EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

ES.1.1 Interstate Reliability Project: Purpose and Location

The Connecticut Light and Power Company (CL&P), a wholly-owned subsidiary of Northeast Utilities (NU), along with The Narragansett Electric Company and New England Power Company, both of which are wholly-owned subsidiaries of National Grid USA (National Grid), propose to construct and operate new 345-kilovolt (kV) electric transmission lines and to make related modifications and improvements to existing 345-kV and 115-kV transmission lines and facilities in northeastern Connecticut, northwestern Rhode Island, and south-central Massachusetts. These proposed electric transmission system improvements, referred to as the Interstate Reliability Project, are part of a family of four projects, collectively known as the New England East-West Solution (NEEWS) projects[1]. Together, the NEEWS projects would address electric system problems in Southern New England.

As part of NEEWS, the Interstate Reliability Project would improve the bulk power electric transmission system Southern New England and achieve future compliance with applicable national and regional reliability standards and criteria. Figure ES-1 illustrates the locations of the electric transmission facilities that CL&P and National Grid propose as part of the Interstate Reliability Project. These proposed facilities include approximately 75 miles of new 345-kV transmission lines to be developed predominantly within existing utility rights-of-way (ROWs), as well as modifications to substations and switching stations.

[1] The Greater Springfield Reliability Project, one of the four NEEWS projects, was approved by the Connecticut Siting Council in 2010 under Docket 370.

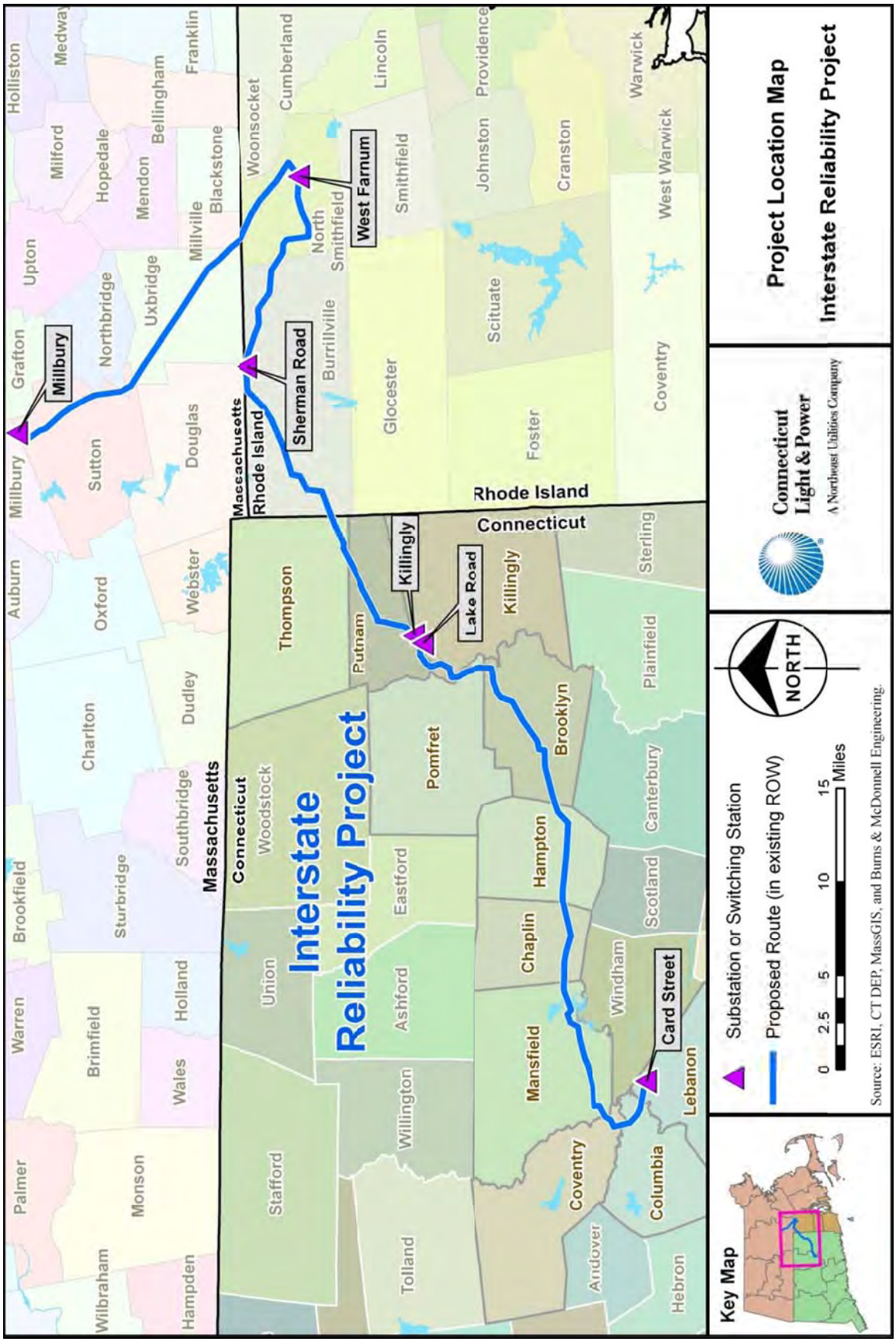


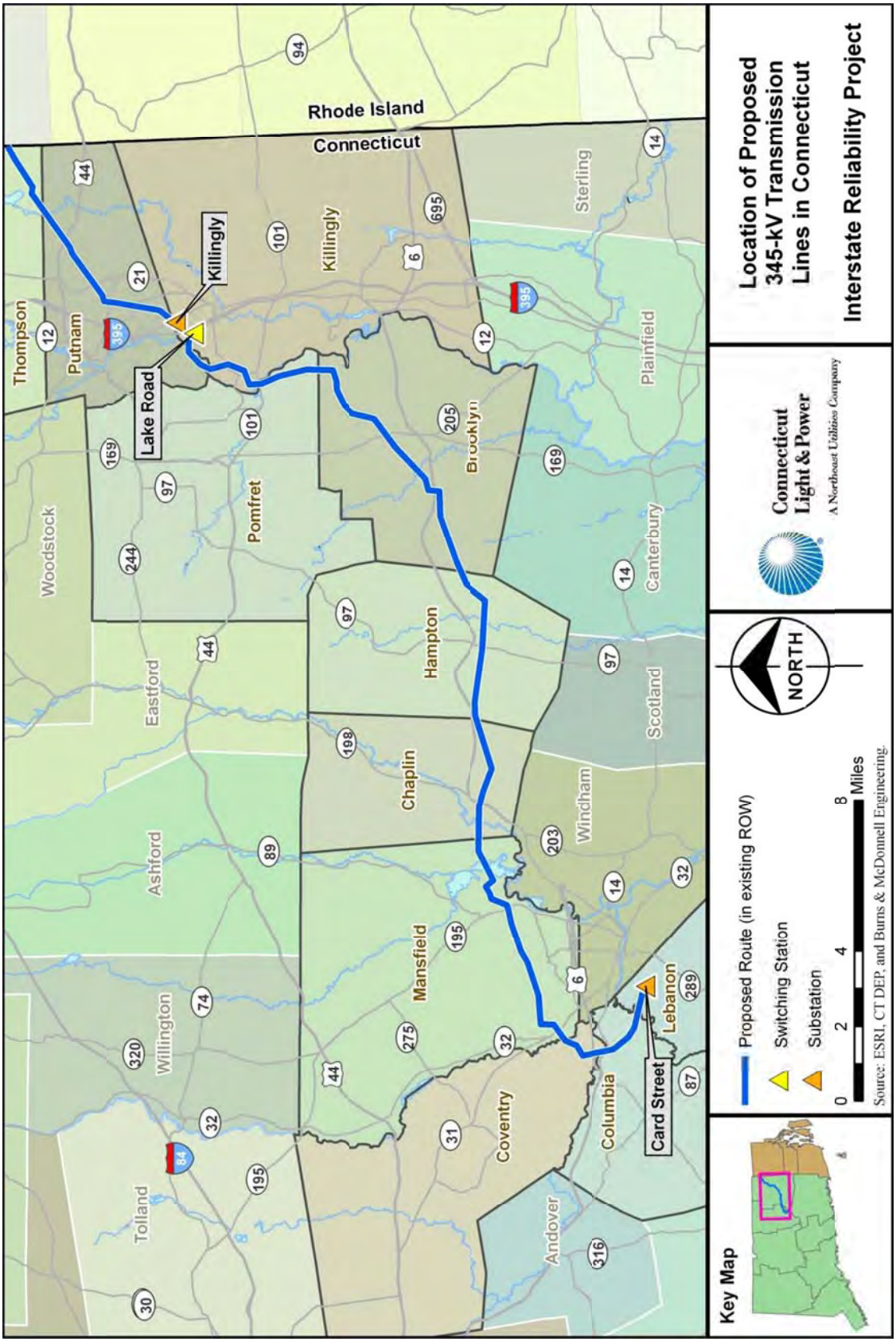
Figure ES-1: Project Location Map: Interstate Reliability Project

The Interstate Reliability Project would increase the capability of the transmission system to move power into Connecticut from the rest of New England, to move power from resources in eastern New England to load in western New England, and to move power from resources in western New England to load in eastern New England. In addition, the Interstate Reliability Project would eliminate violations of reliability standards that existing in Rhode Island at current load levels, specifically overloads and non-compliant o voltages. By reinforcing the electrical connections between key substations and switching stations in Connecticut, Rhode Island, and Massachusetts, the proposed improvements would address reliability violations that would otherwise occur within the 10-year period for which the system must be planned, and would provide long-term flexibility to maintain and operate the transmission system serving all three states and flexibility to dispatch existing and potential future generation resources efficiently for all three states and the New England region.

ES.1.2 Connecticut Portion of the Interstate Reliability Project

The Connecticut facilities proposed as part of the Interstate Reliability Project represent the culmination of extensive analyses. During this process, CL&P, in partnership with the Independent System Operator – New England (ISO-NE) and National Grid, initially conducted detailed evaluations of system alternatives. After these studies led to the selection of a preferred system solution for the new 345-kV lines and related facilities in the three-state area, CL&P then identified and investigated potential line-route alternatives, route variations, and transmission line designs before selecting a Proposed Route and overhead transmission line configurations for the Connecticut portion of the Interstate Reliability Project. The Connecticut portion of the Interstate Reliability Project is hereinafter referred to as “the Project”. The Proposed Route and overhead transmission line configurations, consisting of the following facilities (refer to Figure ES-2), best meet CL&P’s objectives for providing reliable, cost-effective, and environmentally sound improvements to the regional electric transmission system:

Figure ES-2: Location of Proposed 345-kV Transmission Lines and Substation / Switching Stations to be Modified in Connecticut



- 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). The overhead line design along this Proposed Route incorporates CL&P's preferred Best Management Practices (BMPs) designs for reducing magnetic fields.

- Related additions at CL&P's existing Card Street Substation, Lake Road Switching Station, and Killingly Substation.

The proposed 345-kV transmission lines between Card Street Substation, Lake Road Switching Station, and the Connecticut / Rhode Island border would traverse approximately 36.8 miles, crossing portions of 11 towns in northeastern Connecticut. The new 345-kV transmission lines (which are proposed for designation in the CL&P system as the 3271 Line and the 341 Line) would be constructed overhead and aligned adjacent to the existing 345-kV overhead transmission lines that presently occupy existing CL&P ROWs.[2] The existing 345-kV transmission lines were constructed in the early 1970s. Segments of the existing ROWs also include other overhead transmission lines (e.g., 69 kV and 115 kV), as well as distribution lines (23 kV).

