CONNECTICUT SITING COUNCIL APPLICATION
Connecticut General Statutes Section 16-50*l*(a)(1)

For a Certificate of
Environmental Compatibility and Public Need

STAMFORD RELIABILITY CABLE PROJECT
Stamford, Connecticut

January 18, 2013

Submitted to:
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Submitted by:
The Connecticut Light and Power Company
107 Selden Street
Berlin, CT 06037

STAMFORD RELIABILITY CABLE PROJECT

CONNECTICUT SITING COUNCIL APPLICATION

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

STAMFORD RELIABILITY CABLE PROJECT

CONNECTICUT SITING COUNCIL APPLICATION

CRITICAL ENERGY INFRASTRUCTURE INFORMATION APPENDIX (under separate cover)

Section B: Project Need

STAMFORD RELIABILITY CABLE PROJECT

CONNECTICUT SITING COUNCIL APPLICATION

BULK FILING (under separate cover)

TABLE OF CONTENTS

APPLICATION CHECKLIST

Connecticut Siting Council Application Guide for an

ELECTRIC AND FUEL TRANSMISSION LINE FACILITY

April 2010

This application guide is intended to assist applicants in filing for a Certificate of Environmental Compatibility and Public Need (Certificate) from the Connecticut Siting Council (Council) for the construction of an electric or fuel transmission line. Such facilities are defined in Connecticut General Statutes **§**16-50i (a) (1) and (2).

Applicants should consult Connecticut General Statutes **§§**16-50g through 16-50aa and §16a-7c, and Sections 16-50j-1 through 16-50z-4 of the Regulations of Connecticut State Agencies to assure complete compliance with the requirements of those sections. Where appropriate, statutory and regulatory references are noted below.

I. **<u>Pre-Application Process</u>**

Municipal Consultation (Conn. Gen. Stat. §16-50*l*(e))

"… at least sixty days prior to the filing of an application with the council, the applicant shall consult with the municipality in which the facility may be located and with any other municipality required to be served with a copy of the application under subdivision (1) of subsection (b) of this section [any adjoining municipality having a boundary not more than 2500 feet from such facility] concerning the proposed and alternative sites of the facility… Such consultation with the municipality shall include, but not be limited to good faith efforts to meet with the chief elected official of the municipality. At the time of the consultation, the applicant shall provide the chief elected official with any technical reports concerning the public need, the site selection process and the environmental effects of the proposed facility. The municipality may conduct public hearings and meetings as it deems necessary for it to advise the applicant of its recommendations concerning the proposed facility. Within 60 days of the initial consultation, the municipality shall issue its recommendations to the applicant. No later than 15 days after submitting an application to the Council, the applicant shall provide to the Council all materials provided to the municipality and a summary of the consultations with the municipality including all recommendations issued by the municipality." **See Municipal Consultation Filing in Bulk Filing and Section J (Municipal and Community Outreach) of this Application**

"The applicant shall provide the Connecticut Energy Advisory Board (CEAB) the same information that it provides to a municipality… on the same day of the consultation with the municipality."

II. **<u>Form of Application (Regs. Conn. State Agencies §16-50l-2)</u>**

All applications shall include the following components: **See Section A (Formal Requirements)**

a. The purpose for which the application is being made;

b. The statutory authority for such application;

c. The exact legal name of each person seeking the authorization or relief and the address or principal place of business of each such person. If any applicant is a corporation, trust association, or other organized group, it shall also give the state under the laws of which it was created or organized;

d. The name, title, address, and telephone number of the attorney or other person to whom correspondence or communications in regard to the application are to be addressed. Notice, orders and other papers may be served upon the person so named, and such service shall be deemed to be service upon the applicant;

e. Such information as may be required under the applicable provisions of Section 16-50*l* of the Connecticut General Statutes;

f. Such information as any department or agency of the state exercising environmental controls may, by regulation, require; and

g. Such information as the applicant may consider relevant.

III. Filing Requirements (Regs., Conn. State Agencies §16-50j-12)

A. Except as may be otherwise required, at the time applications are filed with the Council, there shall be furnished to the Council an original and 20 copies. All filings from the applicant, parties, or intervenors must consist of an original and 20 copies labeled with the docket number, properly collated and paginated, and bound. An electronic version of all filings, as appropriate, should be provided.

B. Bulk filing should be provided of not less than four (4) copies of the applicable town zoning and Inland wetlands regulations (including a map showing the location of inland wetlands if relevant) and plan of development and any other publicly available material in support of the application. These documents shall include effective dates, revision dates, or dates of adoption. If no such dates are available, the document shall include the date the document was obtained.

C. Applications filed for the purpose of any proceeding before the Council shall be printed or typewritten on paper cut or folded to letter size, 8 1/2 by 11 inches. Width of margins shall be not less than one inch. The impression shall be on only one side of the papers, unless printed, and shall be double spaced, except that quotations in excess of five typewritten lines shall be single spaced and indented. Mimeographed, multigraphed, photoduplicated, or the like copies will be accepted as typewritten, provided all copies are clear and permanently legible. In accordance with the State Solid Waste Management Plan, all filings should be submitted on recyclable paper, primarily regular weight white office paper. Applicants should avoid using heavy stock paper, colored paper, and metal or plastic binders and separators.

D. Every original shall be signed by the applicant or by one or more attorneys in their individual names on behalf of the applicant. All applications shall be filed at the office of the Council, 10 Franklin Square, New Britain, Connecticut 06051. Service of all documents and other papers filed as applications, briefs, and exhibits, but not limited to those categories, shall be by personal delivery or by first class mail to the Council and all parties and intervenors to the proceeding, unless service has been waived.

E. Any exhibits, sworn written testimony, data, models, illustrations, and all other materials that the applicant deems necessary or desirable to support the granting of the application shall be attached to the application. In addition, annexed materials shall include such exhibits, sworn written testimony, and other data that any statute or regulations may require. The applicant may request administrative notice of and refer in the application to portions of other Council docket records and generic hearings or statements prepared by the Council as a result of generic hearings. All documents, including but not limited to maps, shall include effective dates, revision dates, or dates of adoption. If no such dates are available the document shall include the date the document was obtained. Maps must include a key table(s) and a matching source list/table, appropriately organized.

F. Applicants may present material in a sequence and format most appropriate for the particular proposal. To allow timely Council review, include with the application a copy of this form with page references for each item required in Section VI below.

G. Potential applicants are urged to carefully review Conn. Gen. Stat. §§16-50*l*(e), 16-50i and 16a-7c to determine whether the proposed project falls within the Connecticut Energy Advisory Board (CEAB) "request for proposal" process.

IV. Application Filing Fees (Conn. Gen. Stat. §16-50l (a); Conn. Gen. Stat. §4-189j; Regs., Conn. State Agencies §16-50v-la)

Conn. Gen. Stat §16-50*l* (a) mandates a municipal participation fee of $25,000, to be deposited in the account established in accordance with Conn. Gen. Stat. §16-50bb. **See Section A.6 (Application Filing Fees) and Application Cover Letter**

The filing fee for an application is determined by the following schedule:

Estimated Construction Cost		Fee
Up to	$5,000,000	0.05% or $1,250.00, whichever is greater;
Above	$5,000,000	0.1% or $25,250.00, whichever is less.

All application fees shall be paid to the Council at the time an application is filed with the Council. Additional assessments may be made for expenses in excess of the filing fee. Fees in excess of the Council's actual costs will be refunded to the applicant.

V. Municipal Participation Account (Conn. Gen. Stat. §16-50bb; Conn. Gen. Stat. §16-50l(a)(3))

Conn. Gen. Stat. §16-50bb requires that each application be accompanied by a payment in the amount of $25,000 to be deposited in a Municipal Participation Account within the General Fund to defray expenses incurred by each municipality entitled to receive a copy the application under Conn. Gen. Stat. §16-50*l* that chooses to participate as a party to the certification proceeding. Any moneys remaining at the end of the proceeding shall be refunded to the applicant. **See Section A.6 (Application Filing Fees) and Application Cover Letter**

VI. Contents of Application (Conn. Gen. Stat. §16-50l (a) (1) (A); Conn. Gen. Stat. §16-50p; Conn. Gen. Stat. §16-50o)

An application for a Certificate for the construction of a transmission line facility should include or be accompanied by the following:

A. An executive summary. A description of the proposed facility, including location relative to affected municipalities and location relative to adjacent streets. **See Section ES (Executive Summary)**

B. A description of the technical specifications, including but not limited to: **See Sections C, D and E**

1. Itemized estimated costs;
2. Conductor sizes and specifications;

3. Overhead tower design, appearance, and heights, if any;
4. Length of line;
5. Terminal points;
6. Initial and design voltages and capacities;
7. Rights-of-way and access way acquisition;
8. Substation connections;
9. Service area;
10. Construction methods; and
11. For an electric transmission line, a description of the life-cycle costs of the proposed transmission line and alternative facilities, including overhead and underground lines, including all capital and operating costs, and other associated effects that can be calculated for development and operation of the specified transmission line and alternative lines over their expected operational lives.

C. A statement and full explanation of why the proposed facility is needed and how the facility would conform to a long-range plan for expansion of utility service in the state and interconnected utility systems that would serve the public need for adequate, reliable, and economic service, including: **See Section B (Project Need) and Section I (Electric and Magnetic Fields)**

1. A description and documentation of the existing system and its limitations;
2. Justification for the proposed in-service date;
3. The estimated length of time the existing system is judged to be adequate with and without the proposed facility;
4. Identification of system alternatives with the advantages and disadvantages of each;
5. If applicable, identification of the facility in the forecast of loads and resources pursuant to Conn. Gen. Stat. §16-50r; and
6. An impact assessment of any electromagnetic fields to be produced by the proposed transmission line, pursuant to Conn. Gen. Stat. §16-50l(a)(1)(A)(ix).

D. A justification for overhead portions, if any, including life cycle cost studies comparing overhead alternatives with underground alternatives.

E. A schedule of dates showing the proposed program of right of way or property acquisition, construction, completion and operation. **See Section C.4 (Required Property Easement and Crossing Agreement Acquisitions) and Section K (General Project Schedule)**

F. All applications shall include information for property within the proposed project area, including access roads and the proposed right-of-way. To the extent that the Applicant does not own, lease or otherwise have access to property within the proposed project areas, the applicant shall exert due diligence to seek permission to gain access. Due diligence shall be established by the submission of (1) Certified Mailing receipts for letters sent to the owner or owners of record requesting access to the property; and (2) an affidavit from the applicant stating that it was not provided access to the property. In the absence of permission to access, the applicant shall make visual inspections to document existing conditions from public rights-of-way, existing utility rights-of-way and/or from other accessible properties within or surrounding the proposed project area.

G. A proposed route map at a scale no smaller than one inch = 2,000 feet or a USGS topographic map and aerial photos of suitable scale showing details of the rights-of-way and the proximity to the following: **See Appendix A (Project Mapping)**

1. Settled residential areas;
2. Public and Private schools, licensed daycare centers, licensed youth camps and public playgrounds;
3. Hospitals;
4. Group homes;
5. Forests and parks
6. Recreational areas;
7. Scenic areas;
8. Historic areas;
9. Areas of archaeological interest;
10. Areas regulated under the Inland Wetlands and Watercourses Act and Coastal Zone Management Act;
11. Areas regulated under the Tidal Wetlands Act;
12. Public water supplies;
13. Hunting or wildlife management areas; and
14. Existing transmission lines within one mile of the route.

H. A narrative description of the proposed transmission line and transmission line alternatives, including:

1. Existing conditions: **See Section F (Preferred Route Existing Conditions)**
   a. The ecological communities of the wetlands, watercourses and upland systems and their functional significance, including but not limited to,
      i. Floral associations;
      ii. Inventory of wildlife habitat with observed and expected wildlife users;
      iii. Endangered, threatened, special concern or rare species, including their habitats;
      iv. Inventory of breeding birds and their habitats;
      v. Riparian environments and buffer vegetation; and
      vi. Fishery habitat and cold water fisheries.
   b. Existing infrastructure (where applicable)
      i. Existing Right-of-Way boundaries;
      ii. Components of existing transmission line; and

iii. Other improvements within existing and proposed right-of-way.

2. Proposed conditions: **See Section G (Environmental Effects and Mitigation)**

a. Areas of disturbance (temporary and permanent);

b. Proposed construction staging areas, conductor pulling sites, material marshaling yards and construction field offices;

c. Proposed access roads and opportunities for alternative access;

d. Proposed structure location envelopes; and

e. Proposed blasting, grading, and changes to drainage.

I. Proposed route plans at a scale no smaller than 1 inch = 100 feet, except as otherwise required, can be provided in a stacked version and bulk filed, showing existing conditions and certain proposed transmission line changes, expanding upon the narrative descriptions in Section H.

1. Existing conditions: **See Appendix A (Project Mapping)**

a. Identification of existing and proposed right-of-way boundaries;

b. Locations of any existing transmission line structures and accessways;

c. Contour mapping at two-foot intervals;

d. Inland and tidal wetlands boundaries, vernal pools, and intermittent and perennial watercourses, as determined in the field, unless existing mapping is adequate , with a 50 foot buffer shown for wetlands and a 100 foot buffer shown for vernal pools and watercourses.

e. Coastal Management Zone boundaries;

f. 100-year flood plain boundaries as identified by the Federal Emergency Management Agency;

g. Locations of protected and special concern species;

h. Areas susceptible to soil erosion;

i. Habitat for protected and special concern species, including those represented by the DEP Natural Diversity Data Base (confidential data provided in an appropriate manner);

j. Fishery habitat and cold water fisheries. (All maps shall identify the location(s) of source information.)

2. Changes to existing conditions for the proposed transmission line: **To be included in the D&M Plan**

a. Additional Rights-of-way width required, if any;

b. Anticipated transmission line structure location envelopes;

c. Anticipated areas of disturbance (temporary and permanent);

d. Anticipated area of disturbance to an inland wetland buffer boundary or inland wetland;

e. Anticipated area of disturbance for material staging and conductor pulling sites;

f. Anticipated access roads and opportunities for alternative access;

g. Substation connections; and

h. Other sensitive areas requiring special attention.

J. A justification for adoption of the route selected including a comparison with alternative routes which are environmentally, technically, and economically practicable. For electric transmission lines, provide a justification of overhead portions, if any, including comparative cost studies and a comparative analysis of effects described in Conn. Gen. Stat. §16-50*l* (a)(1)(A) and section K below for undergrounding. Include enough information for a complete comparison between the proposed route and any alternative route contemplated**. See Section C (Approach for Identifying the Best Routes for the Needed Transmission System Improvements)**

K. A description of the effect that the proposed facility would have on the environment, ecology, and scenic, historic, and recreational values, including effects on: **See Section G (Environmental Effects and Mitigation)**

1. Public health and safety;
2. Local, state, and federal land use plans;
3. Existing and future development;
4. Road and waterway crossings;
5. Wetland crossings;
6. Wildlife and vegetation, including rare and endangered species, and species of special concern, with documentation by the Department of Environmental Protection Natural Diversity Data Base;
7. Water supply areas;
8. Archaeological and historic resources, with documentation by the State Historic Preservation Officer; and
9. Other environmental concerns identified by the applicant, the Council, or any public agency, including but not limited to, where applicable:
    - Coastal Consistency Analysis (C.G.S. §22a-90)
    - Connecticut Heritage Areas (C.G.S. §16a-27)
    - Ridgeline Protection Zones (C.G.S. §8-1aa)
    - Aquifer Protection Zones (C.G.S. §22a-354b)
    - DOT Scenic Lands (C.G.S. §13a-85a)
    - State Parks and Forests (C.G.S. §23-5)
    - Agricultural Lands (C.G.S. §22-26aa)
    - Wild and Scenic Rivers (C.G.S. §25-199)
    - Protected Rivers (C.G.S. §25-200)

- Endangered, Threatened or Special Concern Species (C.G.S. §26-303)

L. A statement explaining mitigation measures for the proposed facility including: **See Section G (Environmental Effects and Mitigation)**

1. Description of proposed site clearing for access including type of vegetation scheduled for removal and quantity of trees greater than six inches diameter at breast height and involvement with wetlands;
2. Construction techniques designed specifically to minimize adverse effects on natural areas and sensitive areas;
3. Special routing or design features made specifically to avoid or minimize adverse effects on natural areas and sensitive areas;
4. Justification for maintaining retired or unused facilities on the rights-of-way if removal is not planned;
5. Methods to prevent and discourage unauthorized use of the rights-of-way;
6. Establishment of vegetation proposed near residential, recreational, and scenic areas and at road crossings, waterways, ridgelines, and areas where the line would be exposed to view; and
7. Methods for preservation of vegetation for wildlife habitat and screening.

M. Safety and reliability information, including: **See Section H (Project Facilities Reliability and Safety Information)**

1. Provisions for emergency operations and shutdowns; and
2. Fire suppression technology.

N. Justification that the location of the proposed facility would not pose an undue safety or health hazard to persons or property along the area traversed by the proposed facility including: **See Section H (Project Facilities Reliability and Safety Information) and Section I (Electric and Magnetic Fields)**

1. Measurements of existing electric and magnetic fields (EMF) at the boundaries of adjacent schools, daycare facilities, playgrounds, and hospitals (and any other facilities described in Conn. Gen. Stat. §16-50*l*), with extrapolated calculations of exposure levels during expected normal and peak normal line loading;
2. Calculations of expected EMF levels at the above listed locations that would occur during normal and peak normal operation of the transmission line;
3. A statement describing consistency with the Council's "Best Management Practices for Electric and Magnetic Fields," as amended; and buffer zone requirements; and
4. A description of siting security measures for the proposed facility, consistent with the Council's "White Paper on the Security of Siting Energy Facilities," as amended.

O. A schedule of the proposed program for right-of-way or property acquisition, construction, rehabilitation, testing, and operation. **See Section K (General Project Schedule)**

P. Identification of each federal, state, regional, district, and municipal agency with which proposed route or site reviews have been undertaken or will be undertaken, including a copy of each written agency position on such route or site, and a schedule for obtaining approvals not yet received. **Table J-1 and Appendix B (Agency Correspondence)**

Q. Bulk filing of the most recent conservation, inland wetland, zoning, and plan of development documents of the municipality, including a description of the zoning classification of the site and surrounding areas, and a narrative summary of the consistency of the project with the Town's regulations and plans. **See Bulk Filing**

R. Such information any department or agency of the state exercising environmental controls may, by regulation, require.

S. Pursuant to Conn. Gen. Stat. §16-50o, the applicant shall submit into the record the full text of the terms of any agreement, and a statement of any consideration therefor, if not contained in such agreement, entered into by the applicant and any party to the certification proceeding, or any third party, in connection with the construction or operation of the facility. This provision shall not require the public disclosure of proprietary or trade secrets.

T. Such information the applicant may consider relevant.

Please note that all documents, including but not limited to maps, must be dated. If the document date is unavailable, the date the document was obtained shall be provided. Maps must include a key table(s) and a matching source list/table, appropriately organized.

VII. <u>Proof of Service (Conn. Gen. Stat. §16-50l (b))</u>

Each application shall be accompanied by proof of service of such application on: **See Section A.7**

A. The chief elected official, the zoning commission, planning commission, the planning and zoning commissions, and the conservation and wetlands commissions of the site municipality and any adjoining municipality having a boundary not more than 2500 feet from the facility;

B. The regional planning agency that encompasses the route municipalities;

C. The State Attorney General;

D. Each member of the Legislature in whose district the facility is proposed;

E. Any federal agency which has jurisdiction over the proposed facility;

F. The state Departments of Environmental Protection, Public Health, Public Utility Control, Economic and Community Development, Agriculture and Transportation; the Council on Environmental Quality; and the Office of Policy and Management; and

G. Other state and municipal bodies as the Council may by regulation designate, including but not limited to, the State Historic Preservation Officer of the Commission on Culture and Tourism and the Department of Emergency Management and Homeland Security.

VIII. Notice to Community Organizations

The applicant shall use reasonable efforts to provide notice of the application on the following: **See Section A.8 (Notice to Community Organizations)**

A. Affected community groups including Chambers of Commerce, land trusts, environmental groups, trail organizations, historic preservation groups, advocacy groups for the protection of Long Island Sound, and river protection organizations within the watershed affected by the proposed facility that have been identified by a municipality where the facility is proposed to be located or that have registered with the Council to be provided notice; and

B. Any affected water company within the watershed affected by the proposed facility.

IX. Public Notice (Conn. Gen. Stat. §16-50l (b))

Notice shall be made in accordance with all relevant sections of Conn. Gen. Stat. §16-50*l*(b). The Council's regulations should also be consulted when determining appropriate notice. Notice of the application shall be published at least twice prior to the filing of the application in a newspaper having general circulation in the site municipality or municipalities. The notice shall state the name of the applicant, the date of filing, and a summary of the application. The notice must be published in not less than ten point type. **See Section A.9 (Public Notice)**

The Council also recommends to each applicant that at least ten business days prior to the public hearing such applicant should erect and maintain in a legible condition a sign not less than six feet by four feet at conspicuous locations along the route of the proposed line, especially close to populated areas. The signs should be erected in sufficient number to fairly notify most residents living in proximity to the route and set forth the name of the applicant, the type of facility, the public hearing date, and contact information for the Council (Web site and phone number).

Example:
PUBLIC NOTICE:

> CL&P has filed an application with the Connecticut Siting Council (Council) for construction of an electric transmission line facility on this site. The Council will hold a public hearing on March 27, 2010 at the Newington Town Hall Auditorium at 3 and 7 p.m. A copy of the application can be reviewed at the town hall or at the Council offices in New Britain, CT. For more information, please contact the Council by telephone at 860-827-2935, electronically at www.ct.gov/csc, or by mail at 10 Franklin Square, New Britain, Connecticut 06051.

X. Notice in Utility Bills (Conn. Gen. Stat. §16-50l (b))

For electric transmission facilities, notice shall also be provided to each electric company customer in the municipality where the facility is proposed on a separate enclosure with each customer's monthly bill for one or more months, not earlier than 60 days prior to filing the application with the Council, but not later than the date the application is filed with the Council. Such notice shall include the following: **See Section A.10 (Notice in Utility Bills)**

A. A brief description of the project including:

1. Location relative to the affected municipality, and

2. Location relative to adjacent streets.

B. A brief technical description of the project including:

1. Proposed length;
2. Proposed voltage; and
3. Type and range of heights of support structures or underground configurations.

C. The reason for the project.

D. Address and a toll-free telephone number of the applicant by which additional information about the project can be obtained.

E. A statement in print no smaller than twenty-four point type size stating, "NOTICE OF PROPOSED CONSTRUCTION OF A HIGH VOLTAGE ELECTRIC TRANSMISSION LINE."

F. A description of how the project will meet the Council's "Best Management Practices for Electric and Magnetic Fields," as amended, including:

1. a brief statement of specific design elements planned to decrease magnetic fields;
2. how to obtain siting and magnetic field information specific to the project at the Council's website and at respective town halls;
3. how to obtain final post-construction structure and conductor specifications including calculated magnetic field levels specific to the project at the Council's website and at respective town halls; and
4. phone numbers for follow up information including Department of Public Health and utility representatives.

XI. Procedures

A. The Council will review and may reject the application within 30 days if it fails to comply with specific data or exhibit requirements or if the applicant fails to promptly correct deficiencies. (Regs., Conn. State Agencies §§16-50*l*-4 through 16-50*l*-5)

B. The Council and any party or intervenor to the proceeding may file exhibits and interrogatories requesting supplemental or explanatory materials. All filings will be subject to cross-examination and the Council's discretion for admission into the record. (Conn. Gen. Stat. §16-50o)

C. A public hearing must be held in the county within which the proposed facility is to be located, or in whichever county the Council deems appropriate for inter-county facilities, with one session held after 6:30 p.m. for the convenience of the public. The Council's record must remain open for 30 days after the close of the hearing. (Conn. Gen. Stat. §16-50m)

D. The Council must render a decision not later than twelve months after the deadline for filing an application following the request-for-proposal process for a facility described in subdivision (1) or (2) of subsection (a) of Conn. Gen. Stat. §16-50i or subdivision (4) of said subsection (a) if the application was incorporated in an application concerning a facility described in subdivision (1) of said subsection (a). (Conn. Gen. Stat. §16-50p)

XII. CEAB Evaluation (Conn. Gen. Stat. §16a-7c)

A. On or after December 1, 2004, not later than fifteen days after the filing of an application pursuant to subdivision (1) of subsection (a) of section 16-50i of the general statutes, as amended by this act, except for an application for a facility described in subdivision (5) or (6) of subsection (a) of section 16-50i of the general statutes, as amended by this act, the Connecticut Energy Advisory Board shall issue a request-for-proposal to seek alternative solutions to the need that will be addressed by the proposed facility in such application.

B. Not later than forty-five days after the deadline for submissions in response to a request-for-proposal, the board shall issue a report that evaluates each proposal received, including any proposal contained in an application to the council that initiated a request-for-proposal, based on the materials received pursuant to subsection (d) of this section, or information contained in the application, as required by section 16-50*l* of the General Statutes, as amended by this act, for conformance with the infrastructure criteria guidelines created pursuant to section 16a-7b of this act. The board shall forward the results of such evaluation process to the Connecticut Siting Council.

PLEASE NOTE THAT THIS GUIDE IS NO SUBSTITUTION FOR OBTAINING ADVICE FROM LEGAL COUNSEL. IN THE EVENT OF ANY CONFLICT BETWEEN THIS GUIDE AND THE ACTUAL STATUTES AND REGULATIONS, THE STATUTES AND REGULATIONS SHALL GOVERN.

ES. EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The Connecticut Light and Power Company ("CL&P") proposes to construct and operate a new 115-kilovolt ("kV") underground transmission circuit, extending approximately 1.5 miles between CL&P's Glenbrook and South End Substations in Stamford, and to make related improvements to both substations.

This Project, referred to as the Stamford Reliability Cable Project (the "Project" or “SRCP”), would strengthen the reliability of the electric transmission system serving the Stamford-Greenwich Sub-area, eliminate violations of national reliability standards that occur today, address increasing demand for electricity from the City of Stamford's robust economic development efforts and be an important part of a long-range plan for improving the electric transmission system in the Stamford-Greenwich Sub-area.

ES.2 PROJECT NEED

The Project is designed to strengthen the 115-kV transmission system serving the Stamford-Greenwich Sub-area and eliminate reliability criteria violations by relieving power flows and thus ensuring compliance with mandatory national and regional reliability standards. The Project would also provide the Stamford-Greenwich Sub-area with a strong electric supply source arising from the new transmission lines installed in Southwest Connecticut since 2006 by adding a new and alternate path to relieve power flows. Finally, the Project advances a long-range plan for expansion of Connecticut's electric power grid.

CL&P analyzed projected peak load forecasts based on the regional peak load forecast for New England and factored in the robust economic development and urban redevelopment efforts undertaken by Stamford officials, as well as passive and active demand resources. Based on its modeling, CL&P found existing reliability criteria violations in the Stamford-Greenwich Sub-area, which would be resolved by completion of the Project. CL&P also considered non-transmission alternatives, including central generation, energy efficiency and contracted load curtailment. However, there are no currently-available alternatives, at the levels necessary, to resolve the existing reliability criteria violations that the Project would resolve upon its completion.


Glenbrook Substation
Third Party Property
Railroad Crossing
I-95 Overpass
SUT II
South State Street
CDOT RAILS Underpass Lowering
South End Substation
SUT I
METRO-NORTH RAILROAD
NEW YORK, NEW HAVEN AND HARTFORD RAILROAD CATENARY SYSTEM
Court St
Hoyt St
Dolsen Pl
Underhill St
Fenway St
Glenbrook Rd
W Washington Ave
Franklin St
North St
Prospect St
Hillcrest Ave
Arlington Rd
Daskam Pl
Clovelly Rd
Scott Pl
Custer St
Sheridan St
Lincoln Ave
Seaton Rd
Revere Dr
Judy Ln
Lawn Ave
Standish Rd
Stanley Ct
Vernon Pl
Bedford St
Highland Rd
Lindale St
Valley Rd
Lafayette St
Quintard Ter
Crystal St
Grant Ave
Spring St
Summer St
Forest St
Grove St
Ridge Pl
W Broad St
Broad St
Suburban Ave
E Main St
N State St
Clarks Hill Ave
Daly St
Lockwood Ave
Orange St
Maher Rd
Blachley Rd
Winthrop Pl
Whittaker Pl
Luther St
Greyrock Pl
Gregory St
Maple Ave
Frank St
Lillian St
W Park Pl
Main St
Bank St
William St
Myrtle Ave
Ursula Pl
Bell St
Atlantic St
Stamford Plz
Elm St
Elm Ct
Woodrow St
Warren St
Clinton Ave
Leeds St
Raymond St
Dale St
Division St
Federal St
Cherry St
Jefferson St
Frederick St
Cove Rd
Canal St
Dock St
Magee Ave
Gleason Ave
Halloween Blvd
Shippan Ave
Soundview Ave
Van Buskirk Ave
Ranson St
S State St
Manahattan St
Meadow St
Wardwell St
Caldwell Ave
95
1
Map Location
MA
NY
CT
RI
NJ
Legend
PREFERRED ROUTE
Stamford Urban Transitway (SUT) Road Improvements
SUT Phase I (Construction Complete)
SUT Phase II (Construction to Commence Q1 2013)
1:7,200 1" = 600'
0
600
1,200
Feet
N
Data Souce: ESRI Bing Imagery
AECOM Survey: May 2012
Stamford Reliability Cable Project
Glenbrook to South End Substation
Survey Aerial Map
PREFERRED ROUTE
Connecticut Light & Power
A Northeast Utilities Company
AECOM
Figure ES-1
Date: January 10 2013

ES.3 PROJECT PREFERRED ROUTE

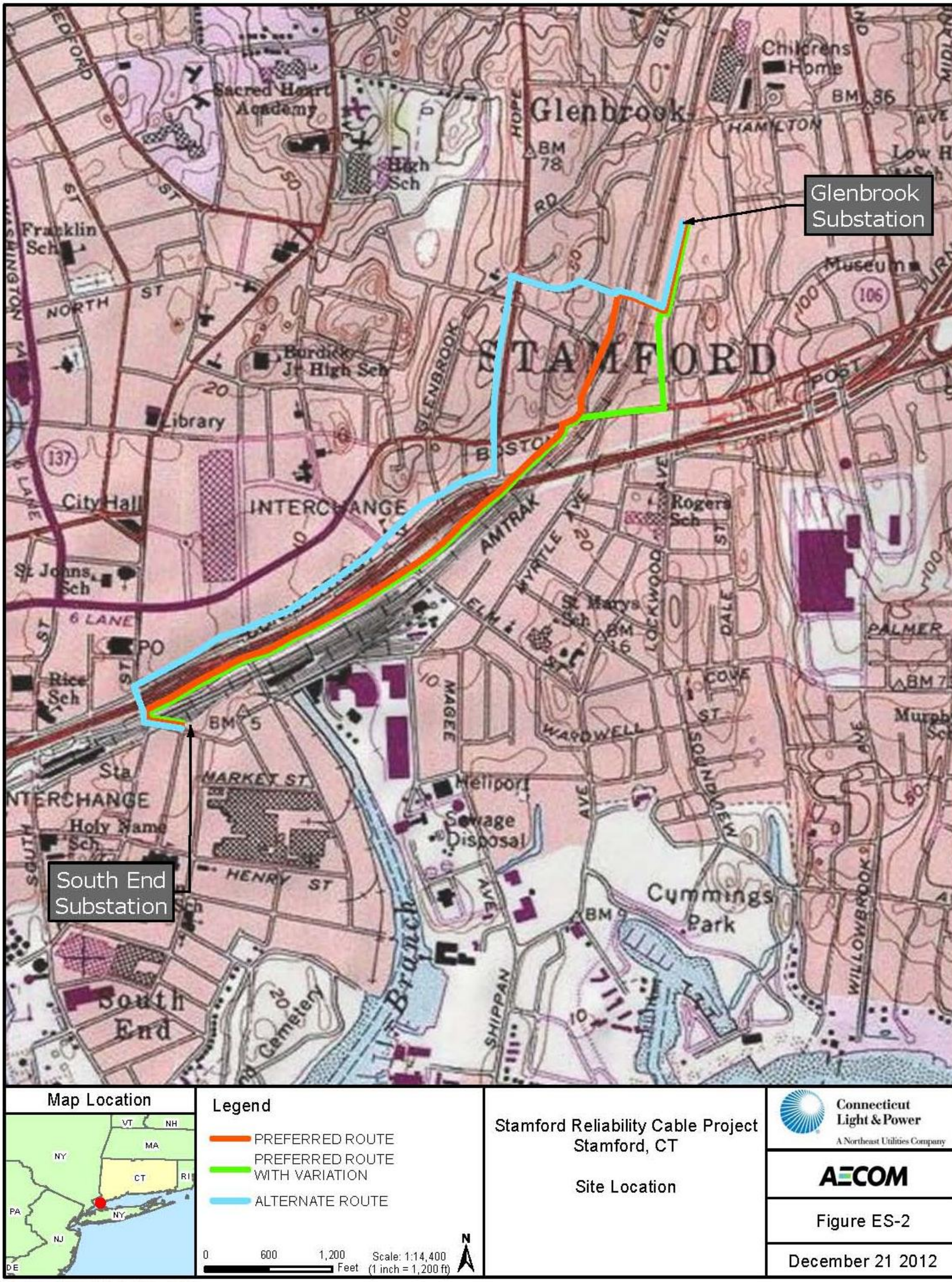
The area between the Glenbrook and South End Substations consists of a highly-developed urban infrastructure that includes the elevated Metro-North Railroad ("MNRR") Corridor and the elevated I-95 corridor, in addition to local streets. Therefore, CL&P examined potential underground routes for the new 115-kV line in lieu of an overhead transmission line approach. The Preferred Route provides the shortest path between the two substations, avoids impact on the recently-completed first phase of the City of Stamford's Urban transitway project, as well as the planned second phase, minimizes underground utility disruption, avoids schools and day-care facilities and has the lowest cost. The Preferred Route is shown in Figure ES-1. CL&P also identified a variation to a short segment of the Preferred Route ("Preferred Route With Variation") and an alternate route ("Alternate Route"). All three routes are shown on the Site Location Map shown in Figure ES-2.

