.8 miles are federal wetlands and 0.2 miles of state designated wetlands). (CL&P 1, Vol. 1, p. 5-19)

420. The foundations of 19 proposed structures would be located within wetland areas, resulting in less than 0.1 acres of permanent fill. (CL&P 18, p. 28)

421. Of the 227 wetlands within CL&P's ROW along the proposed route, 62 contain vernal pools while 26 wetlands contain amphibian breeding habitats. Several of the large wetland systems along the ROW contain multiple vernal pool and/or amphibian breeding habitat areas. Therefore, there are a total of 88 vernal pools and 29 amphibian breeding habitats along the CL&P ROW. (CL&P 1, Vol. 1, pp. 5-34, 5-35)

422. Most of the 88 vernal pools are located along the CL&P ROW within five towns. There are 19 vernal pools in Mansfield, 19 in Brooklyn, 15 in Putnam, 14 in Chaplin, and 13 in Hampton. Most of the 29 amphibian breeding habitats were found along the CL&P ROW in three towns, including seven in Chaplin, six in Hampton, and six in Brooklyn. (CL&P 1, Vol. 1, p. 5-35)

423. Of the vernal pools present on CL&P's ROW, 59 are located in whole or in part along portions of the transmission ROW that are presently managed. Ten of these are traversed by or are immediately adjacent to CL&P's existing on-ROW access roads. (CL&P 18, p. 19)

424. Of 29 amphibian breeding habitats within or adjacent to CL&P's ROW, 20 are wholly or partially along managed portions of the ROW. Existing on-ROW access roads cross seven amphibian breeding habitat areas. (CL&P 18, p. 19)

425. Along the CL&P ROW of the proposed route, four existing 345-kV transmission structures are currently located within amphibian breeding habitat. Also, access roads along the existing ROW traverse ten vernal pools and seven amphibian breeding habitat areas. (CL&P 1, Vol. 1, pp. 5-35, 5-36)

426. CL&P has proposed the transmission line design to place new structures outside of wetlands where possible. (CL&P 1, Vol. 1, p. 6-2)

427. The groundwater quality along most of the proposed route is classified as "GA," which is suitable for drinking without treatment. If shallow groundwater were encountered during construction, detwatering would be performed in accordance with applicable permit conditions and best management practices. (CL&P 1, Vol. 1, pp. 5-19, 6-26)

428. The Towns of Coventry, Mansfield, Brooklyn, Killingly, Putnam, and Thompson have designated aquifer protection areas. Of nine Aquifer Protection Areas, the proposed route crosses approximately 3.3 acres of the Thompson Aquifer Protection Area in Putnam. While no new structures are proposed to be located within the aquifer protection area, three new structures are proposed to be located adjacent to the eastern edge of the Aquifer Protection Area. The other Aquifer Protection Areas are at least 1.7 miles from the proposed route. (CL&P 1, Vol. 1, pp. 5-20, 6-25)

429. Along the proposed route, four existing 345-kV transmission structures are located within the 100-year floodplain associated with Mansfield Hollow Lake and five existing 345-kV transmission structures associated with the Natchaug River in Mansfield Hollow WMA in Chaplin. (CL&P 1, Vol. 1, p. 5-23)

430. The proposed route traverses state-designated stream channel encroachment lines (SCEL) associated with the Willimantic River. There are currently two 345-kV transmission structures located within the Willimantic River SCEL. (CL&P 1, Vol. 1, p. 5-24)

431. No permanent structures would be located with state-designated SCELs. Temporary and permanent impacts to floodplains would occur at locations along the proposed route within the designated 100-year Federal Emergency Management Agency flood zones. The proposed project would include 36 new structures to be located within the FEMA-designated floodplains of 14 waterbodies. (CL&P 1, Vol. 1, p. 6-27)

432. The proposed project would include the installation of three new 345-kV structures within the 100-year floodplain of Mansfield Hollow Lake. (CL&P 1, Vol. 1, p. 6-28)

433. Permanent effects on floodplains may also occur as a result of the installation of new access roads or improvement of existing access roads. Less than 0.5 acres of permanent access roads would be located within floodplains. (CL&P 1, Vol. 1, p. 6-28)

434. CL&P proposes to implement mitigation measures to minimize impact on water resources, including use of temporary erosion and sedimentation controls, on-ROW restoration, and wetland compensation/mitigation. Other than tree removal within forested wetlands, structure placement within wetlands, and permanend access road expansions or development across wetlands or watercourses, most impact to water resources would be short-term and localized. Tree removal within forested wetlands for the purpose of maintaining safe distances between vegetation and the transmission line conductors, would have the effect of converting wetland habitat from scrub-shrub or emergent wetlands. (CL&P 1, Vol. 1, p. 6-8)

435. Construction of the proposed project would result in permanent wetland impacts associated with the placement of structures, guy anchors and access roads in wetlands. (CL&P 1, Vol. 1, p. 6-10)

436. Temporary wetland impacts associated with construction of the proposed project include the placement of timber mats for access roads and crane pads, the placement of rock fill for access roads or crane pads, the installation of grounding systems underground near structures, and the placement of temporary poles used for wire stringing over roadways and other features. (CL&P 1, Vol. 1, p. 6-10)

437. Some temporary and some permanent access roads would be required across smaller streams along the proposed route. (CL&P 1, Vol. 1, p. 6-12)

438. CL&P would limit vegetation clearing along the ROW at watercourse crossings to the extent practical. As feasible, vegetation removal near streams would preserve desirable vegetation within a 25-foot-wide undisturbed riparian zone adjacent to either stream bank to allow for habitat, shading, bank stabilization, and erosion/sedimentation control. (CL&P 1, Vol. 1, p. 6-13)

439. Existing access roads along the ROW associated with the proposed route include 14 culverts across 12 watercourses. CL&P estimates that 41 new temporary or permanent culverts would be required across 39 streams. Two culverts are proposed at two stream crossings. The 39 streams with proposed culverts include 20 at perennial watercourses and 19 at intermittent watercourses. (CL&P 1, Vol. 1, p. 6-14)

440. Long-term effects on wetlands would occur due to removal of vegetation within forested wetlands along the portion of the ROW that would be cleared for the proposed project; expansion of existing access roads or the creation of new permanent gravel access roads; and the installation of transmission line structures in wetlands. (CL&P 1, Vol. 1, p. 6-19)

441. CL&P has attempted to limit the placement of new structures in wetlands to the extent possible. The proposed project would require approximately 24 transmission structures to be located in wetlands that cannot be shifted into upland areas due to transmission line design standards, line spacing requirements, and potential safety issues. (CL&P 1, Vol. 1, p. 6-20)

442. The construction of the proposed project would require approximately 1.5 acres of wetlands to be permanently filled for permanent access roads and structure foundations. Approximately 9 acres of wetlands would be temporarily impacted by construction of the project. (CL&P 1, Vol. 1, p. 6-20)

443. CL&P would consult with the CT DEEP, the USACE and other appropriate agencies to assess mitigation options to compensate for wetland impacts. (CL&P 1, Vol. 1, p. 6-25)

444. CL&P would have to submit a framework for compensatory wetland mitigation for the 401 permit. DEEP prefers that mitigation be as a single large parcel rather than multiple smaller mitigation sites. (DEEP comments June 21, 2012, p. 4)

445. The compensatory mitigation plan would include three basic categories of water resource related impacts: 1.) areas where permanent fill would be required for a structure or access road. 2.) Temporary wetland impacts from temporary access roads or a crane pad pulling location that would be removed after construction. 3.) Secondary impacts where clearing would convert forested wetlands to scrub-shrub wetlands or emergent marsh. (Tr. 4, pp. 87, 88)

446. In applying to the USACE for a Section 404 permit, CL&P revised its estimation of effects to water resources. The revised estimation accounts for construction situations including adequate space for safely accessing the new transmission lines while the existing adjacent transmission lines are live; terrain issues including grading to create level work pads; stability of wetlands; and the provision of access for construction equipment along the ROW, including in wetland areas. (CL&P 18, p. 34)

447. The revised estimates include 35.1 acres of temporary effects, and 1.1 acres of permanent effects on water resources. Secondary impacts from clearing of forested vegetation include approximately 38 acres. (CL&P 18, pp. 35, 36)

448. The revised estimate results in a decrease in permanent impacts to water resources from 1.5 acres to 1.1 acres and an increase in temporary water resource impacts from 8.9 acres to 35.1 acres. (CL&P 18, p. 37)

Vegetation

449. The proposed route would encompass approximately 1,397 acres. Approximately 504 acres are presently forested (upland and wetland), and approximately 893 acres of open old-field, scrub-shrub, agricultural, or other non-forested lands. (CL&P 1, Vol. 1, p. 5-27)

450. Along the existing ROW between Card Street Substation, Lake Road, and the Connecticut/Rhode Island border, CL&P currently manages the vegetation on an average of 150 feet of the typical 300-foot ROW and more than 150 feet where the ROW is wider and supports more than one line. The proposed project would require the vegetative management of an addition a 70 to 90 feet of the ROW. (CL&P 1, Vol. 1, p. 6-30)

451. Most of the forest vegetation that would be removed for the proposed project consists of trees with an average diameter at breast height (dbh) of five to six inches. The proposed project would require the removal of approximately 56,000 trees that are five inches dbh or greater. (CL&P 1, Vol. 1, p. 6-31)

452. Typically, all tall-growing tree species would be removed from the conductor zones on the ROWs. Low-growing tree species and taller shrub species would be retained outside conductor zones. The conductor zones include the area directly beneath the conductors extending 15 feet outward from the outermost conductors. (CL&P 1, Vol. 1, p. 6-34)

Wildlife

453. Construction of the proposed project would both temporarily and permanently alter wildlife habitat along the ROW and may cause disturbance, displacement, or mortality of wildlife. Removal of vegetative cover would displace wildlife, reduce cover, nesting, and foraging habitat for some species. Additionally, construction related noise, installation of access roads and crane pads, and construction equipment movement would disturb or displace mobile wildlife species. (CL&P 1, Vol. 1, p. 6-35)

454. Removal of forest vegetation and conversion to low-growing vegetative communities would also have a long-term benefit to wildlife by providing additional habitat for certain species that use shrubland, open areas, edge, and early successional habitats. (CL&P 1, Vol. 1, pp. 6-35, 6-36)