Table ES-1 identifies the width of the existing CL&P ROWs that the Proposed Route would follow through the 11 Connecticut towns. With the exception of 1.4 miles in the towns of Mansfield and Chaplin (representing approximately 4% of the 36.8-mile Proposed Route), the existing CL&P ROWs along which the proposed 345-kV lines would be aligned are approximately 300 feet wide (or more), and have sufficient un-used width to accommodate a new overhead 345-kV transmission line without the need for additional easement acquisition or a need to rebuild and reconfigure the existing line. However, for 0.9 mile in the Town of Mansfield and 0.5 mile in the Town of Chaplin (referred to collectively as the "Mansfield Hollow area"), the existing CL&P ROW is 150 feet wide and traverses property owned by the federal government under the auspices of the U.S. Army Corps of Engineers (USACE).

[2] The 3271 Line would extend approximately 29.3 miles from Card Street Substation to Lake Road Switching Station adjacent to the existing 330 Line, whereas the 341 Line would extend approximately 7.5 miles from Lake Road Switching Station to the Connecticut / Rhode Island border adjacent to the 3348 Line and then the 347 Line.

Table ES-1: Proposed 345-kV Transmission Lines, By ROW (Miles) in Connecticut Towns

Town	ROW	
	Miles	Width Range (Feet, Typical)
Lebanon	0.6	350
Columbia	1.7	300-350
Coventry	1.2	300
Mansfield	6.4	150*-300
Chaplin	3.3	150*-300
Hampton	4.3	300
Brooklyn	7.2	300-360
Pomfret	1.7	360
Killingly^	3.0	250-400
Putnam^	5.6	340-400
Thompson	1.8	300
Total	**36.8**	

* = CL&P's existing easement is 150 feet wide across federally-owned properties for approximately 0.9 mile in the Town of Mansfield and 0.5 mile in the Town of Chaplin.
^= Following CL&P's existing ROWs, the Proposed Route extends northeast across Killingly into Putnam, back into Killingly, and then into Putnam.

The Mansfield Hollow area property was acquired by the federal government approximately 60 years ago in conjunction with federal projects, such as the creation of Mansfield Hollow Dam and Lake, designed to control flooding on the Thames River. The USACE currently leases the property to the Connecticut Department of Energy and Environmental Protection (CT DEEP), which manages it as Mansfield Hollow State Park and the Mansfield Hollow Wildlife Management Area (WMA).

CL&P's existing overhead 345-kV transmission line is centered within the 150-foot-wide ROW across the 1.4 miles of federally-owned properties, leaving insufficient width to install and properly separate the new overhead 345-kV line adjacent to the existing 345-kV line within the current easement. After investigating various alternative routes and transmission line designs for the 1.4-mile ROW in the Mansfield Hollow area, CL&P determined that the acquisition of additional easement from the USACE to

build and operate a new overhead 345-kV line adjacent to the existing 345-kV line, using structures of similar height and appearance, would be best.[3]

Accordingly, the Proposed Route reflects CL&P's proposed acquisition from the USACE of approximately 11[4] additional acres of easement to expand the ROW and allow the development of the new overhead 345-kV line structures, adjacent to and generally matching the appearance of the existing 345-kV line, through the 1.4 miles of federal property. CL&P is presently engaged in consultations with the USACE regarding the alignment of the proposed 345-kV transmission line across the federally-owned lands.

ES.1.3 The Connecticut Siting Council Application: Organization and Content

The Connecticut portion of the Interstate Reliability Project is subject to the regulations of the Connecticut Siting Council (Council) and other state and federal regulatory agencies. Accordingly, CL&P submits this Application for a Certificate of Environmental Compatibility and Public Need (Application) to the Council.

The Application consists of 11 volumes, as follows:

- Volume 1 presents detailed information concerning the proposed Project, including the Proposed Route, transmission facilities design, construction and operation procedures, existing environmental conditions, potential environmental effects and mitigation measures, and electric and magnetic field (EMF) information.

[3] CL&P identified and evaluated two other feasible options for aligning the new 345-kV line across the federally-owned properties: a No ROW Expansion Option, which would involve rebuilding the existing 345-kV line through the federally-owned properties, but would not require any additional easement from the USACE, and a Minimal ROW Expansion Option, which would require only approximately 4.8 acres of additional easement from the USACE. Both of these options would, however, require the use of taller line structures and would be more costly than the Proposed Configuration. Section ES.8 summarizes these options, which are discussed in detail in Volume 1, Section 10.

[4] This additional easement acreage calculation is estimated based on preliminary survey data and takes into consideration the configuration of the existing CL&P easement. Final easement acreages would be determined based on final legal surveys and agreements with the USACE.

- Volume 1A describes the Project alternatives considered and presents detailed information concerning overhead and underground transmission line variations to portions of the Proposed Route.

- Volume 2 provides detailed information concerning water resource (wetlands and watercourse) field investigations conducted along the Proposed Route.

- Volume 3 presents data regarding archaeological and historic (cultural) resources in the Project region and in the vicinity of the Proposed Route.

- Volume 4 consists of technical reports concerning biological resources along the Proposed Route, including vernal pools and amphibian breeding habitat, breeding birds, and insects (moth / butterflies), as well as copies of correspondence between CL&P and regulatory agencies.

- Volume 5 includes detailed electric transmission system planning reports.

- Volume 6 consists of NU standards and best management practices for erosion and sedimentation control, as well as vegetation management along ROWs.

- Volume 7 includes detailed drawings of the proposed modifications to the Card Street Substation, Killingly Substation, and Lake Road Switching Station.

- Volume 8 contains a visual resource assessment study of the Proposed Route, including photographic simulations that illustrate the anticipated appearance of the proposed transmission lines at specific visual resource sites along the Proposed Route.

- Volume 9 includes aerial photography based maps, at a scale of 1" = 400', that depict the location of the Proposed Route, Mansfield Hollow ROW options, and variations in relation to land uses and environmental resources. The maps include accompanying facing-page text that summarizes the key resource features both in the vicinity of and along the Proposed Route, Mansfield Hollow ROW options, and variations. Cross-sections that illustrate the proposed configuration of the transmission lines along each alignment also are included.

- Volume 10 consists of Plan & Profile drawings of the Proposed Route, as well as full-size cross-sections of the Proposed Route. Photographs of the existing ROW and photo-simulations that illustrate views of the ROW with the new 345-kV line are included on the page facing the cross-sections of the Proposed Route.

- Volume 11 provides aerial-photography based maps, at a scale of 1" = 100' that provide a closer view of the Proposed Route, including proposed structure locations and structure location envelopes, existing and potential access roads, and environmental features such as wetlands, streams, vernal pools / amphibian breeding habitat, and various land uses.

ES.2 PROJECT NEED AND CONNECTICUT BENEFITS

The New England region's bulk-power electric system (including Connecticut) serves 14 million people living in a 68,000 square-mile area. There are more than 300 New England electric generating units, which are capable of producing a total of approximately 32,000 megawatts (MW) of electricity; most of these generating units are connected to approximately 8,000 miles of high-voltage transmission lines. Twelve transmission tie lines interconnect New England with neighboring electric systems in New York and the Canadian provinces of New Brunswick and Québec. In addition to these power-supply resources and transmission interconnections, New England depends upon significant demand-reducing resources. As of the summer 2011, approximately 2,035 MW of demand-reducing resources, including "behind the meter" generators, were registered as part of the ISO-NE Forward Capacity Market. Customers in these programs agree to reduce load quickly to enhance system reliability.

The Federal Energy Regulatory Commission (FERC) has designated all of New England as a single operating control area, and has designated ISO-NE as the independent system operator for the New England region. As such, ISO-NE is responsible for operating New England's bulk-power generation and transmission system, overseeing and administering the region's wholesale electricity markets, and managing the regional bulk-power system planning process.

New England's bulk-power supply system is planned to be fully integrated and seeks to use all regional generating resources to serve all regional load, regardless of state boundaries. Most of the transmission lines are relatively short and networked as a tightly integrated grid. Therefore, the electrical performance of one part of the system affects all areas of the system.

The New England region reached a record summer peak load of 28,130 MW on August 2, 2006, due to extreme temperatures and humidity throughout the region. In accordance with ISO-NE operating procedures, demand-response programs were activated, and this action reduced the peak demand for

electric power by approximately 640 MW. In the absence of these programs, the peak load would have been 28,770 MW. Although this peak load level has not been exceeded since 2006, it has been approached. For example, notwithstanding the recent economic downturn, on July 22, 2011, load peaked at 27,702 MW – the second highest peak ever recorded in New England. This load was net of 643 MW of real-time demand resources that were dispatched by ISO-NE.

The Southern New England area (SNE), which encompasses Massachusetts, Rhode Island, and Connecticut, accounts for approximately 80% of the total New England load. Customer load in SNE, which is concentrated in the Boston area, central Massachusetts, Springfield, Rhode Island, Hartford, and southwestern Connecticut, exceeds available local generation capacity. Accordingly, power is routinely transmitted to SNE from generators in northern New England and Canada.

The Interstate Reliability Project is needed to better integrate the electric supply systems of the three Southern New England states for the benefit of all of New England. It will also yield significant benefits to Connecticut electric customers. Such benefits will include increasing Connecticut's ability to import power and providing increased access to newer, less-polluting power generating resources.

Of all the New England states, Connecticut is the least able to import power to supplement its internal supply resources. New Hampshire, Vermont and Rhode Island have enough import capability to serve 100% of their peak load. Massachusetts and Maine can import slightly less than 50% of their peak load. Connecticut, however, can import only approximately 33% of its peak load even after the improvement in its import capability following completion of the Greater Springfield Reliability Project (one of the NEEWs projects involving the development of new 345-kV facilities [currently being constructed] in the Greater Springfield – north-central Connecticut region).

In sum, the Interstate Reliability Project is needed to fully integrate generation with load throughout SNE by eliminating transmission constraints on the transfer of power from east to west and from west to east.

At the same time, the Project will resolve remaining reliability issues within Rhode Island and provide needed power-import capability to Connecticut. It will ensure that the approximately 2,500 MW of generation along the Card Street Substation (Connecticut) – West Medway (Massachusetts) corridor[5], most of which is relatively new and efficient, can be called upon to more reliably serve load in both western and eastern New England, as needed, over the long-term planning horizon. The bulk-power transmission system will be capable of carrying sufficient power to meet peak customer demand needs in the event one of the 345-kV transmission lines (interfaces) that transfers power across the region is lost suddenly, or other design contingencies occur. Moreover, the Interstate Reliability Project will have potential environmental benefits, serving as an essential link to the regional transmission network that provides access to out-of-state renewable energy resources.

ES.3 TECHNICAL DESCRIPTION OF THE PROPOSED PROJECT FACILITIES

Approximately 96% (35.4 miles) of the Proposed Route for the new transmission lines would be located entirely within existing CL&P ROWs. Of the 35.4 miles of the Proposed Route in CL&P's existing ROWs, approximately 5 miles would extend across property that CL&P owns. CL&P is only seeking approximately 11 additional acres of easement along the 1.4 miles of USACE-owned property in the Mansfield Hollow area. All proposed modifications to the existing Card Street Substation, Lake Road Switching Station, and Killingly Substation would be accomplished within the existing station fence lines (i.e., on already-developed portions of these utility sites).

All of the existing CL&P ROWs along which the new 345-kV lines would be located are occupied by an existing 345-kV transmission line (i.e., the 330, 3348, or 347 Line), and in some areas 115-kV and 69-kV transmission lines and 23-kV distribution lines. The existing 345-kV lines are supported mostly on wood, two-pole H-frame structures with a typical height of 80 feet, with some shorter wood-pole H-frame structures and some taller steel-pole structures in limited areas. Although H-frame structure, which are

[5] West Medway is an NSTAR substation located in Medway, Massachusetts.

the predominant type of structure along existing 345-kV lines, usually consist of two poles, three-pole structures are used at angles (turns in the ROW) to maintain required tension on the conductors.