ES.4 CONSTRUCTION PROCEDURES

CL&P would construct, operate, and maintain the proposed cables in accordance with all regulatory approvals and standard company practices. CL&P plans to use cross-linked polyethylene ("XLPE") electric transmission cables, contained within a concrete-encased duct bank and concrete splice vaults. The cable system construction would be divided into multiple components with discrete construction activities at various locations along the Project route.

The improvements to the Glenbrook and South End Substations would be performed within the existing substation fence lines. These improvements would involve standard construction procedures. The operation and maintenance of the substation and improvements would not substantially affect or alter existing practices at these substations.

Appropriate erosion and sedimentation controls would be deployed during construction of the cables and substation improvements. At the end of construction, after removal of remaining construction debris and stabilization of any disturbed soils, such controls would be removed and final clean-up would take place.



Legend

- PREFERRED ROUTE
- PREFERRED ROUTE WITH VARIATION
- ALTERNATE ROUTE

0 600 1,200 Feet — Scale: 1:14,400 (1 inch = 1,200 ft) — N

Stamford Reliability Cable Project
Stamford, CT

Site Location

Connecticut Light & Power
A Northeast Utilities Company

AECOM

Figure ES-2

December 21 2012

ES.5 ENVIRONMENTAL EFFECTS AND MITIGATION

CL&P conducted comprehensive research to compile existing baseline environmental data along and in the vicinity of the Project. In addition, CL&P and its consultants conducted field investigations and reconnaissance to gather information about current land use, future land use patterns, natural and cultural resources and other environmental resources, in compliance with the Council's *Application Guide for an Electric Transmission and Fuel Transmission Line (April 2010)* (“Application Guide”). CL&P also consulted with federal, state and local agencies on environmental resources.

Based on the proposed engineering plan for the Preferred Route for the Project and analyses of environmental data, the Project would have:

- negligible, if any, adverse effects on topography and geology;
- no long-term adverse effects on surface or groundwater resources or water quality;
- no adverse effects on floodplains or coastal resources;
- no negative effects on vegetation or wildlife or rare plants, wildlife or habitats;
- no effect on wetlands or watercourses, including the East Branch of the Rippowam River (a tidal watercourse) where a required crossing is planned over an underground culvert that contains the river;
- no adverse effects to recreational and/or scenic resources or visual effects;
- no effect on historical or archeological resources; and
- short-term and highly localized construction-related noise and air quality effects.

To mitigate any potential environmental effects, CL&P would:

- prepare a Development and Management Plan ("D&M Plan") that would include procedures on erosion control, construction site dewatering, spill prevention and control; construction staffing and hours; traffic control; and restoration;

- minimize construction noise effects through measures such as using engine-powered equipment that is properly muffled and maintained, and scheduling work, to the extent possible, at times when sensitivity to noise is lower;
- develop a Traffic Management Plan in consultation with Connecticut Department of Transportation ("ConnDOT") and Stamford officials; and
- monitor compliance with the D&M Plan and all permits and approvals.

ES.6 ELECTRIC AND MAGNETIC FIELDS

CL&P conducted an analysis of electric and magnetic fields ("EMF") in compliance with the Council's Application Guide and its *Electric and Magnetic Fields Best Management Practices For the Construction of Electric Transmission Lines in Connecticut* (approved December 14, 2007) ("EMF BMP") included as Appendix D.1. That analysis includes projections for future EMF levels using a base case underground 115-kV line, consisting of a single-circuit line with three XLPE cables in a triangular arrangement. The proposed underground line, as well as the nearby existing overhead transmission lines, were modeled.

CL&P also analyzed engineering controls to potentially reduce magnetic fields and has provided a *Field Management Design Plan* included as Appendix D.2. Finally, CL&P obtained an update from Exponent, Inc. on scientific research/scientific consensus group positions on magnetic fields. Exponent, Inc. found no new evidence to alter the conclusion in the Council's EMF BMP.

ES.7 MUNICIPAL AND COMMUNITY OUTREACH

Since 2010, CL&P has conducted extensive municipal outreach with representatives of the City of Stamford, including its chief elected official and department heads. CL&P mailed brochures explaining the Project to residents located in the vicinity of the Project. In addition, the Connecticut Energy Efficiency Fund Brochure was mailed to residents located in the vicinity of the Project. Copies of these brochures are included in Appendix E.1 and E.2. CL&P held an open house on January 8, 2013 at the Stamford Government Center.

ES.8 COST

The estimated capital cost of the Project is approximately $46.9 million as follows:

- Transmission line cost - $43.9 Million;
- Substation improvements - $3.0 Million.

The life-cycle cost is $61.2 Million for the line.

ES.9 SCHEDULE

Upon the receipt of the Siting Council's approval, CL&P expects an approximately one-year construction process, beginning in early 2014, with the facilities in service in December, 2014.

Page intentionally left blank.

A. FORMAL REQUIREMENTS

A.1 PURPOSE OF THE APPLICATION

The purpose of this Application is to obtain an Environmental Compatibility and Public Need Certificate ("Certificate") for the siting and construction of the Project, which consists of the following components in the City of Stamford:

- Construction of a new 115-kV underground transmission circuit that would extend approximately 1.5 miles between the Glenbrook and South End Substations.
- Improvements to the Glenbrook and South End Substations, which would be installed entirely within the existing fenced-in areas.

The Project is anticipated to provide the following benefits to the Stamford-Greenwich Sub-area:

- Creates a more reliable electric transmission system serving the Stamford-Greenwich Sub-area by providing an additional path to the existing transmission line sources, thereby minimizing the risk of customer outages if current sources are lost.
- Eliminates violations of national reliability standards that occur today.
- Addresses the increasing demand for electricity from robust economic development efforts in the City of Stamford.
- Implements an important project in a long-range plan for the Stamford-Greenwich Sub-area. The long-range plan currently contemplates a new substation in Greenwich and additional transmission connections to the new substation.

The installation of the proposed 115-kV underground circuit between the Glenbrook and South End Substations would create an additional path for the transmission of electricity, if transmission line sources that currently serve the Stamford area were interrupted. This new path would strengthen the capability of the system and minimize customer outages resulting from the loss of the other sources and thus enhance system reliability.

A.2 STATUTORY AUTHORITY FOR APPLICATION

CL&P's Application is filed pursuant to the Public Utility Environmental Standards Act, Conn. Gen. Stat. §16-50g et seq., and the Regulations of Conn. State Agencies. §16-50j-1 et seq. This Application is presented based on the Council's Application Guide to assist applicants in filing for a Certificate from the Council for the construction of an electric or fuel transmission line as defined in Conn. Gen. Stat. §16-50i(a)(1) and (2). CL&P also consulted Conn. Gen. Stat. §§16-50g through 16-50z and §§16-50j-1 through 16-50z-4 of the Regulations of Conn. State Agencies in preparing this Application.

CL&P has provided an Application Checklist ("Checklist") that serves as a directory between the Council's Application Guide and this Application. The Checklist begins on page i and provides a summary of the Application Guide and identifies the corresponding section of the Application where the information is addressed.

A.3 LEGAL NAME AND ADDRESS OF APPLICANT

Applicant: Northeast Utilities Service Company ("NUSCO") as agent for CL&P. CL&P is a specially-chartered Connecticut corporation; both CL&P and NUSCO are wholly-owned subsidiaries of Northeast Utilities ("NU").

Street Address: CL&P
107 Selden Street
Berlin, CT 06037

Mailing Address: CL&P
P.O. Box 270
Hartford, CT 06141-0270

Telephone: (860) 665-5000

Internet Address: Northeast Utilities Transmission Website
www.transmission-nu.com

A.4 APPLICANT CONTACTS

Correspondence and other communications with regard to the Project should be addressed to, and notices, orders and other documents should be served upon the following:

Mr. John Morissette
Manager
Transmission Siting
Northeast Utilities Service Company
107 Selden Street
Berlin, CT 06037

Telephone: (860) 665-2036
E-mail: john.morissette@nu.com

Mr. Anuj Mathur
Project Manager
Transmission Projects
Northeast Utilities Service Company
107 Selden Street
Berlin, CT 06037

Telephone: (860) 665-6783
E-mail: anuj.mathur@nu.com

Jeffery Cochran, Esq.
Senior Counsel
Legal Department
Northeast Utilities Service Company
107 Selden Street
Berlin, CT 06037

Telephone: (860) 665-3548
E-mail: jeffery.cochran@nu.com

Marianne Barbino Dubuque, Esq.
Carmody & Torrance LLP
50 Leavenworth Street
P.O. Box 1110
Waterbury, CT 06721-1110

Telephone: (203) 573-1200
E-mail: mdubuque@carmodylaw.com

A.5 QUANTITY, FORM AND ADMINISTRATIVE NOTICE

1. Pursuant to Connecticut General Statues § 16-50j-12, CL&P is furnishing to the Council an original and 20 paper copies of the Application, as well as electronic copies of the Application.

2. CL&P requests administrative notice of the following Council docket records, generic hearings, or statements prepared by the Council as a result of generic hearings, and other pertinent documents.

Federal

National Institute of Environmental Health Sciences, National Institutes of Health, EMF, Electric and Magnetic Fields Associated with the Use of Electric Power (June 2002), available at http://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

National Research Council, Research on Power-Frequency Fields Completed Under the Energy Policy Act of 1992 (National Academy of Sciences, 1999), available at http://books.nap.edu/openbook.php?isbn=0309065437

Proclamation No. 8460, 74 Fed. Reg. 234 (December 8, 2009), available at http://www.presidency.ucsb.edu/ws/index.php?pid=86954

Federal Energy Regulatory Commission, Guidelines for the Protection of Natural, Historic, Scenic and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities (November 27, 1990)

Report on Transmission Facility Outages During the Northeast Snowstorm of October 29-30, 2011 – Causes and Recommendations, Federal Energy Regulatory Commission and the North American Electric and Reliability Corporation, available at http://ferc.gov/legal/staff-reports/05-31-2012-ne-outage-report.pdf

Regional

ISO-New England, Inc., Power Generation and Fuel Diversity in New England (August 25, 2005), available at http://www.iso-ne.com/pubs/whtpprs/iso_ne_paper.pdf

ISO New England, Inc., 2011 Regional System Plan (October 21, 2011), available at http://www.iso-ne.com/trans/rsp/2011/index.html

ISO New England, Inc., 2012 Regional System Plan (November 2, 2012), available at http://www.iso-ne.com/trans/rsp/2012/index.html

ISO New England Planning Procedure 3, PP 3 - Reliability Standards for the New England Area Bulk Power Supply System. Effective Date: March 5, 2010, available at http://www.iso-ne.com/rules_proceds/isone_plan/pp03/pp3_r5.pdf

ISO New England Inc. FERC Electric Tariff No. 3, Open Access Transmission Tariff, Section II – Attachment K – Regional System Planning Process. Effective: December 7, 2007, available at http://www.iso-ne.com/regulatory/tariff/sect_2/oatt/sect_ii.pdf

Northeast Power Coordinating Council, Inc. Regional Reliability Reference Directory #1, Design and Operation of the Bulk Power System. December 1, 2009 (replaced Document A-2), available at https://www.npcc.org/Standards/Directories/Directory%201%20-%20Design%20and%20Operation%20of%20the%20Bulk%20Power%20System%20%20Clean%20April%2020%202012%20GJD.pdf

Northeast Power Coordinating Council, Inc. Regional Reliability Reference Directory #4, Bulk Power System Protection Criteria. December 1, 2009 (replaced Document A-5), available at https://www.npcc.org/Standards/Directories/NPCC%20Directory%2004%20System%20Protection%20Criteria%20(C22%20Forms).pdf

State

Connecticut Siting Council

Connecticut Siting Council, Electric and Magnetic Fields Best Management Practices for the Construction of Electric Transmission Lines in Connecticut (December 14, 2007), available at http://www.ct.gov/csc/emf-bmp

Connecticut Siting Council, Review of the Connecticut Electric Utilities Ten-Year Forecast of Loads and Resources 2012-2021 (December 27, 2012)

Connecticut Siting Council, Review of the Connecticut Electric Utilities Ten-Year Forecast of Loads and Resources 2008-2017 (November 21, 2008), available at http://www.ct.gov/csc/cwp/view.asp?a=950&Q=429820&PM=1

Connecticut Siting Council, 2010/2011 Forecast of Electric Loads and Resources (September 8, 2011), available at http://www.ct.gov/csc/lib/csc/pendingproceeds/regulations/report_text.pdf

Connecticut Siting Council, White Paper on the Security of Siting Energy Facilities (October 8, 2009), available at http://www.ct.gov/csc/lib/csc/docket_346/whiteppr_final.pdf

Connecticut Siting Council, Investigation into the Life Cycle Costs of Electric Transmission Lines (February 13, 2007), available at http://www.ct.gov/csc/lib/csc/life_cycle_rfp/43714q1.pdf

Connecticut Siting Council Docket No. 217 - Northeast Utilities Service Company Certificate of Environmental Compatibility and Public Need for the construction of a 345-kV electric transmission line and reconstruction of an existing 115-kV electric transmission line between Connecticut Light and Power Company's Plumtree Substation in Bethel, through the Towns of Redding, Weston, and Wilton, and to Norwalk Substation in Norwalk, Connecticut.

Connecticut Siting Council Docket No. 272 - The Connecticut Light and Power Company and The United Illuminating Company Certificate of Environmental Compatibility and Public Need for the Construction of a New 345-kV Electric Transmission Line and Associated Facilities Between Scovill Rock Switching Station in Middletown and Norwalk Substation in Norwalk, Connecticut Including the Reconstruction of Portions of Existing 115-kV and 345-kV Electric Transmission Lines, the Construction of the Beseck Switching Station in Wallingford, East Devon Substation in Milford, and Singer Substation in Bridgeport, Modifications at Scovill Rock Switching Station and Norwalk Substation and the Reconfiguration of Certain Interconnections. Record, available at http://www.ct.gov/csc/cwp/view.asp?a=3&q=260374

Connecticut Siting Council Docket No. 292 - The Connecticut Light & Power Company Certificate of Environmental Compatibility and Public Need for the construction and operation of 8.7 miles of new underground 115-kilovolt electric transmission cables extending from CL&P's existing Glenbrook Substation in the City of Stamford, through the Town of Darien, to CL&P's existing Norwalk Substation in the City of Norwalk. Record, available at http://www.ct.gov/csc/cwp/view.asp?a=3&Q=275874&PM=1

Connecticut Siting Council Docket No. 346 - Implementation of Section 8 and Section 54 of Public Act No. 07-242 An Act Concerning Electricity and Energy Efficiency. Record, available at http://www.ct.gov/csc/cwp/view.asp?a=962&q=396892

Connecticut Siting Council Docket No. 370 –Consolidated proceeding pursuant to the Connecticut Energy Advisory Board (CEAB) Request for Proposal (RFP) process under C.G.S. §16a-7c. Original application: The Connecticut Light & Power Company Certificates of Environmental Compatibility and Public Need for the Connecticut Valley Electric Transmission Reliability Projects which consist of (1) The Connecticut portion of the Greater Springfield Reliability Project that traverses the municipalities of Bloomfield, East Granby, and Suffield, or potentially including an alternate portion that traverses the municipalities of Suffield and Enfield, terminating at the North Bloomfield Substation; and (2) the Manchester Substation to Meekville Junction Circuit Separation Project in Manchester, Connecticut. Competing application: NRG Energy, Inc. application pursuant to C.G.S. §16-50l(a)(3) for consideration of a 530 MW combined cycle generating plant in Meriden, Connecticut. Record, available at http://www.ct.gov/csc/cwp/view.asp?a=3&Q=427408&PM=1

Connecticut Siting Council 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. Record, available at http://www.ct.gov/csc/cwp/view.asp?a=962&q=493418

Department of Energy and Environmental Protection

Connecticut Council on Soil and Water Conservation, State of Connecticut Department of Energy and Environmental Protection, 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, DEP Bulletin 34 (May 2002, last revised September 2007), available at http://www.ct.gov/dep/cwp/view.asp?a=2720&q=325660&depNav_GID=1654

State of Connecticut Department of Energy and Environmental Protection, 2004 Connecticut Stormwater Quality Manual, available at http://www.ct.gov/DEP/cwp/view.asp?a=2721&q=325704&depNav_GID=1654#download

Planning and Standards Division, Bureau of Water Management, Connecticut Department of Energy and Environmental Protection, Water Quality Standards, (Surface Water Quality Standards Effective December 17, 2002 and Ground Water Quality Standards Effective April 12, 1996), available at http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs.pdf

Connecticut Air Quality Standards, Connecticut Department of Energy and Environmental Protection, Regs. Conn. State Agencies §§22a-174-24, et seq. (2006).

Connecticut Noise Control Regulations, Connecticut Department of Energy and Environmental Protection, Regs. Conn. State Agencies §§22a-69-1, et seq. (2006).

2012 Integrated Resource Plan for Connecticut, Connecticut Department of Energy and Environmental Protection, pursuant to Conn. Public Act 11-80 (June 14, 2012), available at http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/cb827b1ffa58b2fd85257a1d0060c374/$FILE/2012%20Integrated%20Resource%20Plan.pdf

Department of Public Health

Connecticut Department of Public Health, Electric and Magnetic Fields (EMF): Health Concerns Fact Sheet (April 2008), available at http://www.ct.gov/dph/lib/dph/environmental_health/eoha/pdf/emf_fact_sheet_-_2008.pdf

Department of Transportation

State of Connecticut Department of Transportation, ConnDOT Drainage Manual (2000, last revised December 2003), available at http://www.ct.gov/dot/cwp/view.asp?a=3200&q=260116

Connecticut Department of Transportation, Utility Accommodation Manual, February 2009 available at http://www.ct.gov/dob/lib/dot/documents/dutilities/accomodation.pdf

Other State Agencies

State of Connecticut Office of Policy and Management, Draft Conservation and Development Policies Plan for Connecticut 2013-2018, available at http://www.ct.gov/opm/lib/opm/igp/org/cdupdate/2013-2018_draft_cd_plan.pdf

Clean Energy Finance and Investment Authority, Comprehensive Plan FY 2013 through FY 2015, available at http://www.ctcleanenergy.com/Portals/0/FY13%20Comprehensive%20Plan.pdf

State of Connecticut Energy Conservation Management Board, Energy Efficiency: Investing in Connecticut's Future (March 1, 2007), available at http://www.ct.gov/dep/lib/dep/air/regulations/proposed_and_reports/app8q.pdf

Connecticut Clean Energy Fund, FY 2011 – FY 2012 Comprehensive Plan (June 14, 2010), available at http://www.ctcleanenergy.com/Portals/0/FINAL%20DRAFT%20CCEF%20FY%2011%2012%20Comprehensive%20Plan.pdf

An Act Establishing Connecticut Heritage Areas, as amended, 2009 Conn. Acts 221 (Reg. Sess.), codified at Conn. Gen. Stat. §16a-27 (2010), available at http://www.cga.ct.gov/2009/ACT/PA/2009PA-00221-R00HB-06584-PA.htm

State Plan of Conservation and Development, as amended, Conn. Gen. Stat. §§16a-27 to 16a-32a (2010).

Report of the Two Storm Panel, presented to Governor Dannel P. Malloy, January 9, 2012, available at http://www.governor.ct.gov/malloy/lib/malloy/two_storm_panel_final_report.pdf

Technical

Institute of Electrical and Electronics Engineers, IEEE Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields From AC Power Lines, IEEE Std. 644-1994 (Reaffirmed 2008) (March 27, 2008), available at https://sbwsweb.ieee.org/ecustomercme_enu/start.swe?SWECmd=GotoView&SWEView=Catalog+View+(eSales)_Standards_IEEE&mem_type=Customer&SWEHo=sbwsweb.ieee.org&SWETS=1192713657

Institute of Electrical and Electronics Engineers, IEEE Guide for the Design, Construction, and Operation of Safe and Reliable Substations for Environmental Acceptance, IEEE Std. 1127-1998 (updated August 1, 2011), available at https://sbwsweb.ieee.org/ecustomercme_enu/start.swe?SWECmd=GotoView&SWEView=Catal

og+View+(eSales)_Standards_IEEE&mem_type=Customer&SWEHo=sbwsweb.ieee.org&SWETS=1192713657

American National Standards Institute, National Electrical Safety Code, ANSI C2-2012. August 1, 2011.

Exponent, Inc., EMF and Health: Review and Update of the Scientific Research (January 28, 2009), available at http://transmission.bchydro.com/NR/rdonlyres/DEF09171-908A-48DF-A9DA-F28676D239FD/0/Exponent2009EMFUpdate0209.pdf

The Brattle Group, Connecticut Light and Power, and the United Illuminating Company, Integrated Resource Plan for Connecticut (January 1, 2010), available at http://www.ctenergy.org/pdf/2010IRP.pdf.

Maps

Natural Resources Division, Connecticut Department of Energy and Environmental Protection, Atlas of Connecticut Topographic Maps, DEP Bulletin 17 (1992), available at http://www.ctdepstore.com/Maps_c16.htm;jsessionid=1FF9EB902F8695DF048A7BD535715052.qscstrfrnt02

State of Connecticut Department of Energy and Environmental Protection, *Natural Diversity Database Map for the City of Stamford*, (last updated June 2010), available at http://www.depdata.ct.gov/naturalresources/endangeredspecies/nddbpdfs.asp

State of Connecticut Department of Transportation, Connecticut Official State Tourism Map (2007-2009), available at http://www.ctbound.org/

Mail-A-Map Street Map, Stamford, (Harbor Publications 2003).

United States Geological Survey, Connecticut Topographic Map Collection, available at http://magic.lib.uconn.edu/topographic_maps.html

Miscellaneous

United States Code of Federal Regulations Title 33, Clean Water Act, Sections 401 and 404.

Conn. Gen. Stat. §16-243 and §§16-11-134, and 135 of the Regulations of Connecticut State Agencies.

2012-2021 Forecast Report of Capacity, Energy, Loads & Transmission (CELT). ISO New England Inc. System Planning, May 2012, available at http://www.iso-ne.com/trans/celt/report/2012/2012_celt_report.pdf

ISO New England Inc. Transmission, Markets and Services Tariff (formerly known as FERC Electric Tariff No. 3). October 1, 2011, available at http://www.iso-ne.com/regulatory/tariff/sect_1/sect_i.pdf

ISO New England Inc. Transmission Operating Agreement among ISO New England Inc. and Participating Transmission Owners. February 1, 2005, available at http://www.iso-ne.com/regulatory/toa/v1_er07-1289-000_toa_composite.pdf

ISO New England Inc. Planning the New England Transmission System for Reliable Operation. August 11, 2009.

The Connecticut Light and Power Company, 2011 Forecast of Loads and Resources for the Period 2011-2020. March 1, 2011, available at http://www.ct.gov/csc/lib/csc/pendingproceeds/forecast_2011/f2011-clp.pdf

The Connecticut Light and Power Company, 2012 Forecast of Loads and for the Period 2012-2021. March 1, 2012, available at http://www.ct.gov/csc/lib/csc/pendingproceeds/forecast_2012_2013/annual_reports/f2012-20120301-cl&p.pdf

Connecticut Siting Council Investigation into the Life Cycle Costs of Electric Transmission Lines. Connecticut Siting Council. Prepared by Kema Inc. February 2007, available at http://www.ct.gov/csc/lib/csc/life_cycle_rfp/43714q1.pdf and Comment Letter of R. Zaklukiewicz. April 13, 2007.

The New England Energy Alliance. Electricity Transmission Infrastructure Development in New England Value through Reliability, Economic and Environmental Benefits. Polestar Communications & Strategic Analysis. December 2007, available at http://www.newenglandenergyalliance.org/

North American Electric Reliability Corporation. Special Report: Electric Industry Concerns on the Reliability Impacts of Climate Change Initiatives. Version 1.1. November 12, 2008, available at http://www.nerc.com/files/2008-climate-initiatives-report.pdf

World Health Organization. Electromagnetic Fields and Public Health, Exposure to Extremely Low Frequency Fields – Fact Sheet #322. June 2007, available at http://www.who.int/mediacentre/factsheets/fs322/en/index.html

A.6 APPLICATION FILING FEES

Pursuant to Conn. Gen. Stat. §16-50v(a); Application Guide §IV; General Statutes §16-50*l*(a), CL&P is submitting the filing fee for this Application as determined by the following schedule:

Table A-1: Application Fees

Estimated Construction Cost	Fee
Up to $5,000,000	0.05% or $1,250.00, whichever is greater
Above $5,000,000	0.1% or $25,250.00, whichever is less

Based on this filing fee schedule and the estimated construction cost for the Project presented in Section D.3, a check for the Council's Application Fee in the amount of $25,250.00 payable to the Treasurer, State of Connecticut accompanies this Application. CL&P understands that additional assessments may be made for expenses in excess of the filing fee, and that fees in excess of the Council's actual costs will be refunded to CL&P.

Pursuant to Conn. Gen. Stat. §16-50*l*(a)(1), CL&P also encloses a separate check in the amount of $25,000.00 payable to the Treasurer, State of Connecticut for the Municipal Participation Fee.

A.7 PROOF OF SERVICE

Pursuant to Conn. Gen. Stat. §16-50*l*(b)), this Application was served on the following:

- The chief elected official, the planning and zoning commission, and the conservation and wetlands commissions of the site municipality (City of Stamford). There are no other municipalities within 2,500 feet of the proposed facility;
- The South Western Regional Planning Agency;
- The State Attorney General;
- Each member of the Legislature in whose district the facility is proposed;
- Any federal agency which has jurisdiction over the proposed facility;

- The Department of Emergency Management and Homeland Security now known as the Department of Emergency Services and Public Protection;

- The State Departments of Energy and Environmental Protection (includes Public Utilities Regulatory Authority); Public Health; Economic and Community Development; Agriculture; and Transportation; the Council on Environmental Quality; and the Office of Policy and Management;

- Other state and municipal bodies as the Council may by regulation designate, including but not limited to, the State Historic Preservation Officer of the Commission on Culture and Tourism (consolidated with Economic and Community Development); and,

- Connecticut Energy Advisory Board.

The names of government officials and agencies on whom a copy of the Application is being served (the "Proof of Service") will be provided to the Council under separate cover.

A.8 NOTICE TO COMMUNITY ORGANIZATIONS

In accordance with the directions provided in the Application Guide (§VIII), the Applicant made reasonable efforts to provide notice of this Application on the following:

- Affected community groups including Chambers of Commerce, land trusts, trail organizations, environmental groups, historic preservation groups, advocacy groups for the protection of Long Island Sound, and river protection organizations within the watershed affected by the proposed facility that have been identified by the City of Stamford, or those that have registered with the Council to be provided notice, as follows:
    - Farmington River Watershed Association
    - Farmington River Coordinating Committee

- Any affected water company within the watershed affected by the proposed facility.
    - Aquarion Water Company

The names of community organizations provided with notice of the Application filing will be provided to the Council under separate cover.

A.9 PUBLIC NOTICE

Pursuant to the Conn. Gen. Stat. §16-50*l*(b), public notice of this Application (the "Public Notice") was published at least twice prior to the filing of the Application in newspapers having general circulation in the site municipality. The notice included the name of the applicant, the date of filing, and a summary of the Application. The notice was published in not less than ten point type. The Public Notice was published in The Advocate and The Connecticut Post on January 7 and 14, 2013. A copy of the Public Notice is included in Appendix E.3.

A.10 NOTICE IN UTILITY BILLS

Pursuant to Conn. Gen. Stat. §16-50*l*(b), notice of the proposed Project was provided to each CL&P customer located within the vicinity of the Preferred Route, Preferred Route With Variation, and Alternate Route on a separate enclosure with each customer's monthly bill for one or more months not earlier than 60 days prior to the filing of this Application with the Council. This included all CL&P customers in the City of Stamford. A copy of the bill insert is included in Appendix E.4.