455. The perennial streams near the proposed route provide habitat for various fish species. CT DEEP provides trout fishing opportunities by stocking publicly-accessible portions of certain rivers. Stocked streams that would be crossed by the proposed route include: Tenmile River, Hop River, Willimantic River, Natchaug River, Merrick Brook, the Little River, Blackwell Brook, White Brook, Quinebaug River, and the Fivemile River. Also, in the fall, the Shetucket River is stocked with large Atlantic salmon. (CL&P 1, Vol. 1, pp. 5-30, 5-31)

456. Near the proposed route, the Little River is proposed for wild trout management in which wild trout populations are self-sustained through catch-and-release angling. The Natchaug River and the Shetucket River are designated as trophy trout areas and are stocked with larger trout. (CL&P 1, Vol. 1, pp. 5-30, 5-31)

457. The proposed project is expected to have minor, if any, impacts to fisheries along the project route. All major waterbodies would be spanned by the 345-kV transmission lines. The only new equipment that would be installed in watercourses includes 41 new temporary or permanent culverts along access roads that cross small watercourses. (CL&P 1, Vol. 1, p. 6-37)

458. Obligate vernal pool species include wood frog, eastern spadefoot toad, spotted salamander, Jefferson salamander, marbled salamander, and fairy shrimp. (CL&P 1, Vol. 1, pp. 5-32, 5-33)

459. The proposed route would cross or be near 88 vernal pools and 29 other areas determined to function as amphibian breeding habitats. Species commonly found during field surveys near the proposed route include spotted salamander, marbled salamander, wood frog, spring peeper, and fairy shrimp. (CL&P 1, Vol. 1, p. 6-38)

460. Construction activities would have the most impact on amphibian species that over-winter in uplands and migrate to wetland habitats to breed. Three common amphibian species include wood frog, spotted salamander and, marbled salamander. Most migration of these amphibian species occurs in March and April. Migration of the marbled salamander typically occurs in late summer and early fall. (CL&P 1, Vol. 1, pp. 6-39, 6-40)

461. Although CL&P attempted to locate structures and access roads outside of vernal pools or amphibian breeding habitat, some are located in larger wetland systems that contain these breeding areas. However, the structures would not be located in the specific vernal pool area of the larger wetland complex. (CL&P 1, Vol. 1, p. 6-40; CL&P 15, R. 30)

462. CL&P would make an effort to adhere to seasonal windows for tree clearing in or near vernal pools and other amphibian breeding habitats, where feasible. The appropriate erosion and sedimentation controls would be installed to limit sediment deposition into amphibian breeding areas. The use of temporary timber mats would be considered for rather than gravel access roads near amphibian breeding areas. Measures would be incorporated into the ROW vegetation management program to protect amphibian breeding habitats. (CL&P 1, Vol. 1, p. 6-41)

Birds

463. CL&P conducted a bird study for the proposed project. The study identified 146 bird species as potentially occurring near the proposed route. (CL&P 1, Vol. 1, p. 5-36)

464. Open old field and shrubland is typically becoming scarce in Connecticut due to farmland reverting to forest. Managed electric transmission line ROW would provide maintained open area and shrubland thereby increasing regional habitat diversity. (CL&P 1, Vol. 1, p. 5-36)

465. No federally-listed bird species are present in the project area. Six state-listed bird species may potentially occur near the proposed route. CL&P performed field studies to determine the presence of the bird species in the project area. (CL&P 1, Vol. 1, pp. 5-38, 5-39)

466. The typical nesting season for most breeding birds found in the project area is between May 1 and July 31. Vegetation removal within the nesting period could result in the loss of a breeding season for those species. (CL&P 1, Vol. 1, p. 6-42)

467. The construction of the proposed project would result in a net long-term loss of approximately 273 acres of woodland habitat for forest-dwelling bird species. However, since most of the nearby habitat is forest, there is existing alternative habitat for these species. (CL&P 1, Vol. 1, p. 6-43)

Threatened, Endangered, or Special Concern

468. There are no known federally-listed threatened or endangered species along the proposed route. The New England cottontail, which is a federal candidate species, is known to occur in Lebanon. The United States Fish and Wildlife Service recommends preservation of scrub-shrub habitat along the project ROW. (CL&P 1, Vol. 1, p. 5-40, pp. 6-44, 6-45)

469. In the vicinity of the proposed route, 29 state-listed species were identified as potentially occurring. No state-listed plant species are known to occur in the project area. The 29 state-listed species include 5 species of butterflies, 12 species of moths, 7 species of birds, 1 turtle species, 2 snake species, and 2 aquatic species. (CL&P 1, Vol. 1, pp. 5-40 through 5-43)

470. CT DEEP natural diversity database recommended:
    a. Surveys be performed to determine the presence/absence of state-listed, bird, butterfly, and moth species. Also, host plant and species-specific surveys to locate Lepidoptera along the proposed route.
    b. Surveys for wood turtles, Eastern ribbon snakes, and Eastern hognose snakes are not required but specific mitigation measures should be implemented during construction to ensure the well-being of such animals.
    c. Field surveys for the aquatic snail are not required but deployment and maintenance of erosion and sedimentation controls should be in place during construction.

    (CL&P 1, Vol. 1, p. 5-41)

471. In 2008, CL&P performed bird and Lepidoptera surveys. (CL&P 1, Vol. 1, p. 5-41)

472. In 2010, surveys were performed to assess plant community types known to host the state-listed species of Lepidoptera. The five community/host plant types identified are bluestem grassland, low-bush blueberry, scrub oak, wild indigo, and bluestem-scrub oak-low-bush blueberry mosaic. (CL&P 1, Vol. 1, p. 5-44)

473. The reduction or elimination of host plant communities that support butterfly and moth species would have the most impact to the species. CL&P intends to minimize the footprint of its project to the extent feasible to reduce potential impact to butterfly and moth habitats. Although it would be beneficial to reduce the impact to this habitat, the vegetation would be expected to recolonize naturally following construction of the proposed project. (CL&P 1, Vol. 1, pp. 6-54, 6-55)

474. CL&P would attempt to minimize direct effects on significant on-ROW plant communities by installing exclusion fencing, such as snow fencing. If construction mush occur within a host-plant community, mitigation measures may include:
    a. Avoiding impacts to significant stands where practical.
    b. Limiting construction improvements to existing dirt access roads along the ROWs.
    c. Developing and implementing a *Vegetation Management Plan* to reduce potential colonization by invasive species and promote the growth of native host plant species.
    d. Avoiding permanent impact to important vegetative areas to the extent practicable.
    e. Performing rare species surveys along certain areas of the ROWs.

    (CL&P 1, Vol. 1, pp. 6-55, 6-56)

475. Wild indigo is currently growing adjacent to existing access roads along the ROW in the project area. This plant species is an important host for the rare frosted elfin and Persius duskywing, both of which occur on the ROWs. CL&P would limit impact to wild indigo to the extent practical. (CL&P 1, Vol. 1, p. 6-56)

476. The American kestrel and Eastern meadowlark are state-listed bird species identified as potentially occurring in the ROW that were observed during field surveys. The brown thrasher, a state-listed bird species of special concern, that was not expected to occur within the project area, was also observed. (CL&P 1, Vol. 1, p. 5-50)

477. Potential mitigation includes planning vegetation removal outside of the breeding bird season and identifying and avoiding active nest sites for rare bird species within the construction area. (CL&P 1, Vol. 1, p. 6-49)

478. A great blue heron rookery was identified within and adjacent to a portion of CL&P's existing ROW in Thompson. Great blue herons gather at rookeries during breeding season, from March through August. (CL&P 1, Vol. 1, p. 5-51)

479. Wood turtles were identified as potentially occurring near the proposed route in Pomfret. (CL&P 1, Vol. 1, p. 5-51)

480. The wood turtle typically over-winters in moving water bodies, tucked into root masses. Typical wood turtle hibernation is from November 1 through April 1. Construction activities are not expected to impact wood turtles during hibernation; however individual turtles could be affected during foraging. (CL&P 1, Vol. 1, p. 6-49)

481. CT DEEP has previously stated a preference for construction within wood turtle habitat during its dormant period. If construction must be done during the wood turtle's active period potential mitigation would include:
    a. The presence of a CT DEEP approved turtle monitor during construction in wood turtle habitats. If found, wood turtles would be removed from the active area and placed in the direction they were moving.
    b. Construction contractors would be able to identify the turtles and know the proper handling and care procedures if the turtle is encountered.
    c. Initial ROW vegetation removal would minimize the removal of low-growth vegetation in areas adjacent to rivers/streams documented to support wood turtles.
    d. Erosion and sedimentation controls would be used to minimize the deposition of sediment into wetland areas and to preclude wood turtles from accessing active construction areas.
    (CL&P 1, Vol. 1, p. 6-50)

482. The eastern hognose snake and eastern ribbon snake were identified as potentially occurring near the proposed route in Mansfield and Putnam, respectively. During the field surveys, eastern ribbon snakes were observed in Chaplin, Hampton and Killingly. (CL&P 1, Vol. 1, p. 5-51)

483. The eastern hognose snake prefers woodlands and fields with well-drained sandy/gravelly soil. The snake is typically dormant from November 1 through April 1. Construction of the proposed project may temporarily displace the species from its habitat and potentially result in mortality of an individual; however, there is suitable habitat near the project area. CT DEEP expressed a preference for construction to occur during the snake's dormant period. If construction does not occur during the dormant period, potential mitigation may include:
    a. The presence of a CT DEEP-approved snake monitor during construction. Any hognose snakes that are encountered would be removed from the active workspace.
    b. Construction contractors would be able to identify the snakes and know the proper handling and care procedures should one be encountered.
    (CL&P 1, Vol. 1, pp. 6-52, 6-53)

484. The eastern ribbon snake prefers habitats near shallow water with dense herbaceous and shrubby vegetation. Construction of the proposed project could affect the eastern ribbon snake through individual mortality, or displacement. Impact to the species would be minimized through the proper installation of temporary

equipment bridges across watercourses, the preservation of vegetation within the riparian zone along the ROW, and the installation of erosion and sedimentation controls. (CL&P 1, Vol. 1, p. 6-53)

485. CT DEEP recommends that construction activities be within the dormant period for the eastern ribbon snake from November 1 through April 1. If construction is not during the dormant period, mitigation includes:
   a. The presence of a CT DEEP-approved snake monitor during construction. Any ribbon snakes that are encountered would be removed from the active work area.
   b. Construction contractors would be able to identify the snakes and know the proper handling and care procedures should one be encountered.
   (CL&P 1, Vol. 1, p. 6-54)

486. An aquatic snail and the moustached clubtail dragonfly were identified as potentially occurring near the proposed route. Both species are found in aquatic environments. (CL&P 1, Vol. 1, p. 5-52)