The new 345-kV transmission line structures would typically be placed along the ROWs adjacent to the existing line structures. In general, proposed tangent structures for the new 345-kV lines would be steel or laminated wood H-frames, with a typical height of 85 feet. In certain areas along the route, taller steel poles with a delta conductor configuration are proposed. One of these areas is in the Town of Mansfield, through the 0.9-mile segment across federally-owned properties (i.e., Mansfield Hollow State Park, WMA, and Mansfield Hollow Lake). In this area, the proposed delta steel-pole design would match the structure type of the existing transmission line and would require 55 feet of ROW expansion.

To illustrate the proposed configuration of the new 345-kV transmission line structures in relation to the existing structures, the 36.8-mile Proposed Route is divided into 14 segments. Cross-sections (XSs) depicting the proposed structure types and general location in relation to the existing structures on each ROW segment are included in Volume 1, Section 3, Appendix 3A, as well as in Volume 9 and Volume 10.

In addition, CL&P evaluated Electric and Magnetic Field (EMF) Best Management Practices (BMP) line-design alternatives for potential use in five focus areas along the Proposed Route designated Focus Areas A through E (refer to Volume 1, Section 7, Appendix 7B). As a result, in three locations, CL&P proposes to use taller steel poles with a delta conductor configuration, instead of an H-frame line design. These locations are Focus Area A in the towns of Coventry and Mansfield (refer to XS-2 BMP), Focus Area D in the Town of Brooklyn (refer to XS-6 BMP), and Focus Area E in the Town of Putnam (refer to XS-12 BMP). If the Council approves CL&P's BMP design in Focus Area E, a 0.6-mile segment of the existing 345-kV line (H-frame structures) also would be removed and rebuilt with taller, steel-pole structures with a delta conductor configuration.

Along the Proposed Route, the preliminary location of each proposed transmission line structure was determined using transmission line design software (Power Line System's "PLS-CADD"TM). Initially, the proposed 345-kV line structures were aligned adjacent to existing 345-kV line structures. This design approach was based on the assumptions that an alignment of the new structures adjacent to the existing structures would maximize the use of existing on-ROW access roads (which are already situated to reach existing structures), minimize changes to the visual environment, and mimic existing span lengths to minimize potential clearance violations under high wind conditions.

However, following these initial analyses, each proposed structure site was further evaluated to account for other factors, such as potential environmental effects. Based on these additional analyses, CL&P determined that the initial sites (adjacent to existing structures) would have placed 57 new 345-kV line structures in wetlands. As constructability evaluations and transmission line design progressed, structure locations were shifted, where practical, to reduce effects on environmental resources (e.g., wetlands) and to improve constructability. As a result of this process, 33 of the 57 structures initially proposed for location in wetlands were shifted to uplands; however, the remaining 24 proposed structures could not be adjusted to avoid wetland locations.[6]

Structure locations may change as the Project planning process continues. Future changes could occur based on information obtained from more detailed field studies (e.g., subsurface investigations, final engineering and environmental surveys, constructability reviews), as well as input from the Council and other regulatory agencies. After this additional information is analyzed, final detailed line engineering would be performed to determine the exact locations of the new structures. Typically, the final structure locations are expected to be within 100 feet (longitudinally) of the preliminary proposed structure locations.

[6] In addition, along a 0.6-mile segment in the Town of Putnam where six existing structures would be removed and replaced per XS-12 BMP, two of the relocated structures would be in wetlands. These two structures also are presently in wetlands.

ES.4 CONSTRUCTION AND OPERATION / MAINTENANCE PROCEDURES

CL&P would construct, operate, and maintain the proposed Project in accordance with all regulatory approvals and standard company practices. Construction of the new transmission facilities would typically be performed in several stages, some overlapping in time.

New 345-kV Transmission Lines. The primary activities generally expected to be involved in the construction of the overhead transmission lines include the following:[7]

- Survey to stake the ROW boundaries (where necessary), vegetation clearing boundaries, and proposed structure locations.
- Mark the boundaries of previously delineated wetland and watercourse areas.
- Identify and mark areas to be avoided (e.g. sensitive cultural or environmental resource areas).
- Establish construction field office area(s), typically including space for an office trailer, sanitary facilities, and parking.
- Prepare material staging sites (e.g., storage, staging and laydown areas) to support the construction effort. The preferred locations for such areas are typically in the immediate vicinity of the ROWs.
- Install erosion and sedimentation controls in accordance with best management practices (controls are deployed using pickups and other small trucks, or small track vehicles). Erosion and sedimentation controls may be installed before vegetation removal, depending on site-specific characteristics. After vegetation removal, soil erosion and sedimentation controls typically are installed around work limits (e.g., access roads, crane pads) in or near wetlands and streams.
- Perform vegetation clearing. Vegetation would be removed along those portions of the ROWs to be used for the construction of the new transmission lines, as well as areas that contain undesirable, tall-growing, woody species that could grow to interfere with the operation of the proposed transmission lines should they not be removed. For example, as part of construction, vegetation would be removed to the designated limits of clearing as required, including at work sites (crane pads), as well as along existing or new access roads. Vegetation also would be removed, as necessary, along existing or new access roads that may be on the ROW (but outside the designated limits of clearing) or off the ROW (but required to reach the ROW). In addition,

[7] These procedures refer to the development of the new 345-kV transmission lines, adjacent to the existing 345-kV lines. If the Council approves CL&P's Focus Area E BMP, then six existing structures along CL&P's existing 347 Line would be removed and replaced. Specific work procedures and sequencing would be required to construct the transmission lines along this 0.6-mile segment while minimizing outages.

danger trees outside the limits of clearing (on or off the ROW) would be removed as necessary to protect the integrity of the proposed or existing transmission lines. Depending on soil saturation, vegetation removal activities in wetlands may involve the use of temporary support (e.g., timber mats or timber riprap) to provide a stable base for clearing equipment.

- Construct new access roads or improve existing roads to provide a minimum travel-way of 12 to 16 feet in width. This typically requires bulldozers or front loaders, dump trucks for crushed stone or gravel, pickups or stake-body trucks for culverts, and/or mat installers for wetland mats. Roads may be temporary (for use during construction only) or permanent (for use during both construction and the subsequent maintenance of the lines). Temporary roads may be constructed of wood mats, whereas permanent access roads may be graveled. Roads must have sufficient width and capacity for heavy construction equipment for both over-the-road and off-road vehicles, including oversized tractor trailers. The need for access by flat-bed trailers and concrete trucks often determines the scope of access road improvements. Road grades must be negotiable for over-the-road trucks; grades are typically 10% maximum, and less if wet weather or surface conditions provide traction problems. Vehicles with tracks or low-ground-pressure tires are typically used in wetlands.

- Prepare staging and material laydown areas both on and off the ROW.

- Prepare level work sites (e.g., crane pads) as necessary at new structures sites. Crane pad installation may involve grading and requires the installation of a stable base (consisting of gravel, timber mats, or equivalent) in order to create a level surface for structure installation equipment.

- Construct foundations and erect/assemble new structures.

- Install conductors and shield wires. The equipment required for these activities would include conductor reels, conductor pulling and tensioner rigs, and bucket trucks. Helicopters also may be used to install the initial pulling lines for the conductors or shield wires.

- Install counterpoise where needed. Depending on site-specific soil resistivity, supplemental grounding systems also may be installed.

- Remove construction debris and restore disturbed sites. Haul construction debris off the ROW for disposal. Vegetative materials cut along the ROWs and not otherwise planned for use by the landowner (e.g., brush) may be piled, scattered, or chipped on the ROW, depending on site-specific environmental features. In some areas, if allowed, disturbed ground will be back-bladed to preconstruction contours, unless directed otherwise. If the ROW is in an agricultural field, the soil may be de-compacted by disking.

- Maintain temporary erosion and sedimentation controls until vegetation is re-established or disturbed areas are otherwise stabilized. Steep areas may be stabilized with jute netting or pre-made erosion control fabric containing seed, mulch, and fertilizer. Culverts or crushed stone fords installed along access roads would be either left in place or removed, as directed by the Council or pursuant to other agency approvals.

After the installation of the new 345-kV transmission lines, CL&P would manage the ROWs in accordance with its established vegetation management program. This program includes the removal of targeted species (e.g., tall-growing trees and selected state-listed invasive woody shrubs) within the portions of the ROWs occupied by transmission lines, as well as the trimming or removal of trees within adjacent areas that may grow closer than minimum allowed distances to conductors. Brush control within CL&P's ROWs is performed every four years, and tree clearing and trimming along the edges of the ROW (as well as outside of the easement if necessary to remove danger trees) is performed every 10 years. All work is performed in accordance with NU's *Specification for Rights-of-Way Vegetation Management* (2011).

Substation and Switching Station Modifications. The modifications to the existing Card Street and Killingly Substations and the Lake Road Switching Station would be performed within the existing station fence lines. These modifications would involve standard construction procedures (e.g., site preparation, implementation of erosion and sedimentation controls, installation of foundations and equipment, and site stabilization with crushed stone or equivalent). The operation and maintenance of the substation and switching station modifications would not substantially affect or alter existing practices at these facilities.

ES.5 ENVIRONMENTAL RESOURCES, POTENTIAL EFFECTS, AND MITIGATION

ES.5.1 Characterization of the Existing Environment

To evaluate the proposed Project, CL&P conducted comprehensive research to compile existing baseline environmental data concerning the Project region, as well as ROW-specific field surveys to characterize the existing environmental resources along the Proposed Route. Environmental information for the Project was compiled, mapped, and described in accordance with the Council's A*pplication Guide for an Electric Transmission and Fuel Transmission Line Facility* (April 2010).

Specifically, existing environmental conditions for the Project were characterized using a combination of baseline research, field investigations, aerial photographic interpretation, and consultations with representatives of environmental agencies and the public. Information was collected using available published resources, the CT DEEP GIS database, and the Environmental Systems Research Institute, Inc. database.

CL&P also contacted representatives of various federal, state and local agencies, and considered public input relating to environmental and cultural features. In addition, baseline research was performed concerning the relationship of the Project to specially designated environmental features, such as federal or Connecticut Heritage Areas, aquifer protection zones, protected rivers, state parks, state forests, state hiking trails, scenic areas, and critical wildlife and plant habitats.

Along the proposed transmission line ROWs and at the substations and switching station, field investigations were performed to identify and characterize site-specific natural resources (e.g., soils, topography, wetlands, watercourses, vegetative communities, vernal pools and amphibian breeding habitats, breeding bird habitat), cultural resources, and visual resources. As a result of this baseline research and field studies, the Proposed Route is described in terms of the following principal environmental conditions, land use features, and natural resources; most of these features also are depicted on the Volume 9 and Volume 11 maps.

- Locations of existing transmission line ROWs, transmission line structures, and access roads, as well as substations and switching stations
- Locations of CL&P-owned properties
- Vegetative community types, including areas of upland and deciduous and mixed forest
- Areas of steep slopes and rock outcrops
- Land uses, including agricultural, residential, commercial, and industrial areas

- Municipal boundaries
- Municipal zoning classifications
- Federal and state jurisdictional wetlands, depicting field-surveyed wetland boundaries
- Watercourses and waterbodies, including streams, rivers and lakes, as well as drainage ditches and culverts
- Floodplain boundaries, as identified by the Federal Emergency Management Agency, and Stream Channel Encroachment Lines as identified by CT DEEP
- Public recreational, scenic, open space, and other protected areas, including forests, parks, water supply areas, hunting/wildlife management areas, and designated recreational trails
- Statutory Facilities, defined by Connecticut General Statutes Section 16-50p(i) as residential areas, public or private schools, licensed child day-care centers, licensed youth camps, and public playgrounds
- Designated cultural resources (historic sites)
- Habitat for endangered, threatened, or special concern species
- Existing infrastructure, including roads, major pipeline/utility corridors, and railroads

ES.5.2 Environmental Effects and Mitigation Measures

Using the baseline environmental data compared to the plans for the development of the proposed Project, CL&P identified and analyzed the potential short- and long-term effects that the construction and operation of the proposed Project would have on the environment, ecology, and scenic, historic, and recreational values. CL&P also identified possible measures for avoiding, minimizing, or mitigating adverse effects.