A.11 NOTICE TO OWNERS OF PROPERTY ABUTTING THE SUBSTATION SITES

Pursuant to Connecticut General Statute §16-50*l*(b), notice of the proposed Project, including modifications to the Glenbrook and South End Substations was provided to abutters to both substations via certified mail, return receipt requested.

A.12 PRE-APPLICATION PROCESS

In accordance with Conn. Gen. Stat. §16-50*l*(e), CL&P had multiple meetings with representatives from the City of Stamford prior to distribution of the Municipal Consultation Filing ("MCF"). The MCF was a key initial step in the Council's comprehensive regulatory process that governs transmission facility planning and siting. Specifically, the MCF:

- Provided information about the Project to representatives of the potentially affected municipality and the public; and,

- Solicited public participation at an early stage in the development of the Project so that issues of concern to the public could be identified and addressed in the Project planning process.

The MCF also presented technical information concerning Project need, route selection, and potential environmental effects, including the results of studies that CL&P or its consultants had performed to date (e.g., the identification and evaluation of potential routes, general environmental characteristics in the Project vicinity, and potential environmental effects and mitigation measures).

On September 7, 2012, the MCF was provided to the City of Stamford, the only affected municipality. There is no other municipality located within 2,500 feet of the Preferred Route, Preferred Route With Variation, or Alternate Route. Through the MCF and other public outreach efforts, CL&P acquired information and recommendations from the City of Stamford to assist in designing and constructing transmission improvements that would provide needed system reliability while minimizing the effects of the Project on the community.

A.13 CONNECTICUT ENERGY ADVISORY BOARD EVALUATION

The MCF was also submitted to the Connecticut Energy Advisory Board ("CEAB"), a statutory body that represents the State of Connecticut in regional energy planning. The CEAB may decide to issue a Request for Proposal ("RFP") for alternate solutions to meet the needs served by the Project. However, CL&P has submitted an RFP exemption request for the Project. In determining whether to issue a RFP, the CEAB will draw upon, among other things, its own general knowledge of Connecticut's energy needs. If the CEAB pursues the RFP process, and if there is an alternate proposal(s), the Council could be called upon to evaluate such proposal(s) along with CL&P's Project.

B. PROJECT NEED[1]

CL&P is proposing the Project to eliminate reliability criteria violations that affect the 115-kV transmission system serving the Stamford-Greenwich Sub-area and to ensure compliance with mandatory national and regional reliability standards. The Project would also extend the strong, reliable source of electric power that resulted from the construction of the Bethel to Norwalk 345-kV line, Middletown to Norwalk 345-kV line, and the Norwalk to Glenbrook 115-kV cables deep into the Norwalk-Stamford Sub-area, thereby bringing the benefits of these additional electric power supplies to the entire region west of the Norwalk Substation and, in particular, to the Stamford-Greenwich Sub-area.[2]

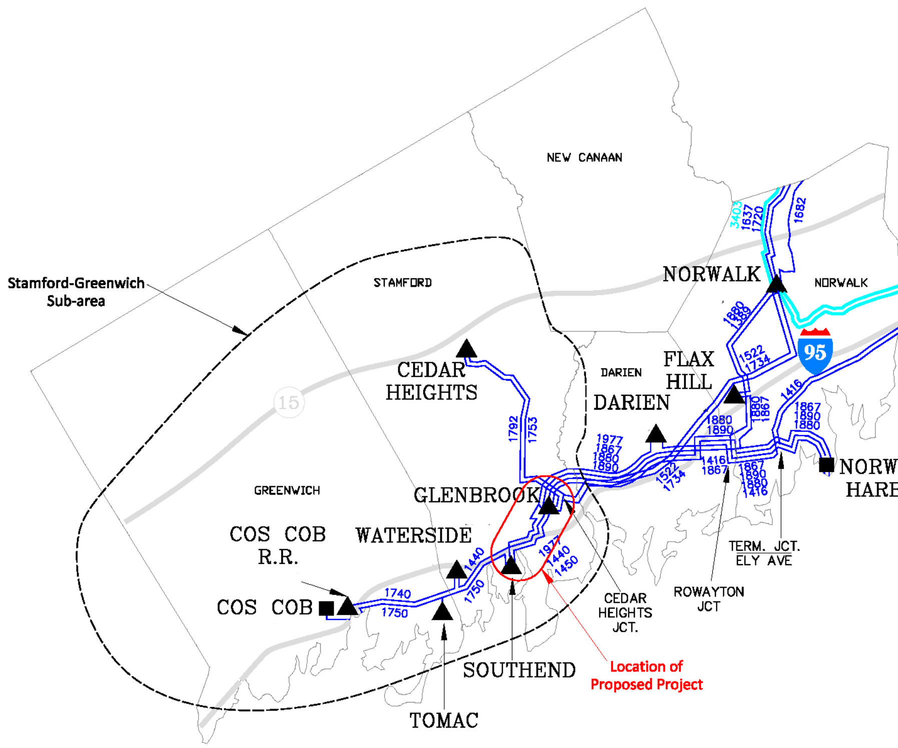


Figure B-1. Geographic Diagram of the Stamford-Greenwich Sub-area

---

[1] This analysis of Project Need has been redacted to avoid disclosure of information determined to be Critical Energy Infrastructure Information ("CEII"). CL&P will be filing a CEII Appendix under separate cover, along with a Motion for a Protective Order, pursuant to the Council's rules that preserve the confidentiality of CEII.

[2] The Stamford-Greenwich Sub-area, which comprises the City of Stamford and the Town of Greenwich, is a component of the Norwalk-Stamford Sub-area, which includes all or a portion of the following municipalities: Bridgeport, Darien, Easton, Fairfield, Greenwich, New Canaan, Norwalk, Redding, Ridgefield, Stamford, Trumbull, Weston, Westport and Wilton.

B.1 BACKGROUND

B.1.1 The Existing SWCT Transmission System and its Limitations

Since 2002, the inadequacy of the electric supply system in Southwest Connecticut ("SWCT") and, in particular, of the Norwalk-Stamford Sub-area within SWCT, has been widely recognized. Connecticut's electric public utilities, CL&P and The United Illuminating Company ("UI"), have proposed and completed major system improvements to enhance the reliability and efficiency of the bulk power transmission system in SWCT.

In 2002, CL&P proposed to construct a new 345-kV transmission line between the Plumtree Substation in Bethel and the Norwalk Substation in Norwalk in order to increase the electric import capability into SWCT, particularly the Norwalk-Stamford Sub-area, and to remedy voltage problems on those portions of the electric system (see Council Docket No. 217). The Bethel to Norwalk 345-kV line was the second of three planned steps for constructing a 345-kV "loop" through SWCT. The Bethel-Norwalk 345-kV line was placed in service in 2006. The first segment of the SWCT 345-kV loop had been constructed between New Milford and Bethel in the 1970s.

In 2002, CL&P proposed to replace the existing 138-kV Long Island Cable from the Norwalk Harbor Station, Connecticut to the Northport Station, New York to reinforce the electrical connection between SWCT and Long Island, New York (see Council Docket No. 224). The new Long Island cables were placed in service in 2008.

In 2003, CL&P and UI proposed to construct a series of new 345-kV transmission lines from Middletown to Norwalk, which completed the SWCT 345-kV loop (see Council Docket No. 272). The newly installed 345-kV loop in SWCT facilitated the transport of electricity into the area, reduced the potential for 115-kV line overloads, improved efficiency with reduced line losses, improved system voltage performance, reduced high levels of available short-circuit current, and generally strengthened the entire New England electric grid by enhancing interconnections between SWCT and the rest of New England. The loop also unlocked existing generation in SWCT and enabled the siting of new generation in the region. The new Middletown-Norwalk 345-kV line was placed in service in 2008. In summary, completion of the 345-kV loop strengthened the transmission system in the SWCT area and created a strong electric supply source at the Norwalk Substation.

In 2003, CL&P proposed to construct two 115-kV transmission cable circuits between the Norwalk Substation in Norwalk and the Glenbrook Substation in Stamford in order to increase the electric import capability into the Norwalk-Stamford Sub-area, and to remedy voltage problems in that part of the electric system (see Council Docket No. 292). The Glenbrook Cables Project extended this new strong source with its two cable construction into the Glenbrook Substation in Stamford. The new Norwalk-Glenbrook 115-kV cables were placed in service in 2008.

When the 345-kV loop was completed in 2008, the Norwalk Substation became a strong, reliable electric supply source. The Project is designed to build upon the strength created at Norwalk Substation and to extend the benefits of the SWCT 345-kV loop and the 115-kV Glenbrook cables farther west into the Stamford-Greenwich Sub-area portion of the Norwalk-Stamford Sub-area. The Stamford-Greenwich Sub-area is served by the Glenbrook Substation, Cedar Heights Substation, South End Substation, Tomac Substation, Waterside Substation and the Cos Cob Substation.

Construction of the Project would provide the additional transmission transfer capability needed to extend the benefits of the 345-kV loop from the Glenbrook Substation to South End Substation and, from there, throughout the Stamford-Greenwich Sub-area. This line will not only provide a new source of electric supply directly to the South End Substation, but also will allow the redistribution of power flows on the transmission lines that presently serve Stamford, including those serving the Tomac, Waterside, and Cos Cob Substations in the western portion of the Stamford-Greenwich Sub-area. In particular, the proposed Project will relieve post-contingency overloads on the 115-kV transmission lines serving these substations and increase system voltage levels, thereby providing more reliable power supplies to meet customer demands in the areas served by those substations.

B.1.2 Justification for the Proposed In-Service Date

As discussed more fully below, the reliability contingency analyses that were performed show potential voltage collapse and thermal overloads that could occur today, in violation of national reliability criteria standards. The projected in-service date for the Project is December 2014. This date represents the earliest date that the Project could be in service after taking into consideration the time required for siting, permitting, and constructing the proposed facilities.

B.1.3 Adequacy of the Current Transmission System With and Without the Project

As noted above, at the present time, without the Project, the transmission system could experience voltage collapse and thermal overload conditions. With the Project in service, analyses of the 2015 summer peak load (the first summer peak period that the Project would be available to provide the reliability benefits) demonstrate that the Project addresses these potential voltage collapse and thermal overload conditions. The Project is expected to continue to prevent these reliability criteria violations and provide more reliable electric transmission service for at least twenty years.

B.1.4 Identification of the Project in the Forecast of Loads and Resources Pursuant to Conn. Gen. Stat. §16-50r

The Project was listed in Table 4-1A: Proposed Transmission Line Projects in CL&P's *2012 Forecast of Loads and Resources For the Period 2012-2021*, dated March 1, 2012.

B.2 METHODOLOGY FOR ANALYZING SYSTEM RELIABILITY

B.2.1 ISO-NE Regional System Planning Process

The Federal Energy Regulatory Commission ("FERC") has given authority to the Independent System Operator - New England ("ISO-NE") to operate and perform regional system planning of the electric system in New England. This process is incorporated in the ISO-NE Open Access Transmission Tariff ("OATT" or "ISO-NE Tariff"). In 2007, ISO-NE took steps to adopt a regional transmission planning process in accordance with FERC Orders No. 890, 890-A and 890-B. This process is referred to as the "Regional System Planning Process" and is set forth in Attachment K of the ISO-NE OATT.

ISO-NE administers the Regional System Planning Process and has a number of responsibilities. For transmission, ISO-NE's primary functions are to: (1) conduct periodic needs assessments on a system wide or specific-area basis, as appropriate, (2) perform solution studies to develop alternatives and define the preferred project to address the identified needs; and (3) develop an annual regional system plan using a 10-year planning horizon. Needs assessments are designed to identify future system needs on the regional transmission system, or within a sub-area of the system, with consideration of available market solutions. Where market solutions do not exist, or where system deficiencies exist even with market solutions incorporated, ISO-NE evaluates and determines preferred regulated transmission solutions, within the solution assessment planning process and the annual transmission planning process.

ISO-NE carries out the regional planning process through the requirements of the ISO-NE Tariff Attachment K as part of an open and transparent stakeholder process involving the Planning Advisory Committee ("PAC"), New England Power Pool ("NEPOOL") Reliability Committee, and other ISO-NE advisory committees. Membership of PAC includes market participants, public utility commissions, consumer advocates and Attorneys General, environmental regulators, and other interested parties. PAC provides input and feedback to ISO-NE regarding the first three phases of the regional system planning process, including the development and review of "needs assessments," the preparation of "solution studies," and the development of the Regional System Plan ("RSP"). Specifically, PAC serves to review and provide input on: (1) the development of the RSP; (2) assumptions for studies performed; (3) the results of needs assessments and solutions studies; and (4) potential market responses to the needs identified by ISO-NE through a needs assessment or the RSP. The fourth and final phase is the submittal of the Proposed Plan Application ("PPA") to ISO-NE by the project sponsor.

The annual RSP represents a compilation of the regional system planning process activities conducted by ISO-NE and stakeholders during a given year and presents the results and findings of the ongoing ISO-NE regional planning process. The RSP addresses system needs and deficiencies as determined by ISO-NE through its periodic needs assessments, with updates occurring on a continuing basis to: (1) account for changes in pool transmission facilities system conditions; (2) ensure reliability of the transmission system; (3) comply with national and regional planning standards, criteria, and procedures; and (4) account for market performance and economic, environmental, and other considerations.

"Needs Assessment" identifies the timing and details of system needs, with recognition of available or potential market solutions. Specifically, Attachment K requires that needs assessments will analyze whether the New England transmission system: (1) meets applicable reliability standards, (2) has adequate transfer capability to support local, regional and inter-regional reliability; (3) supports the efficient operation of the wholesale electric markets; and (4) is sufficient to integrate new resources and loads on an aggregate or regional basis. Needs assessments identify the location and nature of any potential problems with respect to transmission facilities and situations that significantly affect the reliable and efficient operation of the New England transmission system, along with any critical time constraints for addressing the specified needs to facilitate the development of market responses and the pursuit of regulated transmission solutions.

"Solution Study" identifies the most cost-effective transmission solutions to system deficiencies identified through the needs assessment. ISO-NE may form targeted study groups to conduct the solutions studies, which would include project proponents, as well as representatives of affected stakeholder groups. Proposed regulated transmission solutions are made in consultation with PAC and identified solutions are reflected in the RSP.

"Proposed Plan Application ("PPA") Study" is a comprehensive analysis performed by the project sponsor for regulated transmission solutions that are reviewed by the NEPOOL Reliability Committee and approved by ISO-NE under Section I.3.9 of the OATT. These studies look at the overall impact of the project under study to determine if the reliability or operability of the New England power system is adversely impacted by the construction of the project.

B.2.2 ISO-NE Approval of the Project

An ISO-NE led working group ("SWCT Working Group") consisting of members from ISO-NE, NU, and UI was formed to study the SWCT area. The resulting need study was conducted in accordance with the regional planning process as outlined in Attachment K to the ISO-NE OATT. Starting in 2011, transmission needs for the Project were identified and included in the annual ISO-NE RSP.

The SWCT Working Group evaluated transmission alternatives to serve the Stamford-Greenwich Sub-area over a 10-year planning horizon, concentrating on the projected reliability of the transmission network. The SWCT Working Group scoped and performed a deterministic planning analysis for different operating scenarios, including North American Electric Reliability Corporation ("NERC") contingency events and basic transmission reliability criteria for planning, designing and operating the bulk power transmission system. The evaluation modeled stressed system conditions for the year 2018 summer peak load level. Subsequently, the SWCT Working Group identified and evaluated a series of potential transmission solutions and identified the preferred transmission solution as a CL&P Project. With the ISO-NE presentation of a range of potential transmission solutions, including the proposed transmission solution, to the PAC on November 16, 2011, the project was identified as the proposed solution and its status changed to “proposed” in the RSP.

A detailed study scope for the PPA was developed for the NEPOOL Transmission Task Force and the Stability Task Force. CL&P then conducted an analysis consistent with the identified study scope and reviewed its results with these task forces. Once the task forces were satisfied, the project was forwarded to the NEPOOL Reliability Committee, which evaluated the project for a determination of no adverse impact on the New England transmission network (Section I.3.9 of the ISO-NE Tariff). The NEPOOL Reliability Committee voted to recommend approval to ISO-NE on June 20, 2012. In July 2012, ISO-NE issued a letter approving the application and reclassifying the Project from “proposed” to “planned” in the RSP project listing.

B.3 SYSTEM EVALUATION STUDY STANDARDS AND STUDY ASSUMPTIONS

B.3.1 CL&P Transmission Planning Process

CL&P's planning process is integrated with and coordinated by ISO-NE as part of its regional planning process and annual RSP. CL&P’s System Planning Group evaluates the capacity and reliability of the electric transmission facilities in its service territory on a system-wide basis. As part of the system-wide planning process, CL&P investigates reliability needs at all load centers within the CL&P service territory, with specific emphasis on geographic sub-areas exhibiting distinctive transmission, generation, or distribution attributes. This helps to ensure that the particular load requirements of all areas within the CL&P electric system are reliably served. Within those areas, CL&P evaluates the adequacy of its transmission system starting with the high-voltage transmission systems and finishing with substation-level resources and requirements.

The assessment of system reliability conducted by CL&P’s System Planning Group evaluates the system's performance under projected operating conditions over a 10-year period. CL&P employs analytical modeling software at the transmission system level to perform this evaluation. These models are designed to simulate various “what if” scenarios, load-flow patterns, and loading characteristics across the system under both normal and adverse conditions. These studies analyze the impact of contingency events on the transmission system and test the effect of various adjustments that could be implemented to address any inadequacies discovered as a result of the contingency analysis. In addition, CL&P conducts various studies and evaluations in response to changes in conditions that affect the reliability of the system, such as the implementation of new demand resources or the announced retirement or new construction of generating units. Throughout the planning process, CL&P works in close coordination with the planning staff of ISO-NE.

B.3.2 Mandatory Reliability Standards

The following is a list of mandatory reliability standards.

FERC: The Federal Energy Policy Act of 2005 required the FERC to designate an entity to provide for a system of mandatory, enforceable reliability standards under FERC's oversight. This action was part of a transition from a voluntary to a mandatory system of reliability standards for the bulk-power system.

NERC: In July 2006, FERC designated the NERC as the nation's Electric Reliability Organization ("ERO"). The ERO is charged with improving the reliability of the bulk-power system by proactively preventing situations that can lead to blackouts, such as that which occurred in August 2003. Under this framework, NERC establishes a general set of rules and criteria applicable to all geographic areas. Electric utilities must adhere to reliability standards and criteria that are established under the purview of NERC, which has national authority to ensure the reliability of transmission systems across the United States. Failure to comply with these standards can result in FERC's imposition of financial penalties of up to $1 million per day for an instance of non-compliance.

NPCC: The Northeast Power Coordinating Council ("NPCC") is one of several regional reliability councils that, under the supervision of NERC, establish criteria for the design and operation of the bulk power system. NPCC's jurisdiction includes New York, New England, and eastern Canada. NPCC establishes a set of rules and criteria that are particular to its jurisdiction, but must be consistent with the more general NERC standards.

ISO-NE: The ISO-NE has responsibility for the planning and operation of the integrated New England transmission system. ISO-NE operates the various transmission systems owned by electric utilities in New England as a single transmission system. ISO-NE has adopted planning criteria that must be consistent with the standards and criteria established by NERC and NPCC. They are designed to ensure that the electric power system serving New England, including the CL&P electric service territory, will provide an adequate and reliable electric power delivery system.

The national and regional standards and criteria applicable to the CL&P's transmission system are deterministic in nature in that the standards are designed to assess the performance of the CL&P's 69-kV, 115-kV, 138-kV, and 345-kV transmission elements under a series of defined contingency situations. Specifically, these standards and criteria dictate a set of performance tests or contingencies under which the CL&P electric system must perform without experiencing overloads or voltage problems.

B.3.3 Stamford-Greenwich Sub-Area - Projected Peak Load Forecasts

ISO-NE's regional peak load forecast for New England is produced on an annual basis and presented in the Regional System Plan report and is contained in the annual filing of the Capacity, Energy, Loads and Transmission ("CELT") report each spring. The forecast is derived by modeling load from participants for each of the New England states, based on load data from various sub-areas within the New England states, and summing the results to arrive at a New England regional forecast. The forecast is reviewed by the NEPOOL Load Forecast Committee, the NEPOOL Reliability Committee and the PAC. The ISO-NE 2012 CELT forecast was utilized as the basis for the load forecast for these sub-area analyses.

ISO-NE develops New England load forecasts that are used for electric system planning. To model loads in the Norwalk-Stamford Sub-area, a share of the projected New England load that is proportional to the Sub-area's historical share was assigned to it. An assumption of a uniform growth rate for all of New England is thus embedded in the modeling process. The peak load forecasts include forecasts based on both normal and "90/10" weather conditions. Under ISO-NE's design weather scenario, the peak-load forecast is modeled assuming that there is a 10% probability that peak load in the year represented will be higher than forecast (and a 90% chance that the actual peak load will be less than the forecast level). ISO-NE employs the design weather probability level for planning purposes in order to ensure the reliable operation of the grid under weather conditions that may be infrequent, but are reasonably foreseeable, in terms of their potential to occur. This is consistent with the essential nature of having a highly reliable electric system and the overarching requirement that the system be designed with sufficient capability to meet heat-wave conditions consistent with historical experience. Moreover, the risk and consequences of having shortfalls and a constrained electric system are far more significant than having an electric system that has the flexibility to respond to both normal and reasonably foreseeable peak demands. The products of the ISO-NE annual forecast include collective forecasts for all of New England, forecasts for each state, and forecasts for specific locations such as the Norwalk-Stamford Sub-area.

CL&P follows the same basic approach as ISO-NE, but applies the approach in a more granular fashion to develop load forecasts of smaller areas such as distribution substations. As part of its transmission reliability planning process, CL&P develops a forecast of peak load for each substation for purposes of testing and evaluating the performance capabilities of the system. To analyze the need for the Project, CL&P used ISO-NE's recent peak forecast (2012 CELT) for New England and adapted it to determine peak loads over the planning horizon at each of the CL&P's substations serving Connecticut and including the Stamford-Greenwich Sub-area. Although CL&P's transmission planning process is closely aligned and integrated with that of ISO-NE, an important consideration that CL&P must factor into its area-specific analysis is unique peak load “granular” requirements in the Stamford-Greenwich Sub-area.

CL&P continuously monitors the real estate and commercial developments within Connecticut. These new developments can be significant at times and the new load must be considered in planning to ensure that an adequate electric grid is available to meet customer demands reliably. These changes in future load forecasts are generally incorporated in the ISO-NE forecast. In Stamford, City officials have undertaken efforts to encourage robust economic development and urban redevelopment, especially within the City's South End area. These efforts include:

- Building Land Technologies, LLC (“BLT”) - Harbor Point Development: overall plans by BLT call for a total of 6 million square feet (“s.f.”) of combined office space, retail leases, and residential uses, which include:
  - Bridgewater Associates World Headquarters: 750,000 s.f.

   - Harbor Points Retail Centers: a total of 400,000 s.f. of space at the renovated historic Yale & Towne site and at The Square, in the center of the Waterside community.

   - The Hotel and Spa at The Square: a total of 257,805 s.f. with 13 stories and 131 rooms.

- Malkin Properties, LLC - Metro Center II: 250,000 s.f. office space near the Stamford Transportation Center.

- Spinnaker Associates: redevelopment of the former Clairol site, a 32 acre site, being developed to house Chelsea Piers, a 346,000 s.f., multi-sport athletic facility, plus other key occupants including NBC Sports, NBC Olympics, NBC Sports Digital, NBC Sports Network and the Comcast Sports Management Group.

- Stamford Hospital Expansion: an 11-story medical specialty building addition, with an additional 33,500 s.f. central utility plant, to support the larger facility.

- Park Square West Phase I and II: four separate buildings with a total of 419 apartments.

- The Mill River Corridor/Park/Skating Rink: a 26-acre linear park, extending from South End north past Stamford's Downtown area, and including an outdoor ice skating rink, walking and bicycle trail, and additional housing units.

To analyze the need for the Project, CL&P used ISO-NE's 2012 CELT peak forecast for each of the CL&P's substations serving Connecticut and incorporated the passive and active demand resources in the Stamford-Greenwich Sub-area. Table B-1 includes the projected 2015 load and demand resource levels in megawatts (“MW”) at the South End, Tomac, Waterside, Cos Cob and Darien Substations serving the Stamford-Greenwich Sub-area.

Table B-1: Projected 2015 Load and Demand Resource Levels (MW)

Substation	Gross Peak Load	Passive Demand Resources	Active Demand Resources	Net Load
South End	105.1	5.4	3.7	96.0
Tomac	52.2	2.7	1.8	47.7
Waterside	75.8	3.9	2.7	69.2
Cos Cob	160.0	8.3	5.7	146.0
Darien	69.7	3.6	2.5	63.6
Total	**462.8**	**23.9**	**16.4**	**422.5**

B.3.4 Incorporation of Energy Efficiency into the ISO-NE Planning Process

Demand Resources ("DR") are treated as capacity resources in the ISO-NE Forward Capacity Auctions. In accordance with Attachment K of the ISO-NE OATT, demand resources are modeled in the base case at the levels of the most recent Forward Capacity Auction ("FCA") and in this case FCA6. Demand resources are split into two major categories, passive and active demand resources.

Passive Demand Resource: Passive demand resources are largely comprised of energy efficiency ("EE") programs and are expected to lower the system demand during all hours and during designated peak hours in the summer and winter. In accordance with ISO-NE planning procedures, 100% of passive demand resources are modeled in the base case power flows.

Active Demand Resource: Active demand resources are commonly known as real-time demand response ("RTDR") resources and can be dispatched if a forecasted or real-time capacity shortage occurs on the system. In addition active demand resource can be contracted interruptible load when called upon by ISO-NE. In accordance with ISO-NE planning procedures, typically 75% of active demand resources are modeled in the base case power flows. The reduced level of capacity resource capability reflects the ISO-NE historical operating experience when dispatching such units in emergency system conditions.

Because DR was modeled at the low-side of the distribution substations in the power-flow model, all DR values were increased to account for the reduction in losses on the local distribution network (assumed to be 5.5% based on historical studies). Passive DR was modeled by load zone and active DR was modeled by dispatch zone. Since Active DR is only reported by load zone, the active DR load zones were split proportionally to dispatch zones using the percentage of CELT load modeled in the dispatch zone to the total CELT load modeled in the load zone.

B.3.5 The SRCP Impact

The results of the contingency event analyses indicated reliability criteria violations in the Stamford-Greenwich Sub-area. The major conclusions from these contingency event analyses are:

- The transmission loading capability between the Glenbrook Substation and the South End Substation is insufficient to reliably serve the customer demands in the Stamford-Greenwich Sub-area under contingency events.

- The transmission loading capability from the South End Substation to the Waterside Substation and the Cos Cob Substation is insufficient to reliably serve the customer demands in the Stamford-Greenwich Sub-area under contingency events.

Due to the overloads on the transmission lines between the Glenbrook Substation and the South End Substation, CL&P is proposing to install a new cable circuit to increase the power flow loading capability between these two stations. This is the preferred transmission solution to address the reliability criteria violations. Contingency events were retested with the Project modeled in service to show the reliability benefits that would be realized by the Project. With the Project in service the transmission system serving the Stamford-Greenwich Sub-area would experience improved transmission reliability for the contingencies tested in conformance with the reliability standards and criteria established by NERC, NPCC and ISO-NE. The Project is a new transmission circuit, with the following approximate summer thermal ratings of Normal = 250 MVA (megavolt ampere), LTE = 450 MVA and STE = 475 MVA, that provides an alternative transmission path for power flows and relieves criteria violations on the limiting 115-kV transmission system in the Stamford-Greenwich Sub-area. With the Project in place, these criteria violations are eliminated. The reliability benefits that the Project serves are summarized below:

- The transmission transfer capability between the Glenbrook Substation and the South End Substation is increased to reliably serve the customer demands in the Stamford-Greenwich Sub-area under contingency events.
- The Project provides a new and alternate path to relieve power flows in the vicinity of the Waterside, Cos Cob and Tomac Substations to below LTE ratings under contingency events.

Some double-circuit tower contingency events cause a portion of the electric system between South End, Waterside, Tomac, and Cos Cob to interrupt load after the completion of this Project. These violations are on the 115-kV line segments serving Tomac, Waterside and Cos Cob. Such criteria violations can be resolved by the future construction of a new underground transmission line into that area of Greenwich.

B.4 NON-TRANSMISSION ALTERNATIVES

Regional transmission planning, under the guidance of ISO-NE, must take into account load growth and grid reliability, while also remaining flexible to allow market solutions to be considered (e.g., generation, demand response programs) to meet reliability needs. In assessing the need for new transmission to serve the Stamford-Greenwich Sub-area, CL&P first considered the following non-transmission alternatives.

Central Generation: The installation of central generating units constructed at the existing generating stations and new generating units at new sites, which could be provided by the marketplace and connected to the existing transmission system, are potential non-transmission alternatives to be evaluated on a case by case basis.

Energy Efficiency: Passive and active energy efficiency programs can be proposed by proponents to reduce peak load and thus reduce the additional power flow capability requirements for the existing transmission system. Passive demand resources could include conservation and load management and Connecticut Energy Efficiency Fund programs. Active demand resources could include the installation of small and dispersed generating units located on the existing distribution system to supply local load requirements and reduce the needed transmission requirements for additional power flow system capability. In addition customer load interruption programs, that would require customers to voluntarily interrupt load under the direction of ISO-NE, could provide the necessary relief to ensure transmission system reliability.

Load Curtailment: The incorporation of planned contracted customer load curtailment could be used to reduce the need to maintain service requirements and thus reduce power flows on the transmission network.

Any of these options individually, or in combination, have the potential in some circumstances to defer or displace the need for upgrades to the existing transmission system while maintaining the same level of reliability. However, these alternatives are not currently available to meet the immediate reliability needs that the Project addresses.

The non-transmission alternatives that are identified in the following sections were evaluated on a system basis to determine whether they could be developed and sized to adequately address the transmission reliability requirements in the Stamford-Greenwich Sub-area. Because of the unlikelihood of the development of such alternatives sufficient to displace the pressing need for the Project, central generation energy, efficiency and load curtailment do not present practical alternatives to resolve the reliability criteria violations that the Project addresses.

Page intentionally left blank.

C. APPROACH FOR IDENTIFYING THE BEST ROUTES FOR THE NEEDED TRANSMISSION SYSTEM IMPROVEMENTS

CL&P's approach for identifying the best routes for the needed transmission system improvements included a determination of the study area and evaluation of route identification criteria and objectives. In addition, CL&P considered the recommendations of City officials and in particular the City's recent and planned roadway improvement projects.