487. The aquatic snail is vulnerable to significant changes in water elevation and changes in water quality. The species could be negatively impacted from erosion and sedimentation into the snail habitat. Potential effects would be minimized by maintaining as much vegetation as possible along the ROWs in riparian zones and installing the appropriate erosion and sedimentation controls. (CL&P 1, Vol. 1, p. 6-51)

488. The moustached clubtail dragonfly could be affected by a reduction in water quality through direct disturbance or sedimentation into the watercourse. Potential mitigation may include avoiding or minimizing construction within the species' habitat, maintaining vegetation as feasible within riparian zones and use of soil erosion and sedimentation controls. (CL&P 1, Vol. 1, pp. 6-51, 6-52)

Air Quality

489. All ambient background air concentrations are less than the National Ambient Air Quality Standards for all pollutants and averaging periods in New London, Tolland and Windham counties. (CL&P 1, Vol. 1, p. 5-93)

490. During construction, local air quality may be temporarily affected from fugitive dust and vehicular emissions from construction. To minimize air quality effects during construction, access roads and other areas would be watered to suppress dust. Additionally, crushed stone aprons at access road entrances to public roads would be installed to minimize tracking of soil onto the road. Construction vehicles would be properly maintained and idling time of diesel equipment would be minimized. (CL&P 1, Vol. 1, p. 6-71)

Land Uses

491. Land uses near the proposed route consist of forest lands, agricultural areas, recreational areas, transportation corridors, and residential, commercial, and industrial developments. (CL&P 1, Vol. 1, p. 5-55)

492. The construction of the proposed project would convert approximately 222 acres of upland forest and approximately 51 acres of forested wetlands to scrub/shrub lands. (CL&P 1, Vol. 1, pp. 6-58, 6-59)

493. Recreational areas along the existing and proposed transmission line ROW include Mansfield Hollow State Park, Mansfield Hollow WMA, the Natchaug State Forest, and recreational trails. Impact to these recreational areas would be short-term, during construction. (CL&P 1, Vol. 1, p. 6-61)

494. CL&P does not allow the use of all-terrain vehicles on its property. On property where CL&P has an easement, it must receive landowner approval prior to installing barricades to discourage unwarranted access onto and use of its ROWs. (CL&P 1, Vol. 1, p. 6-66)

Visibility and Recreational Property

495. The visual appearance of the proposed structures being the same type as the existing structures and side-by-side within the ROW, for example H-frame structures, would maintain a symmetrical appearance. (Tr. 6, pp.70-72)

Lebanon

496. The 0.6 mile section of the proposed route that extends through northeastern Lebanon is predominantly forest with some rural residences. The proposed transmission line would be within CL&P's existing ROW, between two overhead transmission lines. The proposed route also crosses the Airline State Park Trail, which is a recreational trail. The nearest historic site is the Bridge over Tenmile River, which is 3,000 feet southwest of the proposed crossing of the river. (CL&P 1, Vol. 1, pp. 5-58, 5-59)

497. At the Airline Trail crossing in Lebanon, the proposed transmission line would be in the middle of the existing ROW. The proposed project does not require the removal of forested vegetation in this area. Long views of the transmission line are limited due to bends in the trail. (CL&P 1, Vol. 1, pp. 6-63, 6-64)

Columbia

498. The land use near the 1.7 mile section of the proposed route that extends through the northeastern portion of Columbia is a mix of forest, rural residences and agricultural land. The nearest historic site is the Tenmile Mill located approximately 1,000 feet south of the proposed route. Three privately-owned open space parcels near the proposed route include a parcel approximately 0.6 miles north of the proposed route near the Windham/Columbia border; Potter Meadow, which is a 34-acre property owned by Joshua's Tract Conservation and Land Trust near the Willimantic and Tenmile Rivers and is approximately 0.2 miles north of the proposed route; and one parcel approximately 0.5 miles east of the proposed route south of Willimantic Road. (CL&P 1, Vol. 1, pp. 5-59, 5-60)

499. The proposed route would cross one town-identified priority wetland, which is valuable as wildlife habitat, ecological integrity and ability to recharge groundwater supplies. (CL&P 1, Vol. 1, p. 5-60)

Coventry

500. The land around the 1.2 mile section of the proposed route that extends through the southwestern corner of Coventry are predominantly rural residences, agricultural and forest. From the Coventry/Columbia border to Babcock Hill Junction, the proposed transmission line would be placed between the existing 330 Line and 69-kV double-circuit lines. From Babcock Hill Junction, the proposed route heads north-northeast within the existing ROW and would be within a currently unmanaged portion of the ROW parallel to the existing 330 Line. (CL&P 1, Vol. 1, p. 5-60)

501. The proposed route would cross the Hop River State Park Trail just north of the Hop River crossing. (CL&P 1, Vol. 1, p. 5-61)

502. The transmission line ROW crosses the Hop River Trail perpendicularly. Views of the transmission structures are limited due to bends in the trail except for in the vicinity of the crossing. Most views of the transmission lines at the trail crossing are to the south. The proposed transmission lines would be located in the middle of the existing ROW. Visibility of the proposed transmission lines would be similar to that of the existing transmission lines. (CL&P 1, Vol. 1, p. 6-64)

Mansfield

503. The area around the 6.4 mile section of the proposed route that would cross the southern portion of Mansfield is predominantly forest with some rural residences and intermixed agricultural land. In Mansfield, the proposed route would extend for approximately one-mile through Mansfield Hollow State Park, across Mansfield Hollow Lake, and through Mansfield Hollow WMA. The proposed transmission line would be within a currently unmanaged portion of the ROW adjacent to the existing 330 Line. (CL&P 1, Vol. 1, p. 5-61)

504. Within Mansfield, the proposed route would cross the Highland Ridge Driving Range, the west branch of the Nipmuck Trail, the Mansfield Hollow Dam Levee Trail, the Red Trail, and the eastern branch of the Nipmuck Trail. (CL&P 1, Vol. 1, pp. 5-61, 5-62)

505. Visibility of the ROW is limited along the Nipmuck Trail West Branch due to topography and dense forest, except for the area where the trail and ROW cross. At the ROW crossing of the Nipmuck Trail East Branch in the Mansfield Hollow WMA, east of Mansfield Lake, there are views of the ROW from across the lake but the existing transmission line structures are not visible from most of the trail because of topography and dense forest vegetation. (CL&P 1, Vol. 1, p. 6-64)

506. The existing 345-kV transmission line structures are visible from Mansfield Hollow State Park and WMA in Mansfield. In addition, existing transmission line structures are visible in the background of views along the levee trail located south-southeast of the Mansfield Hollow Dam. The proposed transmission line structures would be similarly visible from the same locations within Mansfield Hollow State Park and WMA. (CL&P 1, Vol. 1, pp. 6-64, 6-65)

507. Scenic vistas are identified at Mansfield Hollow Lake, including two along the southeastern portion of the lake (approximately 400 feet east of the proposed route), and two at Bassetts Bridge (approximately 2,000 feet north of the proposed route). Two scenic vistas are identified north of Pleasant Valley Road (approximately 2,500 feet and 3,000 feet south of the proposed route). One scenic vista was identified along Stearns Road approximately 1,500 feet north of the proposed route). A scenic vista was identified at Wolf Rock approximately 3,000 feet north of the proposed route and one along Storrs Road approximately 2,000 feet north of the proposed route. (CL&P 1, Vol. 1, p. 5-62)

508. Of the scenic vistas in Mansfield…the existing and proposed transmission line structures would not be visible from Saw Brook Lane. From the crest of Mountain Road the existing and proposed transmission line structures are visible above the tree line. From the vista on the northwest corner of Mansfield Hollow Lake, off Route 89, there is no view of the existing or proposed transmission line stuctures. From the levee trail, some of the existing structures are visible and the proposed transmission line structures would not signigicantly increase visibility. The portion of Bassetts Bridge Road that crosses Mansfield Hollow Lake has view os the tops of some existing transmission line structures. The proposed structures are not expected to increase the visibility from the Bassetts Bridge Road vista. (CL&P 1, Vol. 1, p. 6-65)

509. Joshua's Tract Conservation and Historic Trust, Inc. owns several parcels of land, one of which is Winfred Acres located approximately 800 feet southeast of the proposed route. Other nearby parcels owned by the Trust include Wolf Rock Nature Preserve located approximately 0.2 miles north of the proposed route and the Pond Lot located approximately 0.3 miles north of the proposed route. (CL&P 1, Vol. 1, p. 5-62)

Chaplin

510. The area around the 3.3 mile section of the proposed route in the southern portion of Chaplin consists of forest and rural residences. Within Chaplin, the proposed route would cross the Natchaug State forest and approximately 2,900 feet of land owned by the Fin, Fur, and Feather Club, Inc. In addition, the northern section of the Airline State Park Trail is approximately 200 feet south of the proposed route for approximately 0.8 miles. (CL&P 1, Vol. 1, p. 5-63)

511. In Chaplin, visibility of the existing ROW from the Airline Trail is variable. There is dense deciduous vegetation on both sides of the trail that limit views of the transmission lines. The proposed transmission line would be located on the north side of the ROW, which is farther from the trail. Therefore, views of the proposed transmission lines are not expected to differ from existing views. (CL&P 1, Vol. 1, p. 6-64)

Hampton

512. In the area near the 4.3 mile section of the proposed route in south-central Hampton, land use is predominantly undeveloped forest with scattered agricultural land and rural residences. The proposed route would cross the Airline State Park Trail and Bigelow Howard Valley Fish and Game Club. The James L. Goodwin State Forest is approximately 1,200 feet north of the proposed route. Pine Acres Lake is over 3,000 feet north of the proposed route. (CL&P 1, Vol. 1, pp. 5-63, 5-64)

513. The proposed route would span the Airline Trail as it extends through a rock cut. Views of the existing and proposed structures are expected only at the trail crossing. (CL&P 1, Vol. 1, p. 6-64)

514. A town-designated scenic vista is south of the existing ROW near Parker Road and Route 97. The proposed route would also cross Route 97, which was identified by the Quinebaug-Shetucket Heritage Corridor, Inc. as a scenic rural driving route. (CL&P 1, Vol. 1, p. 5-64)

515. The CL&P ROW is not visible from the scenic vista in Hampton because it is located downhill and is buffered by forest. The proposed transmission line structures would not increase the visibility to that area. (CL&P 1, Vol. 1, p. 6-65)

Brooklyn

516. The area around the approximately 7.2 mile section of the proposed route in Brooklyn is predominantly undeveloped forest, rural residences and agricultural land. The proposed transmission line would be aligned within the existing ROW, north or west of the existing 330 Line. (CL&P 1, Vol. 1, p. 5-64)