The avoidance, minimization, and mitigation of adverse effects to environmental resources, land uses, and cultural resources were key considerations in the Project planning process and will continue to be important during the finalization of Project design and the preparation of a Development & Management

(D&M) Plan,. The Project D&M Plan would include specifications for Project construction, operation, and maintenance, including environmental mitigation measures. A D&M Plan is a pre-requisite condition of the Council's issuance of an approval to construct for the Project.

Based on current Project engineering plans and analyses of the existing environmental data, the proposed Project would have the following potential environmental effects:

- Result in minimal, short-term, and localized soil disturbance as a result of on-ROW construction activities and substation and switching station modifications.

- Traverse 104 watercourses, including 54 perennial waterbodies and 50 intermittent watercourses. The primary waterbody crossings include the Tenmile River, Hop River, Willimantic River, Mansfield Hollow Lake, Quinebaug River, and Fivemile River. No structures would be located within major waterbodies and no construction access would be required across larger rivers or streams. Construction access across smaller watercourses would be performed in accordance with regulatory requirements.

- Extend across the Stream Channel Encroachment Line (SCEL) of the Willimantic River (which forms the boundary between the towns of Coventry and Mansfield). The new 345-kV line conductors would span the river, and no new 345-kV structures would be located within the SCEL.

- Affect approximately 127 wetlands, out of a total of 227 wetlands delineated within the width of CL&P's ROWs. Of the 227 wetlands within the ROWs, 222 meet both federal and state wetland jurisdictional criteria, whereas five meet the criteria (based on soils) only as state wetlands. The principal effects to the 127 wetlands will occur as a result of forested vegetation removal, temporary or permanent access roads, or structure placement (where no upland sites area available). Based on current Project design information, CL&P estimates that approximately 1.5 acres of wetland would be filled as a result of permanent access roads (1.2 acres), new structures (<0.1 acre), and guys (<0.1 acre). Approximately 8.9 acres of wetlands would be temporarily affected by construction activities, whereas an estimated 51 acres of forested wetlands would be permanently converted to scrub-shrub wetland habitat. CL&P has avoided the proposed placement of new transmission line structures in wetlands to the extent practical and would minimize permanent access roads in wetlands where possible. Work in wetlands would be in accordance with the conditions of permits from the Council, CT DEEP and USACE.

- Affect approximately 273 acres of forested habitat (222 acres of forested upland and 51 acres of forested wetland). Virtually all of the 273 acres of affected forested habitat (approximately 263 acres, or 96%) is within CL&P's existing ROWs. However, approximately 11 acres (4%) of the total forested habitat affected by the Project is within the Mansfield Hollow area. Of the affected forested habitat in the Mansfield Hollow area, 9.5 acres consist of mature mixed (upland) forest and 2.8 acres consist of forested wetlands.

- Traverse or be located near approximately 88 vernal pools, as well as 29 additional areas used by amphibians for breeding.

- Extend across the reported habitat of 29 state-listed threatened, endangered, or special concern species including seven bird species, one turtle species, two snake species, one aquatic snail species, one dragonfly species, and 17 butterfly and moth species. CL&P commissioned surveys of certain of these species as requested by CT DEEP and expects to work with CT DEEP to define appropriate avoidance or mitigation strategies for the species determined to occupy the proposed Project ROWs. Many of the reported species depend on shrubland or grassland habitat, which is found on ROWs and would increase as a result of the proposed Project. (Note: there are no federally-listed species within the Project vicinity.)

- Be consistent with federal, state, and local land-use plans. Although 10 of the 11 towns traversed by the Proposed Route are within the Quinebaug and Shetucket Rivers Valley National Heritage Corridor (the Connecticut portion of which corresponds to the state-designated heritage corridor), the new transmission lines would follow existing ROWs and thus would be consistent with current land-use plans.

- Result in incremental and generally localized visual effects associated with the installation of a second 345-kV overhead line along the existing ROWs.

- Require cultural resource studies, including consultations with Native American tribes, to identify and minimize potential effects on archaeological and historic sites.

In general, the proposed Project would minimize adverse environmental effects by collocating the new 345-kV transmission lines along CL&P ROWs, adjacent to existing overhead 345-kV transmission lines (with 96% of the Proposed Route and Proposed Configurations for the new transmission lines entirely within existing CL&P ROWs) and by developing the proposed substation and switching station modifications within the existing station fence lines on property that is already designated for utility use. Although the construction and operation of the Project would result in unavoidable short- and long-term effects on certain environmental, ecologic, cultural, and recreational / scenic resources, CL&P has identified measures that can be effectively applied to mitigate these effects to the extent practical.

The identified mitigation measures are based on CL&P's historical experience in the construction, operation, and maintenance of the existing transmission lines along the Project ROWs; on the results of the field investigations and agency consultations conducted for the Project; and on recent, directly relevant expertise in siting and constructing 345-kV transmission facilities elsewhere in Connecticut.

For example, as part of the Project planning process, CL&P has already modified the new 345-kV transmission line design to place new structures outside of wetlands where possible. Similarly, as has been the case on other recent 345-kV transmission line projects, CL&P would commit to prepare Project-specific construction plans related to erosion and sedimentation control; spill prevention; and ROW revegetation. CL&P also would preserve riparian vegetation (compatible with overhead transmission lines) near streams to the extent practical, and would make every effort to align new permanent access roads in upland (rather than wetland) areas where possible.

Furthermore, along with the mitigation methods identified thus far by CL&P, additional measures to avoid or minimize adverse effects on the environment may be identified during the course of the Council proceedings and during the process of acquiring Project-specific permits and approvals from other state and federal agencies, including the CT DEEP and the USACE. In addition, CL&P understands that both the CT DEEP and the USACE will require mitigation (consisting of wetland enhancement, restoration, preservation, creation, or some combination thereof) to compensate for the Project's effects on water resources. Such compensatory mitigation is typically a condition of regulatory approvals from these agencies. Mitigation measures related to construction activities would be reflected in the final Project design and incorporated into the D&M Plan or other Project specifications, as appropriate.

After the completion of Project construction (including restoration of the ROWs and staging areas), CL&P would implement a post-construction monitoring program, which would be designed and executed pursuant to the conditions of permits and certificates from the Council, CT DEEP, and the USACE. In general, the post-construction monitoring would be performed to verify the success of Project restoration and, as necessary, to identify additional restoration measures that may be required. Monitoring may include, for instance, inspections of percent vegetative cover, wetlands functions, and permanent erosion controls on the restored ROWs.

ES.6 EMF ANALYSES

CL&P conducted detailed modeling to project future EMF levels associated with the existing and proposed lines along each segment of the Proposed Route. The proposed overhead 345-kV line modeled for these projections is a base-case horizontally configured line using H-frame structures, except along four segments of the Proposed Route.

One of the four segments is along the ROW in Mansfield Hollow State Park and Mansfield Hollow WMA (i.e., Mansfield Hollow Segment 1, located in the Town of Mansfield) where the existing 345-kV line employs a delta configuration on steel monopoles. In this area, CL&P's proposal for the new 345-kV line is to match this delta configuration.

The other three segments along portions of the Proposed Route in the Towns of Coventry / Mansfield, Brooklyn, and Putnam would employ taller steel monopoles with a delta conductor configuration. Along these segments, CL&P proposes a delta 345-kV line configuration instead of H-frame structures to comply with the Council's EMF *Best Management Practices for the Construction of Electric Transmission Lines* (Best Management Practices).

These three segments, as well as two others in Mansfield, were CL&P's five "focus areas" for BMP review in a Field Management Design Plan (refer to Volume 1, Section 7, Appendix 7B). Under the Council's BMPs, the priority areas for extra spending (4% guideline) on low-cost magnetic field mitigation design features are where portions of the proposed new lines are adjacent to residential areas, public or private schools, licensed child day-care facilities, licensed youth camps, or public playgrounds. The five focus areas have such facilities near the Proposed Route, although not in all cases adjacent to the proposed line.

The Council's BMP establishes a benchmark for additional Project spending on these modified designs of up to 4% of the estimated Project cost in Connecticut using the base-case line design, including the cost

of the Project's related substation and switching station work in Connecticut. The BMP also specifies that this extra cost allowance should be used on measures that achieve magnetic field reductions at ROW edges of 15% or more, as compared to the levels associated with the base-case line design. The intention of the BMP is to achieve magnetic field reductions using some or all of the 4% allowance. However, the BMP recognizes that projects can vary widely with regard to numbers of adjacent statutory facilities and magnetic field levels, justifying some variances above and below the Council's spending and field reduction guidelines.

In Section III of the BMP, the Council recommends an overall total of low-cost design features calculated at 4% of the initial "base design" project cost including substation costs. The estimated capital cost for the Project in Connecticut (including substation costs) is $213.7 million, assuming that CL&P's base-line design is used throughout. Under the Council's 4% guideline, $8.5 million ($213.7 million x 0.04) is the guideline budget for low-cost magnetic field mitigation on the Project.

CL&P anticipates that the Council will review CL&P's preferences for magnetic field mitigation spending in this Plan, and then, applying the guidelines of the BMP, designate specific field reduction strategies to be employed in specific Project locations.

ES.7 ALTERNATIVES ANALYSES

ES.7.1 Overview of Alternatives Considered

The proposed Interstate Reliability Project is the result of a comprehensive evaluation process, conducted over more than six years, by ISO-NE, National Grid, and CL&P. This process began with a determination of the need for the project, then continued with the identification and analysis of alternative solutions for addressing the need, and concluded with the examination of specific alternative routes and sites for the proposed transmission facilities. As a result of these analyses, the Proposed Route and proposed transmission line configurations were selected as the preferred alternative for the Connecticut portion of the Project.

The following types of alternatives were considered:

- **No Action Alternative**. Under this alternative, the Interstate Reliability Project would not be developed and the Southern New England electric transmission system would not be improved. The No Action Alternative was rejected because it would not resolve the regional electric reliability problems that ISO-NE, CL&P, and National Grid have been studying for more than six years. Under the No Action Alternative, the electric supply system in the region, particularly in Connecticut, Rhode Island, and Massachusetts, would not comply with national and regional reliability standards and criteria.

- **System Alternatives**. Following the evaluations of the need for the Interstate Reliability Project, various transmission system alternatives that would potentially meet that need were identified and evaluated. The results of these analyses led to the selection of a 345-kV transmission solution that would connect CL&P's Card Street Substation, CL&P's Lake Road Switching Station, National Grid's West Farnum Substation, and National Grid's Millbury Switching Station. In addition, potential non-transmission system alternatives that would address the need served by the transmission solution were investigated. These included both generation and demand reduction alternatives. No practical non-transmission alternative could be identified.

- **Overhead and Underground Transmission Line and Route Alternatives**. After the preferred system alternative was selected for the Interstate Reliability Project (based on the results of the detailed systems alternatives analyses), CL&P conducted detailed studies to identify and evaluate potential routes and associated line configurations for the Connecticut portion of the proposed 345-kV transmission lines. These alternatives all necessarily had to interconnect CL&P's Card Street and Lake Road stations with the National Grid facilities. As part of this process, CL&P evaluated both overhead and underground transmission line designs, with potential alignments along various existing ROWs and "greenfield" corridors. All of the route alternatives were evaluated against standard CL&P criteria and objectives for overhead and underground transmission lines. These objectives and criteria are summarized in Tables ES-2, ES-3, and ES-4. The route alternatives that were identified, evaluated, and then dismissed from consideration due to overriding environmental, engineering, or cost considerations are illustrated in Figure ES-3.