C.1 GEOGRAPHIC BOUNDARIES OF THE STUDY AREA

As noted in Section B, CL&P identified a need for a new transmission line into the Stamford-Greenwich Sub-area and found that such need would be met by a 115-kV underground circuit between the Glenbrook and South End Substations. CL&P initially defined a geographic study area for the Project and then identified and analyzed potential transmission routes within this area. In formulating the study area, the Project team took into consideration that the shortest routes between the existing substations would typically minimize environmental and social impacts, as well as costs. As a result, CL&P developed potential routes that were between 1.5 and 2.0 miles long. Figure C-1 depicts CL&P's study area for the Project. Due to the proximity of the Stamford Harbor Canal to the south and downtown Stamford to the north, the study area narrows considerably in the vicinity of South End Substation.

Once the study area was determined, CL&P began its analysis of potential Project routes.

C.2 ROUTE IDENTIFICATION CRITERIA AND OBJECTIVES

To identify and evaluate routes for the Project, CL&P considered environmental, social, engineering, and economic factors and applied a set of established routing objectives. The goal of this evaluation process was to select from among those routes identified a preferred route, and to consider alternate routes, each of which would be feasible, practical, and capable of reliably meeting the Project objectives.

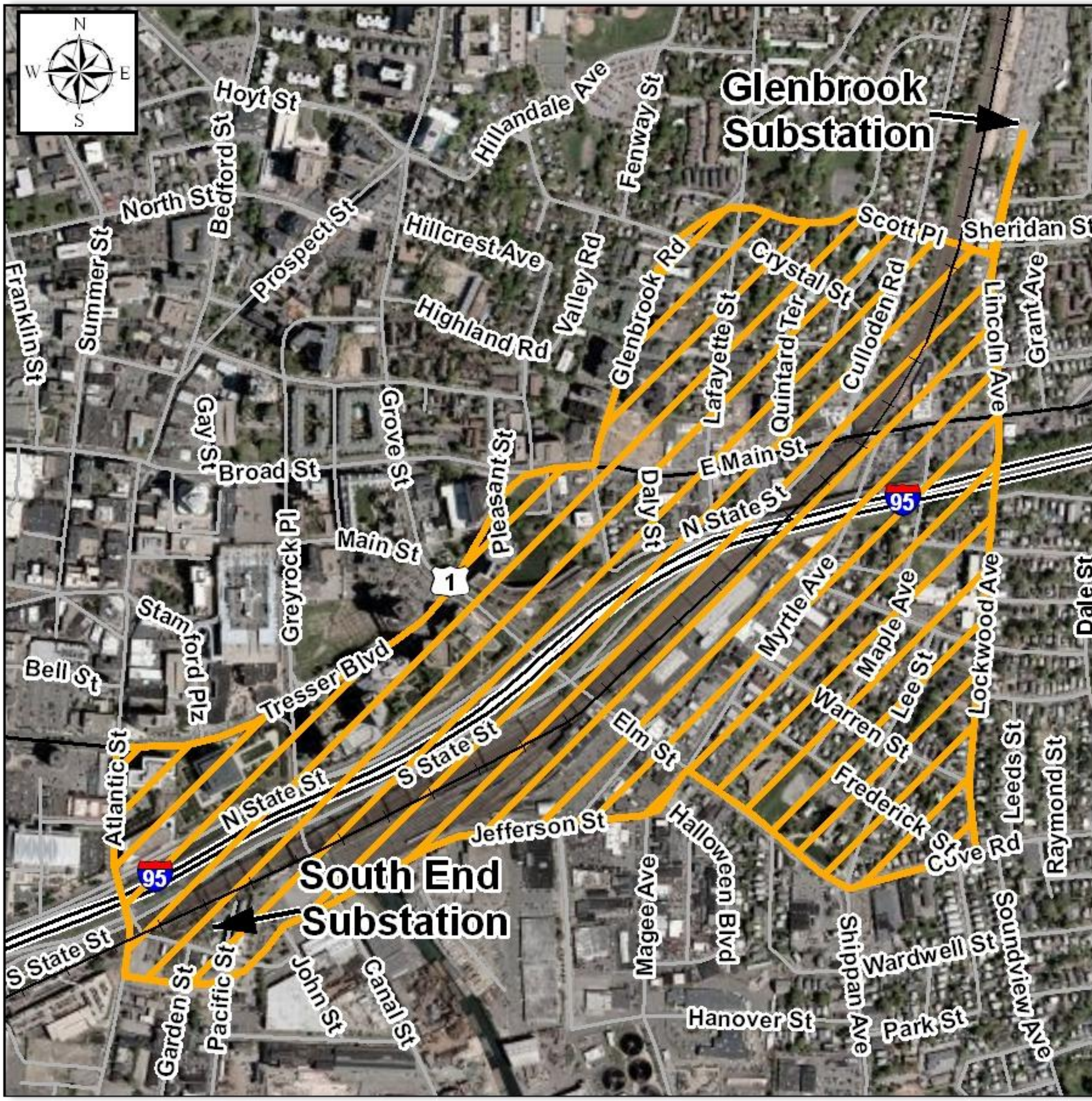


Figure C-1. Proposed 115-kV Underground Transmission Line Route Study Area

C.2.1 Route Identification Criteria

The following route identification criteria were considered:

- **Constructability**: The complexity of construction and impact on schedule must be determined. Such complexities include trenchless installation techniques (e.g. directional drilling or jack and bore) requiring specialized equipment during construction.

- **Existing Utilities Impacts**: Depending on the route, existing utilities within the route alignment will present conflicts with the alignment of the proposed duct bank installation. Some existing utilities may require relocation or represent challenging geometric requirements for locating portions of the duct bank. External heat sources such as existing electric circuits that may negatively impact the ampacity rating of the cable must be considered in the final design.

- **Operations and Maintenance**: Routes are evaluated based upon the operating performance of the underground transmission cable from an ampacity perspective and the proximity to other underground transmission circuits. For maintenance purposes, routes that site splice vaults in readily accessible locations and that minimize the total number of vaults are more favorable. A vault is a buried underground enclosure where underground cable ends are spliced together.

- **Permits, Right-of-Way, and Easements**: Route alternatives that avoid certain permitting requirements, such as those of a railroad, can provide project cost and schedule benefits. The actual permits required and ease of obtaining these permits would vary for the different route alignments. Sharp changes in direction for the duct bank may require additional vaults and splices, as well as long radius bends that can require easements. Route alternatives that require additional easements and/or property acquisitions increase the overall project cost, could increase the potential for delays in the project schedule, and potentially increase effects on abutting land uses.

- **Proximity to Schools or Licensed Day-care Centers**: Route alternatives that avoid school zones and licensed day-care centers are considered more favorable. Schools and licensed day-care centers can be most sensitive to the inconvenience of noise and the traffic congestion that can result with construction activities. Also, increased traffic at drop-off and pick-up times can seriously impact construction activities.

- **Surface Disruption Impacts:** Surface disruptions would be limited to only areas of public right-of-way (ROW) and on properties where temporary construction and permanent easements are required. The location, size, depth, and duration of such surface disruptions would vary depending on the final route alignment, the construction method, cable and casing materials, and overall site constraints. Route alternatives presenting greater surface disruptions may also increase inconvenience to the public.

- **Scheduling Impacts:** Several routes within the study area involve limitations with regard to schedule. Work in areas with residences might only be permitted during day-time hours, and further restricted on weekends and holidays. Traffic control plans would define work schedules along the busier thoroughfares like Route 1 and the I-95 access roads; while the trenchless construction activities would be subject to the restrictions of the railroad crossing permit.

- **Length of Route:** Generally, the shorter and straighter a route, the lower the route installation cost, due to less material and less time for construction. A shorter route would also equate to fewer surface disruptions and conflicts with existing utilities. When comparing routes that have major differences in length, the number of splice vaults required can increase complexity, add more materials and result in significant additional costs.

- **Coordination with Other Local Projects:** Identification and coordination with other local utility projects can provide benefits, influence scheduling and be a factor in route selection.

- **Environmental Resources:** Alignment of underground cables along roadway ROW may pose potential environmental issues, such as excavation through areas of contaminated soils or groundwater; traffic congestion; difficult crossings of watercourse and wetlands that the roads traverse via bridge; and disturbance to vegetation and land uses adjacent to roads (due to construction staging, heavy equipment operation, etc.). Selecting a route that avoids or minimizes adverse environmental effects is the preferred option.

- **Costs**: The route with the lowest cost to construct would have greater weight in selecting the recommended route. Costs must always be weighed with complexity and other intangibles, such as traffic and noise impacts, effects on local business and other socioeconomic issues.

- **Proximity to Public Services:** Route alternates that avoid public services such as police stations, fire stations, and hospitals would be more favorable from a construction point of view because access to these types of facilities along a selected route would need to be maintained around the clock.

- **Public Transportation Facilities:** Route alternatives that would avoid significant impact to bus routes reduce public inconvenience.

C.2.2 Route Identification Objectives

CL&P applied the following set of route selection objectives for the transmission cables, which have been established based on the experience of utility facility siting and construction in Connecticut:

- Comply with all statutory requirements, regulations and state and federal siting agency policies;
- Achieve a reliable, operable, constructible and cost-effective solution;
- Maximize the reasonable, practical and feasible use of existing linear corridors (e.g., transmission lines, highways, public roadways, railroads, pipelines);
- Minimize the need to acquire property by eminent domain;
- Minimize adverse effects to 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; and
- Maintain public health and safety.

C.3 IDENTIFIED ROUTE

As discussed above, the route identification criteria and the route identification objectives created the framework for CL&P to identify an appropriate route and alternates for an underground line from Glenbrook Substation to South End Substation. Given the urban nature of the Project area, CL&P focused its analysis of route options on the use of existing ROWs, including public roads, existing transmission lines, railroads, and limited access highways (e.g., I-95), along with some parking lots and private lands in locations where off-ROW properties were needed to complete a potential route option.

Some of the route options initially identified by CL&P were quickly found to be impractical because of overriding social or engineering constraints. For example, a route along I-95 was eliminated as a viable alternative because ConnDOT policies limit the longitudinal occupation of interstate corridors unless no other practical option exists. In addition, the I-95 corridor is raised above grade through most of the Project area, and other areas have both limited land available and difficult topography.

Similarly, the MNRR corridor does not present a viable route for the transmission facilities due to railroad policies limiting co-location of utilities, potential conflicts with the various land use developments that abut the railroad, and construction obstacles associated with various above- and below-grade railroad crossings.

Finally, the City of Stamford has an extensive roadway improvement project known as the Stamford Urban Transitway ("SUT") that is underway. The SUT involves reconstruction of roadways between East Main Street (Route 1) and Atlantic Street. The City has completed SUT Phase I, primarily along Jefferson Street and Dock Street. In SUT Phase II (commencing Q1 2013), the City plans substantial improvements along Myrtle Avenue and East Main Street (Route 1). During early discussions with the Project team, City officials recommended that CL&P avoid the path of SUT Phase I as construction was recently completed and also avoid SUT Phase II construction. Therefore, CL&P avoided focusing on potential cable routes primarily in streets within SUT Phase I and Phase II. (See Figure C-2)

Thereafter, CL&P focused its efforts on various underground cable routes along local public roads within the study area, excluding the SUT-affected roads. For these potential route alignments, CL&P conducted additional screening analyses involving further field reconnaissance, as well as baseline environmental data compilation and review. This process resulted in the identification of three potentially viable routes (i.e., along different roadways or land parcels) between Glenbrook Substation and South End Substation that generally satisfied routing criteria and objectives. CL&P then compared key factors of each of these routes to the other two routes. The route comparison is summarized in Table C-1.

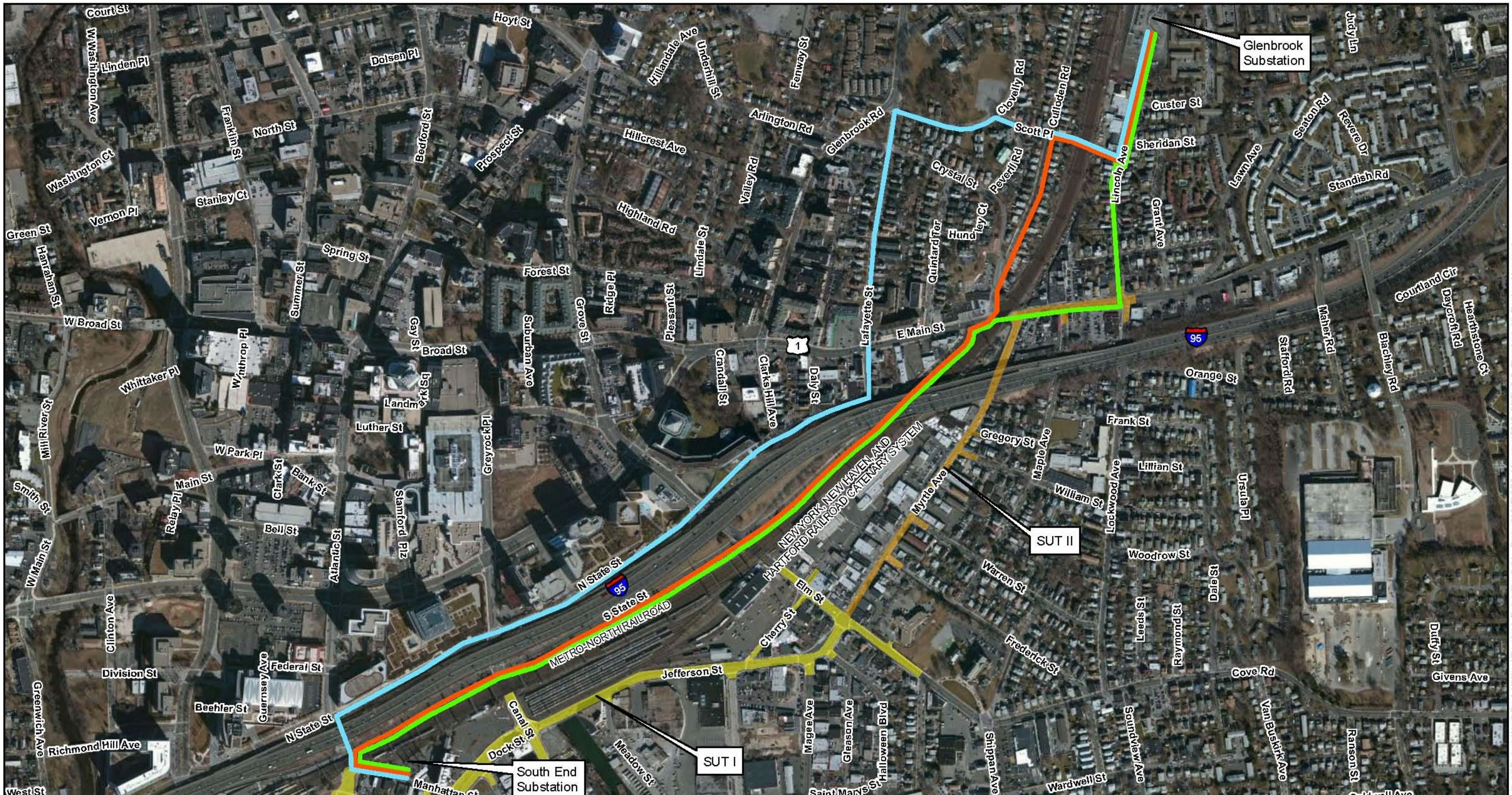
Three of the routes considered are described in the following sections. While the routes are predominately located in city streets, some of the routes require a trenchless installation beneath the MNRR as well as access across private property. The alignments shown are preliminary and actual segment lengths may vary slightly from those described in Section D.1.

CL&P designated the routes as follows: Preferred Route, Preferred Route With Variation, and Alternate Route as shown on Figure C-2.

The Preferred Route - is 8,000 feet in length and is the shortest of the three routes located primarily along city streets. This route would require a jack and bore crossing of the MNRR corridor. In addition, this route would require an easement on one private property and one from the City of Stamford, as well as a crossing agreement with MNRR.

The Preferred Route With Variation - is marginally longer (8,080 feet) and differs from the Preferred Route in that it would not require a jack and bore crossing of the MNRR corridor or the two property easements. However, the Preferred Route With Variation would require an encroachment agreement with ConnDOT due to the longer section of the route on East Main Street/Route 1. Unlike the other routes, this route would also affect the City of Stamford's SUT II Project.

The Alternate Route - is 8,800 feet in length and is the longest of the three routes. As with the Preferred Route, the Alternate Route would require a jack and bore crossing of the MNRR corridor. In addition, this route would require easements on two private properties, one from the City of Stamford, as well as a crossing agreement with MNRR.



Map Location	Index Map

Legend

- PREFERRED ROUTE
- PREFERRED ROUTE WITH VARIATION
- ALTERNATE ROUTE

Stamford Urban Transitway (SUT) Road Improvements

- SUT Phase I (Construction Complete)
- SUT Phase II (Construction to Commence Q1 2013)

0 600 1,200 Feet

1:7,200 1" = 600'

Data Souce: ESRI Bing Imagery
AECOM Survey: May 2012

Stamford Reliability Cable Project
115-kV Route Options
Glenbrook to South End Substation
Survey Aerial Map

ALL ROUTES MAP

Connecticut Light & Power
A Northeast Utilities Company

AECOM

Figure C-2

Date: January 10 2013

Table C-1: Route Analysis

Key Factors	Preferred Route	Preferred Route With Variation	Alternate Route
Route Length	8,000 feet	8,080 feet	8,800 feet
Impact to ConnDOT Property – Route 1 – Atlantic Street	<u>275 Feet</u> 175 feet 100 feet	<u>1,150 feet</u> 1,050 feet 100 feet	<u>395 feet</u> 45 feet 350 feet
ConnDOT Encroachment Agreement Required	No	Yes	No
Railroad Crossing Agreement Required	Yes	No	Yes
Impact to City Projects (SUT)	0 feet	700 feet	0 feet
Underground Utilities Congestion	Least	Greatest	Moderate
Property Easement Required	2	0	3
Schools/Licensed Day-care Centers within 600 feet	0	0	2 (Day-cares)

C.3.1 Route Analysis Summary

This section presents an expanded discussion of the route selection parameters. Each of the parameters is discussed separately below. A discussion of the Property easements required for the Project is presented in Section C.4 below.

Route Length: There is approximately a 10% difference in length between the Alternate Route and either the Preferred Route or the Preferred Route With Variation. This increased length of the Alternate Route would result in higher construction costs and a longer construction schedule. Additionally, because the Alternate Route follows major streets, there would be greater traffic disruption and more underground utility congestion. The Preferred Route is the shortest route and would require the shortest construction window.

Impact to ConnDOT Property/ConnDOT Encroachment Agreement: ConnDOT roadways within a city are generally synonymous with high activity corridors. Encroachment on ConnDOT ROW is limited to East Main Street (Route 1) and Atlantic Street with total footage as follows: the Preferred Route – 275 feet; the Preferred Route With Variation – 1,150 feet; and the Alternate Route – 395 feet. The Preferred Route With Variation is the only option that would require an encroachment agreement with ConnDOT. As such, the Preferred Route is recommended in terms of its lower impact to ConnDOT property.

Railroad Crossing: Two of the final routes considered, the Preferred Route and the Alternate Route, require a trenchless crossing or bore of the MNRR corridor, which in turn would necessitate a crossing agreement with the railroad authority. The Preferred Route With Variation would preclude the need for a bored crossing by using an existing East Main Street (Route 1) railroad underpass which impacts SUT Phase II as detailed below. Although the segment with the bore may result in greater construction costs as compared to the open trench of the nearly equal-length segment of the Preferred Route With Variation, the Preferred Route is deemed the more favorable option as it minimizes encroachment on East Main Street (Route 1) and avoids the SUT Phase II entirely.

Impact to City Projects: The Preferred Route With Variation passes through a portion of Phase II of the SUT Phase II Project. As such, this option would require an open-trench excavation of approximately 700 feet of newly reconstructed roadway. Through discussions with City of Stamford officials, the Project team was encouraged to avoid disturbing the rebuilt streets. It should also be noted that East Main Street (Route 1) is an old roadway with an extremely high level of underground utility congestion that increases the risk of unforeseen complications, which have associated costs and schedule impacts. The Alternate Route and the Preferred Route have minimal impact to East Main Street (Route 1) as they both cross at nearly perpendicular angles and do not impact the City's SUT Phase II project.

Underground Utility Congestion: The crossing of underground utilities is inevitable in the construction of any urban underground transmission line. Encountering underground utilities slows construction progress and risks damage to the existing utilities. An extensive investigation of utility maps resulted in the comparative ranking of underground utility congestion shown in Table C-1. The opportunities to parallel existing utilities along North and South State Streets as well as the shorter perpendicular crossing of East Main Street (Route 1) resulted in less crossing of utilities and thus led to the determination that the Preferred Route was the more favorable option with respect to this key factor.

Schools/Licensed Day-care Centers: Noise and the traffic congestion that can result with construction work can seriously disrupt the activities of schools and day-care centers, while increased traffic during drop-off and pick-up times can also hamper construction. Since the Preferred Route and the Preferred Route with Variation avoid school zones and day-care centers, they were considered the more favorable option with regard to this key factor.

As Table C-1 demonstrates, the Preferred Route is the shortest in length, does not require a ConnDOT encroachment agreement, does not impact the City's SUT projects, has the least underground utility congestion, and no impact to existing schools or licensed day-care centers. While the Preferred Route would require a railroad crossing agreement, this would be offset by other factors such as the City's opposition to impacting the SUT projects. After consideration of the key factors for all three routes, CL&P selected the Preferred Route.

C.4 REQUIRED PROPERTY EASEMENT AND CROSSING AGREEMENT ACQUISITIONS

As noted in Table C-1 above, the Preferred Route requires the acquisition of permanent easements across two parcels of land. The permanent easements will allow for the long term operation of the underground transmission circuit Project. In addition, temporary easements on the same two parcels of land would be required to facilitate the Project construction and would only be in effect during the construction phase of the Project.

The first parcel upon which temporary and permanent easements are required is privately held and is located at 80 Lincoln Avenue. The second parcel is located at the eastern terminus of Scott Place. This latter parcel is owned by the City of Stamford. Both parcels directly abut the MNRR corridor. In order to accommodate the land acquisition needs of the Project, CL&P would also need to enter into temporary and permanent Railroad License/Crossing Agreements (Agreements) with MNRR. Collectively, the easements and Agreements would allow CL&P to construct and operate the Project in the area between Lincoln Avenue and Scott Place. CL&P has obtained permission from these property owners to perform surveys and data gathering on the affected properties.

Table C-2 presents the approximate square footage of the temporary and permanent easements that CL&P anticipates acquiring for the Project as well as the square footage of the temporary and permanent crossing areas.

Table C-2: Anticipated Property Easements and Crossing Agreement for the Preferred Route

Parcel	Temporary Easement/ Crossing Area	Permanent Easement/ Crossing Area
80 Lincoln Avenue	3,850 +/- s.f	2,620+/- s.f.
City of Stamford	205+/- s.f	781+/- s.f.
MNRR	2,054+/- s.f. [1]	145+/- l.f.

[1] Work area only, no easement needed.
s.f. = square feet
l.f. = linear feet

D. PROPOSED PROJECT, POTENTIAL ROUTE VARIATIONS AND ESTIMATED COSTS

Due to the physical constraints posed by the existing urban infrastructure, the elevated MNRR corridor, and elevated I-95 corridor, CL&P focused on developing an underground transmission alternative in lieu of an overhead transmission line approach. Some of the underground route options initially identified were eliminated because of significant social, or engineering constraints, as described in Section C. In addition, input from City officials, in particular, the location and extent of the City of Stamford's SUT Project, further influenced the route selection process.

D.1 POTENTIAL UNDERGROUND ROUTES

CL&P identified three potential underground transmission line routes for the new 115-kV single circuit underground duct bank and carefully considered the advantages and disadvantages of each route. The three potential routes, the Preferred Route, Preferred Route With Variation and the Alternate Route are each described below. Aerial mapping depicting the potential routes is included in Appendix A (Figures 4, 5 and 6).

D.1.1 Preferred Route Description

At 8,000 feet in length, the Preferred Route is the shortest of the three routes and is located primarily along city streets. This route would require a jack and bore crossing of the MNRR corridor. In addition, this route would require an easement on one private property and one from the City of Stamford, as well as a crossing agreement with MNRR.

The Preferred Route consists of seven underground segments through the City of Stamford.

- **Segment 1:** Originating at the CL&P Glenbrook Substation, the route first extends southerly down Lincoln Avenue to a location past Sheridan Street where it turns westerly onto private property (735 feet). Lincoln Avenue is a lightly traveled street that is zoned residential to the east and light industrial to the west.
- **Segment 2:** The route continues westerly across the MNRR corridor, using a 140-foot jack and bore crossing, connecting to Scott Place and extending westerly to the Culloden

Road intersection (480 feet). This route segment passes from an industrial area through private property, railroad property, and a narrow City of Stamford Greenway that borders the railroad until it reaches the eastern terminus of Scott Place, which is zoned residential with residences located on both sides of the street.

- **Segment 3:** The route then turns southerly down Culloden Road, which becomes Crystal Street, to the East Main Street/Route 1 intersection (1,230 feet). Culloden Road is a lightly traveled street, with residences on both sides, that extends to the intersection with Crystal Street where commercial zoning begins to the east.
- **Segment 4:** A short route segment is required to cross East Main Street/Route 1 as the route continues southwesterly, connecting into North State Street (175 feet). East Main Street/Route 1 is a heavily traveled ConnDOT corridor bordered by a commercial area north and south of the crossing.
- **Segment 5:** The route then continues southwesterly along North State Street and then bears left onto South State Street crossing under the elevated I-95 roadway (975 feet). North State Street is a highly travelled two lane road bordered to the west by a commercial area and to the east by the light industrial area occupied by the MNRR.
- **Segment 6:** The route continues southwesterly on South State Street to Atlantic Street where it turns southeasterly onto Atlantic Street, crossing through the MNRR corridor underpass to Manhattan Street (4,055 feet). South State Street is a moderate to heavily travelled road with 3 to 4 traffic lanes through this segment located between I-95 and the MNRR corridor, which services northbound I-95 with on-ramps near Canal Street and Elm Street and an off-ramp at Atlantic Street. With heavy traffic throughout the day, Atlantic Street is a major access to downtown Stamford.
- **Segment 7:** The route then extends easterly along Manhattan Street terminating in the CL&P South End Substation (350 feet). Manhattan Street is a lightly travelled road located within a generally industrial area.

The Preferred Route is shown on Figure 4 in Appendix A.

D.1.2 Preferred Route With Variation Description

CL&P also developed a Preferred Route With Variation. The variation differs from the Preferred Route in that it would not require a jack and bore crossing of the MNRR corridor or the two property easements. However, the Preferred Route With Variation segment is marginally longer (8,080 feet) and would require an encroachment agreement with ConnDOT due to the longer section of the route on East Main Street/Route 1. Unlike the other routes, this route would also affect the City of Stamford's SUT II Project.

The Preferred Route With Variation consists of five underground segments through the City of Stamford.

- **Segment 1:** Originating at the CL&P Glenbrook Substation, the route extends southerly down Lincoln Avenue to the intersection with East Main Street/Route 1 (1,650 feet). Lincoln Avenue is a lightly travelled street that is zoned residential to the east and light industrial to the west.

- **Segment 2:** The route then turns westerly on East Main Street/Route 1 (part of SUT Phase II project) and extends through the MNRR underpass to North State Street (1,050 feet). East Main Street/Route 1 is a heavily travelled ConnDOT corridor bordered by residences, commercial and light industrial areas.

- **Segment 3:** The route then continues southwesterly along North State Street then bears left onto South State Street crossing under the elevated I-95 roadway (975 feet). North State Street is a highly travelled two lane road bordered to the west by a commercial area and to the east by the light industrial area occupied by the MNRR.

- **Segment 4**: The route continues southwesterly on South State Street to Atlantic Street where it turns southeasterly onto Atlantic Street, crossing through the MNRR corridor underpass to Manhattan Street (4,055 feet). South State Street is a moderate to heavily traveled road with 3 to 4 traffic lanes through this segment located between I-95 and the MNRR corridor, which services northbound I-95 with on-ramps near Canal Street and Elm Street and an off-ramp at Atlantic Street. With heavy traffic throughout the day, Atlantic Street is a major access to downtown Stamford.

- **Segment 5**: The route then extends easterly along Manhattan Street terminating in the CL&P South End Substation (350 feet). Manhattan Street is a lightly traveled road located within a generally industrial area.

The Preferred Route With Variation is shown on Figure 5 in Appendix A.

D.1.3 Alternate Route Description

Finally, CL&P developed an Alternate Route. At 8,800 feet in length, the Alternate Route is the longest of the three routes. As with the Preferred Route, the Alternate Route would require a jack and bore crossing of the MNRR corridor. In addition, this route would require easements on two private properties, one from the City of Stamford, as well as a crossing agreement with MNRR.

The Alternate Route consists of seven underground segments through the City of Stamford.

- **Segment 1**: Originating at the CL&P Glenbrook Substation, the route first extends southerly down Lincoln Avenue to a location past Sheridan Street where it turns westerly onto private property (735 feet). Lincoln Avenue is a lightly travelled street that is zoned residential to the east and light industrial to the west.

- **Segment 2**: The route continues westerly across the MNRR corridor, using a 140-foot jack and bore crossing, connecting to Scott Place and extending westerly into the Clovelly Road intersection (830 feet). This route segment passes from an industrial area through private property, railroad property, and a narrow City of Stamford Greenway that borders the railroad until it reaches the end of Scott Place. Scott Place is a lightly travelled street with residences on both sides.

- **Segment 3**: The route then extends westerly down Clovelly Road to the intersection with Lafayette Street (670 feet). Clovelly Road is a lightly traveled street with residences on both sides.

- **Segment 4**: The route then turns southerly down Lafayette Street crossing over East Main Street/Route 1 connecting into North State Street (1,880 feet). Immediately upon turning south on Lafayette Street the route passes Daskam Park to the west. Lafayette

Street is a one-way southbound street predominantly occupied by residences. Near East Main Street/Route 1 a commercial zone begins. East Main Street/Route 1 is a heavily travelled corridor bordered by a mixture of commercial areas and neighborhoods.

- **Segment 5**: The route then extends southwesterly along North State Street, just north of the I-95 roadway corridor to Clarks Hill Avenue intersection, where it enters the rear loading area access road of the Financial Centre. The route passes along this private access road, crosses a grassy area to Elm Street, then emerges back onto North State Street. The route then continues southwesterly along North State Street to Atlantic Street (4,030 feet). From Lafayette Street to Clarks Hill Avenue, North State Street is a lightly travelled street with residences nearby. A property easement would be required to pass through the Financial Centre property. Beyond the Financial Centre, North State Street passes through a light industrial area with moderate to heavily traffic as southbound I-95 exits just to north of the intersection with the Elm Street and a southbound I-95 on-ramp at the intersection with Atlantic Street.