517. In Brooklyn, the proposed and existing ROW would cross Route 169, a National Scenic Byway. There are three town-designated scenic vistas near the proposed route: Tatnic Hill, Gray Mare Hill, and off Barrett Hill Road. (CL&P 1, Vol. 1, pp. 5-64, 5-65)

518. There are currently views of the transmission line ROW from Route 169. Most of the views are limited to the area near the crossing. CL&P designed the proposed transmission line to install the new structures in alignment with the existing structures and to maintain similar conductor heights. (CL&P 1, Vol. 1, p. 6-65)

519. The ROW is not visible form the scenic vista off Tatnic Hill Road due to a forested buffer. The ROW would not be visible from a scenic vista off Barrett Hill Road because the ROW is located at the bottom of the hill and there is a forested buffer providing screening. There are limited views of the ROW from a scenic vista in the Gray Mare Hill area due to topography and vegetation. (CL&P 1, Vol. 1, pp. 6-65, 6-66)

520. The proposed route would cross the Milo Appley Conservation Showcase property adjacent to the Eastern Connecticut Conservation District, which includes several trails near the ROW. The route would also cross a portion of the Wolf Den Land Trust's White Brook Sanctuary property and CL&P-owned land that abuts the Quinebaug River and includes public hiking and recreational trails. (CL&P 1, Vol. 1, p. 5-65)

521. The Quinebaug River Trails are on CL&P-owned land north of Day Street. Portions of the Quinebaug River Trails extend near or beneath CL&P's ROW near Day Street Junction. The existing and proposed 345-kV transmission line structures would be visible from various locations along the trails. (CL&P 1, Vol. 1, p. 6-66)

Pomfret

522. The area around the 1.7 mile section of the proposed route that extends through Pomfret includes agricultural, open field/shrub, and forested areas. The proposed route also would be west of and parallel to the Quinebaug River. The town has created a canoe/kayak boat and parking area on CL&P's property on the river at Killingly Road. (CL&P 1, Vol. 1, p. 5-65)

Killingly and Putnam

523. The proposed route would cross the Quinebaug River into Killingly, then cross the river twice more each time crossing town boundaries between Killingly and Putnam. The route would extend from the Pomfret/Killingly border, approximately 1.9 miles northeast through Killingly then cross the Quinebaug River for the second time to be in Putnam. The route would then extend through Putnam for approximately 0.8 miles then cross the river for the third time to be in Killingly. The route would then extend through the northwestern corner of Killingly for approximately 1.1 miles then continue northeast into Putnam for approximately 4.9 miles. (CL&P 1, Vol. 1, p. 5-66)

524. Through Killingly and Putnam to Killingly Substation, the proposed route would be aligned in the middle of the existing ROW between the existing 345-kV line and two existing 115-kV lines or between two 345-kV lines. The proposed transmission line would be in the center of the existing ROW, west of and adjacent to the existing 345-kV line through the remainder of Killingly and through Putnam to Heritage Road. (CL&P 1, Vol. 1, p. 5-66)

525. Land use in the area of the proposed route through Killingly and Putnam are predominantly forest and agricultural with some rural residences and commercial/industrial land. (CL&P 1, Vol. 1, pp. 5-66, 5-67)

526. The proposed route extends near several parcels conserved by the Wyndham Land Trust, Inc., including within 500 feet of Dunn Preserve, a 32-acre property accessible from Lake Road, in Killingly and within 200 feet of Chaffee Preserve, a 29-acre parcel accessible from Route 44 in Putnam. (CL&P 1, Vol. 1, p. 5-67)

527. The proposed route would follow several town-designated "greenbelt" protection areas in Putnam. These areas are characterized by streams, wetlands, floodplains. (CL&P 1, Vol. 1, p. 5-67)

528. In the area around the 1.9 mile section of the proposed route that would extend through Thompson, the land use is predominantly forest with some rural residences. Quaddick State Park is approximately 0.8 miles north of the ROW along the east shore of the southern portion of Quaddick Reservoir. Quaddick State Forest is approximately one mile north of the proposed route near the northern portion of Quaddick Reservoir. (CL&P 1, Vol. 1, p. 5-68)

Thompson

529. The existing and proposed transmission lines extend over Barker Preserve, which is land owned and managed by Wyndham Land Trust. (CL&P 1, Vol. 1, p. 5-68)

530. The proposed route would cross a portion of Lower Pond, which has been designated as one of the state's best examples of Atlantic white cedar swamp. (CL&P 1, Vol. 1, p. 5-68)

531. The proposed route would traverse approximately 1,800 feet of Tamler Preserve, which is owned and managed by Wyndham Land Trust. (CL&P 1, Vol. 1, p. 5-68)

Historic Areas and Cultural Areas

532. The proposed route would not be adjacent to any resources listed on or eligible for the National Register of Historic Places (NRHP) or the State Register of Historic Places (SRHP). (CL&P 1, Vol. 1, p. 5-87)

533. Five known Native American archaeological sites are within one mile of the proposed route. One site, located in Pomfret, was determined as not eligible for the NRHP. The remaining four archaeological sites are in Mansfield and each have insufficient reported data to make a determination of eligibility for the NRHP. (CL&P 1, Vol. 1, p. 5-88)

534. There are 21 significant above-ground historic architectural resources within approximately 0.25 miles of the proposed route, some of which are within historic districts. The resources include:

a. In Coventry - Flanders Road Bridge
b. In Mansfield – Three cemeteries, Mansfield Hollow Historic District, Mansfield Hollow Dam, Mansfield Center Historic District, and Mansfield Center Cemetery
c. In Chaplin – The Chewink Cemetery and Old Cemetery
d. In Hampton – South Cemetery
e. In Brooklyn – Brooklyn Green Historic District
f. In Killingly – Rogers Village
g. In Putnam – Munyan Cemetery
(CL&P 1, Vol. 1, p. 5-90)

535. The proposed project is not expected to have an adverse visual impact on the 21 significant historic architectural resources that are within 0.25 miles of the proposed route. (CL&P 1, Vol. 1, p. 6-70; CL&P 18, p. 25)

536. Approximately 115 Native American archaeological sites are throughout the sensitive areas identified by CL&P's assessment. These sites are being reviewed for eligibility for listing on the NRHP/SRHP. (CL&P 1, Vol. 1, p. 5-91; CL&P 18, p. 26)

537. There are seven pre-20th-century Euro-American archaeological sites in the area assessed by CL&P. The function and eligibility of the sites for the NRHP/SRHP is undetermined. (CL&P 1, Vol. 1, p. 5-91)

538. Approximately 23 miles of the proposed route appeared sensitive for undocumented Native American archaeological resources. (CL&P 1, Vol. 1, p. 6-69)

539. CL&P would conduct additional archaeological reconnaissance investigations during the project planning stage and coordinate with the Connecticut SHPO, Native American tribes, the USACE and the Quinebaug-Shetucket Rivers Valley National Heritage Corridor, Inc. (CL&P 1, Vol. 1, pp. 6-69, 6-70)

540. CL&P would avoid sites eligible for the NRHP/SRHP where possible. If avoidance is not possible, mitigation measures would be developed for review and approval by the Connecticut SHPO. (CL&P 1, Vol. 1, p. 6-70)

Mansfield Hollow Configurations

541. The proposed transmission line would be aligned along existing ROWs across two segments of federally-owned property in the Mansfield Hollow portion of Mansfield and Chaplin. These two segments total 1.4 miles including 0.9 miles through Mansfield Hollow State Park in Mansfield (Segment 1) and 0.5 miles across the Mansfield Hollow WMA in Chaplin (Segment 2). (CL&P 1, Vol. 1, p. 10-1)

542. The federal government, through the USACE, took control of the Mansfield Hollow property for flood control purposes. USACE leases most of the property to DEEP, which manages the property as a state park and wildlife management area. (Tr. 6, pp. 55, 56)

543. The existing transmission line ROW on these properties is 150 feet wide. The existing 150-foot wide easement is not wide enough to accommodate the proposed 345-kV transmission line alongside the existing transmission line. To expand the easement, CL&P had to submit a request for additional easement to the real estate branch of the USACE. The real estate branch consults with the environmental evaluation branch, which analyzes the potential environmental impacts of the easement expansion request. (CL&P 1, Vol. 1, pp. 10-2, 10-3; Tr. 6, p. 56)

544. In Segment 1, the existing transmission line is supported on monopoles with a delta configuration with an average height of 115 feet above ground level (agl). In Segment 2, the existing transmission line is supported on wood-pole H-frame structures with an average height of 75 feet agl. (CL&P 1, Vol. 1, p. 10-7)

545. Vegetation is maintained as scrub-shrub growth over approximately 100 feet of the ROW width in Segment 1 and approximately 140 feet of the ROW width in Segment 2. (CL&P 1, Vol. 1, p. 10-7)

546. CL&P identified three configuration options for the installation of the proposed transmission line through the federally-owned properties.
   a. The "no ROW expansion" option would be used if the USACE does not grant a conveyance for additional easement rights. This option would include the installation of the existing and proposed transmission lines using vertical conductor configurations and taller monopole structures.
   b. The "Minimal ROW expansion" option limits the expansion of the additional easement to approximately 4.8 acres by using taller monopole structures to support the proposed transmission line within both Segment 1 and Segment 2. This option would require a 25-foot easement width expansion in Segment 1 and 35-foot easement width expansion in Segment 2.
   c. The "11-acre Expansion" option of the existing easement including expanding the easement by 55 feet (approximately 5.8 acres) in Segment 1 and 85 feet (approximately 5.2 acres) in Segment 2. In this case, CL&P would construct the new transmission line on structures that generally match the existing structures.