- **Potential Variations to the Proposed Transmission Line Configuration and Route**. CL&P prefers the Proposed Route and overhead transmission line configurations. However, during the alternatives analysis process, six route variations and transmission line configurations were identified that could potentially be developed, replacing certain segments of the Proposed Route or the overhead line design. Detailed technical information, impact analyses, and estimated costs were compiled for each variation, and each variation was compared to the portion of the Proposed Route that would be replaced. The Volume 9 maps include environmental data for each of these six variations, at a comparable level of detail to that presented for the Proposed Route.

Table ES-2: CL&P Transmission Line Route Selection Objectives

- Comply with all statutory requirements, regulations, and state and federal siting agency policies
- Maximize the reasonable, practical and feasible use of existing linear corridors (e.g., transmission line, highways, railroads, pipelines)
- Minimize adverse effects to sensitive environmental resources
- Minimize adverse effects to significant cultural resources (archaeological and historical)
- Minimize adverse effects on designated scenic resources
- Minimize conflicts with local, state and federal land use plans and resource policies
- Minimize the need to acquire property by eminent domain
- Maintain public health and safety
- Achieve a reliable, operable and cost-effective solution

Table ES-3: Route Evaluation Criteria for Overhead Transmission Line Siting

ROUTING CRITERIA	DESCRIPTION
Availability of Existing ROWs for the New Lines to Follow	The potential collocation of the 345-kV transmission facilities along existing ROWs where linear uses are already established (e.g., transmission lines, highways, railroads, pipelines) is a primary routing consideration. The collocation of linear utilities within existing utility corridors is strongly favored by the Federal Energy Regulatory Commission's *Guidelines for the Protection of Natural, Historic, Scenic, and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities*, with which any electric transmission line approved by the Council must be consistent.[8] An entirely new 345-kV overhead line route would require a minimum 100-foot-wide ROW to accommodate a line with vertically arranged line conductors and a minimum 150-foot-wide ROW for horizontally arranged line conductors. The placement of the same new 345-kV transmission line on an existing corridor (parallel to existing transmission lines) may require a lesser expansion of an existing ROW or may not require any additional ROW at all, providing that the existing ROW is wide enough and has sufficient un-used space for the new 345-kV transmission line. Typically, to accommodate a new 345-kV H-frame transmission line adjacent to an existing transmission line, approximately 90 feet of ROW would have to be cleared of tall-growing woody vegetation and managed in low-growth vegetation. The use of new steel-monopole structures, built adjacent to an existing overhead line of steel-monopole structures, each supporting conductors in a delta configuration, would require approximately 70 feet of new vegetation clearing.
Engineering Considerations	Whether on existing or new ROWs, the terrain and location of the transmission line route and constructability issues must be considered since both may have a significant bearing on cost and effects on environmental resources. Among the constructability factors considered is the ability to avoid or minimize the location of structures along steep slopes or embankments, in areas of rock outcroppings, or within environmentally sensitive areas such as wetlands. Engineering requirements for the transmission line and access roads (as necessary) to cross streams, railroads, and other facilities are also assessed.
Avoidance or Minimization of Conflicts with Developed Areas	Where possible, it is preferable to avoid or minimize conflicts with residential, commercial, and industrial land uses such as homes, businesses, and airport approach zones. One of CL&P's primary routing objectives for any proposed transmission line is to minimize the need to acquire (by condemnation or voluntary sale) homes or commercial buildings to accommodate the new transmission facilities (refer to Table 14-1). Further, in Connecticut, statutory provisions[9] discourage the construction of a new 345-kV overhead transmission line "adjacent to" certain land uses (collectively referred to herein as "Statutory Facilities"), including residential areas, private and public schools, licensed child day-care facilities (residential and commercial day-cares), licensed youth camps, and public playgrounds.
Consideration of Visual Effects	Because 345-kV line structures are typically at least 85 feet tall (for an H-frame configuration), structure visibility is a design consideration. In recognition of public opinion regarding structure visibility, it is desirable to avoid placing structures in areas of visual or historic sensitivity; to consider designs for minimizing structure height; and to assess the potential visual effects of removing mature trees along ROWs, as required to conform to electrical clearance requirements (i.e., the potential implications of removing trees that provide vegetative screening).
Avoidance or Minimization of Environmental Resource	In accordance with federal, state, and municipal environmental protection policies, the avoidance or minimization of new or expanded corridors through sensitive environmental resource areas such as parks, wildlife areas, and wetlands is desired.
Accessibility	An overhead line must be accessible to both construction and maintenance equipment. Although access along the entire overhead line route is typically not needed, vehicular access to each structure location from some access point is required.

[8] Connecticut General Statutes Section 16-50p(a)(2)(D)
[9] Connecticut General Statutes Section 16-50p(i)

Table ES-4: Route Evaluation Criteria for Underground Transmission Cable System Siting

ROUTING CRITERIA	DESCRIPTION
Environmental Considerations	Underground cables are preferably sited away from, rather than through, significant environmental resources. Whereas an overhead transmission line can span wetlands, watercourses, vegetation, rock outcroppings and steep slopes, the installation of an underground cable system requires the excavation of a continuous trench. The operation of the cable system requires continuous permanent access along the entire route so that any splice vault or portion of the cable duct bank can be reached by heavy equipment as necessary for maintenance and repairs. Therefore, any sensitive environmental resources (such as watercourses, wetlands, or endangered species habitat) located along an underground cable route would be directly affected by the excavations required for the cable system, as well as by the access roads that must be permanently maintained along the underground route. To mitigate such impacts, the cables can be installed for short distances beneath these resources using subsurface construction technology, such as jack and bore or horizontal directional drilling, but at great expense. Existing public road corridors are usually considered for the installation of underground cables in preference to overland electric transmission line ROWs. Road corridors typically provide continuous permanent access along the underground cable route and often are characterized by gradual slopes. However, when sited in or adjacent to roadways, underground cables must avoid conflicts with existing underground utilities. Furthermore, alignment of underground cables along road ROWs may pose other potential environmental issues, such as excavation through areas of contaminated groundwater or soils; traffic congestion; difficult crossings of watercourses and wetlands that the roads traverse or bridge; and disturbance to vegetation and land uses adjacent to the roads (due to construction staging, heavy equipment operation, etc.).
Engineering Considerations	Steep terrain poses serious problems for underground cable construction and may cause down-hill migration and overstressing of the cable and cable splices (the point where two cables are physically connected together). Accordingly, one of the primary engineering objectives for an underground cable system is to identify routes that are relatively straight, direct, and have gradual slopes and inclines to minimize construction and maintenance costs, and to avoid downhill cable migration.
Availability of Useable ROW	A new 345-kV underground cable system typically requires a minimum 40-foot-wide work area for construction. Additionally, land must be available for burying splice vaults, each approximately 10 feet wide by 10 feet deep and up to 32 feet in length. Such vaults, which must be placed at approximately 1,600-foot intervals along a 345-kV cable route, are required to allow the individual cable lengths to be spliced together and also must be accessible, via manholes, for cable system maintenance and repair. Due to constraints posed by buried utilities within road travel lanes or conflicts with public highway use policies, vaults must sometimes be located beneath road shoulders or on private lands adjacent to public road corridors.
Social Considerations	Cable construction requires considerable time and results in noise, disruptions to traffic and access to adjacent land uses, and potential conflicts with other in-ground utilities. Consequently, where possible, a routing consideration is to limit the length of cable installation through densely developed residential areas and central business districts. These social effects must be carefully considered and balanced against the potential lesser effects of constructing and operating overhead line segments in comparable areas.
Availability of Land for Transition Stations	Unless terminated at a substation, underground transmission systems require separate above-ground transition stations at each location where the underground cables interconnect to overhead transmission lines. In general, transition stations require the purchase and conversion of land to industrial (utility) use, and consist of above-ground facilities within a graded, fenced area, similar in appearance to a transmission substation. Routing analyses must consider the availability of land required for transition stations, as well as the environmental and social effects resulting from station development (e.g., surrounding land uses and potential effects on natural resources, cultural resources, neighborhoods, and the visual environment).

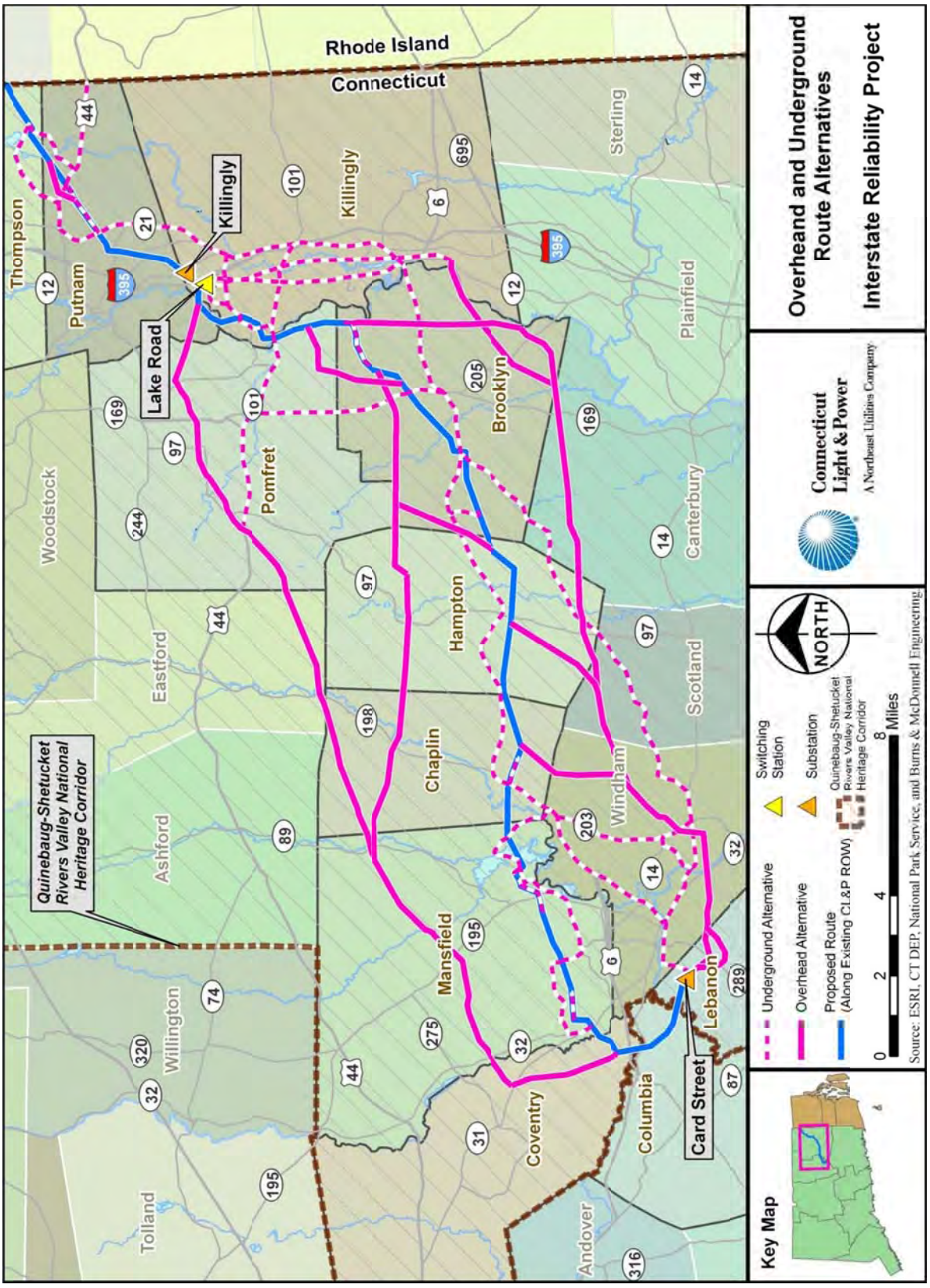


Figure ES-3: Transmission Line Route Alternatives Initially Identified

ES.7.2 Summary of Variations to Portions of the Proposed Route

As part of the alternatives evaluation process that led to the selection of the proposed Project, CL&P identified and conducted detailed evaluations of six 345-kV transmission line route variations (two overhead and four underground line configurations[10]). As illustrated on Figure ES-4, the six route variations are:

- Mansfield Underground Variation
- Mount Hope Underground Variation
- Brooklyn Overhead Variation
- Brooklyn Underground Variation
- Willimantic South Overhead Variation
- Willimantic South Underground Variation

Each of these route variations represents a potential alternative to the alignment of the proposed overhead 345-kV transmission line along certain segments of CL&P's existing ROWs. Although CL&P prefers to develop the proposed Project configuration and line route, these route variations were determined to be potentially feasible to construct and operate, and thus each was evaluated in more detail. However, compared to the portions of the proposed overhead transmission line that these variations would replace, CL&P found each of the variations are much less desirable due to constructability, engineering, environmental, social, and/or cost factors. These variations are described in Volume 1A, Section 15 and are shown on the Volume 9 maps.