- **Segment 6**: The route then turns southeasterly onto Atlantic Street, passing through the I-95 underpass and the MNRR corridor underpass to Manhattan Street (350 feet). With heavy traffic throughout the day, Atlantic Street is a major access to downtown Stamford.

- **Segment 7**: The route then extends easterly along Manhattan Street terminating in the CL&P South End Substation (350 feet). Manhattan Street is a lightly traveled road located within a generally industrial area.

The Alternate Route is shown on Figure 6 in Appendix A.

D.1.4 Conclusion

Based on its analysis, CL&P selected the Preferred Route. The Preferred Route was selected after carefully considering: cost, length, encroachment or involvement of other public agencies, disruption, current or future transportation projects, underground utility congestion, and impact to existing schools or licensed day-care centers.

D.2 UNDERGROUND TRANSMISSION SYSTEM DESIGN

In addition to analyzing potential routes, CL&P analyzed the two standard design technologies used by CL&P for underground transmission lines: high pressure fluid filled ("HPFF") pipe type cable and XLPE cable. CL&P evaluated the use of a single circuit XLPE system design with a 3500 kcmil copper conductor. CL&P determined that this XLPE cable design and conductor size would satisfy the Project's thermal rating requirements. The maximum HPFF conductor size produced by the sole existing HPFF cable manufacturer is 2750 kcmil copper. A single 2750 kcmil copper cable system would not meet the thermal rating requirements for the Project; therefore, an HPFF cable installation would require a double circuit system to meet the Project's required ratings. CL&P evaluated use of a double circuit HPFF cable system and determined that a double circuit HPFF design would not be feasible due to the limited space within the fenced in area at South End Substation to terminate two new transmission lines; the double circuit design would require expansion of South End Substation. Accordingly, CL&P selected the single circuit XLPE system.

A typical XLPE underground 115-kV transmission system is comprised of the following general components: cables, splice vaults, duct bank, cable splices, terminations, grounding, communications, termination structures and foundations.

The electric cables would be installed in a duct bank encased in concrete. Smaller conduits would also be installed for the relaying, communications, temperature monitoring, and ground continuity cables. Figure D-1 illustrates a typical underground duct back. The cables would be installed one cable per duct. Splice vaults would be spaced at approximately 2,000 foot intervals.

The proposed cables for the Project are designed to withstand water penetration and have a lead sheath which functions as a moisture barrier. The cables and splices are capable of continuous long-term operation under a 30-foot head of water with no water ingress. The capacity to prevent water penetration is tested in accordance with International Electrotechnical Commission standard *IEC 60840.*

If sand and/or salt water were to enter into the splice vaults during a flooding event, thermal problems are unlikely to occur because water, seabed, and sand each have a much lower thermal resistivity than air. If vaults were to fill with sand and/or salt water, vacuum trucks would be used to remove the sand and dewater the vaults. After removing sand and water, the vaults would be washed to remove any remaining salt. The clamps and the racking system used to support the cables in the vaults would be specified to be non-magnetic and non-corrosive, which reduces the risk of corrosion in the vaults.

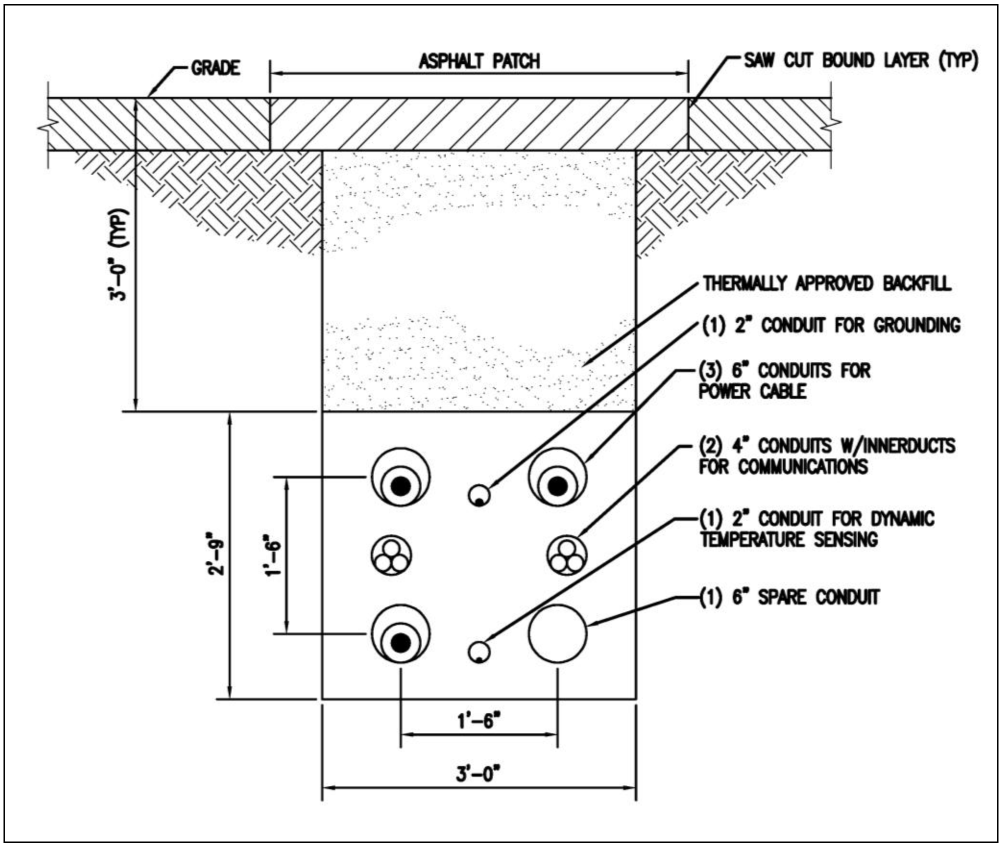
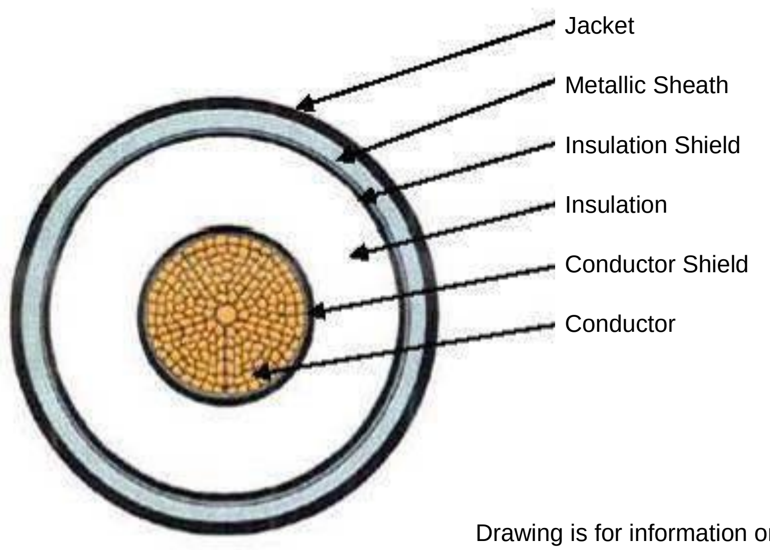


Figure D-1. Typical Underground Duct Bank Cross Section

D.2.1 Cables

A single circuit of an underground 115-kV transmission system would consist of three cables, or phases. Each phase of the circuit would consist of one 3500 kcmil copper conductor cable insulated to 115-kV with 690 mils of XLPE insulation. Each cable would be approximately 4.5 inches in diameter. Figure D-2 illustrates the cross section of a typical 3500 kcmil copper conductor 690 mil XLPE 115-kV cable.



Item	Description	Cumulative Diameter (inches)
Conductor	Segmental stranded compacted and copper, watertight	2.06
Conductor shield	Supersmooth semiconducting copolymer compound	2.21
Insulation	Superclean XLPE compound	3.61
Insulation shield	Supersmooth semiconducting copolymer compound	3.72
Metallic sheath	Extruded lead, alloy E	4.13
Jacket	Black MDPE with extruded semiconducting PE coating	4.5

Figure D-2. 3500 kcmil Copper Conductor 690 mil XLPE 115-kV Cable Cross Section

D.2.2 Splice Vaults

Splice vaults are installed whenever the maximum installable length of cable is reached. Limiting factors include maximum allowed pulling tension, maximum allowed side wall pressure, and maximum length of cable that can be transported on a cable reel. Reinforced concrete splice vaults would be spaced approximately every 2,000 feet along the route. Figure D-3 depicts a typical splice vault installation.

The splice vault size and layout is determined by the space required for cable pulling, cable splicing, and supporting the cable in the vault. The outside dimensions of the splice vaults are expected to be 24 feet long by 9 feet wide and 9 feet high. The top of the splice vault is installed a minimum of 3 feet below grade with two access holes, or manhole covers, each approximately 36 inches in diameter.

Figure D-3. Typical Splice Vault Installation

D.2.3 Duct Bank Installation Technique

The most basic method for constructing an underground duct bank is by open cut trenching. Typically, mechanical excavation is required to remove the concrete or asphalt road surface (for roadways), topsoil, and sub-grade material to the desired depth. Removed material is relocated to an appropriate off-site location for disposal, or occasionally reused as backfill. Once a length of trench is opened and shoring installed where required, polyvinyl chloride ("PVC") conduit is assembled and lowered into the trench. The area around the conduit is filled with a high strength thermal concrete. After the concrete is allowed to set up, the trench is then backfilled and the site restored. Backfill materials would be clean excavated material, thermal sand and/or a thermal concrete mix often referred to as fluidized thermal backfill ("FTB").

The underground 115-kV transmission cable would be installed in a concrete encased duct bank for the entire length of the underground route, except for any trenchless installation section. The duct bank would consist of four six-inch, two four-inch, and two two-inch Schedule 40 PVC conduits. The conductor cables would be installed in three of the six-inch conduits, and the remaining six-inch conduit would be used for a spare. Fiber optic cables used for communications, relaying, temperature monitoring, and the ground continuity conductor would be installed in the smaller conduits. The duct bank configuration may change when foreign utilities constrain the available space. At times, it may be necessary to reorganize the ducts into a flat configuration consisting of the four six-inch conduits being installed horizontally with the smaller four-inch and two-inch conduits interspersed creating a lower profile, but wider duct bank. This change may be utilized to avoid large underground facilities like the underground East Branch of the Rippowam River on South State Street and to avoid areas with high utility congestion like Route 1. Figure D-4 illustrates a typical duct bank trenching operation.

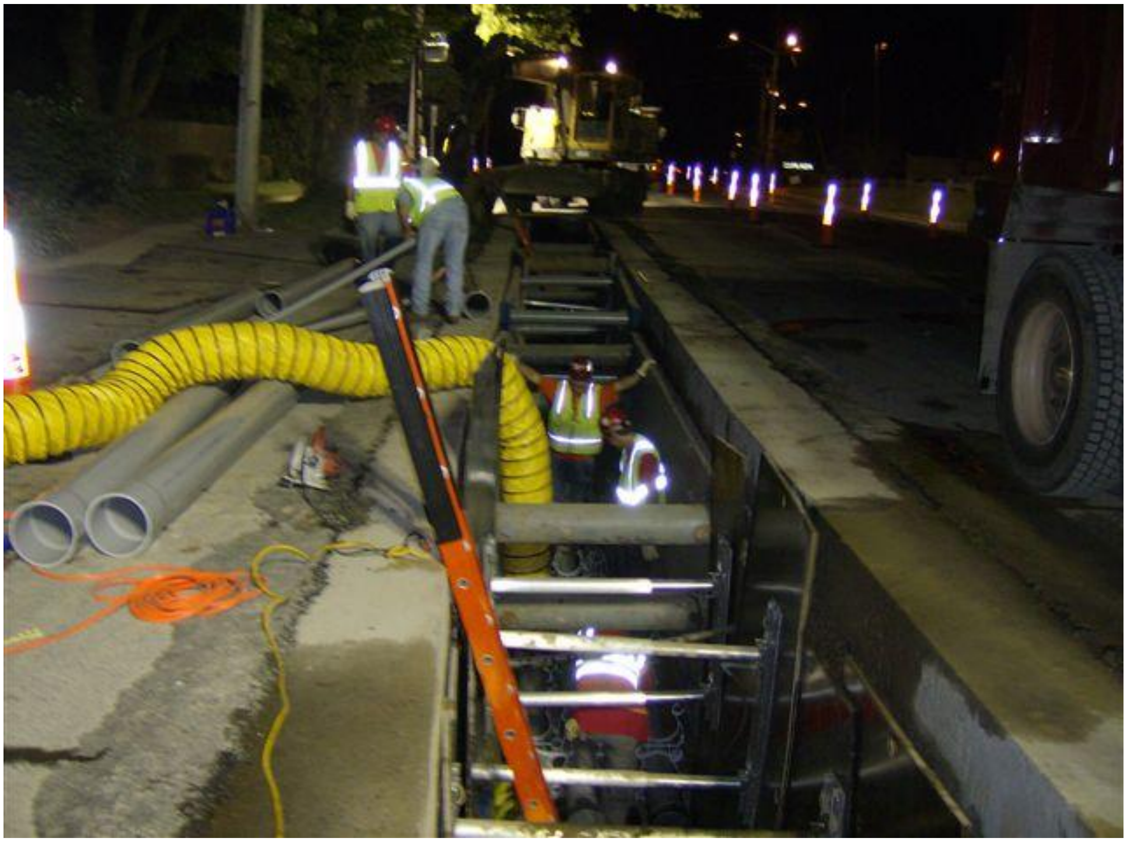


Figure D-4. Typical Duct Bank Trench

D.2.4 Trenchless Installation Technique

Both the Preferred Route and the Alternate Route would require the use of a trenchless installation to cross the Metro-North Railroad corridor. The proposed trenchless installation is a jack and bore, which consists of an auguring operation that simultaneously jacks or pushes a casing pipe into the excavated cavity. Figure D-5 illustrates a typical jack and bore installation. As the equipment progresses forward, subsequent casing segments are added while the soils are removed through the center of the casing. To avoid de-rating of the circuit, a centrifugally cast fiberglass-reinforced polymer-mortar pipe (trade-name: HOBAS) would be used in place of the standard steel casing. Upon completing the casing installation, the duct system is positioned inside the HOBAS casing pipe using specially designed spacers, and the entire casing is then backfilled with thermally designed grout. The grout not only solidifies the installation from any movement, but also helps dissipate heat away from the cable system. The final details of the installation based upon MNRR conditions placed on construction activity, if any.

The jack and bore would include a 42-inch inside diameter casing pipe to allow personnel to enter the casing should the manual removal of obstacles be necessary. The jack and bore operation may require an around-the-clock construction schedule. If a 24 hour work day becomes a construction requirement, it is expected that noise abatement techniques would be utilized to mitigate the disturbance.

Figure D-5. Trenchless Installation

CL&P considered another trenchless installation methodology known as the horizontal directional drill ("HDD"), which offers the advantages of being steerable by the use of guidance equipment. However, the HDD disadvantages discussed below as compared to the jack and bore methodology outweigh the use of HDD for the Project.

In contrast, a HDD installation would use a 42-inch high-density polyethylene ("HDPE") (ID – inner diameter) casing pipe installed at an entry and exit angle of approximately 11 degrees (i.e. very flat), have a minimum bending radius of 1,000 feet, and would reach a maximum depth below the MNRR tracks of approximately 18 feet. The size of the casing pipe being installed determines the size of installation equipment to be used and its minimum bending radius influences the minimum length of the HDD that must be installed.

The HDD boring rig and associated equipment would be set up along Lincoln Avenue and may cause a partial or entire street closure throughout the duration of the drilling operation. In contrast, the jack and bore boring rig and equipment would likely be set up entirely off of Lincoln Avenue, thereby causing no traffic disruptions.

The HDD installation would cross under the MNRR corridor tracks and continue under Scott Place to the receiving pit area, a total distance estimated to be approximately 500 feet. In contrast to the HDD, the length of the jack and bore is not influenced by the HDD casing pipe's minimum bending radius. Therefore, the jack and bore would be the minimum possible length of approximately 140 feet.

The HDD installation is steerable; however, inconsistencies in soil conditions can affect the ability to adequately control the drill direction. The HDD installation would be much longer than the jack and bore installation, thereby requiring even greater directional control especially in known congested locations that do not allow adjustments to the route.

Because the HDD installation is significantly longer than the jack and bore installation, both cost and time savings will likely be realized using the jack and bore methodology.

D.2.5 Cable Splices

Pre-fabricated or pre-molded compression splices are commonly used to splice XLPE 115-kV cables. The conductor ends are joined together by a compression splice. The splicing of the high-voltage transmission cables is performed inside the splice vault and within a controlled atmosphere. Figure D-6 shows a typical completed XLPE splice installation in a vault along with associated equipment.

Figure D-6. Typical 115-kV Splice Assembly

D.2.6 Terminations

Terminations are synthetic rubber stress cones that “transition” the solid dielectric cable to overhead lines, substation buswork or above ground equipment, as shown on Figure D-7. These terminations are typically mounted on a substation termination structure or to an overhead-to-underground transition structure, often called a riser pole. The preparation process closely resembles that of a splice, as described previously. The synthetic rubber stress cone is then placed over the cable insulation to control electrical and mechanical stress.

Figure D-7. Typical Cable Termination

D.2.7 Riser Pole and Termination Structures

Riser pole and termination structures would be installed within the South End and Glenbrook Substations, respectively, for the transition of the 115-kV circuit from underground cables to the overhead substation bus. Termination structures can have a variety of features and are commonly designed for each unique scenario. Figure D-8 and Figure D-9 show an example of a riser pole and substation termination structure, respectively. Additional substation information is included in Section D.2.8.

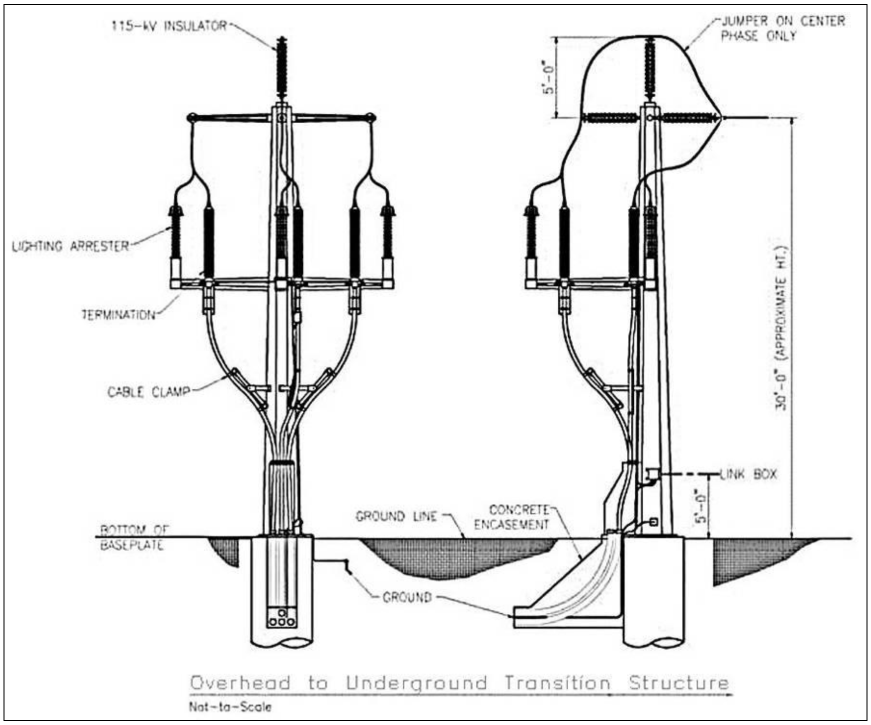


Figure D-8. Typical 115-kV Riser Pole

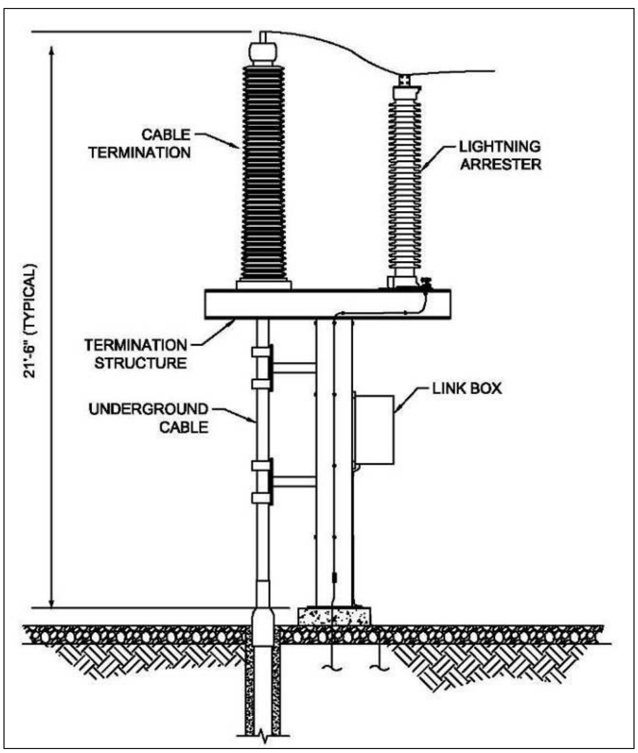


Figure D-9. Typical 115-kV Termination Structure

D.2.8 Substation Modifications

The proposed modifications to the existing South End and Glenbrook Substations would be performed on CL&P-owned property. The construction of these modifications would involve similar sequences of activities, as summarized in this section and Section E.2. Actual sequences and methods of construction may vary based on the characteristics of each site and the final specific engineering designs for each station.

D.2.8.1 South End Substation

At the 0.8 acre South End Substation site, the scope of work would include two categories: (1) electrical and physical work and (2) substation protection and control work. Work within each category is identified below. General arrangement plan and sections are included as Appendix C.1.

The electrical and physical work is anticipated to consist of the following:

- Installation of a riser pole on which the cable termination bushings would be installed.
- Installation of a motor operated disconnect ("MOD") switch with ground switch to serve as the line MOD for the cable line on a structure with the height matching the cable termination and ring bus heights. The cable line connects to the ring bus.
- Installation of lightning arresters on the riser pole structure.
- Installation of the control cables for the MOD in the existing conduits already installed.

The substation protection and control work is anticipated to consist of the following:

- Reconfiguring the primary and back up relays as line protection relay for the cable line.
- Calculating and establishing new line relay setting using the cable line impedance.
- Using the fiber optic cables installed with the underground cable line as communication path for cable line protection schemes.
- Installation of line metering.

- Update the System Control and Data Acquisition system ("SCADA") with new points associated with cable line relays and metering.

D.2.8.2 Glenbrook Substation

At the 4.9 acre Glenbrook Substation site, the anticipated work would include the same categories as those identified for the South End Substation: (1) electrical and physical work and (2) substation protection and control. Work within each category is identified below. General arrangement plan and sections are included as Appendix C.2.

The electrical and physical work is anticipated to consist of the following:

- Installation of a 115-kV circuit breaker.
- Installation of a cable termination.
- Installation of a motor operated disconnect switch with motor operated ground switch to act as the line MOD for the cable line.
- Installation of lightning arresters on the termination structure.
- Installation of 3 potential transformers ("PT") for relaying.
- Installation of the control cables for the breaker, PTs, and MOD in the existing trench.

The substation protection and control work is anticipated to consist of the following:

- Installation primary and back up relays for the 115-kV line to South End.
- Calculating and establishing new line relay setting using the line impedance.
- Installation of breaker failure relay(s) and breaker control.
- Using the fiber optic cables installed with the underground line as communication path for line protection schemes and for direct transfer trip.
- Using the fiber optic cables installed with the underground line to monitor cable temperature.

- Installation of line metering.
- Update SCADA with new points associated with circuit breaker, line relays and metering.

D.3 ESTIMATED PROJECT COSTS

The estimated capital cost of the Project is $46.9 million. Of this amount, transmission line costs are approximately $43.9 million and substation modification costs are approximately $3.0 million.

D.4 FACILITY SERVICE LIFE AND LIFE-CYCLE COSTS

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 40-year economic life of the transmission line portion of the project and the project in its entirety. The following items and assumptions were included in this study:

- Annual carrying charges of the capital cost
- Annual Operation and Maintenance Costs
- Cost of energy losses
- Cost of capacity

Applying these factors, the life-cycle cost for the Project is $61.2 million for the line.

Page intentionally left blank.

E. CONSTRUCTION PROCEDURES

The Project facilities would be constructed in accordance with established electric utility practices, best management practices, final engineering plans, CL&P's specifications and the conditions specified in certificates and permits obtained for the Project. The following subsections describe the land requirements for the development of the Project and the procedures that would be used to construct the Project facilities. During actual construction, certain work activities and sequences may vary, based on factors such as site-specific conditions, final Project designs, and the requirements of regulatory approvals.

E.1 TYPICAL UNDERGROUND TRANSMISSION LINE CONSTRUCTION PROCEDURES

The Project's underground 115-kV cable system would consist of XLPE electric transmission cables, which would be contained within a concrete-encased duct bank (consisting of several PVC conduits), as well as concrete splice vaults. Splice vaults are required for pulling in the transmission cable through conduits, for the splicing of each cable length, and ultimately to provide access to portions of the cable system to perform maintenance and repair activities. Two to four splice vaults would be buried at intervals of approximately 2,000 feet along the route. Illustrations of typical duct bank cross-section and splice vault are included as Figures D-1 and D-3, respectively.

In addition, three fiber optic cables would be installed in the duct bank. Two fiber optic cables are required for remote protection and control of the cable system and associated equipment, and the other fiber optic cable is for monitoring the operating temperature of the cables. A ground continuity conductor would also be installed for grounding the cable sheaths and equipment within the proposed splice vaults. The fiber optic cables would be spliced and pulled into a precast handhole located near each splice vault location.

E.1.1 Land Requirements

CL&P proposes installing the underground cable system principally within or adjacent to public roads within the City of Stamford. The exact location of the cables and the splice vaults within and adjacent to such roads would be determined based on final engineering designs, taking into consideration the constraints posed by existing buried utilities and the location of other physical features.

In addition, CL&P is negotiating with representatives from MNRR to obtain rights to install a segment of the Project beneath the railroad infrastructure. Depending on the final route, CL&P may also need to acquire rights from private parties to accommodate a portion of the Project.

E.1.1.1 Duct Bank Requirements for Off-Road Construction

For off-road construction, a new underground cable would require a dedicated area for construction, consisting of a permanent easement for future maintenance and repair activities and an additional temporary easement during the initial construction for equipment and temporary storage of materials. The actual width of the area required to accommodate the construction equipment needed to excavate the trench and to install the duct system would depend on the depth of the duct bank, site-specific topographic conditions and environmental and land-use characteristics.

E.1.1.2 Duct Bank Requirements for In-Road Construction

The installation of a transmission cable system within a public road usually requires a minimum width of 30 feet to accommodate the excavation of the cable trench, equipment, and temporary storage of equipment. Installation of the cable system within public roads would require coordination with other underground and overhead utilities and permission from the City of Stamford and/or ConnDOT regarding the location of the cable facilities and concurrence concerning the methods and schedule to be used to install the cable system.

E.1.1.3 Splice Vault Requirements

The outside dimensions of splice vaults for 115-kV XLPE cables are approximately 9 feet wide by 9 feet high and up to 24 feet long. The installation of each splice vault therefore typically requires an excavation area approximately 13 feet wide, 13 feet deep, and 30 feet long. The actual burial depth of each vault would vary, based on site-specific topographic conditions and on the depth of the adjacent cable sections that must interconnect within the vault (the depth of the cables at any location would be based on factors such as the avoidance of other buried utilities).

Vaults may be installed within public roadways. However, in order to avoid conflicts with existing buried utilities in public roadways, they may be installed in suitable locations adjacent to such roads (e.g., beneath parking lots, sidewalks, road shoulders, or road medians).

Splice vaults located outside of public roads would require a permanent easement for future access for maintenance and transmission cable repairs, and an additional temporary easement for construction activities. Within the easements for the off-road splice vaults, certain uses such as the development of structures and growth of trees would be prohibited to avoid duct bank damage and impacts to the operation of the cables.

E.1.1.4 Construction Support Areas

During construction, areas for temporarily storing and staging construction materials and equipment would be required in the vicinity of the transmission route. To the extent possible, these construction support areas would be sited on previously disturbed property (e.g., CL&P property, existing parking lots, properties formerly used for other types of construction staging, such as highway work). Landowner permission and regulatory approvals (as appropriate) would be obtained for the temporary use of such sites.

Generally, CL&P would establish one or more primary construction yards near the Project area. Such yards, which usually encompass several acres in size, are used to store construction equipment, bulk materials (including the conduits and splice vaults), and supplies, as well as to park contractor vehicles. Materials may also be assembled in the yards before they are delivered to work sites. After the completion of construction, the yard sites would be restored.

In addition, smaller staging areas would be established near active construction work sites. Such staging areas, established within or adjacent to roads (e.g., within paved travel lanes, on road shoulders, on road medians, in parking lots), would be used temporarily to park equipment, establish sanitary facilities, and store limited amounts of materials needed for cable system installation (e.g., trench boxes, backfill material). Material deliveries would be more frequent in areas where less storage space is available.

As construction progresses along the route, temporary support sites would be moved to keep equipment and materials near work locations. Once a temporary construction support area is no longer needed, it would be restored substantially to its previous condition.

E.1.2 Underground Transmission Line Construction Sequence and Methods

The Project construction is expected to be completed over a 12-month period. However, the cable system construction would be divided into multiple components so that the actual work at any one location would be periodic and would involve various discrete tasks. To perform these tasks, different crews, with different tasks to address, may work in the same area at different times. Such multiple mobilizations to an area cannot be avoided due to the sequential nature of underground cable installation and the different crew skill sets required for the specialized construction. However, the cable system installation would also involve other parallel activities and multiple construction crews would be deployed at the same time to perform discrete construction activities at various locations along the routes.

For example, trenching and duct bank installation may be performed at various locations along the routes concurrently, using separate crews. At the same time, other crews may be dedicated to the installation of splice vaults. In general, trenching and duct bank installation progress linearly at approximately 20 to 50 feet per day per crew. In comparison, the installation of splice vaults, which requires large excavations, may take 3 to 5 days per splice vault. The time required for both trenching and splice vault installation is based on factors such as subsurface conditions (e.g., the presence of rock, groundwater) that dictate the use of special construction procedures, the depth at which the vaults or duct banks must be installed, and conflicts with existing utilities that may need to be relocated. The activities involved in the cable system construction are further described below.

E.1.2.1 Pre-Construction Planning

Prior to starting construction, CL&P would complete pre-construction planning activities. In particular, CL&P would continue to consult with the City of Stamford and would conduct site-specific studies and surveys in order to develop construction procedures that would minimize or avoid adverse effects to the environment and to the public. CL&P's pre-construction planning activities would include, but not be limited to:

- Conducting surveys to identify existing underground and overhead infrastructure and developing plans for the temporary or permanent relocation, if required, of facilities such as electric, gas, water, sewer, telecommunication facilities, utility poles, traffic signals, hydrants, and bus stops.