   (CL&P 1, Vol. 1, pp. 10-3, 10-4)

547. CL&P has adopted the 4.8-acre Minimal ROW Expansion as the preferred option for the configuration of the new line across federal lands. (CL&P 15, R. 38)

548. In early 2012, the USACE indicated a preference for the 4.8-acre Minimal ROW Expansion option. DEEP also indicated a preference for the Minimal ROW Expansion option for Segment 2 because it would have less wetland impacts compared to the 11-acre ROW Expansion. DEEP favored the 11-Acre Expansion option in Segment 1, since there was no difference in wetland impacts between the two options and so preferred the lower cost option. (DEEP comments dated June 21, 2012; CL&P 15, R. 38)

549. USACE will assess the environmental impacts associated with the Minimal ROW Expansion option and complete an Environmental Assessment of the proposed real estate transaction to confirm its consistency with the National Environmental Policy Act (NEPA). (CL&P 15, R. 38)

550. CL&P proposes that the Council approve the proposed route over federally-owned properties but not approve a specific line configuration until the Development and Management Plan, or that the Council approve the Minimal ROW Expansion option over the properties. (CL&P 15, R. 38)

551. If the Council were to approve a different transmission line configuration through Mansfield Hollow USACE property than what is approved by the USACE, CL&P would have to request that this docket proceeding be reopened and the configuration be amended to match that approved by the USACE. (Tr. 6, p. 73)

552. The existing transmission line is centered within the ROW in the Mansfield Hollow area, leaving inadequate space in the remaining portion of the easement for the construction of a new transmission line. CL&P is currently negotiating with USACE regarding potential expansion of the ROW. (CL&P 1, Vol. 1, p. 1-11)

553. As part of the base line design, there are certain areas along the proposed route that would require taller steel poles. One such area is a 0.9-mile segment of the proposed route over federally-owned Mansfield Hollow State Park, Mansfield Hollow Wildlife Management Area (WMA), and Mansfield Hollow Lake in the Town of Mansfield. Another is a 0.5 mile segment through the Mansfield Hollow WMA in the Town of Chaplin. This 1.4 mile section of ROW is collectively referred to as the Mansfield Hollow area. The existing ROW in this area is 150 feet wide. (CL&P 1, Vol. 1, pp. 1-10, 3-4, 3-10)

554. The Mansfield Hollow area property is owned by the federal government under the umbrella of the U.S. Army Corps of Engineers (USACE). The property was acquired by the federal government in the 1950s to aid in flood control on the Thames River, which resulted in the creation of Mansfield Hollow Dam and Lake. The USACE leases the property to the Connecticut Department of Energy and Environmental Protection (CT DEEP). (CL&P 1, Vol. 1, pp. 1-10, 1-11)

No ROW Expansion

555. All proposed construction would occur within the existing 150-foot ROW, including access roads and construction staging areas. (CL&P 1, Vol. 1, p. 10-13)

556. Along Segment 1, the existing 330 Line is supported on five steel-pole delta structures and one steel-pole vertical structure that are between 106 and 137 feet high. These six existing structures would be removed and the 330 Line would be reconstructed near the southern ROW edge on six taller steel monopoles that range from 130 to 160 feet. The proposed 3271 Line would be installed on steel-monopole structures ranging in height from 130 feet to 155 feet. (CL&P 1, Vol. 1, pp. 10-13, 10-15)

557. Along Segment 2, the existing 330 Line, which is supported by five H-frame structures ranging in height from 73 to 81 feet, would be removed. The reconstructed 330 Line would be supported by steel-monopoles ranging in height from 110 to 130 feet. The proposed 3271 Line would be constructed on steel-monopoles ranging in height from 115 to 135 feet. (CL&P 1, Vol. 1, p. 10-15)

558. The transfer of the 330 Line to new structures would require multiple day outages of the lines. (CL&P 1, Vol. 1, p 10-17)

559. Construction of the proposed lines would affect most of the ROW in both segments, resulting in limitations for avoiding environmental resources in the ROW. Most vegetation within the entire 150-foot wide ROW would have to be removed for construction of the No ROW Expansion option. Following construction, the entire ROW width would be maintained as scrub-shrub. (CL&P 1, Vol. 1, p. 10-19)

560. Installation of the taller structures for the No ROW Expansion option may result in greater visual impact from locations near Mansfield Hollow State Park than the proposed structures. However, the existing transmission line structures are currently visible so the installation of new structures would have an incremental impact on the overall visibility of the transmission line. (CL&P 1, Vol. 1, p. 10-21)

561. The No ROW Expansion option would take longer to construct than the proposed configuration, which would potentially lengthen the duration of temporary nuisance effects on recreational users of the state park and WMA. (CL&P 1, Vol. 1, p. 10-22)

562. The No ROW Expansion Option would cost approximately $28.5 million. (CL&P 1, Vol. 1, p. 10-26)

Minimal ROW Expansion Option

563. The Minimal ROW Expansion Option includes the existing 330 Line remaining in place and the proposed 3271 Line being installed on monopoles in a vertical configuration in both Segment 1 and Segment 2. This option would require approximately 4.8 acres of additional easement from the USACE. (CL&P 1, Vol. 1, p. 10-27)

564. The proposed 345-kV line would be installed near the northern edge of the expanded ROW. New structures would range in height from 130 feet to 155 feet in Segment 1 and from 115 feet to 135 feet in Segment 2. (CL&P 1, Vol. 1, pp. 10-28, 10-29)

565. In Segment 1, vegetation in approximately 150 feet of the 175-foot ROW would be managed as scrub-shrub vegetation. Vegetation along the existing southern ROW edge would not be affected. In Segment 2, 180 feet of the 185-foot ROW would be maintained as scrub-shrub vegetation. The five-foot area of undisturbed vegetation would be along the southern ROW edge. (CL&P 1, Vol. 1, p. 10-30)

566. There are no temporary or permanent (fill) wetland effects expected for Segment 1. In Segment 2, there would be 0.3 acres of temporary wetland effects and less than 0.1 acres of permanent fill. Overall, there would be 7.5 acres of vegetation removal in Segment 1, all in upland areas. There would be 5.6 acres of vegetation removal in Segment 2, including 2.1 acres in wetland areas and 3.5 acres in upland areas. (CL&P 18)

567. Two vernal pools would be potentially affected in Segment 2. (CL&P 18)

568. The Minimal ROW Expansion Option would result in approximately one acre of temporary wetland impacts. (CL&P 18, p. 55)

569. The vertically-configured structures installed for the Minimal ROW Expansion Option would be up to 39 feet taller than the existing structures in Segment 1 and up to 60 feet taller than the existing structures in Segment 2. As with the NRE Option, the MRE Option may have greater visibility than the existing and proposed (11-acre Expansion) configuration due to increased height and the use of different structure types. However, the increased visual impact would be incremental because the existing structures, especially in Segment 1, are visible from Mansfield Hollow State Park and WMA. (CL&P 1, Vol. 1, p. 10-33)

570. Currently, the USACE prefers the minimal ROW Expansion Option on the federal property. (Tr. 4, p. 53)

571. The capital cost of the MRE Option is approximately $14.3 million. (CL&P 1, Vol. 1, p. 10-29)

11-acre ROW Expansion Option

572. The 11-acre ROW Expansion Option allows for the construction of the proposed transmission line on structures that generally match existing structures, thereby minimizing incremental visual impact. (CL&P 1, Vol. 1, pp. 10-26, 10-38)

573. The 11-acre ROW Expansion Option would require the most forested upland and wetland vegetation removal of the three options described. (CL&P 1, Vol. 1, p. 10-38)

574. Structure heights for the 11-acre expansion option would range from 115 to 145 feet in Segment 1 and 70 to 85 feet in Segment 2. (CL&P 1, Vol. 1, p. 10-39)

575. The 11-Acre ROW Expansion Option compared to the Minimal ROW Expansion would result in 6.2 more acres of easement to be acquired from USACE, 4.1 more acres of upland forest clearing, 1.2 more acres of forested wetland vegetation clearing. (CL&P 15, R. 39)

576. There would be no temporary or permanent (fill) effects to wetlands in Segment 1. In Segment 2, there would be 0.4 acres of temporary wetland effects and less than 0.1 acres of permanent fill. (CL&P 18)

577. Segment 1 would require 10.2 acres of vegetative clearing, including less than 0.1 acre in wetland areas and the remaining 10.2 acres in upland areas. Segment 2 would require 8.8 acres of vegetation removal, including 3.3 acres in wetland areas and 5.5 acres in upland areas. (CL&P 18)

578. Two vernal pools would be potentially affected in Segment 2. (CL&P 18)

579. The 11-acre Expansion Option would result in temporary impacts to approximately 1.3 acres of wetlands. (CL&P 18, p. 54)

580. The 11-acre ROW Expansion Option would cost approximately $13.0 million. (CL&P 1, Vol. 1, p. 10-26)

Statutory Facilities

581. Pursuant to CGS Section 16-50p(i), CL&P identified "Statutory Facilities," such as private or public schools, licensed child day-care facilities, licensed youth camps, public playgrounds and residential areas. (CL&P 1, Vol. 1, p. 5-69)

582. The proposed route would be within 500 feet a school and day care facilities:
a. Mount Hope Montessori School, Bassetts Bridge Road, Mansfield
b. Green Dragon Day Care, Bassetts Bridge Road, Mansfield
c. A residential day care, Hickory Lane, Brooklyn (625 feet away)
(CL&P 1, Vol. 1, p. 5-70; Tr. 7, p. 13)

583. There are no known youth camps or public playgrounds near the proposed route. (CL&P 1, Vol. 1, p. 5-70)

584. There are several homes near the proposed route. CL&P does not consider groups of homes along the proposed route as adjacent residential areas; however, it has identified these groups of homes as "focus areas" for the purpose of compliance with the Council's EMF Best Management Practices for the Construction of Electric Transmission lines in Connecticut. (CL&P 1, Vol. 1, pp. 5-70, 5-71)

VII. ELECTRIC AND MAGNETIC FIELDS

General

585. The Council last updated its *"Electric and Magnetic Field Best Management Practices for the Construction of Electric Transmission Lines in Connecticut"* (EMF BMPs) in December 2007 to address concerns regarding potential health risks from exposure to electric and magnetic fields (EMF) from transmission lines. (Council Admin. Notice 23; CL&P 1, Vol. 1, pp. 7-1, 7-2)

586. 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. (Council Admin. Notice 33, FOF # 281; CL&P 1, Vol. 1, pp. 7-2, 7-3)

587. EF is produced whenever voltage is applied to electrical conductors and equipment. For the purpose of engineering transmission projects, electric fields are typically measured in units of kilovolts/meter. As the weight of scientific evidence indicates that exposure to electric fields, beyond levels traditionally established for safety, does not cause adverse health effects, and as safety concerns for electric fields are sufficiently addressed by adherence to the National Electrical Safety Code, as amended, health concerns regarding EMF focus on MF rather than EF. (Council Admin. Notice 33, FOF #282; CL&P 1, Vol. 1, p. 7-2)

588. MF is produced by the flow of electric currents. The magnetic field 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. For the purpose of engineering transmission projects, magnetic fields are typically measured in units of milligauss (mG). (Council Admin. Notice 33, FOF #282; CL&P 1, Vol. 1, p. 7-3)