[10] While CL&P eliminated an "all-underground" cable system route from consideration for the reasons discussed in Volume 1A, Section 14, shorter underground cable segments were evaluated as potential variations to portions of the proposed overhead transmission line route or overhead line design. For the purposes of this discussion, "route variation" or "variation" denotes either a potential alternative alignment to a segment of the proposed Project (i.e., the overhead 345-kV line along CL&P's existing ROWs) or a potential transmission line configuration alternative (e.g., underground cable) within CL&P's existing ROWs. Overhead line design variations for EMF BMPs and the Mansfield Hollow area are addressed in Volume 1, Sections 7 and 10, respectively.

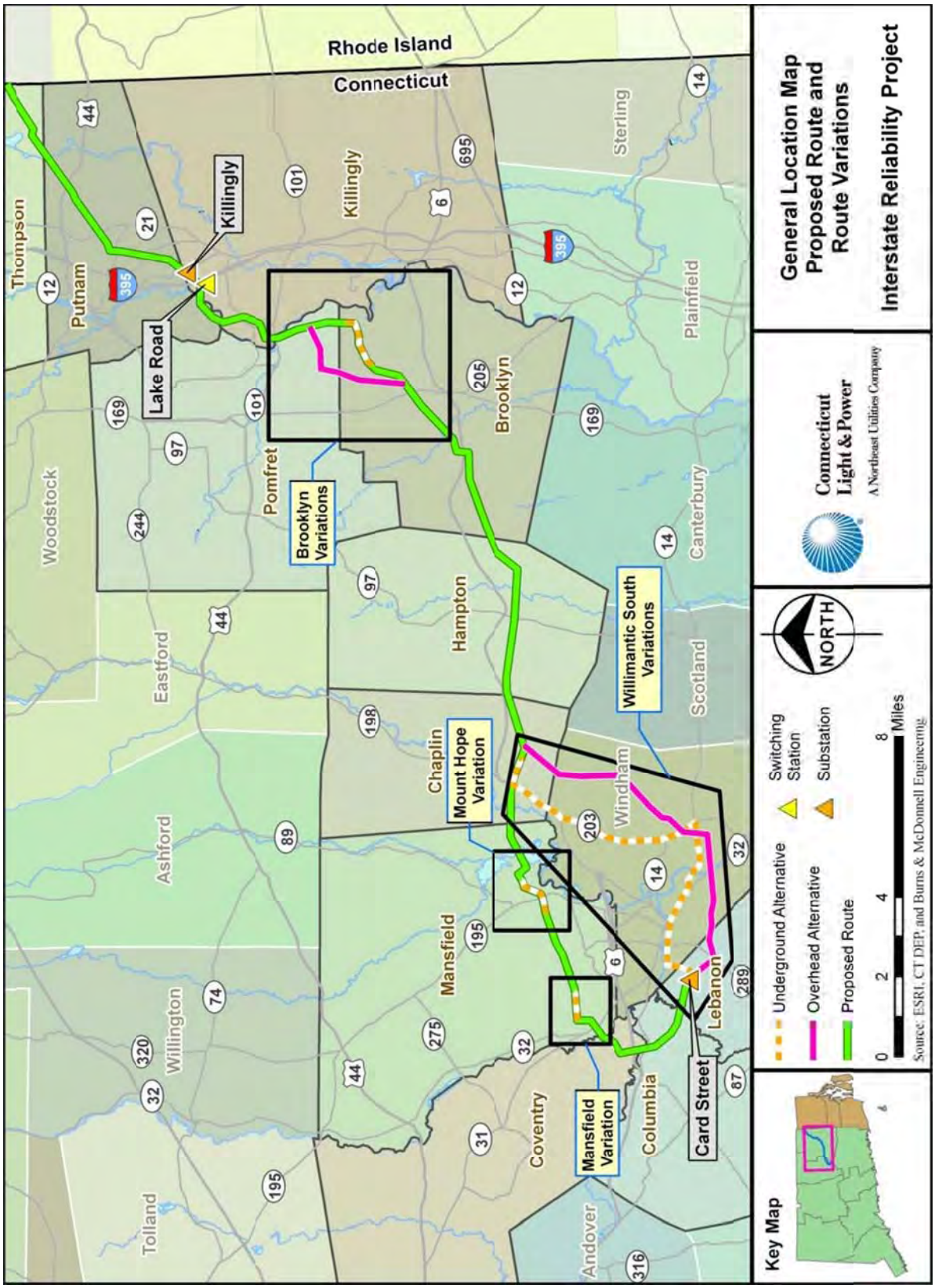


Figure ES-4: Proposed Route and Route Variations

ES.8 MANSFIELD HOLLOW AREA DESIGN OPTIONS

Along the 36.8-mile Proposed Route, the new overhead 345-kV transmission line would follow CL&P's existing ROWs across two segments of federally-owned property, totaling 1.4 miles, in the Mansfield Hollow area in the towns of Mansfield and Chaplin. These federal lands, which are owned by the USACE and are leased to the CT DEEP, are identified in relation to CL&P's ROW as follows (refer to Figure ES-5):

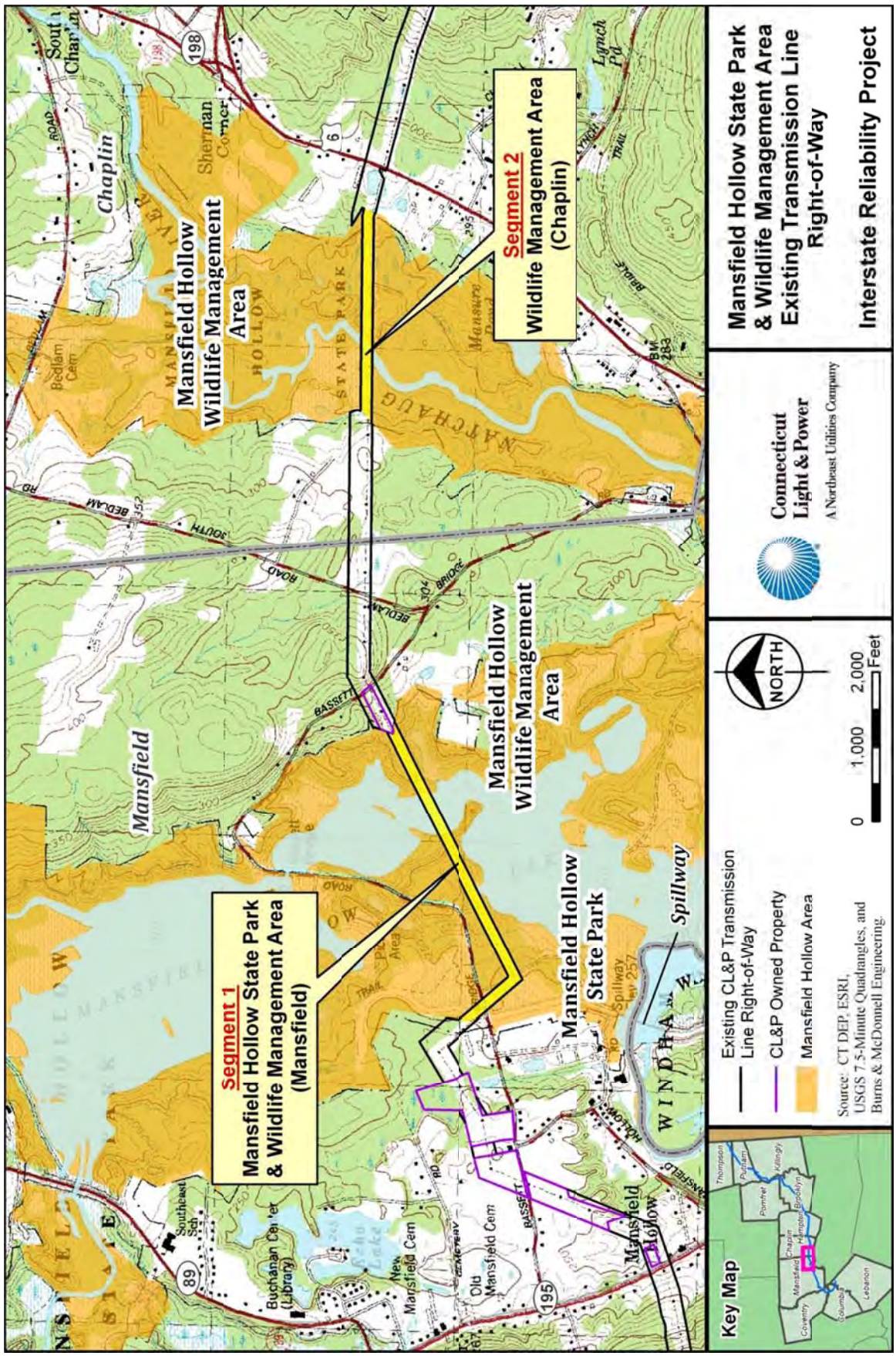
- Segment 1: An approximately 0.9-mile segment of CL&P's existing transmission line ROW traverses Mansfield Hollow State Park, including an approximately 600-foot span of Mansfield Hollow Lake, as well as a portion of the Mansfield Hollow WMA on the eastern side of the lake (Town of Mansfield, Tolland County).

- Segment 2: CL&P's existing transmission line ROW traverses a second portion of the WMA for approximately 0.5 mile across and in the vicinity of the Natchaug River (Town of Chaplin, Windham County).

Across these federally-owned properties, CL&P's existing ROW is 150 feet wide, and CL&P's existing 345-kV transmission line is generally positioned in the center. Because of needed conductor separations, the 150-foot easement is not wide enough to accommodate the new 345-kV Line as proposed (i.e., using structure types that would match the existing 345-kV line structure types in each segment) alongside the existing 330 Line.

To construct and operate the new overhead 345-kV transmission line north of and adjacent to the existing 330 Line through the 1.4 miles of federally-owned lands, CL&P proposes that the USACE grant a conveyance of expanded easement rights. Specifically, CL&P's Proposed Configuration through the Mansfield Hollow properties (as described in the preceding sections of this section) would involve expanding the 150-foot-wide easement by 55 feet (approximately 5.8 acres) along Segment 1 in the Town of Mansfield and by 85 feet (approximately 5.2 acres) along Segment 2 in the Town of Chaplin.