- Conducting studies of soil and groundwater conditions along the routes and preparing plans for soil and groundwater handling during construction.
- Identifying locations of construction storage yards and construction support areas and obtaining approvals for using such areas.

E.1.2.2 Construction Procedures

The first step in the construction process would be to deploy appropriate erosion and sedimentation controls (e.g., catch basin protection, silt fence or straw bales) at locations where pavement or soils would be disturbed. Within roads and other paved areas, the pavement then would be sawcut and removed.

To install the duct bank, a trench would be excavated approximately 6 to 10 feet deep and approximately 5 feet wide (for trench depths requiring shoring to stabilize the sidewalls). Excavated material (e.g., pavement, subsoil) would be placed directly into dump trucks and hauled away to a suitable disposal site or hauled to a temporary storage site for screening/testing prior to final disposal or re-used in the excavations for backfill. If groundwater is encountered, dewatering would be performed in accordance with authorizations from applicable regulatory agencies and may involve discharge to catch basins, temporary settling basins, temporary holding tanks (frac tanks), or vacuum trucks.

The duct bank system would consist of 6-inch PVC conduits for the XLPE cables; two-inch PVC conduits for the ground continuity conductors and four-inch PVC conduits for the fiber optic relaying cables and the temperature sensing fiber cables. The conduit would be installed in sections, each of which would be about 10 to 20 feet long and would have a bell and spigot connection. Conduit sections would be joined by swabbing the bell and spigot with glue then pushing the sections together. After installation in the trench, the conduits would be placed into spacers that hold the conduit in the desired configuration and then encased in high strength concrete. The trench would then be backfilled with a low-strength FTB with sufficient thermal characteristics to help dissipate the heat generated by the cables.

Trenching, conduit installation, and backfilling would proceed progressively along the route such that relatively short sections of trench (typically 200 feet per crew) would be open at any given time and location. Work zones around the trench area usually range from approximately 600 to

800 feet. During non-work hours, temporary cover (steel plates) would be installed over the open trench within paved roads to maintain traffic flow over the work area. After backfilling, the trench area would be repaved using a temporary asphalt patch or equivalent. Disturbed areas would be permanently repaved as part of final restoration.

At intervals of approximately 2,000 feet along the route, pre-cast concrete splice vaults would be installed below ground. The length of an underground cable section between splice vaults (and therefore the location of the splice vaults) is determined based on engineering requirements (such as the maximum allowable cable pulling tensions; maximum allowable cable sidewall pressure; cable weight/length that can fit on a reel and be safely shipped) and land constraints. The specific locations of splice vaults would be determined during final engineering design and in some areas could be closer than the 2,000 foot interval stated above.

For safety purposes, the splice vault excavation would be shored and fenced. Vault sites also may be demarcated by concrete (Jersey) barriers. Vault installation within roadways will require the closure of travel lanes in the immediate vicinity of the vault construction.

Each vault would have two entry points to the surface. After backfilling, these entry points would be identifiable as manhole covers, which would be set flush with the ground or road surface.

After the vaults and duct bank are in place, the conduits would be swabbed and tested (proofed), using an internal inspection device (mandrel), to check for defects. Mandrelling is a testing procedure in which a “pig” (a painted aluminum or wood cylindrical object that is slightly smaller in diameter than the conduit) is pulled through the conduit. This is done to ensure that the “pig” can pass easily, verifying that the conduit has not been crushed, damaged, or installed improperly.

After successful proofing, the transmission cables and ground continuity conductors would be installed and spliced. Cable reels would be delivered by tractor trailers to the vault sites, where the cable would be pulled into the conduit using a truck-mounted winch and cable handling equipment. To install each transmission cable and ground continuity conductor within the conduits, the large cable reel would be set up over the splice vault, and a winch would be set up at one of the adjacent splice vault locations. The cables and the ground continuity conductors (during a separate mobilization) would then be inserted in the conduits by winching a pull rope attached to the ends of each cable. The splice vaults would also be used as pull points for installing the temperature sensing fiber optic cables under a separate pulling operation. In addition, pull boxes would be installed near the splice vaults for the pulling and splicing operations required for the remaining fiber optic cables.

After the transmission cables and ground continuity conductors are pulled into their respective conduits, the ends would be spliced together in the vaults. Because of the time-consuming precise nature of splicing high-voltage transmission cables, the sensitivity of the cables to moisture (moisture is detrimental to the life of the cable), and the need to maintain a clean working environment, splicing XLPE cables involves a complex procedure that requires a controlled atmosphere. This “clean room” atmosphere would be provided by an enclosure or vehicle that must be located over the manhole access points during the splicing process. It is expected to take approximately five to seven days to complete the splices in each splice vault (three XLPE 115-kV cable splices in each splice vault). Each cable and associated splice would be stacked vertically and supported on the wall of the splice vault via a racking system. During commissioning access to splice vaults may be required.

E.2 SUBSTATION CONSTRUCTION PROCEDURES

The proposed modifications to the existing South End and Glenbrook Substations would be performed within the existing fenced-in area and on CL&P-owned property. The construction of these modifications would involve similar sequences of activities, as summarized in this section and Section D.2.8. Actual sequences and methods of construction may vary based on the characteristics of each site and the final specific engineering designs for each station.

E.2.1 Land Requirements

The proposed modifications to the Glenbrook and South End Substations would be accomplished within the existing fence lines of these facilities, which are already devoted to utility use.

E.2.2 Substation Construction Sequence and Methods

A sequential construction approach would be used to modify the existing substations.

E.2.2.1 Site Preparation

The type of site preparation required would depend on the characteristics of each site. Work may include, as necessary:

- Installing temporary soil erosion and sedimentation controls (e.g., silt fence, straw bales). Such controls would be maintained and replaced as necessary throughout the construction process. The primary objective of these controls would be to minimize the potential for off-site erosion.

- Creating temporary access to the sites for heavy construction equipment.

- Grading and drainage improvements to create a level work area.

E.2.2.2 Foundation Construction

Foundation construction would commence after the completion of rough grading. The foundation installation process would involve excavation, form work, steel reinforcement, and concrete placement. Excavated material would either be reused on-site or disposed of off-site in accordance with applicable requirements.

E.2.2.3 Installation of Equipment

After the foundations are installed, construction activities would shift to the erection of steel-support structures for electrical equipment, such as insulators, buswork, and disconnect switches. In addition, control and power conduits and ground-grid conductors would be installed. A riser pole structure would be installed at the South End Substation to transition the 115-kV circuit from underground cables to overhead buswork. A termination structure would be installed at Glenbrook Substation to terminate the 115-kV underground circuit. Relay and control equipment would be installed at the South End and Glenbrook Substations within each substation's existing protective relay and control enclosures. At the Glenbrook Substation, a 115-kV circuit breaker would be added as part of the protection schemes for the new line and equipment. The circuit breaker would be installed on a concrete foundation and connected to the rest of the substation.

E.2.2.4 Testing and Interconnections

All of the substation equipment would be tested prior to final connection to the transmission grid. New structures and associated conductors and wires would be installed to connect the new transmission line terminals at the existing substations, to the new 115-kV overhead or underground transmission facilities.

E.2.2.5 Final Cleanup, Site Security and Restoration

After the facilities at each substation are installed, any remaining construction debris would be collected and properly disposed of. Temporary erosion controls would be maintained until soils disturbed by construction activities are stabilized. The fences around the existing substations would be replaced, if affected by the construction activities.

CL&P is coordinating with the City of Stamford officials regarding landscaping at the South End Substation as part of a separate project which is presently ongoing (see Council Petition No. 999). As part of that project, some landscaping is required. The landscaping would be performed after completion of construction at the substation. At Glenbrook Substation, CL&P would replace any vegetation that required removal for the Project.

Page intentionally left blank.

F. PREFERRED ROUTE EXISTING CONDITIONS

This section describes the existing environmental conditions along and in the vicinity of the Preferred Route and provides a context for the discussion in Section G, which considers the extent to which the Project could potentially affect resources and how such effects may be mitigated.

Aerial-based maps at a scale of 1 inch = 600 feet depicting the Project facilities in relation to environmental features are provided in Appendix A (Figures 2, 3, 4, 7 and 8). These aerial photographs show the Preferred Route and the nearby principal land use features and natural resources, including:

- Location of existing substations,
- Residential, commercial, and industrial land uses,
- Municipal zoning classifications,
- Wetlands and watercourses,
- Floodplain boundaries as identified by the Federal Emergency Management Agency ("FEMA"),
- Existing infrastructure including local roads, regional highways and railroads.

CL&P and its consultants have conducted field investigations and other reconnaissance of the Preferred Route in order to verify and update the information depicted on the aerial photographs. Additionally, CL&P has compiled information concerning current land use, future land use patterns, natural and cultural resources, and other environmental resources as a result of consultations with federal, state, and local agency representatives. Appendix B includes copies of Project related agency correspondence. The sections below present summaries of the existing environmental conditions along the Preferred Route.

F.1 TOPOGRAPHY, GEOLOGY, AND SOILS

The topography along the Preferred Route is characterized by flat and gently sloping areas with elevations ranging from approximately 10 to 20 feet above sea level.

Bedrock geology in the Project area consists of two different forms of gneiss and one form of schist, Pumpkin Ground Member of Harrison Gneiss, Ordovician Granitic Gneiss and The Trap Falls Formation (schist). The Pumpkin Ground Member of Harrison Gneiss is gray to spotted, medium to coarse grained, foliated gneiss. The Ordovician Granitic Gneiss is a light colored, foliate granitic gneiss. The Trap Falls Formation consists of gray to silvery, partly rusty weathering, medium grained schist.

Surficial geology along the Preferred Route varies and consists of different thicknesses of sand, gravel and glacial till (till), as well as significant areas of artificial fill deposition. Information concerning the physical properties and classification of soils in the vicinity of the Project is presented in Table F-1. Descriptions of soil types identified along the Preferred Route were obtained from the U.S. Department of Agriculture ("USDA"), Natural Resource Conservation Service ("NRCS") Web Soil Survey (accessed May, 2012), and the USDA NRCS Soil Survey Geographic ("SSURGO") database. This information provides a useful baseline for identifying areas of hydric soils (which signal the presence of a wetland); for assessing the potential for erosion and sedimentation during construction; and for planning appropriate mitigation measures (including erosion and sedimentation controls) to be implemented during Project construction.

Table F-1: Principal Soil Associations along the Preferred Route

Soil Map Unit Name and Symbol	General Description	Hydric Soil	Depth to Bedrock
Urban land Charlton - Chatfield complex	Highly developed areas interspersed with well drained till based soils	No	0-25 feet
Udorthents - Urban land complex	Areas of substantial cutting or filling interspersed with highly developed areas	No	0-25 feet
Urban land	Highly developed areas	No	0-25 feet

Source: USDA Soil Conservation Service, Soil Surveys of Fairfield County Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Accessed 5/5/2012. http://soildatamart.nrcs.usda.gov.

The Charlton series consists of very deep, well drained loamy soils formed in till derived from parent materials that are very low in iron sulfides. They are nearly level to very steep soils on till plains and hills. Slope ranges from 0 to 50 percent. Saturated hydraulic conductivity is moderately high or high.

The Chatfield series consists of well drained and somewhat excessively drained soils formed in till derived from parent materials that are very low in iron sulfides. They are moderately deep to bedrock. These are nearly level through very steep soils on glaciated plains, hills, and ridges. Slope ranges from 0 through 70 percent. Saturated hydraulic conductivity is moderately high or high in the mineral soil.

Udorthents-Urban land complex soils typically consist of variably drained soils that have been disturbed by cutting or filling, and areas that are covered by buildings and pavement. Most areas of these components are so intermingled that it is not practical to map them separately. These soils are in areas that have been cut to a depth of 2 feet or more or are on areas with more than 2 feet of fill.

Urban land consists entirely of man-made surfaces such as pavement, concrete and buildings. Urban land is typically impervious and will not infiltrate water.

F.2 WATER RESOURCES

This section describes the existing water resources located along the Preferred Route including, if any, wetlands, watercourses and waterbodies (surface water, streams, rivers, lakes, ponds and reservoirs), as well as groundwater and floodplains.

Connecticut is divided geographically into eight major drainage basins/watersheds. The Project is located within the Southwest Coast drainage basin, which is characterized by watercourses that flow into Long Island Sound. The Southwest Coast drainage basin includes the following rivers: Byram River, Goodwives River, Little River (Saugatuck River tributary), Mianus River, Mill River (Rippowam River tributary), Mill River (Southport), Noroton River, Norwalk River, Pequonnock River, Rippowam River, Saugatuck River, Silvermine River, and West Branch Saugatuck River.

F.2.1 Inland and Tidal Wetlands and Watercourses

A review of the following data sources was conducted to identify the mapped wetlands and watercourses along the Preferred Route:

- National Wetlands Inventory ("NWI") mapping
- Connecticut Department of Energy and Environmental Protection ("CT DEEP") wetlands mapping
- NRCS Soil Surveys

As a result of this review, no potential surface water resource areas were identified in the vicinity of the Preferred Route. On April 26, 2012, CL&P's consultants performed a field review of the Preferred Route that confirmed no wetlands, vernal pools or watercourses exist proximate to the route. However, the Preferred Route does cross over the East Branch of the Rippowam River, which is underground and contained within a culvert at the crossing location.

F.2.2 Groundwater Resources

In the vicinity of the Project, the groundwater quality is classified as "GB" (i.e., industrial process water and cooling waters; baseflow for hydraulically connected surface water bodies; presumed not suitable for human consumption without treatment) by the CT DEEP. Potable water in the Project area is supplied by Aquarion Water Company of Connecticut.

The CT DEEP's Aquifer Protection Area Program, identifies Level A and Level B Aquifer Protection Areas by municipality. Aquifer Protection Areas are delineated for active public water supply wells in stratified drift that serve more than 1,000 people, in accordance with Conn. Gen. Stat. §22a-354c and -354z. Level A mapping delineates the final Aquifer Protection Area, which becomes the regulatory boundary for land use controls designated to protect the well from contamination. Level B mapping delineates a preliminary Aquifer Protection Area, providing an estimate of the land use controls designated to protect the well from contamination.[3] According to the CT DEEP, there are no aquifer protection areas in the vicinity of the Project.

[3] CT DEEP, January 19, 2012. Aquifer Protection Area Mapping.

F.2.3 Flood Hazard Areas

The FEMA classifies flood zones for insurance and floodplain management purposes and has prepared maps that designate certain areas according to the frequency of flooding. An area within the 100-year flood designation has a one in one hundred chance to flood in any given year. A review of FEMA data indicates the Preferred Route does not cross any areas of the 100-year flood plain.

F.2.4 Coastal Area Resources

Although the majority of the Preferred Route is located in inland areas, the southwestern portion of the Project area is located within a designated coastal boundary as illustrated on the All Routes Map - Existing Conditions in Appendix A (Figure 2). As defined by the Connecticut Coastal Management Act ("CCMA"), the coastal boundary extends to an area delineated on the landward side by the elevation of the 100-year coastal flood zone or a 1,000-foot setback from the mean high water mark in coastal waters, or a 1,000-foot setback from tidal wetlands, whichever is farthest inland. The seaward side of the coastal boundary corresponds to Connecticut's jurisdiction within Long Island Sound.

The CCMA sets forth specific policies and standards applicable to the resources within the coastal boundary and to the evaluation of activities and plans relevant to the coastal area. Federal, state, and local agencies must follow these policies and standards when evaluating proposed developments in the coastal area. In addition, the CCMA identifies 14 coastal resources that have been mapped on a statewide basis. These resources are:

- Coastal bluffs and escarpments
- Rocky shorefronts
- Beaches and dunes
- Tidal wetlands
- Freshwater wetlands and watercourses
- Intertidal flats
- Coastal hazard areas

- Developed shorefront
- Islands
- Shorelands
- Shellfish concentration areas
- Coastal waters and estuarine embayment
- Air resources and air quality
- General resources

None of the above referenced resources would be affected by the Project. CL&P met with the City environmental planning staff who determined that the Project is exempt from the coastal area management approval process.

F.3 WILDLIFE AND VEGETATION

With the exception of a small area (<500 feet) between Lincoln Avenue and Scott Place, the Preferred Route is aligned along existing city streets for its entire length. Therefore, vegetation along the Project is extremely limited and almost exclusively located along the road shoulder, adjacent to the route. The existing vegetation in these areas consists mainly of plant species which are associated with neighborhoods, commercial/industrial facilities, railroad ROW and other highly disturbed urban habitats such as roadsides and unmaintained areas.

Sparse vegetation exists along the gravel railroad bed where the Preferred Route crosses under the railroad ROW just south of Glenbrook Substation, between Lincoln Avenue and Scott Place. Plant species occurring at this location consist of grasses, forbs and a few scattered small trees.

The Preferred Route crosses or is located near sparse urban plant associations, which provide little wildlife habitat. Wildlife inhabiting the Project region can be expected to be adapted to urban areas and would be expected to be habitat generalists and more or less cosmopolitan in their distribution. Such wildlife species may include opossum, raccoon, woodchuck, and birds such as rock dove, mocking bird, American robin, American crow, house sparrow, and house finch. Herpetofauna (amphibians and reptiles) tend to be scarce in urban habitats because they are typically less tolerant of human activity and disturbance. Given the urban character of the

Preferred Route and the lack of wetlands, there is no potential for amphibian breeding along the route.

F.4 THREATENED AND ENDANGERED SPECIES

Based on CL&P's review of the United States Fish and Wildlife Survey ("USFWS") website, Endangered Species Consultation Procedure, (http://www.fws.gov), three federally listed species may occur within Fairfield County (the piping plover, roseate tern and bog turtle). According to the USFWS, none of these species are known to occur within the City of Stamford and no habitat for these species exists in the Project area. Therefore, it was determined that no federally listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the USFWS is known to occur in the Project area. Due to the negative determination, preparation of a Biological Assessment or further consultation with the USFWS under Section 7 of the Endangered Species Act is not required. Copies of agency consultation letters are provided in Appendix B.

CL&P consulted with the CT DEEP, Natural Diversity Database ("NDDB") regarding state-listed species in the Project area. Correspondence from the CT DEEP included in Appendix B.2, NDDB (dated March 19, 2012) indicated that the proposed Project would not impact any extant populations of federal or state endangered, threatened or special concern species.

F.5 FISHERIES

As stated in Section F.2.1, no watercourses exist proximate to the route. However, the Preferred Route does cross over the East Branch of the Rippowam River, which is underground and contained within a culvert at the crossing location. Therefore, no impacts to fisheries are anticipated to occur as a result of the Project.

F.6 LOCAL, STATE AND FEDERAL LAND USE

Mapping depicting the environmental features on and adjacent to the Preferred Route is provided in Appendix A (Figures 2, 4 and 8). The principal environmental features shown on the maps include the following:

- Commercial/Industrial areas;
- Settled neighborhoods and schools;
- Regional Highways, local roads and railroads;
- Areas regulated under the Tidal Wetlands Act and Coastal Zone Management Act;
- 100-year flood plain boundaries as identified by FEMA; and,
- Zoning classifications.

As shown on the Project mapping, several dominant land uses are evident within the Project area. These general land uses include commercial/industrial, retail and residential. Some neighborhoods are located along the northern portion of the Preferred Route and occur along Lincoln Avenue, Scott Place, Culloden Road and Crystal Street. There are additional neighborhoods along the southern portion of the Preferred Route, which are located on Manhattan Street and Pacific Street. Regional highways (I-95), state routes (Routes 1 and 7), local roads and the MNRR corridor also occur along the Preferred Route. A large, centrally located portion of the Preferred Route is located along South State Street, which is bordered to the north by I-95 and to the south by a railroad ROW.

Based upon publicly available data, there are no schools, licensed day-care centers, licensed youth camp facilities or playgrounds within 500 feet of the Preferred Route.

The State and the City Stamford have developed plans to guide land conservation and development. The primary State-level plan is the *Conservation and Development Policies Plan for Connecticut 2005-2010*. The *2006-2015 Regional Plan of Conservation and Development*, which was prepared by the South Western Regional Planning Agency ("SWRPA"), provides a coordinated plan for the eight municipalities within the planning region (i.e., Darien, Greenwich, New Canaan, Norwalk, Stamford, Weston, Westport, and Wilton).

On the municipal level, general land use objectives are defined in plans of development, conservation and open space plans, coastal area management plans (for areas bordering Long Island Sound and associated tidally-influenced waterbodies), and harbor management plans. To evaluate the consistency of the proposed Project with land management objectives, the plans listed in Table F-2 were obtained and reviewed.

Table F-2: List of Land Use Plans Reviewed

Applicability	Plan
State/Regional	− Statewide Plan of Conservation and Development − *2006-2015 Regional Plan of Conservation and Development*, SWRPA
Stamford	− City of Stamford Master Plan, October 23, 2002

Stamford's Master Plan (*Citywide Policies Report* p. 32, Strategy B3.6) recommends that a priority should be given to burying overhead wires and power lines, particularly in areas such as downtown, neighborhood business districts, and on major corridors.

F.7 SCENIC AREAS, RECREATIONAL AREAS AND VISUAL EFFECTS

There are no areas of municipal land, scenic areas, open space, recreational areas or parks immediately adjacent to the Preferred Route. The nearest open space is Dasham Park, located approximately 1,000 feet away. The Preferred Route is located in a highly urbanized area of Stamford.

F.8 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Heritage Consultants LLC ("Heritage"), a firm specializing in historical and social sciences, was retained to compile information about the history and prehistory of the Project area; to identify the known cultural resources in the vicinity of the Preferred Route; and, based on such information, to make recommendations regarding the potential for locating as yet undiscovered resources during the development of the Project. The Heritage Cultural Resources Assessment report with addendum, which addresses both archaeological and historic resources, is included in Appendix B.1.

Cultural resources include buried archaeological sites, standing historic structures, or thematically-related groups of structures. To be considered significant and eligible for listing on the National or State Registers of Historic Places ("NRHP"/"SRHP"), a cultural resource must exhibit physical integrity and contribute to American history, architecture, archaeology, technology, or culture; and must possess at least one of the following four criteria:

- Association with important historic events;
- Association with important persons;
- Distinctive design or physical characteristics; and/or
- Potential to provide important new information about prehistory or history.

The State Historic Preservation Office ("SHPO") is responsible for reviewing projects to ensure that significant cultural resources would be protected or otherwise preserved. CL&P has provided the Heritage report to the SHPO for review. CL&P is committed to working with the SHPO in protecting and mitigating potential impacts to preserve Connecticut's cultural heritage.

The Heritage report is based on information obtained from the Office of State Archaeology, previously published technical studies of cultural resources, reviews of the NRHP and SRHP listings, the Historic American Engineering Record ("HAER") Connecticut Inventory, and consultations with the SHPO and the Connecticut State Archaeologist. As is standard procedure, the report does not provide exact locational information about buried archaeological sites in order to protect the integrity of such resources.

F.9 NOISE

The State of Connecticut has noise regulations (Regulations of Connecticut State Agencies ("RCSA") §§22a-69-1 to 22a-69-7.4) that identify the limits of sound that can be emitted from certain types of land uses. The State regulations define daytime vs. nighttime noise periods; classify noise zones based on land use; and identify noise standards for each zone. In general, the regulations specify that noise emitters must not cause the emission of excessive noise beyond the boundaries of their land so as to exceed the allowable noise levels on a receptor's land.

The environment surrounding the existing substations consists of busy urban road ROWs, where the existing noise environment is influenced by traffic noise, including I-95, as well as the MNRR corridor, which parallels the entire Preferred Route.

F.10 AIR QUALITY

Ambient air quality is affected by pollutants emitted from both mobile sources (e.g., automobiles, trucks) and stationary sources (e.g., manufacturing facilities, power plants, and gasoline stations). Also, naturally occurring pollutants, such as radon gas or emissions from forest fires, affect air quality. In addition to emissions from sources within the state, Connecticut's air quality is significantly affected by pollutants emitted in states located to the south and west, and then transported into Connecticut by prevailing winds. Ambient air quality in the state is monitored and evaluated by the CT DEEP. Air quality is assessed in terms of compliance with the National Ambient Air Quality Standards ("NAAQS") for selected "criteria" pollutants, as well as conformance with regulations governing the release of toxic or hazardous air pollutants.

The state is currently designated as in attainment or is unclassified with respect to the NAAQS standards for five criteria air pollutants: particulate matter no greater than 10 micrometers in diameter ("PM10"), sulfur dioxide ("SO_2"), nitrogen dioxide ("NO_2"), carbon monoxide ("CO"), and lead ("Pb"). The state is currently designated as being in non-attainment with the 8-hour NAAQS standard for ozone ("O_3"), and the 2006 24-hour $PM_{2.5}$ standard. Fairfield County is non-attainment for both the 8-hour ozone and 24-hour $PM_{2.5}$ standard.

The U.S. Environmental Protection Agency ("EPA") has determined that carbon dioxide ("CO_2") is a pollutant and has included CO_2 in its list of criteria pollutants. Areas of non-attainment have not yet been established for CO_2 or other greenhouse gases.

F.11 STATUTORY FACILITIES AND SURROUNDING FEATURES

Figure 7 in Appendix A depicts the locations of other surrounding features within one-half mile of the property, not addressed in the previous sections. The figure shows the location of all existing municipal, state, and federal property and statutory facilities as defined under Conn. Gen. Stat. §16-50*l*(a)(1)(A)(iii).

No statutory facilities are located within 600 feet of the Preferred Route. Six statutory facilities (i.e., three licensed day-care centers, two preserved open spaces, one school) were identified within a one-quarter mile radius (i.e., 1,320 feet) of the Preferred Route. A number of additional facilities were identified within one-half mile (i.e., 2,640 feet) of the Project as shown on Figure 7 (Appendix A) and in Table F-3. One church is located within a one-half mile of the Preferred Route. A number of residences are located within one-quarter mile of the Preferred Route. However, work will be conducted almost entirely within existing road and utility ROWs. Therefore, no adverse impacts to residences will occur as a result of the Project.

Table F-3: Statutory Facilities within One-Half Mile of the Preferred Route

Name of Facility	Type of Facility	Distance from Project (feet)
Hill Avenue Cemetery	Cemetery	1,838
Woodland Cemetery	Cemetery	2,444
Saint Mary’s Church	Church	1,577
UBS Child Development Center	Licensed Day-care Center	689
CLC Maple Avenue Child Development Center	Licensed Day-care Center	953
Noah’s Ark Nursery School	Licensed Day-care Center	1,233
Mark of Excellence	Licensed Day-care Center	1,576
Lead Academy	Licensed Day-care Center	1,810
William Pitt Child Development Center	Licensed Day-care Center	1,997
CTE After School Academy	Licensed Day-care Center	2,096
Rising Star Learning Center	Licensed Day-care Center	2,096
Villa Divino Amore Nursery School	Licensed Day-care Center	2,104
Starkco Activities Program	Licensed Day-care Center	2,146
Roscco Activities Program	Licensed Day-care Center	2,430
Bright Horizons Children's Center-Stamford	Licensed Day-care Center	2,480
Bright Minds	Licensed Day-care Center	2,582
Tressler Boulevard Playgrounds	Playground	1,396
Dasham Park	Preserved Open Space	1,053
South End Neighborhood Center	Preserved Open Space	1,271
Town Hall Park	Preserved Open Space	1,691
Columbus Park	Preserved Open Space	2,030
Rotary Park	Preserved Open Space	2,128
Edward Hunt Recreation Area	Preserved Open Space	2,242
Kiwanis Park	Preserved Open Space	2,278
Roger Smith Park	Preserved Open Space	2,517
Northrop Field	Preserved Open Space	2,575
Rogers Elementary School	School	1,065
Stark School	School	2,378
Burdick Junior High School	School	2,419
Stamford High School	School	2,504

F.12 ENERGY FACILITIES WITHIN A FIVE MILE RADIUS

Listed below are the NU transmission facilities, both substation and line, located within a 5-mile radius of the proposed project route in accordance with Conn. Gen. Stat. §16-50j(59)(15). These facilities are located in the towns of Greenwich, Stamford, Darien and Norwalk.

Table F-4: Energy Facilities within Five Mile Radius

Substations	
Cos Cob	
Tomac	
Waterside	
South End	
Glenbrook	
Cedar Heights	
Flax Hill	
Darien	
Line No.	**Transmission Lines**
1740	Cos Cob-Waterside
1750	Cos Cob-Tomac-South End
1977	South End-Glenbrook-Darien
1440	Waterside-Glenbrook
1450	South End-Glenbrook
1792	Glenbrook-Cedar Heights
1753	Glenbrook-Cedar Heights
1867	Glenbrook-Flax Hill-Norwalk Harbor
1880	Glenbrook-Norwalk-Norwalk Harbor
1890	Glenbrook-Sasco Creek-Norwalk Harbor
1734	Glenbrook-Norwalk
1522	Glenbrook-Norwalk
1416	Darien-Compo

Page intentionally left blank.

G. ENVIRONMENTAL EFFECTS AND MITIGATION

This section identifies the potential environmental effects of the Project, based on the installation of the cable system along the Preferred Route, using the proposed facility design and construction methods as described in Sections D and E. The purpose of this section is to identify and analyze the potential short- and long-term effects that the construction and operation of the proposed Project would have on the environment, ecology, and on scenic, historic, and recreational values, and then describes the measures that CL&P proposes to avoid, minimize, or mitigate 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 the Project D&M Plan. The D&M Plan would include the specifications for Project construction, operation, and maintenance, including the environmental mitigation measures defined in this Application and specified in the Council's Certificate.

Based on the existing conditions along the Preferred Route and the proposed design, the construction and operation of the Project would not have significant permanent adverse effects on the existing environment or on the scenic, historic or recreational values of the surrounding area. CL&P has incorporated measures into all phases of Project development and implementation to ensure that the environment is protected in accordance with federal, state and local requirements.

As noted above, prior to the commencement of any construction activities, CL&P must prepare a D&M Plan. The D&M Plan would include *Northeast Utilities Transmission Group Best Management Practices Manual for the State of Connecticut, Construction & Maintenance Environmental Requirements*--December 2011 ("BMPs"), which is designed to minimize or eliminate potential adverse environmental effects that may result from construction activities. The D&M Plan would include specific procedures and information on erosion control, construction site dewatering, spill prevention and control, construction staffing and hours, traffic control and restoration. The D&M Plan would also provide contact information if questions or concerns arise during the construction or operation of the Project.

Prior to the commencement of any construction activities, CL&P would install erosion controls at the limits of work and around adjacent catch basins, in accordance with the approved Project Plans, the D&M Plan and the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*. The erosion controls would be inspected and maintained throughout the course of the Project until all disturbed sites are stabilized.

During construction, CL&P would monitor the construction contractors' compliance with the D&M Plan, and would comply with the environmental inspection provisions of other state and federal permits, as applicable.