589. International health and safety agencies, including the World Health Organization (WHO), the International Agency for Research on Cancer (IARC), and the International Commission on Non-Ionizing Radiation Protection (ICNIRP), have studied the scientific evidence regarding possible health effects from MF produced by non-ionizing, low-frequency (60-Hertz (Hz)) alternating currents in transmission lines. Two of these agencies attempted to advise on quantitative guidelines for mG limits protective of health, but were able to do so only by extrapolation from research not directly related to health: by this method, the maximum exposure advised by the International Committee on Electromagnetic Safety (part of IARC) was 9,040 mG, and the maximum exposure advised by the ICNIRP was 833 mG. Otherwise, no quantitative exposure standards based on demonstrated health effects have been set world-wide for 60-Hz MF, nor are there any such state or federal standards in the U.S. (Council Admin. Notice 33, FOF #284)

590. No evidence has been offered to alter the conclusions of the World Health Organization's 2007 status report on EMF. Studies continue to show a weak correlation between elevated electromagnetic field levels and childhood leukemia. (DEEP Comments dated June 21, 2012)

591. The IEEE International Committee for Electromagnetic Safety has issued a guideline for long-term public exposure to MF of 9,040 mG. The International Commission on Non-Ionizing Radiation Protection's guideline for long-term public exposure is 2,000 mG. (CL&P 17, p. 82)

592. Since 2007, there have been eight or nine reviews of the scientific evidence related to health effects associate with EMF exposure. Some areas of interest have been closed, determining that there is no association between certain types of cancer and EMF exposure. Other areas, such as childhood leukemia, are still being studied. Since both childhood leukemia and long-term EMF exposure are rare, it is difficult to identify a large enough population of children with both for a conclusive study of association. (Tr. 4, pp. 73-75)

593. Consistent with the Council's EMF BMPs, CL&P began with a "base" design of the proposed project that includes "no-cost" magnetic field management features. CL&P then added in potential designs that are "low-cost" magnetic field management features at five locations along the project route. The five locations with potential low-cost magnetic field management designs are sections of the route that are near public or private schools, licensed child day care facilities, licensed youth camps, public playgrounds or near an area that the Council may determine to be a residential area. (CL&P 1, Vol. 1, p. 7-8)

594. Consistent with the Council's EMF BMPs, CL&P included in its low-cost design a goal of reducing magnetic field levels at the edges of the ROWs along the project route by more than 15 percent by spending no more than four percent of the estimated project cost using the base design, including the associated substation and switching station costs. (CL&P 1, Vol. 1, p. 7-8)

595. Locating a new transmission line on an existing ROW, adjacent to an existing transmission line, allows for phasing the conductors of the new line resulting in partial cancellation of magnetic fields from each of the two lines. CL&P designed the proposed project for best phasing of line currents in the same direction to reduce magnetic fields at no cost. For the section of the line between Card Street Substation and Lake Road Switching Station the proposed lines are very similar to the existing lines, which allows for the best reduction in MF. (CL&P 17, p. 49; Tr. 4, pp. 90, 91)

596. If the proposed line were constructed in a delta configuration, the three conductors of the line would be in different positions than the existing horizontally configured line. The result may be an MF reduction on the ROW edge closest to the proposed line; however, farther away from the delta configured line, the cancellation effects may revert to where there is not much difference or the H-frame line has better cancellation. The opposite edge of the ROW, closer to the existing H-frame configured line, may have higher MF levels because it is farther away from the proposed line. (Tr. 4, p. 92)

597. While equipment such as transformers within the associated substations and switching station may be a source of EMF, such equipment is not expected to have an effect on exposure to the general public. The fields that come from equipment within the substations and switching station would generally decrease rapidly with distance from the fence line. CL&P 1, Vol. 1, p. 7-9)

598. MF measurements represent a snapshot in time as MF varies depending on power supply and demand with the state and surrounding region. Conversely, EF is stable over time. (CL&P 1, Vol. 1, p. 7-10)

599. EMF calculations are based on voltage, current, line phasing and conductor configurations. Calculations are estimated perpendicular to the lines at the lowest point of conductor sag. The typical conductor height would be higher than the modeled height at most locations; therefore, magnetic fields would typically be lower than the predicted fields. (CL&P 1, Vol. 1, pp. 7-10, 7-11)

600. A typical bottom conductor height of 35 feet is assumed for calculations of EMF levels from a 345-kV line. (CL&P 1, Vol. 1, Appendix 7B, p. 7-13)

601. The system was modeled in 2015, which is the expected last year before the project would be operational, referred to as pre-Interstate. This modeling would include changes to the system previously approved by ISO-NE with in-service dates prior to 2015. The post-Interstate calculations were modeled for 2020, with all lines in service, referred to as post-NEEWS. The 2020 post-NEEWS calculations include the Rhode Island Reliability Project, the Greater Springfield Reliability Project, the Manchester to Meekville Junction Project, the Interstate Reliability Project, and a potential future Central Connecticut Reliability Project. (CL&P 1, Vol. 1, pp. 7-11, 7-12; CL&P 15, R. 34)

602. The calculations are run using: annual peak load (APL), from ISO-NE's 90/10 system peak loads in 2012 and estimated peak loads for 2020 using ISO-NE's projected 90/10 level in 2019 to 2020; peak daily average loads (PDAL) for a 24-hour period at 80% of the hourly peak load; and annual average loads (AAL) at 60% of the annual load factor for the New England Transmission System. (CL&P 1, Vol. 1, pp. 7-12, 7-13)

603. CL&P modeled the proposed transmission line using an H-Frame base design configuration, except along four segments of the route. The four segments include one segment within Mansfield Hollow, where the existing transmission line consists of a delta configuration and the proposed configuration is VERTICAL???; and three segments where CL&P proposes a delta 345-kV line configuration to comply with the Council's EMF BMPs. (CL&P 1, Vol. 1, pp. 7-16, 7-17)

604. CL&P identified five focus areas (referred to as Focus Areas A through E) along the proposed route that the Council may consider to be adjacent to public or private schools, licensed child day care facilities, public playgrounds, licensed youth camps and groups of residences. These focus areas were assessed for the potential low-cost magnetic field management designs. (CL&P 1, Vol. 1, p. 7-45)

605. In two of the identified focus areas, Focus Areas B and C, CL&P proposes the base design H-frame configuration of the proposed conductors. (CL&P 1, Vol. 1, p. 7-45)

606. CL&P calculated MF levels for each of the focus areas along the proposed project route. The calculations include a pre-project AAL load case for 2015; and a post-project AAL load case for 2020 for the proposed and each alternative line configuration. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-16)

607. The estimated capital cost of the Connecticut portion of the proposed project, including substation costs, is $213.7 million, assuming a base-line design. Per the Council's EMF BMPs CL&P calculated that 4 percent of the total project cost is $8.5 million. Therefore $8.5 million is the budget for CL&P to spend on low-cost magnetic field mitigation for the proposed project. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-2)

608. The cost of implementing the EMF BMP designs for Focus Areas A, D, and E is approximately $8.4 million. The additional costs associated with these designs are expected to be borne solely by Connecticut consumers. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-33)

Focus Area A

609. Focus Area A is a 2.3 mile section of the ROW in Coventry and Mansfield between structures 9028 and 9048 of the existing 330 Line. This is an area where there are homes near each side of the ROW along crossing streets. The Council may determine whether this is or is not a "residential area." (CL&P 1, Vol. 1, Appendix 7B, p. 7B-6)

610. MF and cost calculations for the section of ROW associated with Focus Area A is:

Configuration	Max. level on ROW* (mG)	MF % change-north edge	MF % change-south edge	% cost increase**	Cost of 2.3-mile section ($)	Incremental increase in cost ($)
Baseline	146.9	-	-	-	$10,320,459.	-
H-Frame +20'	131.2	-6%	-1%	0.6%	$11,616,544.	$1,296,085.
Delta	143.6	-28%	+12%	1.3%	$13,040,737.	$2,720,278.
Delta +20'	133.4	-25%	+10%	1.9%	$14,467,025.	$4,146,566.
Vertical	101.5	-20%	+32%	1.4%	$13,418,505.	$3,098,046.
Vertical +20'	105.8	-36%	+39%	2.0%	$14,680,935.	$4,360,476.
Split phase	127.1	-57%	+29%	4.2%	$19,358,355.	$9,037,896.

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-18)
*Typical location on the ROW for maximum magnetic field levels is directly underneath the conductors, midspan between the structures.
**The project percent cost increase resulting from design modification.

611. MF at nearby residences in Focus Area A are calculated as:

	Distance to nearest ROW edge (ft)	2015 pre-Interstate case	2020 post-NEEWs base design	2020 post-NEEWS delta design
Homes North of ROW	4	4.4 mG	6.7 mG	4.9 mG
Homes South of ROW	5	25.2 mG	16.2 mG	18.3 mG

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-20)

612. If an EMF BMP design is chosen, CL&P's preference in Focus Area A is the delta configuration, which yields the greatest reduction of MF levels on the north/west edge of the ROW and the least increase of MF levels on the south/east edge of the ROW. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-26)

613. Within the 2.3 mile Focus Area A there are four road crossings with three homes immediately adjacent to the north edge of the ROW and three homes immediately adjacent to the south edge of the ROW. (DEEP comments dated June 21, 2012)

Focus Area B

614. Focus Area B is a 0.9 mile section of the ROW in Mansfield between structures 9070 and 9078 of the existing 330 Line. In this section, the ROW is near a home day care and the Mount Hope Montessori School. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-6)

615. MF and cost calculations for the section ROW associated with Focus Area B are:

Configuration	Max. level on ROW* (mG)	MF % change-north edge	MF % change-south edge	% cost increase**	Cost of 0.9-mile section ($)	Incremental increase in cost ($)
Baseline	146.9	-	-	-	$3,879,199.	-
H-Frame +20'	131.2	-6%	-1%	0.2%	$4,386,589.	$507,390.
Delta	143.6	-28%	+12%	0.5%	$4,942,327.	$1,063,128.
Delta +20'	133.4	-25%	+10%	0.8%	$5,504,342.	$1,625,143.
Vertical	101.5	-20%	+32%	0.5%	$4,995,001.	$1,115,802.
Vertical +20'	105.8	-36%	+39%	0.8%	$5,581,315.	$1,702,116.
Split phase	127.1	-57%	+29%	1.7%	$7,559,719.	$3,680,520.