Figure ES-5: Location of the Existing CL&P ROWs across the Mansfield Hollow Federally-Owned Properties: Segments 1 and 2



The expanded easement, which would total approximately 11 acres, would allow the development of the new 345-kV transmission line parallel and adjacent to (north of) the existing 330 Line. This wider easement would allow CL&P to build the new transmission line using structures that would generally match (in terms of appearance and height) the existing 330 Line structure types.

Although CL&P's preference is to construct the Project in the Proposed Configuration through Mansfield Hollow, CL&P has identified two feasible overhead line configuration options that also would allow the development of the new 345-kV transmission line adjacent to the 330 Line across the federal property.[11] These configuration options are:

- **No ROW Expansion Option**. In the event that a grant of conveyance for the additional easement rights cannot be obtained from the USACE, this overhead line design option would allow the installation of the proposed 345-kV transmission line within the existing 150-foot-wide ROW through the Mansfield Hollow area. This option would require the removal and reconstruction of the existing 330 Line closer to the southern edge of the 150-foot-wide ROW and the development of the new 345-kV overhead line adjacent to and north of the reconfigured 330 Line. Complex construction sequencing and 330 Line outages would be needed to build this option. While no additional easements from the USACE would be required under this option, both 345-kV lines through Mansfield Hollow would be constructed using vertical conductor configurations and taller monopole structures.

- **Minimal ROW Expansion Option**. This configuration option would limit the amount of additional easement required from the USACE to approximately 4.8 acres by using taller monopole structures to support the new 345-kV line, north of and adjacent to the existing 330 Line, within both Segments 1 and 2. The existing 330 Line would remain in place. Using this overhead transmission line design, 25 feet of additional easement width would be required along Segment 1, while 35 feet would be required along Segment 2.

Tables ES-5 and ES-6 provide a summary comparison of these two options to the Proposed Configuration through the USACE-owned properties.

[11] In addition to these configuration options for constructing the new 345-kV line across the federally-owned properties, CL&P identified and evaluated two route variations that would avoid Mansfield Hollow. These route variations, the Willimantic South Overhead Variation and the Willimantic South Underground Variation, would replace the western 11-12 miles of the Proposed Route, generally between Card Street Substation and U.S. Route 6 in the Town of Chaplin. CL&P determined that any of the Mansfield Hollow configuration options would be preferable to the Willimantic South Variations, based on cost and environmental factors.

Table ES-5: No ROW Expansion Option: Summary of Potential Environmental Effects, by ROW Segment (Assumes use of the entire 150-foot-wide ROW)

ENVIRONMENTAL FEATURE	POTENTIAL ENVIRONMENTAL EFFECTS, BY SEGMENT		OPTION TOTAL
	1	2	
ROW Length (miles)	1.0	0.5	1.5
Construction ROW Width (feet)	150	150	
New ROW Width Required (feet)	0	0	0
Water Resources			
Waterbody Crossings (number)	1 span Mansfield Hollow Lake	2 1 span (Natchaug River) 1 crossing (S20-24 with permanent culvert*)	2 spans 1 crossing with permanent culvert)
Wetlands			
Number Affected	2 (W20-65) (W20-66)	5 (W20-70, W20-73, W20-75, W20-76, W20-77)	7
Vernal Pools Affected (number)	0	2 (CH-1-VP and CH-2-VP)	2
Wetlands, Temporary Effects (estimated acres)	0.0 acre	0.3 acre	0.3 acre
Wetlands, Permanent Fill Effects (estimated acres)	0.0 acre	< 0.1 acre	< 0.1 acre
Biological Resources			
Vegetation Potentially Affected (estimated acres)			
• Forested Upland	4.2 acres	1.5 acres	5.7 acres
• Forested Wetland	0.1 acre	0.7 acre	0.8 acre
• Scrub-shrub Upland	7.1 acres	4.6 acres	11.7 acres
• Open Field Upland	2.0 acres	0	2.0 acres
• Scrub-shrub Wetland	<0.1 acre	2.3 acres	2.3 acres
Natural Diversity Data Base Areas (No.)	1	1	2
Land Uses			
Recreational Areas (linear miles traversed along ROW)			
• Mansfield Hollow State Park	0.9 mile	0	0.9 mile
• Mansfield Hollow WMA	0.1 mile	0.5 mile	0.6 mile
• Trails	2 Red Trail (within Park) Nipmuck Trail East Branch (within WMA)	0	2
Visual Resources			
Structure Appearance	Weathering Steel Finish	Weathering Steel Finish	

Notes:
1. All vegetation within the 150-foot-wide ROW assumed to be affected by the complex construction sequence required for this configuration.
2.The wetland bordering Mansfield Hollow Lake (designated as Wetland W20-66) would be spanned.
3.Wetland effects determined based on preliminary locations of structures, crane pads, and access roads. All effects except structure locations and permanent access roads are assumed to be temporary (i.e., crane pads and wood mat roads across wetlands will be removed after the completion of construction. All access roads are assumed to be within the 150-foot-wide ROW. Estimates for forested wetland vegetation clearing assume wetland W20-73 near Natchaug River (Segment 2) would be affected across the entire 150-foot-wide ROW. Stream S20-24 would be crossed on USACE property, but the permanent culvert would be installed on privately-owned easement just to the east of the federal lands.

Table ES-6: Minimal ROW Expansion Option: Summary of Potential Environmental Effects, by ROW Segment

ENVIRONMENTAL FEATURE	POTENTIAL ENVIRONMENTAL EFFECTS, BY SEGMENT		OPTION TOTAL
	1	2	
ROW Length (miles)	1.0	0.5	1.5
Construction ROW Width (feet)	70	80	
New ROW Width Required (feet)	25	35	0
Water Resources			
Waterbody Crossings (number)	1 span Mansfield Hollow Lake	3 1 span (Natchaug River) 1 crossing (S20-23); permanent culvert at S20-24	2 spans 2 crossings (1 permanent culvert)
Wetlands			
Number Affected	1 (W20-66, Mansfield Hollow Lake border, possible tree trimming)	5 (W20-70, W20-72/73, W20-74, W20-75, W20-76)	6
Vernal Pools Affected (number)	0	2 (CH-1-VP, CH-2, VP)	2
Wetlands, Temporary Effects (estimated acres)	0	0.3 acre	0.3 acre
Wetlands, Permanent Fill Effects (estimated acres)	0	<0.1 acre	<0.1 acre
Biological Resources			
Vegetation Potentially Affected (estimated acres)			
• Forested Upland Vegetation Removal (Permanent)	3.7 acres*	1.7 acres*	5.4 acres*
• Forested Wetland Vegetation Removal (Permanent)	< 0.1 acre*	1.5 acres*	1.5 acres*
• Scrub-shrub Upland Vegetation Potentially Affected	7.3 acres	4.7 acres	12.0 acres
• Open Field Upland Vegetation Potentially Affected	2.1 acres	0	2.1 acres
• Scrub-shrub Wetland Vegetation Potentially Affected	< 0.1 acre	2.3 acre	2.3 acres
Natural Diversity Data Base Areas (No.)	1	1	2
Land Uses			
Recreational Areas (linear miles traversed along ROW)			
• Mansfield Hollow State Park	0.9 mile	0	0.9 mile
• Mansfield Hollow WMA	0.1 mile	0.5 mile	0.6 mile
• Trails	2 Red Trail (within Park) Nipmuck Trail East Branch (within WMA)	0	2
Visual Resources			
Structure Appearance	Galvanized Steel Finish	Weathering Steel Finish	

Notes:

1. The wetland bordering Mansfield Hollow Lake (designated as Wetland W20-66) would be spanned. Some tops of trees in this wetland may need to be cut to maintain clearance from conductors.
2. Wetland effects determined based on preliminary locations of structures, crane pads, and access roads. All effects except structure locations and permanent access roads are assumed to be temporary (i.e., crane pads and temporary roads across wetlands will be removed after the completion of construction.). Wetland W20-72/73, which would be traversed along the expanded ROW west of the Natchaug River is assumed to require forested vegetation clearing along a 300-foot length of the 35-foot-wide expanded ROW width.

* Assumes that the forested areas south of Line 330 (totaling approximately 3.5 acres) would remain in place and would not be affected by the proposed Project (refer to XS-3-MRE and XS-5-MRE).

Both the No ROW Expansion Option and the Minimal ROW Expansion Option represent viable configurations for the alignment of the new 345-kV line along Segments 1 and 2. However, compared to the Proposed Configuration, each of these options offers significant trade-offs in terms of cost, structure design and appearance, and environmental resource effects (principally forested vegetation clearing). Table ES-7 summarizes and compares the principal characteristics of each of the three configuration options.

As the tabular comparisons illustrate, the proposed overhead line configuration represents the least-cost option for aligning the new 345-kV line through the federally-owned Mansfield Hollow properties. Compared to the existing 330 Line, this option would also minimize differences in the appearance (design and height) of the new 345-kV line structures. However, this configuration would require the acquisition of the most new easement from the USACE (11 acres) and the most forested upland and wetland vegetation removal (also approximately 11 acres).

In comparison, whereas the No ROW Expansion Option would not require any additional easement from the USACE, the construction complexities associated with the removing and rebuilding of the 330 Line make this the most expensive of the three options. Further, to accommodate both the 330 and 3271 Lines within the 150-foot-wide ROW, steel monopoles would have to be used along both Segments 1 and 2. Along Segment 2 in particular, these monopoles would be substantially taller than the existing 330 Line's H-frame structures.

Table ES-7: Summary Comparison of Mansfield Hollow Configuration Options (Federal Properties, Combined Segments 1 and 2)

Factor	Proposed Configuration	No ROW Expansion Option	Minimal ROW Expansion Option
Location, Design, and Appearance			
Length (miles) [12]	1.5	1.5	1.5
New ROW Required (acres)	11.0	0	4.8
Structure Type	Delta Steel Pole (Segment 1) H-Frame (Segment 2)	Vertical Steel Pole (Segments 1 and 2) Rebuilt 330 Line and 3271 Line	Vertical Steel Pole (Segments 1 and 2)
Structure Height Range (feet) SEE NOTE 1	115-145 (Segment 1) 70-85 (Segment 2)	130-160 (Segment 1) 110-135 (Segment 2)	125-155 (Segment 1) 115-135 (Segment 2)
Environmental Resources			
Water Resources			
Waterbody crossings (No.)	4	3	3
Wetlands, Temporary Effects (acres)	0.4 acre	0.3 acre	0.3 acre
Wetlands, Permanent Effects (fill) (acres)	<0.1 acre	<0.1 acre	<0.1 acre
Vegetation			
Wetlands, Forested Vegetation Removal (acres)	2.8 acres	0.8 acre	1.5 acres
Wetlands, Scrub-Shrub Vegetation Potentially Affected (acres)	2.3 acre	2.3 acres	2.3 acres
Upland Forested Vegetation Removal (acres)	9.5 acres	5.7 acre	5.4 acres
Upland Scrub-Shrub Vegetation Potentially Affected (acres)	12.2 acres	7.1 acres	12.0 acres
Open Field Upland Vegetation Potentially Affected (acres)	2.3 acres	2.0 acres	2.1 acres
Biological Resources			
Vernal Pools Potentially Affected (No.)	2	2	2
State-listed Species Habitat Traversed (No.)	2	2	2
Visual Resources			
Difference in existing and proposed structure heights (feet)	-7 to +24 feet (Segment 1) -13 to +13 feet (Segment 2)	-8 to +49 (Segment 1) +34-55 (Segment 2)	-7 to +39 feet (Segment 1) +27-60 feet (Segment 2)
Estimated Cost			
Capital Cost	$13.0 million	$28.5 million	$14.3 million
Cost to Connecticut Consumers	$3.5 million	$19.0 million	$4.8 million

Notes:

1. Existing 330 Line structure height ranges are 106-137 feet in Segment 1 and 68-81 feet in Segment 2.
2. For each configuration option, preliminary analyses have been performed to identify anticipated locations of structures, crane pads, and access roads. Potential effects on wetlands vary for each configuration as a result of the differences in ROW widths, structure types and locations, anticipated crane pad sites, and access roads. For all configuration options, potential effects on wetlands have been minimized to the extent practical.
3. Assumes that the cost of the Proposed Configuration is regionalized (i.e., 27% of cost applied to Connecticut consumers) and any expenditures in excess of the Proposed Configuration costs are localized (i.e., Connecticut consumers bear 100% of costs).