G.1 TOPOGRAPHY, GEOLOGY, AND SOILS

The Project would have negligible, if any, adverse effects on topography and geology. Grading would not be required to install the cable underground within existing road ROWs.[4]

Cable installation would involve the excavation of a continuous trench, as well as two to four concrete splice vaults at approximately 2,000 foot intervals along the route. During such excavation activities, measures would be implemented, as required, to contain temporary soil storage piles and to avoid sedimentation into water resource areas and/or catch basins. As appropriate for work in urban areas, suitable temporary erosion and sedimentation control measures would be installed.

Typically, temporary erosion controls would be installed and maintained, where soils are disturbed at work sites, based on the field judgment of CL&P's experienced personnel. Typical erosion and sedimentation controls may not be required for trenching and other construction activities (e.g., cable pulling) within road ROWs, where the potential for off-site erosion or sedimentation is limited, but would be employed as needed at any off-road ROW work sites. Such temporary controls would typically be maintained until the restoration of disturbed work sites is deemed successful, as determined by standard criteria for storm water pollution prevention and erosion control. After the completion of conduit and splice vault installation, disturbed ROWs would be restored to the appropriate grade. Excess excavated materials and

[4] Note: If the cables are installed adjacent to, but not within, existing road ROWs, grading may be required to create a level work area.

materials not suitable for backfilling the cable trench would be trucked off-site and disposed of in accordance with applicable regulations.

In the event that bedrock is encountered, excavation, drilling, or pneumatic hammer would be the preferred methods to remove rock. Although not anticipated, if extensive bedrock is encountered during construction, provisions for blasting would be considered and developed by CL&P, in accordance with controlled blasting techniques.

G.2 WATER RESOURCES

Neither the construction nor the operation of the Project would have any long-term adverse effects on surface or groundwater resources or water quality as described below.

G.2.1 Inland and Tidal Wetlands and Watercourses

There are no wetlands or watercourses proximate to the Preferred Route. However, the Project will need to cross the East Branch of the Rippowam River, a tidal watercourse. At the crossing location, the river is contained in an underground culvert. As proposed the Project would cross over the top of the underground culvert. Therefore, no impacts to the river are anticipated.

Project wide, CL&P would implement its BMPs to minimize or eliminate potential adverse environmental effects during the construction phase of the Project including measures to reduce the likelihood of sediment migration away from distinct construction sites.

G.2.2 Groundwater Resources

It is possible that groundwater may be encountered in either the cable trench, which would be excavated to a depth of approximately 8-10 feet, or during installation of the splice vaults, which would require excavations to depths of approximately 13 feet. However, the Project area traverses densely developed urban areas, where groundwater is not used for direct potable water supply. If groundwater is encountered during cable/splice vault excavation, the water would be pumped from the excavated areas, filtered and discharged into municipal storm water catch basins or pumped into a tank truck for disposal outside of the Project area. During construction, care would be taken to avoid impacts to municipal water lines and other utilities that may be located within road ROWs.

G.2.3 Flood Hazard Areas

The Preferred Route is not located within any mapped flood hazard areas. Therefore, no adverse effects on floodplains are anticipated.

G.2.4 Coastal Area Resources

There would be no effect on coastal resources as a result of the Project. Project construction activities would take place in previously developed commercial/industrial and neighborhoods and would have no effect on access to the shoreline. Along the portion of the underground route that traverses the coastal boundary, any effects would be short-term, limited to the construction phase, and highly localized. CL&P will be consulting with the CT DEEP, and would submit an application for coastal zone consistency certification for the Project, if required.

As stated in Section F.2.4, portions of the Project are located within the Coastal Area Management Boundary, as defined by Conn. Gen. Stat. §22a-94(a) and would therefore be regulated under the CCMA. The CCMA identifies eight adverse impacts to coastal resources. Each of the adverse impacts is identified in this section and an explanation of why the Project would not adversely affect each resource is provided. In all cases, the Project would not result in adverse impacts to coastal resources as defined in the CCMA.

1. **Degrading water quality of coastal waters by introducing significant amounts of suspended solids, nutrients, toxics, heavy metals or pathogens, or through the significant alteration of temperature, pH, dissolved oxygen or salinity.**

The Project would not affect water quality within the coastal boundary, including the East Branch of the Rippowam River. Erosion and sediment controls would be established as required by CT DEEP Bulletin 34, 2002 *Connecticut Guidelines for Soil and Erosion and Sediment Control*. Any stormwater generated by the Project would be treated in accordance with the CT DEEP's *2004 Connecticut Stormwater Quality Manual*; no impacts from stormwater would occur as a result of the Project.

2. **Degrading existing circulation patterns of coastal water by impacting tidal exchange or flushing rates, freshwater input, or existing basin characteristics and channel contours.**

The Project will not impact tidal exchange, flushing rates, freshwater input, existing basin characteristics or channel contours. As described in #1 above, the Project will adhere to the guidelines set forth in the *2002 Connecticut Guidelines for Soil and Erosion and Sediment Control* and the *2004 Connecticut Stormwater Quality Manual.* Proper Project planning and consideration of all resource areas and guidelines will ensure no impacts will occur. The only watercourse crossing proposed along the Project route will occur on top of the existing underground culvert conveying the East Branch of the Rippowam River; no impacts or channel contour modifications will occur.

3. **Degrading natural erosion patterns by significantly altering littoral transport of sediments in terms of deposition or source reduction.**

The Project would not affect littoral transport of sediments. The *Connecticut 2002 Soil Erosion and Sediment Control Guidelines* would be followed and no impacts would occur as a result of the East Branch of the Rippowam River crossing.

4. **Degrading natural or existing drainage patterns by significantly altering groundwater flow and recharge and volume of runoff.**

Drainage patterns would not be significantly altered by the Project. After the Project installation is complete, the areas would be returned to pre-existing grade and contours, to the extent possible. The proposed groundwater practices are not anticipated to significantly affect the flow of groundwater and would not substantially increase runoff in the Project area.

5. **Increasing the hazard of coastal flooding by significantly altering shoreline configurations or bathymetry, particularly within high velocity flood zones.**

The Project is not within the 100-year floodplain and is located away from the shoreline. Therefore, no impacts to the shoreline configuration would occur.

6. **Degrading visual quality by significantly altering the natural features of vistas and viewpoints.**

The Project is located in a highly urbanized area of Stamford. No areas of municipal land, scenic areas, open space, recreational areas or parks are located along the Project. All cable installation will occur below the existing grade and will have no visual impact on the adjacent areas. The substation modifications will occur within the existing fence lines and these improvements and modifications will not degrade the visual quality of the area.

7. **Degrading or destroying essential wildlife, finfish or shellfish habitat by significantly altering the composition, migration patterns, distribution, breeding or other population characteristics of the natural species or significantly altering the natural components of the habitat.**

No essential wildlife, finfish or shellfish habitat exists along the Preferred Route and proximate to the Glenbrook and South End Substations.

8. **Degrading tidal wetlands, beaches and dunes, rocky shorefronts, and bluffs and escarpments by significantly altering their natural characteristics or function.**

The Project would not alter the natural characteristics of any coastal resource area. The East Branch of the Rippowam River is currently conveyed underground via a culvert. CL&P expects to locate the duct bank above the existing culvert at this location. Therefore, no impacts to the River are anticipated to occur as a result of this crossing.

G.3 WILDLIFE AND VEGETATION

No significant areas of vegetation exist within the Project area. Therefore, no negative effects to vegetation or wildlife are anticipated. To accommodate the construction of the underground cable there may be some cases where street (public) trees or other vegetation on private property would have to be trimmed or removed. Wherever possible, Project construction would occur within the street. However equipment such as excavators and cranes would still need the necessary overhead clearances to work safely. Therefore, trees with limbs overhanging the roadway may have to be pruned.

If it is necessary to install splice vaults along the side of the roadway, off the paved surface, it is more likely that trees or vegetation on private property could be affected. In these locations any vegetation within the construction workspace would have to be removed and it is possible that trees outside the workspace would have to be pruned to provide the necessary overhead clearances.

Where removal or pruning of woody vegetation is required along the roadway, it would be done by a professional crew with all appropriate training. When pruning is necessary all cuts would be smooth and would be made in front of the branch collar and large, heavy branches would be precut on the underside to prevent splitting or peeling. The use of climbing spurs would be avoided unless safety issues preclude this.

Where a jack and bore crossing method is needed, some trees may have to be removed in order to provide the necessary work space for the drilling equipment. The vegetation removal and pruning in these areas would again be done by hand, or with appropriately sized equipment.

CL&P recognizes that the excavation work could have potential impacts to the root systems of nearby vegetation. The impacts would be highly variable and depend on factors such as species, size and location of the vegetation, and would therefore need to be evaluated on an individual basis.

CL&P understands the importance of the existing vegetation to the local communities and the City of Stamford as a whole. As a result, wherever possible impacts to existing vegetation would be minimized by proposing routes that do not have significant amounts of vegetation associated with them, and by designing the project to avoid conflicts where vegetation does exist. However, it is still possible that some existing vegetation would have to be removed or pruned. CL&P would work closely with city officials, and the affected private landowners, to develop an appropriate vegetation restoration plan that would be implemented at the completion of construction.

Upon completion of construction, CL&P would revegetate previously vegetated, disturbed areas with seed mixtures where necessary. However, most of the disturbed areas would be paved. In the absence of other specific requirements, disturbed areas would be re-vegetated in compliance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* and NRCS recommendations. Timely restoration of the limited vegetated areas that may be disturbed during construction would further minimize vegetative disturbance and the potential for erosion.

G.4 THREATENED AND ENDANGERED SPECIES

CL&P has consulted with both the CT DEEP and the USFWS regarding the presence of any state or federal listed species in the Project vicinity. As a result of that consultation, CL&P has determined there are no listed species present in the Project area. Accordingly, no effects on rare plants, wildlife, or habitats are anticipated to occur as a result of the Project.

G.5 FISHERIES

No watercourses exist proximate to the route. However, the Preferred Route does cross over the East Branch of the Rippowam River, which is underground and contained within a culvert at the crossing location. Therefore, no impacts to fisheries are anticipated to occur as a result of the Project.

G.6 LOCAL, STATE AND FEDERAL LAND USE

The proposed Project is consistent with local, state, and federal land use plans. According to the City of Stamford Zoning Regulations, the Preferred Route lies within areas zoned for Business, Industrial, and Residential use.

CL&P has also reviewed the *Conservation and Development Policies Plan for Connecticut 2005-2010* ("C&D Plan") for information relating to the State's growth in general, and the City of Stamford and neighboring communities specifically. The objective of the C&D Plan is to guide and balance response to human, environmental, and economic needs in a manner that best suits Connecticut's future.

Based upon the general planning information provided in C&D Plan, the Project is consistent with the overall goals and objectives of the Plan and serves a public need for a reliable source of electricity for the City of Stamford. As stated in the C&D Plan:

> "The ability to redevelop Connecticut's Regional Centers requires that existing infrastructure be maintained and updated to support compact urban development. This holds true and is particularly relevant regarding electric capacity and delivery systems. While concentrated development in Connecticut's Regional Centers will require appropriate energy capacity and

distribution infrastructure, this type of compact growth can help reduce the need for multiple delivery systems across dispersed areas." (p. 22)

In addition, the future land-use and planning objectives of SWRPA, the regional planning agency encompassing the Project area, are also consistent with the Project. The SWRPA *2006-2015 Regional Plan of Conservation and Development* notes the inadequacy of southwestern Connecticut's electrical transmission grid, and encourages coordination between state and federal siting agencies to achieve a balance between the need for expanded services and preservation of the natural environment and community character.

There are no federal properties or federally-designated areas located on or within one-quarter mile of the Preferred Route. Therefore, the Project is not affected by any applicable federal land use plan.

G.7 SCENIC AREAS, RECREATIONAL AREAS AND VISUAL EFFECTS

No adverse effects to recreational and/or scenic resources are expected as a result of the Project. This is the result of the Preferred Route being located in a highly urbanized area of Stamford. There are no areas of municipal land, open space, recreation or parks located long the Preferred Route.

G.8 HISTORIC AND ARCHEOLOGICAL RESOURCES

Heritage has provided CL&P with a Preliminary Archeological Assessment of the proposed Project area, which included review of both historic and archeological resources. As a result of the assessment, Heritage has identified numerous inventoried historic structures and several properties listed on the National Register of Historic Places, which occur within the Project area. However, because the Project would be built in previously developed areas and within exiting roadways that do not contain historic resources, the Project would not result in impacts to said resources.

A review of potential archeological resources was also included in the Heritage assessment of the Project area and was based upon the review of Global Imaging System ("GIS") data obtained from the Connecticut SHPO, as well as historic maps, aerial photographs, and topographic quadrangles maintained by Heritage. As a result of their assessment, Heritage has determined that no previously recorded archeological sites are situated within one-quarter miles of the Project corridor. In addition, due to the highly developed character of the Project area and the associated disturbed soils, Heritage concluded that further archeological investigations of the proposed Project area are not warranted. In a letter dated July 5, 2012, the SHPO concurred with Heritage, stating, "…SHPO believes that no additional archeological investigations of this project are warranted". Thereafter, due to revisions to the initial alignment of the routes considered for the Project, CL&P provided updated route maps to Heritage. Heritage issued an addendum to its preliminary archeological assessment dated June 29, 2012 confirming that no further archaeological investigations were warranted. Therefore, the proposed Project is not anticipated to affect archeological resources. A copy of the Heritage report, its addendum and the SHPO response are included in Appendix B.1.

G.9 NOISE

Construction-related noise, which would be short-term and highly localized in the vicinity of work sites, would result from the operation of construction equipment; truck traffic; earth moving vehicles and equipment; and jackhammers. The operation of the Project would not result in any adverse noise impacts.

During construction, activities such as pavement removal, trench excavation, the installation of splice vaults, and the general operation of construction equipment would increase ambient sound levels in the immediate Project vicinity. A majority of the Project would be aligned within busy urban road ROWs, where the existing noise environment is influenced by traffic noise, including I-95 and noise associated with the trains on the nearby railroad. Construction noise is exempted under the Connecticut regulations for the control of noise, RCSA §22a-69-1.8(h). However, the temporary increase in construction related noise could potentially raise ambient sound levels near work sites. The extent of a noise effect to humans is dependent upon a number of factors, including the change in noise level from ambient, the duration and nature of the noise, the presence of other non-Project noise sources, people's attitudes concerning the Project, the number of people exposed to the noise and the type of activity affected by the noise (e.g. sleep, recreation, conversation). The effect of construction-generated noise would also depend on the source location as sound attenuates with distance and with the presence of vegetative buffers or other barriers.

In general, construction activities would typically occur during the daytime (7:00 AM to 7:00 PM), when human sensitivity to noise is lower. During the Council's review process, CL&P expects to further define appropriate work hours for construction activities. Work hour specifications would be included in the D&M Plan for the Project.

Standard types of construction equipment would be used for the Project. In general, the highest noise levels from this type of equipment is approximately 92 dB(A) at the source. Taking into consideration the factors that would cause an increase in sound levels to cause public annoyance at noise sensitive receptors, the following procedures may be employed during construction to minimize noise effects at these sites.

- Engine-powered construction equipment would be properly muffled and maintained to minimize excessive noise to the extent possible.

- In areas where rock removal is required, efforts would be made to schedule work to minimize noise and vibration disturbances.

- To the extent feasible, construction work would be scheduled to minimize disruptions to traffic and to residential and business uses.

- Sound pressure levels at all points along the property lines of both substations would continue to meet state regulations as specified in Conn. Gen. Stat. §22a-69-3.3, -3.5(a), -3.7, -4(g).

G.10 AIR QUALITY

The proposed Project would result in short-term, highly localized effects on air quality during construction, primarily from fugitive dust and vehicular emissions. To minimize the amount of dust generated by construction activities, the extent of exposed/disturbed areas along the Preferred Route at any one time would be minimized. Temporary gravel pads/stone construction entrances would be installed at points of ingress/egress at any off road construction work areas as necessary to minimize the potential for equipment to track dirt onto roads. Roadways within the construction zone would be regularly inspected and swept to remove any excess accumulation of dirt. In addition, to minimize dust, water may be used to wet down disturbed soils along the Preferred Route, as needed. There would be no expected effects on air quality associated with the operation of the Project facilities.

G.11 STATUTORY FACILITIES AND SURROUNDING FEATURES

There are no statutory facilities within 600 feet of the Preferred Route. Accordingly, as described in Section F.11 and shown in Table F-3, no adverse impacts to statutory facilities or surrounding features are anticipated to occur as a result of the Project.

G.12 TRANSPORTATION, ACCESS AND EXISTING UTILITIES

The proposed route alignment is anticipated to be located within urban road ROWs, which readily provides access to the work areas for construction equipment and workers. The Project will require close coordination with ConnDOT and the City of Stamford to prepare a Traffic Management Plan detailing the location of traffic control devices (such as signs, barricades, striping, etc.), lane closures and detour routes to minimize impacts to vehicular and pedestrian traffic. Police personnel will be utilized as necessary to direct traffic around or through the construction areas. Measures will be taken to maintain access to all affected residences and businesses during construction.

The construction of the substation improvements will take place entirely within the existing fence lines of both South End and Glenbrook Substations. Therefore, no adverse effects to transportation patterns are anticipated. The construction of the new transmission circuit between the two substations would have minor, short-term, and localized effects on transportation patterns in the immediate vicinity of the Project. These effects would stem primarily from in road construction activity as well as additional traffic on local roads associated with the movement of construction vehicles and equipment to and from contractor yards, staging areas, and work sites along the Project route.

Construction of the Project would not affect railroads or other utilities (e.g., pipelines, water lines, stormwater, or sanitary sewers). The Preferred Route would be constructed (by use of a jack and bore operation) under the MNRR railroad corridor and all other utilities would be avoided. Similarly, the operation of the Project, which would not generate traffic, would not affect transportation systems or local traffic patterns.

During construction, the well-established public road network in the Project area would afford ready access to all Project work sites for vehicles and equipment. Along the Preferred Route, construction equipment, materials, and support vehicles are anticipated to use existing public roads to reach work sites. During construction, personnel traveling to and from work sites, as well as the movement of construction equipment, may cause temporary localized increases in traffic. When heavy equipment must be transported along public roads for delivery to the work sites, temporary disruptions in local traffic patterns, delays, or detours could also occur. However, any such traffic-volume increases would be localized and short-term, as would any potential traffic detours.

G.13 PUBLIC HEALTH AND SAFETY

The proposed Project would be designed, constructed, and maintained in compliance with the standards of the National Electrical Safety Code ("NESC") and other applicable electrical safety codes. The facilities would be designed in accordance with sound engineering practices using established design codes and guides published by, among others, the Institute of Electrical and Electronic Engineers ("IEEE"), the American Society of Civil Engineers ("ASCE"), the American Concrete Institute ("ACI"), and the American National Standards Institute ("ANSI").

Trenching, conduit installation, and backfilling would proceed progressively along the route such that relatively short sections of trench (typically 200 feet per crew) would be open at any given time and location. During non-work hours, temporary cover (steel plates) would be installed over the open trench within paved roads to maintain traffic flow over the work area. After backfilling, the trench area would be repaved using a temporary asphalt patch or equivalent. Disturbed areas would be permanently repaved as part of final restoration.

CL&P recognizes that the installation of buried cable systems within or adjacent to public roads would cause temporary inconvenience to the public and minor environmental effects. However, the installation of the cable facilities within or adjacent to road ROWs would be scheduled to minimize adverse effects on traffic and adjacent land uses to the extent practicable. Construction work would be accomplished in several stages, and each stage may require in-road activities that temporarily affect vehicle and pedestrian traffic patterns and land uses in the immediate vicinity. In summary, the construction activities that may affect vehicle and pedestrian traffic patterns are:

- Reconfiguring traffic patterns and setup of traffic control devices
- Marking the cable system alignment and locating existing utilities
- Establishing temporary erosion and sediment control measures
- Probing to locate rock and groundwater
- Relocating existing overhead and underground utilities
- Trimming or removing trees, fencing, landscaping
- Installing the splice vaults
- Trenching and installing the typical duct bank configuration for the transmission cable
- Temporary pavement restoration
- Testing/proofing the transmission conduits (mandrelling and video inspection)
- Pulling the transmission cables into the conduits
- Pulling the ground continuity conductors into the conduits
- Splicing the transmission cables
- Testing cables inside splice vaults
- Pulling the temperature sensing fiber optic cables
- Installing pull boxes for remote operation and control of the fiber optic cables
- Pulling the fiber optic cables for remote operation and control
- Installing the final roadway pavement
- Installing off-road pavement and sidewalks and
- Reestablishing lawns, fencing, etc.

CL&P would develop a Traffic Management Plan, based on consultations with City of Stamford and ConnDOT officials, which would serve to minimize potential traffic congestion and access restrictions during the construction period. CL&P would also inform businesses, landowners, and residents along the route of the Traffic Management Plan and of the construction schedule. Consideration would be given to minimize the impact of construction activity on vehicular traffic and pedestrians in the vicinity of the Project and disruption to access along existing travelled ways would be minimized by utilizing steel plates, and performing crossings in phases to maintain operations.

Page intentionally left blank.

H. PROJECT FACILITIES RELIABILITY AND SAFETY INFORMATION

The Project would be designed in accordance with sound engineering practices and constructed in full compliance with the standards of the NESC and good utility practice. Should equipment experience a failure, protective relaying would immediately remove the equipment from service, thereby protecting the public, the equipment within the substations, as well as the associated underground infrastructure.

H.1 EMERGENCY OPERATIONS AND SHUTDOWN

Protective relaying equipment is incorporated into the Project design to automatically detect abnormal system conditions and send a protective trip signal to the respective circuit breaker(s) at each end of the line to isolate the faulted section of the transmission system. Specifically, fiber optic strands would be installed within a conduit in the underground duct bank. These strands would provide a robust and reliable communications path for the protective relaying systems.

The protective relaying schemes include fully redundant primary and back up equipment. This ensures that if a line or station equipment failure were to occur at a time when one of the protective relaying schemes is removed from service for maintenance, the redundant protective scheme would initiate the removal from service of the faulted transmission facility being monitored.

If one of the transmission lines experiences an insulation or conductor failure, then high-speed protective relaying would immediately remove the line from service, thereby protecting the public and the transmission line. If equipment at the substations experiences a failure, then protective relaying would immediately remove the equipment from service, likewise protecting the public and equipment within the substations.

H.2 FIRE DETECTION TECHNOLOGY

Fire/smoke detection systems are already in place in the existing relay and control enclosures at the Glenbrook and South End Substations. In the event fire or smoke is detected, these detection systems would automatically activate an alarm at the Connecticut Valley Electric Exchange (“CONVEX”) and the system operators would then take the appropriate action. In addition, the relay/control enclosures at both the South End Substation and the Glenbrook Substation are equipped with fire extinguishers.

The new protective relaying and associated equipment within the substations, along with the existing SCADA system for remote control and equipment monitoring would be utilized to ensure the safe operation of the transmission system at both substations.

H.3 GENERAL SITE SECURITY

Access drives to the substations are presently gated and the perimeter of the substations are enclosed with a 7-foot high chain link fence topped with an additional foot of 3 strands of barbed wire to discourage unauthorized entry and vandalism. Lighting presently exists at both the South End and Glenbrook Substation yards to facilitate work at nighttime or during inclement weather.

All gates would be padlocked at the end of the workday during the construction phase and at all times after the Project is completed. Appropriate signage is posted at the substations alerting the general public of the high voltage facilities within the substations.

H.4 PHYSICAL SECURITY OF PROPOSED FACILITIES

The physical security of the proposed facilities would be consistent with the Council's *White Paper on the Security of Siting Energy Facilities,* as amended, initially adopted in the Council's Docket 346 on September 28, 2009. As stated in the *White Paper:*

> "Generally speaking, siting security in this document does not relate to operational, reliability, and maintenance procedures affecting electric facilities, asset connection requirements, or naturally caused calamities (for example, hurricanes or ice storms). Most of these security concerns are predictable and the Council already factors them into its siting decisions. Moreover, most storm threats involve the electric distribution system, which is not under the Council's purview. *White Paper,* at pp. 1, 2.

The *White Paper* Guidelines focus on the unpredictable intentional act of perpetrators designed to damage the physical structures of the certificated facilities (as opposed to, for instance, cyber security). In light of the limitations of the Council's jurisdiction, this description will be limited to measures relevant to the proposed 115-kV underground transmission line to be constructed principally within roadways in Stamford.

H.4.1 Summary of Physical Security Measures

The following summary follows the format suggested by the Council at pages 5 and 6 of its *White Paper,* which focuses on security issues associated with four areas: Planning, Preparedness, Response, and Recovery. Each section first presents the discussion topic included in the *White Paper,* and then provides CL&P's proposed security approach for the issue area.

H.4.2 Planning

H.4.2.1 Identification

Identify the physical vulnerabilities most likely to pose a security threat.

CL&P proposes to construct the new underground 115-kV transmission line, on roadways which traverse short distances in an urban area. The roadways are not, and cannot be, fenced. The locations of the roadways are shown on easily accessible on-line mapping resources. Accordingly, trespassers may relatively easily identify the roadways and could gain access to them, however, they would be easily detected by adjacent landowners or passers-by. Thus, the trespasser is less likely to prepare an attack on the facility than would be the case of an overhead facility which is oftentimes sited in more remote locations.

Additionally, the facilities cannot be easily damaged. What is more important is that the transmission system is designed to withstand a sudden unexpected loss of a single line and the overlapping loss of a second line, without widespread loss of service, and without damage to customer or utility equipment. Moreover, if elements of an underground line are damaged or destroyed, they can be repaired or replaced. Accordingly, an attack designed to destroy or interfere with a section of underground transmission line is unlikely to cause severe and long lasting damage to the overall system.

The Project will also involve minor modifications to CL&P's existing South End and Glenbrook Substations. These existing substations are points of greater system vulnerability than underground transmission line. Since two or more transmission or distribution circuits will be connected at a substation an attack on one of these points would be more likely to affect more than one circuit (and therefore more than one source of supply) than would an attack on a portion of an underground transmission line.

However, these substations are not located in isolated areas, and they are fenced and monitored. In fact, there are already security precautions in place in the substations where Project construction will be required.

H.4.2.2 Facility Type/Characteristics

Identify the type and characteristics of the facility and any ways in which the facility's setting affects security concerns.

A single circuit of an underground 115-kV transmission system would consist of three cables, or phases. Each phase of the circuit would consist of one 3500 kcmil copper conductor cable insulated to 115 kV with 690 mils of XLPE insulation. Each cable would be approximately 4.5 inches in diameter. Figure D-2 illustrates the cross section of a typical 3500 kcmil copper conductor 690 mil XLPE 115-kV cable.

The setting of the proposed facilities poses no particular security concern. However, the proposed new line is underground, in roadways in an urban setting where hostile activity is less difficult to detect in a timely manner than would be the case in rural areas, and the ROWs cannot be fenced. The substations affected are secure and monitored, and are also located in settled areas.

H.4.2.3 Interdependencies

Examine any pertinent ways in which the facility is linked to other facilities and systems and potential repercussions from a facility or system interruption. Examine whether the proximity of the facility to other electric facilities, either dependent or independent, presents security challenges.

The system is planned and operated according to applicable reliability standards, so that the sudden and unexpected loss of even a critical system element when the system is already under stress will not result in a cascading outages, or damage to customer or utility equipment. The proposed facilities will help to provide such a robust system. There is nothing about the particular points of interconnection of the proposed facilities, or their proximity to other facilities, that presents any enhanced security challenge.

In the event of the outage of the line, loss of service, if any, would last for only a short time, and might be avoided by transmitting power over alternate paths for the period of time required to effect emergency repairs. Underground transmission lines can typically be restored to service after a damaging outage in one to two months.

H.4.2.4 Awareness

Examine if there is an established method to help regional, state and national security officials maintain situational awareness of this facility.

CL&P has established procedures to help regional, state and national security officials maintain situational awareness of its facilities. CONVEX monitors the transmission facilities of CL&P and other member utilities in Connecticut and Western Massachusetts in real time, and ISO-NE similarly monitors the situation of the entire New England bulk power system.

Causes of outages are investigated promptly and, when appropriate, reported to law enforcement officials. Maintaining situational awareness is a dynamic task. In 2006, when NERC applied to be designated by the FERC as an ERO, it included a provision for maintaining situational awareness and continues to develop improvements to that end. NERC developed a tool known as Situation Awareness for FERC, NERC, and the Regions (“SAFNR”). This system is intended to provide near real-time information to situation awareness staffs at FERC, NERC, and the eight regional reliability entities, through a secure internet access system. SAFNR was implemented on June 1, 2009. However, it provides limited data and uses display formats that are unique to each Reliability Coordinator. The users identified additional data and functionality requirements to provide a system that will achieve enhanced situation awareness, particularly in the near real-time horizon with a focus on common visual representation of the information and increased trending capability. NERC is now developing an enhanced version of SAFNR (Version 2) that will provide these improvements.

H.4.3 Preparedness

H.4.3.1 Support infrastructure

Examine site security infrastructure, including site monitoring, physical and nonphysical barriers and access controls

CL&P will prepare its physical security plan for the proposed facility in accordance with the guidelines of NERC's Physical Security Concepts Overview. Physical security typically comprises eight distinct concepts:

- Deter - visible physical security measures installed to induce individuals to seek other less secure targets.
- Detect - physical security measures installed to detect unauthorized intrusion and provide local and/or remote intruder annunciation.
- Delay - physical security measures installed to delay an intruder's access to a physical asset and provide time for incident assessment and response.
- Assess - the process of evaluating the legitimacy of an alarm and the procedural steps required to respond.
- Communicate - communication systems utilized to send and receive alarm/video signals and voice and data information. Also, includes the documented process to communicate detected intrusions.
- Respond - the immediate measures taken to assess, interrupt, and/or apprehend an intruder.
- Intelligence - measures designed to collect, process, analyze, evaluate and interpret information on potential threats.
- Audit - the review and inspection of physical security measures to evaluate effectiveness.

Site security and monitoring will largely be provided by CL&P's SCADA system that connects to CONVEX. A SCADA system collects data from various sensors at remote locations and then sends this data to CONVEX, which manages and controls the data. As part of its duties, CONVEX maintains a procedure on how sabotage events will be identified and reported to local and federal officials, neighboring entities and to regulatory bodies. NERC provides guidelines for assessing the degree of protection each component of the grid should receive and recommended types of precautions that these faculties should have in place.

Substations are protected by a 7-foot-high chain link fence topped with 1 foot of barbed wire (three strands). Access is limited through a locked gate and only authorized personnel are permitted to enter. All gates are padlocked at the end of the work day (including during on-station construction activities and at all other times). CL&P retains remote access through the SCADA system and through other monitoring devices.

H.4.3.2 Personnel

Review any simulated exercises that include local police, fire, and other emergency response teams.

Examine whether local law enforcement/emergency response liaison is in place, and review mutual aid agreements between affected entities.