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-18)
*Typical location on the ROW for maximum magnetic field levels is directly underneath the conductors, midspan between the structures.
**The project percent cost increase resulting from design modification

616. MF calculations at the nearest corners of statutory facilities within Focus Area B are:

	Distance to nearest edge of ROW (ft)	2015 pre-Interstate case	2020 post-NEEWS base design	2020 post-NEEWS delta design
Mount Hope Montessori School	137	1.7 mG	1.2 mG	1.4 mG
Green Dragon Day Care	196	2.7 mG	0.9 mG	1.7 mG

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-20)

617. If an EMF BMP design is chosen in Focus Area B, CL&P's preference is the base-design H-frame configuration. The H-frame design would result in the lowest MF levels at the nearby statutory facilities in comparison to the delta configuration. The proposed project constructed on H-frame structures would also result in lower MF levels than the pre-Interstate calculations. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-27)

618. Magnetic field levels at Mount Hope Montessori School were calculated to be lower after operation of the proposed project than they are currently. The school property was appraised at approximately $650,000. The cost to build a new school is estimated at approximately $2,000,000. (Tr. 4, p. 116; Tr. 5, pp. 107, 113)

619. CL&P could install vegetation between the Mount Hope Montessori School and the CL&P ROW for visual screening. (Tr. 6, p. 15)

Focus Area C

620. Focus Area C is a 0.4-mile section of the ROW immediately adjacent to Focus Area B in Mansfield between structures 9078 and 9081 of the 330 Line. Along this section, the ROW crosses the Hawthorne Lane cul-de-sac residential development. The property owners on Hawthorne Lane have initiated negotiations with CL&P to shift a section of the existing ROW to the south, thereby moving the existing and proposed transmission lines farther from most of the homes in this development. The property owners would allow the shift on their properties but a release of a conservation easement by the Town of Mansfield would be required. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-6)

621. MF and cost calculations associated for the section of ROW associated with Focus Area C are:

Configuration	**Max. level on ROW* (mG)**	**MF % change-north edge**	**MF % change-south edge**	**% cost increase****	**Cost of 0.4-mile section ($)**	**Incremental increase in cost ($)**
Baseline	146.9	-	-	-	$3,311,244.	-
H-Frame +20'	131.2	-6%	-1%	0.1%	$3,561,195.	$249,951.
Delta	143.6	-28%	+12%	0.0%	$3,414,870.	$103,626.
Delta +20'	133.4	-25%	+10%	0.2%	$3,687,898.	$376,654.
Vertical	101.5	-20%	+32%	0.1%	$3,471,144.	$159,900.
Vertical +20'	105.8	-36%	+39%	0.3%	$3,846,612.	$535,368.
Split phase	127.1	-57%	+29%	1.2%	$5,941,222.	$2,629,978.
Vertical configuration of two lines on relocated ROW***	80.2	-72%	+25%	0.8%	$5,084,530	$1,773,286.

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-18)
*Typical location on the ROW for maximum magnetic field levels is directly underneath the conductors, midspan between the structures.
**The project percent cost increase resulting from design modification.
***north and south ROW edges are not the same as other configuration alternatives.

622. MF at nearby residences in Focus Area C are calculated as:

	Distance to nearest ROW edge (ft)	2015 pre-Interstate case	2020 post-NEEWs base design	2020 post-NEEWS delta design
Homes North of ROW	70	2.6 mG	2.5 mG	2.3 mG
Homes South of ROW	240	2.0 mG	0.6 mG	1.2 mG

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-20)

623. If an EMF BMP design were chosen for Focus Area C, CL&P's preference is a base design H-frame line configuration. A delta line configuration would result in lower MF levels on the northern ROW edge (the side with the most homes), however the predicted MF levels at the nearest homes would be only slightly lower than with the H-frame design. Additionally, MF levels from a line with the base design H-frames are calculated to be lower at the nearest homes than the 2015 pre-Interstate MF levels. With that said, due to property owner requests, CL&P investigated a shift of the ROW to the south over Hawthorne Lane and configuring the proposed line in a vertical configuration. This is referred to as the Hawthorne Lane Alternative. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-27)

624. The Hawthorne Lane Alternative would require new easements from each landowner to CL&P without purchase and the release of a conservation easement from the Town of Mansfield. The conductors would span the Hawthorne Lake roadway, a forested wetland system that contains three vernal pools. (CL&P 1, Vol. 1, Appendix 7B, pp. 7B-29, 7B-30)

Focus Area D

625. Focus Area D is a one mile section of the ROW in Brooklyn between structures 9210 and 9219 of the existing 330 Line. In this focus area, there are two home-based child day care facilities and a number of homes along Darby Road and Meadowbrook Drive. (CL&P 1, Vol. 1, Appendix 7B, pp. 7B-6, 7B-7)

626. MF and cost calculations for the section of ROW associated with Focus Area D are:

Configuration	**Max. level on ROW* (mG)**	**MF % change-north edge**	**MF % change-south edge**	**% cost increase****	**Cost of 1-mile section ($)**	**Incremental increase in cost ($)**
Baseline	146.9	-	-	-	$5,118,233.	-
H-Frame +20'	131.2	-6%	-1%	0.3%	$5,764,942.	$646,719.
Delta	143.6	-28%	+12%	0.7%	$6,529,045.	$1,410,812.
Delta +20'	133.4	-25%	+10%	1.0%	$7,278,072.	$2,159,839.
Vertical	101.5	-20%	+32%	0.7%	$6,579,640.	$1,461,407.
Vertical +20'	105.8	-36%	+39%	1.0%	$7,244,063.	$2,125,830.
Split phase	127.1	-57%	+29%	2.1%	$9,686,576.	$4,568,343.

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-19)
*Typical location on the ROW for maximum magnetic field levels is directly underneath the conductors, midspan between the structures.
**The project percent cost increase resulting from design modification.

627. MF at nearby statutory facilities in Focus Area D are calculated as:

	Distance to nearest ROW edge (ft)	2015 pre-Interstate case	2020 post-NEEWs base design	2020 post-NEEWS delta design
Susan Kirconnell Day Care	497	0.4 mG	0.1 mG	0.3 mG

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-20; Tr. 7, p. 13)

628. CL&P's EMF BMP design preference in Focus Area D is the base case design H-frame. Although other line configurations would reduce MF levels on the northern ROW edge, all alternative configurations are more expensive and the reduction of MF levels would be offset by the additional visual impact of any other structure types. (CL&P 1, Vol. 1, Appendix 7B, pp. 7B-30, 7B-31)

Focus Area E

629. Focus Area E is a 0.6 mile section of the ROW in Putnam between structures 9305 and 9310 of the existing 347 Line. This section of the ROW crosses the rear portion of residential properties on Elvira Heights. There are 15 homes within 400 feet of the ROW, the nearest of which is about 115 feet from the southeast ROW edge. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-7)

630. MF and cost calculations for the section of ROW associated with Focus Area E are:

Configuration	Max. level on ROW* (mG)	MF % change-north edge	MF % change-south edge	% cost increase**	Cost of 0.6-mile section ($)	Incremental increase in cost ($)
Baseline	146.9	-	-	-	$3,141,826.	-
H-Frame +20'	131.2	+14%	0%	0.1 %	$3,411,990.	$270,164.
Delta	143.6	+50%	+4%	0.3%	$3,779,466.	$637,640.
Delta +20'	133.4	+59%	+3%	0.4%	$4,014,011.	$872,185.
Vertical	101.5	+50%	+6%	0.6%	$4,433,135.	$1,291,309.
Vertical +20'	105.8	+41%	+7%	0.8%	$4,861,558.	$1,719,732.
Split phase	127.1	+50%	+6%	1.6%	$6,472,509.	$3,330,683.
Vertical for existing and proposed	61	-23%	-37%	2.9%	$9,396,201.	$6,254,375.
Delta for existing and proposed	73.2	-18%	-35%	2.0%	$7,415,909.	$4,274,083.
H-frame with 45-foot westward shift of existing and proposed	112.7	+86%	-57%	3.3%	$10,202,048.	$7,060,222.
Vertical for existing and proposed with both shifted to center of ROW	59.5	+32%	-69%	3.4%	$10,305,500.	$7,163,674.

(CL&P 1, Vol. 1, Appendix 7B, p. 7B-24)
*Typical location on the ROW for maximum magnetic field levels is directly underneath the conductors, midspan between the structures.
**The project percent cost increase resulting from design modification.

631. CL&P prefers not to shift the ROW. CL&P also prefers not to rebuild the existing line as a delta or vertical configuration because of the expense and need for line outages; however, this is the only practical EMF BMP alternative. (CL&P 1, Vol. 1, Appendix 7B, p. 7B-32)

632. The CL&P-preferred EMF BMP design for Focus Area E would have environmental effects, including:
   a. A decrease in the amount of upland and wetland forest removal on the north edge of the ROW.
   b. An increase in the amount of vegetation disturbance along the ROW due to the construction of two transmission lines.
   c. An increase in temporary and permanent effects to wetlands and watercourses.

   (CL&P 1, Vol. 1, Appendix 7B, pp. 7B-32)

Base-Design EMF Calculations

Cross-Section 1

633. Cross Section 1 (XS-1) extends 2.8 miles between Card Street Substation and Babcock Hill Junction. The ROW is 350 feet in width and currently contains a 345-kV transmission line and a double-circuit 69-kV transmission line. (CL&P 1, Vol. 1, p. 7-17)

634. MF and EF measurements taken from a location within XS-1 at 4 Scalise Drive in Columbia at the southwest edge of the ROW produced values of 5.8 mG for MF, and 0.005 kV/m for EF. The measurement location at the edge of the ROW is approximately 190 feet from the centerline of the proposed transmission line. (CL&P 1, Vol. 1, p. 7-17)

635. In XS-1, the proposed 345-kV transmission line would be installed on H-frame structures, between the existing 69-kV transmission line and the existing 345-kV H-frame line. AAL MF calculations at the edges of the ROW are:

	West/South edge of ROW	East/North Edge of ROW
XS-1 (2015 case)	7.6 mG	28.2 mG
XS-1 (2020 case)	5.8 mG	18.7 mG

(CL&P 1, Vol. 1, pp. 7-18, 7-19)

Cross-Section 2 BMP

636. Cross-Section 2 BMP (XS-2 BMP) extends 2.8 miles between Babcock Hill Junction and the vicinity of Highland Road. This surrounding area is known as Focus Area A. The ROW is 300 feet in width and currently contains an existing 345-kV transmission line. There is a collection of homes near this segment of the ROW. (CL&P 1, Vol. 1, pp. 7-19, 7-45)

637. CL&P took MF and EF measurements for this cross section near a home at the northwest edge of the ROW at 164 Stafford Road in Mansfield. MF was measured at 8.2 mG and EF was measured at 0.017 kV/m at a distance of 150 feet from the proposed transmission line location. (CL&P 1, Vol. 1, p. 7-19)