[12] Each option would include 1.4 miles across federally-owned lands.

The Minimal ROW Expansion Option provides a configuration that minimizes the amount of additional easement required from the USACE (4.8 acres) by using tall steel-pole structures. These structures would not match the appearance of the existing 330 Line structures in Segments 1 or 2, and would be the same type and general height as the structures required for the No ROW Expansion Option. The Minimal ROW Expansion Option would be substantially less costly than the No ROW Expansion Option, and only $1.3 million more expensive than the Proposed Configuration.

ES.9 COST

The estimated capital cost for the three-state Interstate Reliability Project is $509 million. Of this amount, transmission line construction accounts for $383 million, whereas substation and switching station modifications total $126 million.[13] The $509 million total is itemized, by company, as follows:

- CL&P: $218 million ($193 million for the new transmission line construction and $25 million for substation and switching station modifications)
- National Grid: $291 million

In accordance with the Council's *Life-Cycle Cost Studies for Overhead and Underground Transmission Lines* (2007), CL&P performed a present-value analysis of capital and operating costs over a 35-year economic life of the Project. The following items were considered:

- Annual carrying charges of the capital cost
- Annual operation and maintenance costs
- Cost of energy losses
- Cost of capacity

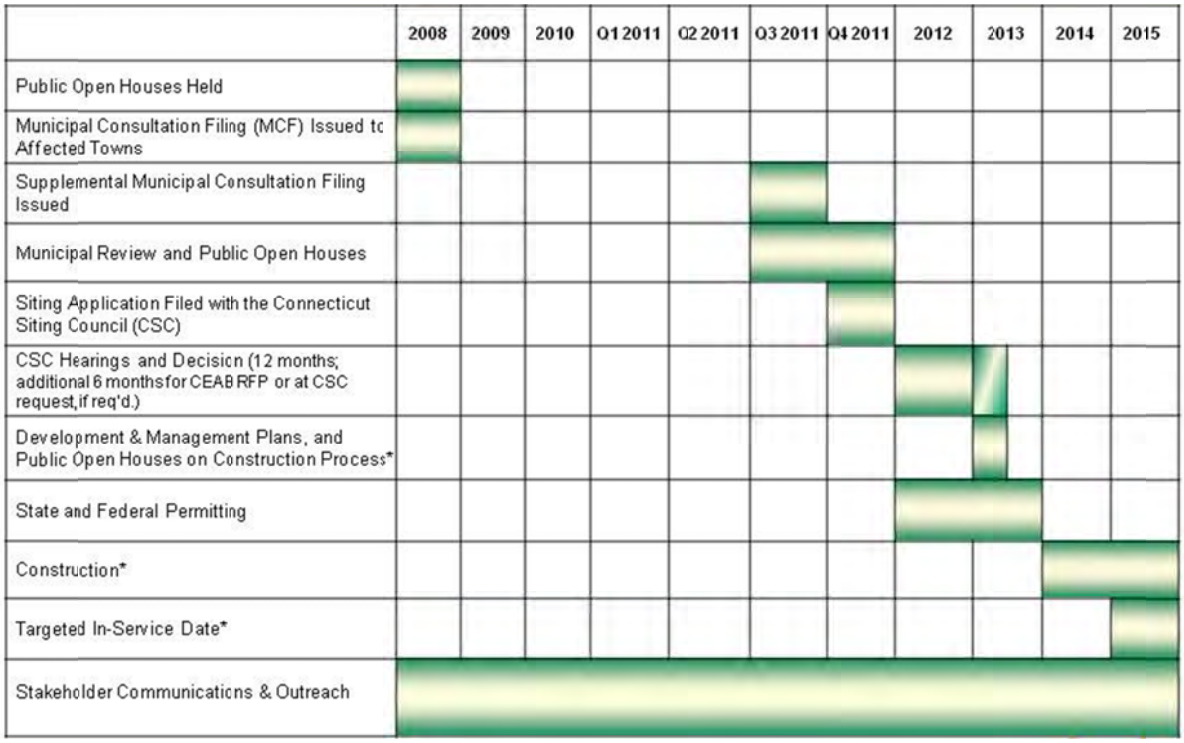
[13] The Interstate Reliability Project cost estimates reflect conformance with the FERC's May 27, 2011 Order authorizing recovery of 100% of transmission construction work in progress (CWIP) costs for the NEEWS projects, including the Interstate Reliability Project. Under this FERC Order, on June 1, 2011, CL&P, Western Massachusetts Electric Company, and the New England Power Company ceased their accrual of Allowances for Funds Used During Construction (AFUDC) associated with expenditures on the NEEWS projects. Accordingly, project cost estimates no longer include AFUDC beyond June 1, 2011.

Applying these factors, the life-cycle cost for the Connecticut portion of the Interstate Reliability Project is $319 million.

ES.10 SCHEDULE

The key activities in CL&P's proposed schedule for developing the Connecticut portion of the Interstate Reliability Project are illustrated in Figure ES-6. This schedule does not illustrate the detailed Project studies and investigations that CL&P performed prior to 2011, such as the initial Project system and transmission line planning (which began in 2004) and the environmental and engineering studies of the ROW (some of which also were performed in 2004 and 2007-2011).

Figure ES-6: Connecticut Portion of the Interstate Reliability Project – Estimated Timeline



*Pending receipt of approvals from the Council and federal / state regulatory agencies.
*Note that the construction timeline refers to the installation of the new 345-kV transmission lines and station modifications, and does not necessarily include the completion of all ROW restoration and post-installation monitoring activities.

ES.11 AGENCY COORDINATION AND REGULATORY APPROVALS

In addition to a Certificate from the Council, the Project will require approvals from various other state agencies and from federal agencies. As part of the Project planning process, CL&P initiated consultations with representatives of the federal and state regulatory agencies from whom approvals for the Project would be required.

At the federal level, the entire three-state Interstate Reliability Project must comply with the Clean Water Act (CWA), Endangered Species Act, and National Historic Preservation Act. Furthermore, CL&P would need USACE approval for the expansion of the existing ROW across the USACE-owned properties in the Mansfield Hollow area.

At the state level, along with compliance with the Council's regulations, CL&P would have to obtain Project-specific permits or approvals from CT DEEP pertaining to water quality (pursuant to Section 401 of the CWA), stormwater management, and threatened and endangered species. Cultural resources approvals would be required from the State Historic Preservation Office.

Table ES-8 summarizes the federal and state permits and approvals expected to be required for the proposed Project. This summary is based on currently available data concerning the Project, and may be modified as the Project planning, design, and review process moves forward.

ES.12 MUNICIPAL CONSULTATION AND PUBLIC OUTREACH

CL&P has conducted extensive community outreach throughout the planning and municipal consultation phases of the Project. As part of the Project planning process, CL&P initiated consultations with the public and representatives of the 11 towns that would be traversed by the new 345-kV transmission lines along the Proposed Route. CL&P also has consulted with the Town of Windham, the only additional municipality that would be affected by the route variations (refer to Volume 1A, Section 15.5).

Table ES-8: Potential Permits, Reviews, and Approvals Required for the Project

Agency	Certificate, Permit, Review, Approval or Confirmation	Activity Regulated
FEDERAL		
U.S. Army Corps of Engineers (USACE), New England District	Section 404 CWA Easement Expansion Approval	Discharge of dredge or fill material into waters of the U.S. (wetlands or watercourses) Real Estate Approval: easement expansion across Mansfield Hollow properties
U.S. Fish and Wildlife Service	Coordinates with USACE regarding endangered or threatened species (non-marine); provides input to USACE permit application review	Construction or operation activities that may affect federally-listed endangered or threatened species
U.S. Environmental Protection Agency	Provides input to USACE permit application review	Construction or operation activities that may affect water, air, or other resources
Advisory Council on Historic Preservation	Involved if cultural resource sites would be potentially affected by the Project	Section 106 National Historic Preservation Act compliance; input to USACE permit review, if applicable
CONNECTICUT		
Connecticut Siting Council	Certificate of Environmental Compatibility and Public Need Development & Management Plan approval prior to construction	General transmission line need, siting, construction, environmental compatibility, safety, and operation / maintenance and ROW management procedures
Department of Energy and Environmental Protection (CT DEEP)	401 Water Quality Certification	Conformance to Section 401 of the CWA; Section 401 approval from CTDEEP is required prior to USACE permit issuance
	General Permit	Stormwater management during construction
	Stream Channel Encroachment Line (SCEL) Permit: Span of Willimantic River	Construction activities riverward of SCEL (if applicable; currently, no new structures are proposed within the SCEL)
	Water Diversion Permit	Installation of permanent culverts across streams with a watershed of 100 acres or more
	Threatened, Endangered, and Special Concern Species	Approval of species-specific mitigation plans as part of Council's process, 401 Water Quality Certification approval
CT DEEP Public Utilities Regulatory Authority	Approval pursuant to C.G.S. Section 16-243	Method & Manner of Construction Approval to Energize Lines
State Historic Preservation Office (SHPO)[14]	Approval of proposed Project consistency with the National Historic Preservation Act; comments during Council and USACE processes	Construction and operation activities that may affect archaeological or historic resources.

[14] The SHPO is part of the Connecticut Commission on Culture and Tourism, Historic Preservation and Museum Division.

CL&P also prepared a Municipal Consultation Filing (MCF), as required pursuant to the Council's regulations. In August 2008, CL&P issued a MCF concerning the Connecticut portion of the proposed Interstate Reliability Project. The August 2008 MCF was provided to all of the towns in which the then-identified primary route under consideration for the new 345-kV facilities and any potential route variations were located. In September and October, public open houses were held in the towns of Brooklyn, Mansfield, and Willimantic. CL&P also consulted with the chief elected officials of the 12 potentially affected municipalities.

Subsequently, the Project was held in abeyance while ISO-NE conducted a regional electric system needs reassessment. As the needs reassessment was being performed, CL&P and National Grid continued to evaluate and refine the Project. After the issuance of the August 2008 MCF, CL&P and National Grid conducted additional planning and routing studies, engineering analyses, and environmental evaluations, leading to their identification of a Proposed Route for the planned 345-kV transmission lines and related substation and switching station modifications.

To provide the public and potentially affected municipalities the opportunity to review the updated Project information, in July 2011, CL&P issued a Supplemental MCF, which augmented the original 2008 MCF, presenting the results of additional studies concerning the Project that were completed since August 2008. After the issuance of the Supplemental MCF, CL&P held two additional "open houses" – one in the Town of Mansfield and one in the Town of Killingly (Danielson area).

During both the 2008 and 2011 municipal consultation periods, CL&P met with town representatives and held "open houses" at which the proposed Project and alternative routes were presented. Overall, these municipal consultations were designed to obtain additional input regarding the proposed Project from representatives of each of the Connecticut towns potentially affected by the proposed transmission facilities, as well as from the interested public.