638. In XS-2 BMP, the proposed 345-kV line would be constructed on a steel pole with conductors in a delta configuration to be located to the north/west of the existing structure. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-2 BMP (2015 case)	4.6 mG	28.0 mG
XS-2 BMP (2020 case)	5.2 mG	20.6 mG

(CL&P 1, Vol. 1, p. 7-20)

639. The cost of implementing the alternative configuration identified in XS-2 BMP would be an addition $2,720,300 or 1.3 percent over the base design cost of the project. (CL&P 1, Vol. 1, p. 7-46)

Cross-Section 2

640. Cross-Section 2 (XS-2) extends 3.3 miles within Mansfield from the vicinity of Highland Road to Mansfield Hollow State Park. The ROW is 300 feet wide and currently contains an existing 345-kV transmission line. Two "focus areas," one with a home day care facility and a school, and one including a collection of homes are near the ROW in XS-2. (CL&P 1, Vol. 1, p. 7-21)

641. Measurements were taken at the edge of the ROW near the Green Dragon home day care and the Mount Hope Montessori School both on Bassetts Bridge Road in Mansfield. At the home day care, MF was measured at 28.4 mG and EF at 0.007 kV/m at 160 feet from the centerline of the proposed transmission line. At the school, MF was measured at 6.6 mG and EF at 0.107 kV/m at 150 feet from the centerline of the proposed transmission line. (CL&P 1, Vol. 1, p. 7-21)

642. In XS-2, the proposed 345-kV line would be constructed on H-frame structures to the west/north of the existing transmission lines. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-2 (2015 case)	4.6 mG	28.0 mG
XS-2 (2020 case)	7.2 mG	18.4 mG

(CL&P 1, Vol. 1, p. 7-22)

Cross-Section 3

643. Cross-Section 3 (XS-3) extends about one mile through federally-owned property of Mansfield Hollow State Park, Mansfield Hollow Lake, and the Mansfield Hollow WMA. The ROW is 150 feet in XS-3. The existing transmission line structures in this segment are steel pole with conductors in a delta configuration. (CL&P 1, Vol. 1, p. 7-23)

644. In XS-3, the proposed 345-kV line would be constructed on vertical structures to the west/north of the existing transmission lines. Calculations at the proposed edges of the ROW assumed a ROW expansion of 55 feet. AAL MF calculations at the proposed edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-3 (2015 case)	8.8 mG	24.7 mG
XS-3 (2020 case)	24.1 mG	22.3 mG

(CL&P 1, Vol. 1, p. 7-24)

Cross-Section 4

645. Cross-Section 4 (XS-4) extends 0.8 miles between Bassetts Bridge Road and Shuba Lane. The ROW is 300 feet wide and currently contains an existing 345-kV transmission line. (CL&P 1, Vol. 1, p. 7-25)

646. The proposed transmission line would be installed on H-frame structures to the west/north of the existing 345-kV line. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-4 (2015 case)	4.6 mG	28.0 mG
XS-4 (2020 case)	7.2 mG	18.4 mG

(CL&P 1, Vol. 1, pp. 7-25, 7-26)

Cross-Section 5

647. Cross-Section 5 (XS-5) extends 0.5 miles along a 150-foot wide ROW through federally-owned land of the Mansfield Hollow WMA in Chaplin. The ROW currently contains an existing 345-kV transmission line on H-frame structures. (CL&P 1, Vol. 1, p. 7-26)

648. CL&P proposes to construct the 345-kV transmission line in an H-frame configuration to be consistent with the existing structures. To accommodate the construction of H-frame structures, CL&P proposes an approximately 85-foot wide ROW expansion on the federal property. (CL&P 1, Vol. 1, p. 7-26)

649. The proposed transmission line would be installed on H-frame structures to the west/north of the existing 345-kV line. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-5 (2015 case)	8.3 mG	35.2 mG
XS-5 (2020 case)	25.1 mG	24.1 mG

(CL&P 1, Vol. 1, p. 7-27)

Cross-Section 6

650. Cross-Section 6 (XS-6) extends 12.6 miles on the ROW between Willimantic Road and Day Street Junction. The existing ROW in XS-6 is 300 feet and currently consists of one 345-kV transmission line. (CL&P 1, Vol. 1, p. 7-28)

651. The proposed transmission line would be located on H-frame structures to the west/north of the existing transmission line. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-6 (2015 case)	4.6 mG	28.0 mG
XS-6 (2020 case)	7.2 mG	18.4 mG

(CL&P 1, Vol. 1, p. 7-29)

Cross-Section 6 BMP

652. Cross-Section 6 BMP (XS-6 BMP) extends one mile from west of Church Street to Day Street Junction in Brooklyn. This surrounding area is known as Focus Area D. The existing ROW is 300 feet wide and consists of an existing 345-kV transmission line. A home day care facility and several homes are located near XS-6 BMP. (CL&P 1, Vol. 1, pp. 7-29, 7-45)

653. The proposed 345-kV line would be constructed on steel monopoles in a delta configuration on the west/north side of the ROW. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-6 BMP (2015 case)	4.6 mG	28.0 mG
XS-6 BMP (2020 case)	5.2 mG	20.6 mG

(CL&P 1, Vol. 1, p. 7-31)

654. The cost of implementing the alternative configuration identified in XS-6 BMP would be an additional $1,410,800 or 0.7 percent above the base design cost of the project. (CL&P 1, Vol. 1, p. 7-46)

Cross-Section 7

655. Cross-Section 7 (XS-7), extends 2.3 miles between Day Street Junction and Hartford Turnpike. The ROW is 360 feet wide and currently consists of a 345-kV transmission line, and two 115-kV transmission lines. (CL&P 1, Vol. 1, p. 7-32)

656. The proposed 345-kV transmission line would be installed on H-frame structures on the west/south side of the ROW. AAL MF calculations at the edges of the ROW are:

	West/South edge of ROW	East/North Edge of ROW
XS-7 (2015 case)	6.4 mG	16.6 mG
XS-7 (2020 case)	20.0 mG	18.7 mG

(CL&P 1, Vol. 1, p. 7-33)

Cross-Section 8

657. Cross-Section 8 (XS-8) extends 2.6 miles between Hartford Turnpike and Lake Road Junction. The ROW is 360 feet wide and currently consists of one 345-kV transmission line, and two 115-kV transmission lines. (CL&P 1, Vol. 1, pp. 7-33, 7-34)

658. The proposed 345-kV transmission line would be positioned in between the two existing 115-kV structures and the one 345-kV structure. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-8 (2015 case)	15.1 mG	27.1 mG
XS-8 (2020 case)	19.3 mG	17.6 mG

(CL&P 1, Vol. 1, p. 7-35)

Cross-Section 9

659. Cross-Section 9 (XS-9) extends 0.2 miles between Lake Road Junction and Lake Road Switching Station. The ROW is 250 feet wide and currently contains two existing 345-kV lines supported by steel monopoles. (CL&P 1, Vol. 1, p. 7-35)

660. The proposed 345-kV transmission line would be installed on two steel monopoles with the conductors in a vertical configuration. The new line would be between the two existing transmission lines. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-9 (2015 case)	9.7 mG	34.3 mG
XS-9 (2020 case)	20.8 mG	19.9 mG

(CL&P 1, Vol. 1, p. 7-36)

Cross-Section 10

661. Cross-Section 10 (XS-10) extends 0.7 miles between Lake Road Junction and Killingly Substation. The ROW is 400 feet wide and currently contains one 345-kV transmission line and two 115-kV transmission lines all on H-frame structures. (CL&P 1, Vol. 1, p. 7-37)

662. The proposed 345-kV transmission line would be installed on H-frame structures in between the existing 345-kV line and the 115-kV lines. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-10 (2015 case)	17.0 mG	5.1 mG
XS-10 (2020 case)	16.7 mG	11.2 mG

(CL&P 1, Vol. 1, p. 7-38)

Cross-Section 11

663. Cross-Section 11 (XS-11) extends 1.7 miles between the Killingly Substation and Heritage Road in Putnam. The existing ROW is 340 feet wide and consists of an existing 345-kV transmission line and a double-circuit 23-kV distribution line. (CL&P 1, Vol. 1, p. 7-39)

664. The proposed 345-kV line would be installed on H-frame structures in between the existing 345-kV line and the existing distribution line. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-11 (2015 case)	2.5 mG	7.2 mG
XS-11 (2020 case)	2.5 mG	20.4 mG

(CL&P 1, Vol. 1, p. 7-40)

Cross-Section 12

665. Cross-Section 12 (XS-12) extends 4.5 miles between Heritage Road in Putnam and the Connecticut/Rhode Island border in Thompson, excluding the Elvira Heights area in Putnam. The ROW is 300 feet wide and currently consists of one 345-kV transmission line. (CL&P 1, Vol. 1, p. 7-41)

666. The proposed 345-kV transmission line would be installed on H-frame structures to the west/north of the existing 345-kV line. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-12 (2015 case)	1.2 mG	7.2 mG
XS-12 (2020 case)	2.2 mG	20.4 mG

(CL&P 1, Vol. 1, p. 7-42)

Cross-Section 12 (BMP)

667. Cross-Section 12 BMP (XS-12 BMP) extends 0.6 miles from immediately south of Route 44 and parallel to the Elvira Heights residential subdivision in Putnam. This is referred to as Focus Area E. The ROW is 300 feet wide and currently contains one existing 345-kV transmission line supported on H-frame structures. While no statutory facilities exist in this area, there are a collection of residents along Elvira Heights Court. (CL&P 1, Vol. 1, p. 7-43)

668. Measurements of existing conditions were taken at 12 Elvira Heights in Putnam. MF was measured at 25.4 mG, while EF measurements were not collected due to vegetative shielding of the electric field at this location. (CL&P 1, Vol. 1, p. 7-43)

669. CL&P proposes to reconstruct the existing 345-kV line, changing the structures from H-frame to steel monopoles in a delta conductor configuration. The proposed new 345-kV transmission line would also be constructed on steel monopoles with a delta conductor configuration. AAL MF calculations at the edges of the ROW are:

	West/North edge of ROW	East/South Edge of ROW
XS-12 BMP (2015 case)	1.2 mG	7.2 mG
XS-12 BMP (2020 case)	1.8 mG	13.3 mG

(CL&P 1, Vol. 1, p. 7-44)

670. The cost of implementing the alternative configuration identified in XS-12 BMP would be an additional $4,274,000 or 2.0 percent above the base design cost of the project. (CL&P 1, Vol. 1, p. 7-46)