CL&P has regularly consulted with first responders in the municipalities along the Project ROWs, which have been occupied by the existing 115-kV transmission lines for decades. The addition of the proposed new line will not call for any change in the established procedures for notification and response. CL&P is cognizant of the capabilities and needs of these first responders. Should the Council approve this Project, depending on the route approved, CL&P will assess, in consultation with the Connecticut Department of Emergency Services and Public Protection ("DESPP") and local first responders, regarding the type of simulated exercises that may be needed.

The DESPP Training and Exercise Division sponsors emergency preparedness training, seminars, exercises, and conferences for local first responders as defined in Homeland Security Presidential Directive 8 (i.e., police, fire, emergency management, emergency medical services, public health, public works, private sector, non-governmental organizations and others) that are designed to cover Mitigation, Preparedness, Response and Recovery. CL&P is represented on the Private Sector Council of DESPP, which meets quarterly and more frequently as needed.

CL&P has participated in state and regional emergency exercises in the past. CL&P will continue to consult with DESPP's Training and Exercise Division which is responsible for the establishment of training programs and the development, delivery and evaluation of exercises. CL&P hosts training exercises for DESPP, the Connecticut Department of Health Services, and the Federal Emergency Management Agency, including exercises related to potential terrorist incidents on the electric transmission systems. DESPP also works collaboratively with local, state, tribal, and federal partners to coordinate and conduct training and exercises in accordance with the agency's strategic plan. The identification of and development of training to prevent or respond to security threats is a dynamic and evolving process.

H.4.4 Response

H.4.4.1 Access to information

Examine notification procedures to public and/or local officials, including the types of security issues that would warrant such notification.

The addition of a 115-kV underground transmission line will not require any change in existing, pre-established public notification procedures. Nevertheless, during the MCF process for the Project, CL&P personnel met with the City of Stamford officials. Following NERC and CONVEX protocols and after the Project is approved and a formal Project design is developed, CL&P will coordinate further with such officials to discuss the best mechanisms for communicating incidents.

The other possible security issue would be an incident related to the Project at the South End or Glenbrook Substations. Because they are existing stations, CL&P has established protocols for notifying the appropriate local government officials and response agencies. If required based on the type of incident, CL&P would implement a public outreach process for notification of appropriate media outlets.

H.4.4.2 Mitigation

Examine mitigation measures, including alternate routing of power, strategically located spares and mobile backup generation.

The addition of this facility would serve to improve the reliability of the grid in Connecticut. In the event of the interruption of the new line, power flow would be automatically redirected to other lines. CL&P continually prepares for outage contingencies. The system is planned and operated so that the sudden and unexpected loss of the new line would not result in a widespread loss of load or in damage to utility or customer equipment.

CL&P keeps an inventory of spare equipment in order to quickly restore facilities to service after most failures. For example, spare cables and substation equipment are located in a central storage area to be deployed as required.

During the response to an incident, natural resources at or adjacent to the site would be protected to the extent practical and subsequently restored to pre-incident conditions as appropriate. In the event of an incident, the first priority would be to eliminate any threat to public safety and to then repair the transmission facilities. Any natural resources damaged as a result of the incident would then be mitigated as appropriate to the type of impact. In general, the resource protection and mitigation measures expected to apply would be the same as those employed during Project construction If wetlands or water resources are involved, mitigation protocols would be coordinated with the appropriate resource agencies, such as the U.S. Army Corps of Engineers and the CT DEEP.

H.4.5 Recovery

H.4.5.1 Recovery Measures

Identify measures that will be taken, if necessary, to restore natural resources at the site of the facility.

Recovery from any environmental disturbance due to an unanticipated event would depend largely on the nature of the incident and the environmental disturbance created by the incident and by the repairs subsequently required to the transmission facilities. CL&P would expect to employ the environmental construction precautions. In addition, the Project-specific Development & Management Plan would provide resource-specific information to guide to environmental restoration in areas that might be affected by an incident.

H.4.5.2 Reporting

Determine whether reporting procedures are established to evaluate and improve the effectiveness of local emergency response teams, methods to limit negative impacts on neighboring electric facilities, and restoration of the natural environment.

CL&P will investigate and analyze any incident and its response. CL&P will maintain regular contact with the local first responders and relevant public officials, including DESPP. In addition, CL&P will review its conclusions with appropriate public officials to improve the capabilities of local first responders' reactions, if required.

CL&P's post-incident evaluation process is required by federal and regional regulatory authorities to examine what may be needed to be done to improve on its response. Additionally, CL&P's self analysis will evaluate what improvements may be needed to minimize adverse effects on the environment and neighboring electric facilities in responding to future incidents.

I. ELECTRIC AND MAGNETIC FIELDS

This section provides EMF information for the Project, presenting projections for future EMF levels associated with the proposed transmission line in each segment of the Preferred Route. The base case underground 115-kV line that was modeled for these projections is a single-circuit line using three cross-linked polyethylene cables in a triangular arrangement. Because of the proximity of the cable route to nearby existing overhead transmission lines, both the proposed underground and existing overhead transmission lines were modeled in the calculations.

Section I.1 provides general background information about EMF – what it is and typical levels encountered in the environment. Section I.2 describes the Council's requirements for addressing EMF. Section I.3 outlines the methods for measuring and calculating fields and summarizes the measured and calculated magnetic fields to comply with the requirements of the Council. Section I.4 summarizes new developments in EMF health research since the adoption of the Council's EMF BMP in December of 2007. Section I.5 reviews CL&P's actions demonstrating consistency with the Council's guidelines. Section I.6 provides the references used for this section.

In addition, there are four appendices for this section. Appendix D.1 is the Council's EMF BMP. Appendix D.2 is CL&P's Field Management Design Plan ("FMDP") for the proposed project. Appendix D.3 contains tabulated results of the calculated electric and magnetic fields for the Project and information on generator dispatch. Appendix D.4 provides a review of relevant scientific literature since June of 2011 that was prepared by CL&P's consultant, Exponent, Inc.

I.1 ELECTRIC AND MAGNETIC FIELDS FROM POWER LINES AND OTHER SOURCES

Electricity used in homes and workplaces is transmitted over considerable distances from generation sources to distribution systems. Electricity is transmitted as alternating current ("AC") to all homes and over electric lines delivering power to neighborhoods, factories, and commercial establishments. The power provided by electric utilities in North America oscillates 60 times per second (i.e., at a frequency of 60 hertz ("Hz")).

- **Electric fields** are the result of voltages applied to electrical conductors and equipment. The electric field is expressed in measurement units of volts per meter ("V/m") or kilovolts per meter ("kV/m"); 1 kV/m is equal to 1,000 V/m. Most objects, including fences, shrubbery, and buildings, easily block electric fields. Therefore, certain appliances within homes and the workplace are the major sources of electric fields indoors, while power lines are the major sources of electric fields outdoors (Figure I-1, lower panel).

- **Magnetic fields** are produced by the flow of electric currents; however, unlike electric fields, most materials do not readily block magnetic fields. The level of a magnetic field is commonly expressed as magnetic flux density in units called gauss ("G"), or in milliGauss ("mG"), where 1 G = 1,000 mG.[5] The magnetic field level at any point depends on characteristics of the source, including the arrangement of conductors, the amount of current flow through the source, and its distance from the point of measurement. The levels of both electric fields and magnetic fields diminish with increasing distance from the source.

Background AC magnetic field levels in homes are generally less than 20 mG when not near a particular source, such as some appliances. Higher magnetic field levels can be measured outdoors in the vicinity of distribution lines, sub-transmission lines, and transmission lines (Figure I-1, upper panel).

Electric appliances are among the strongest sources of AC magnetic fields encountered in indoor environments. Magnetic fields near appliances can reach 1,000 mG or more. For example, Gauger (1985) reports the maximum AC magnetic field at 3 centimeters from a sampling of appliances as follows: 3,000 mG (can opener), 2,000 mG (hair dryer), 5 mG (oven), and 0.7 mG (refrigerator). Similar measurements have shown that there is a tremendous variability among appliances made by different manufacturers. The potential contribution of different sources to overall exposure over long periods is not very well characterized, but both repeated exposure to higher fields for short times and longer exposure to lower intensity fields for a long time contribute to an individual's total exposure.

---

[5] Scientists more commonly refer to magnetic fields in units of microTesla (μT). Magnetic fields in units of μT can be converted to mG by multiplying by 10, i.e., 0.1 μT = 1 mG.

Considering EMF from a perspective of specific sources or environments, as illustrated in Figure I-1, does not fully reflect the variations in an individual's personal exposure as encountered in everyday life. To illustrate this, magnetic field measurements were recorded, over a two-hour period, by a meter worn at the waist of an individual who conducted a range of typical daily activities in a Connecticut town.

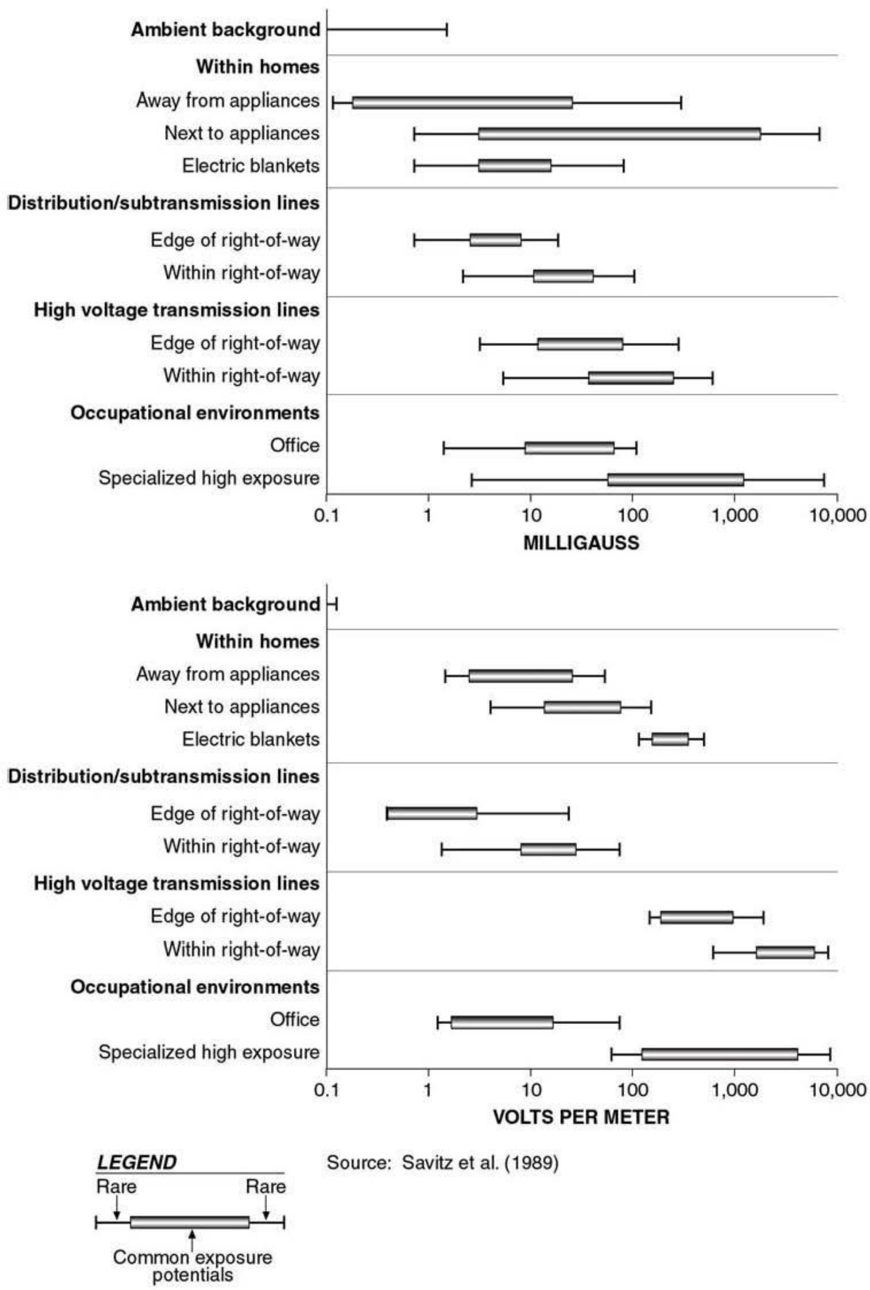


Figure I-1. Electric and Magnetic Fields in the Environment

As illustrated in Figure I-2, these activities included a visit to the post office and the library, walking along the street, getting ice cream, browsing in a bicycle shop, stopping in a chocolate shop, going to the bank/ATM, driving along streets, shopping in a supermarket, stopping for gas, and purchasing food at a fast food restaurant.

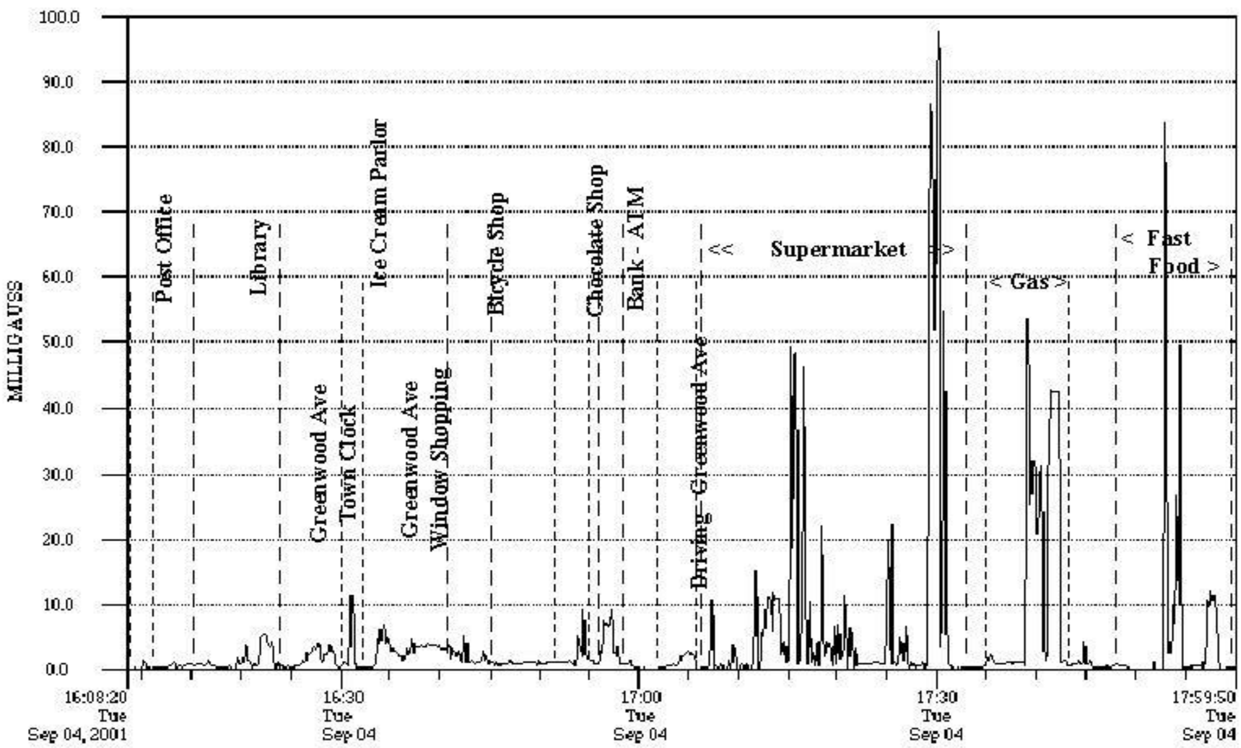


Figure I-2. Typical Magnetic Field Exposures in a Connecticut Town (Bethel)

During the course of the two hours, a maximum magnetic field of 97.55 mG was measured in the supermarket (Table I-1). As Figure I-2 shows, from moment-to-moment in everyday life, magnetic fields are encountered that vary in intensity over a wide range. Other patterns of exposure to magnetic fields could well be very different. For example, a rider on commuter or long-distance electric trains in Connecticut would encounter higher average power-frequency magnetic fields of perhaps 14 to 50 mG during a trip, with peak values in the range of 100 to 400 mG (DOT/FRA, 2006).

Table I-1: Summary of Magnetic Fields Measured in a Connecticut Town (Bethel)

Magnetic Field Levels (milliGauss, mG)		
Maximum	**Average**	**Median**
97.55	4.57	1.10

* Maximum occurred in the supermarket

I.2 CONNECTICUT SITING COUNCIL REQUIREMENTS

In Section N of the Council's Application Guide*,* the Council requests that applicants provide the following information:

1. Measurements of existing EMF at the boundaries of adjacent schools, day-care facilities, playgrounds, and hospitals (and any other facilities described in Conn. Gen. Stat. §16-50*l*), with extrapolated calculations of exposure levels during expected normal and peak normal line loading; and

2. Calculations of expected EMF levels at the above listed locations that would occur during normal and peak normal operation of the transmission line.

In addition, since 1993, the Council requires that proposed new electric transmission lines be designed in compliance with its EMF BMP. In December 2007, after a two-year proceeding, the Council adopted a complete revision of the EMF BMP, adding new requirements based on policies previously implemented by the State of California. The revised EMF BMP document was supported by an independent scientist retained by the Council (Dr. Peter Valberg), by a panel of scientists presented by the Connecticut Department of Public Health and by the Commissioner of the Department of Public Health, and by scientists presented by CL&P and The United Illuminating Company, including Dr. Michael Repacholi, the then-recently retired Coordinator of the World Health Organization's Radiation and Environmental Health Unit. The EMF BMP provides "precautionary guidelines" (EMF BMP, p. 4) for reduction of magnetic field levels associated with new electric transmission lines at the edges of electric transmission ROWs and beyond, especially where the new line would be adjacent to residential areas, public and private schools, licensed day-care centers, licensed youth camps, and public playgrounds.

In adopting the EMF BMP, the Council recognized "the weight of scientific evidence indicates that exposure to electric fields, beyond levels traditionally established for safety, does not cause adverse health effects" and that scientific literature "reflects the lack of credible scientific evidence for a causal relationship between "MF" (magnetic field) exposure and adverse health effects" (EMF BMP, pp. 2-3). Still, as part of its statutory duties, including its duty under Conn. Gen. Stat. §16-50j *et seq*. to address public health and safety, the Council follows procedures to ensure a proposed transmission line would not pose an undue safety or health hazard to persons or property. These procedures and the EMF BMP require that an applicant for approval of an electric transmission line provide:

1. **Measurements and Calculations.** An assessment of the effects of any electromagnetic fields produced by the proposed transmission lines (Conn. Gen. Stat. §16-50*l*(a)(1)(A)) including a proposed line adjacent to "residential areas, private or public schools, licensed child day-care facilities, licensed youth camps, and public playgrounds," (EMF BMP, p. 4) and "electromagnetic field effects on public health and safety" (Conn. Gen. Stat. §16-50 p(a)(3)(B)). This is to be met by taking measurements of existing electric and magnetic fields at the boundaries adjacent to the above facilities, with extrapolated calculations of exposure levels during expected normal and peak normal line loading. In particular, "an applicant shall provide design alternatives and calculations of MF for pre-project and post-project conditions under 1) peak load conditions at the time of the application filing, and 2) projected seasonal maximum 24-hour average current load on the line anticipated within 5 years after the line is placed into operation" (EMF BMP, p. 7).

2. **Field Management Design Plan.** The Council expects applicants will propose no-cost/low-cost measures to reduce the magnetic fields by one or more engineering controls via a FMDP. The Plan should depict "the proposed transmission line project designed according to standard good utility practice and incorporate no-cost MF mitigation design features. The Applicant shall then modify the base design by adding low-cost MF mitigation design features specifically where portions of the project are adjacent to residential areas, public or private schools, licensed child day-care facilities, licensed youth camps or public playgrounds" (EMF BMP, p. 4).

3. **Updates on Research.** The Council will "consider and review evidence of any new developments in scientific research addressing MF and public health effects or changes in scientific consensus group positions regarding MF" (EMF BMP, p. 5).

4. **Statement of Compliance.** A statement describing the consistency of the proposed mitigation design with the EMF BMP (p. 6, 8), and buffer zone requirements (Conn. Gen. Stat. §16-50p(a)(3)(D)).

I.2.1 Statement of Compliance with the BMP and Buffer Zone Requirements

Section I.3 provides measurements and calculations, developed pursuant to the Council's Application Guide and the EMF BMP, for the proposed transmission line. These measurements and calculations also account for existing overhead transmission lines that are nearby to the route of the proposed line.

The FMDP for the proposed transmission line improvements, based in part on these calculations is included in Appendix D.2. In compliance with the EMF BMP, the FMDP begins with the "base" design of the proposed new transmission line incorporating standard utility practice with only "no-cost" magnetic field management features. The FMDP then examines modified line designs incorporating "low-cost" magnetic field management features for a "focus area" of the project (along Lincoln Avenue and Culloden Road in the vicinity of the Glenbrook Substation) where the proposed transmission line could be considered by the Council to be adjacent to a residential area. After examining potential "BMP" designs to reduce magnetic field levels at nearby facilities, compared to those associated with the base line design, the FMDP recommends one BMP design for the focus area as best fitting the Council's guidelines.

I.3 EMF MEASUREMENTS AND CALCULATIONS

The major sources of EMF associated with the Project are the proposed underground line and existing overhead transmission lines on an existing ROW nearby. Transformers and other equipment within the South End and Glenbrook Substations are also potential EMF sources, but would cause little or no exposure to the general public. The strength of fields from equipment inside a typical substation decreases rapidly with distance, reaching very low levels at relatively short distances beyond substation perimeter fences. EMF levels from substations "attenuate sharply with distance and will often be reduced to a general ambient level at the substation property lines. The exception is where transmission and distribution lines enter the substation" (IEEE Std. 1127-1998). Because the fields outside the perimeter fence of a substation are highest directly above or below where transmission and distribution lines enter and leave the substation, measuring and calculating the EMF levels associated with transmission lines effectively addresses potential EMF exposures close to substations.

I.3.1 Field Measurements of EMF from Existing Sources

CL&P took spot measurements of existing electric and magnetic fields at selected locations along the Preferred Route. Continuous magnetic field measurements were also taken walking along the path of the proposed transmission line. See Figures I-3 through I-7 for depictions of these measurements. The measurements were taken at a height of 1 meter (3.28 feet) above ground, in accordance with the industry standard protocol for taking measurements of EMF near power lines (IEEE Std. 644-1994, R2008). The meters were calibrated on October 26, 2012.

The electric field was measured in units of kV/m with a single-axis field sensor and meter (Electric Field Measurements, Inc.) The magnetic field was measured in units of mG using a meter with sensing coils for three axes (EMDEX II). These instruments meet the IEEE instrumentation standard for obtaining valid and accurate field measurements at power-line frequencies (IEEE Std. 1308-1994, R2001, R2010). The meters were calibrated on October 26, 2011 by the manufacturers by methods like those described in IEEE Std. 644-1994, R2008.

Measurements of the magnetic field present a "snapshot" of the conditions at a point in time. Within a day, and over the course of days, months, and even seasons, magnetic field levels change at any given location, depending on the amount and the patterns of power supply and demand within the state and surrounding region. In contrast, the electric field is quite stable over time.

I.3.1.1 Electric and Magnetic Field Measurements across Lincoln Avenue

Measurements of electric and magnetic fields were taken on a horizontal transect of the Preferred Route on Lincoln Avenue in the vicinity of Glenbrook Substation. A depiction of the measurement area is shown in Figure I-3 below. The orange line represents the Preferred Route. The yellow line represents the measurement path. Tabulated results of the measurements are provided in Table I-2 and Figure I-4. These measurements were taken on

October 18, 2012 at approximately 1:45 PM. Nearby sources of electric fields include not only the existing overhead transmission lines, but also overhead and underground distribution lines along Lincoln Avenue.

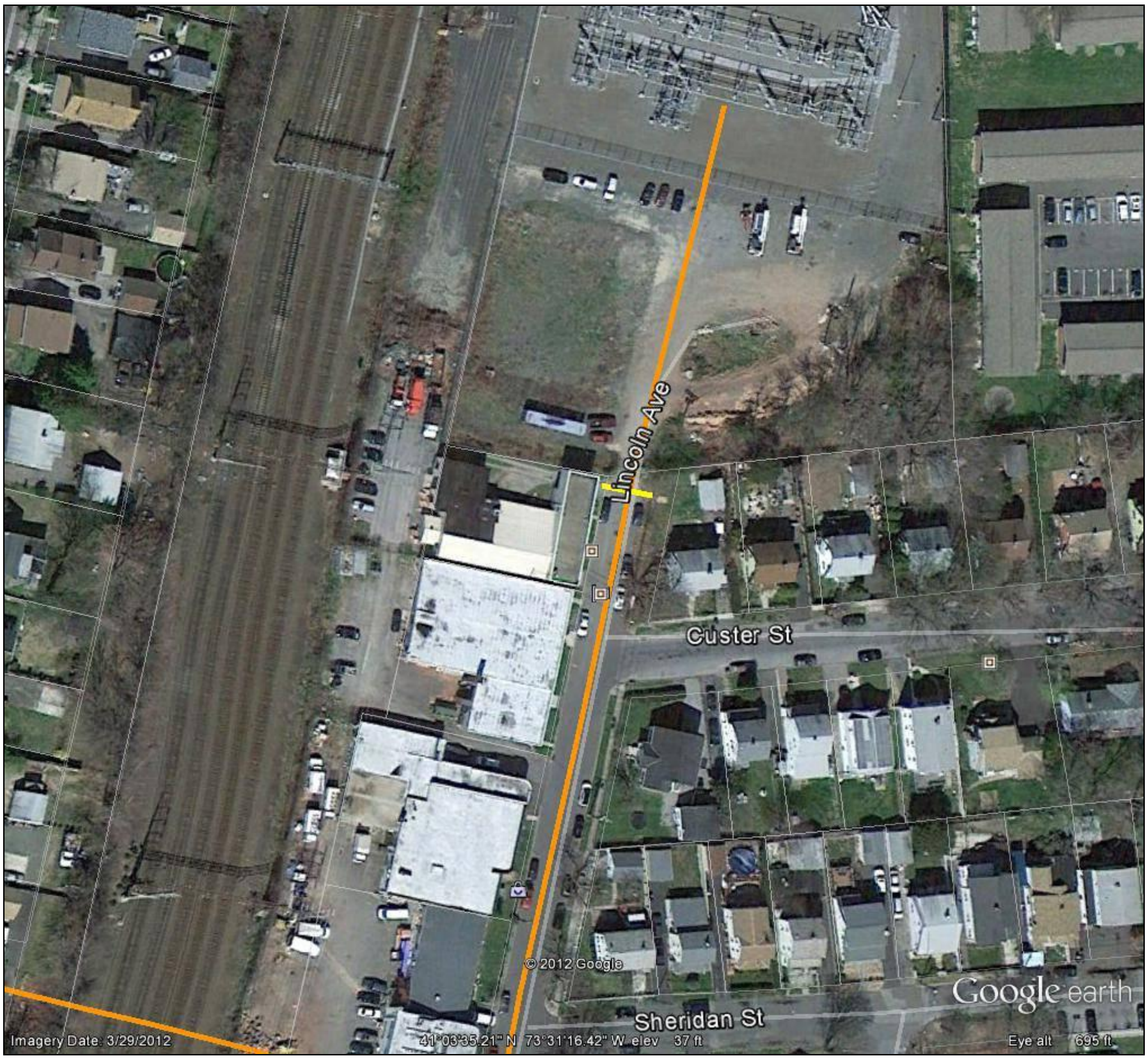


Figure I-3. GoogleEarth™ View of Measurement Path Across Lincoln Avenue

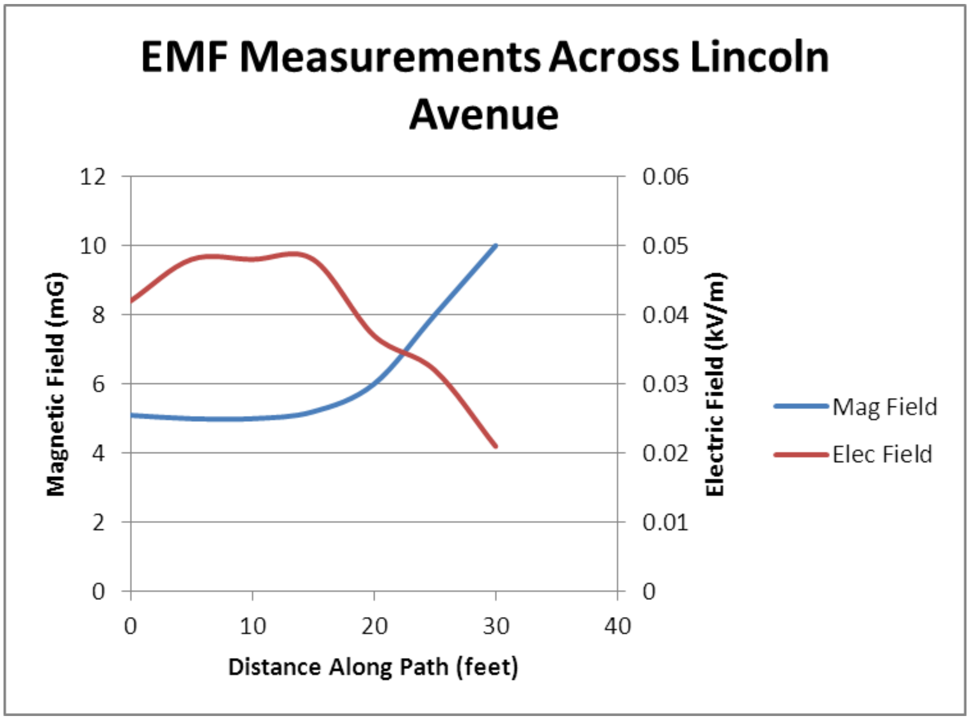


Figure I-4. Electric and Magnetic Fields Measured Across Lincoln Avenue

Table I-2: Measured Electric and Magnetic Fields Across Lincoln Avenue

Distance Along Path (East to West) (feet)	Magnetic Field (mG)	Electric Field (kV/m)
0	5.1	0.042
5	5	0.048
10	5	0.048
15	5.2	0.048
20	6	0.037
25	8	0.032
30	10	0.021

I.3.1.2 Magnetic Field Measurements Along the Preferred Route

In addition to performing measurements along a transect of the Preferred Route where distinct cross sections exist, CL&P personnel also performed measurements walking along the Preferred Route. The measurements were performed between 1:30 PM and 2:30 PM on September 24, 2012. Two paths were recorded. One was along Lincoln Avenue between Glenbrook Substation and the location of the jack and bore underneath the railroad tracks. The second was a continuous path from Scott Street towards South State Street to a location between Canal Street and Atlantic Street. The locations of these paths are shown in Figure I-5 below. The yellow path represents Measurement Path 1. The green path represents Measurement Path 2.

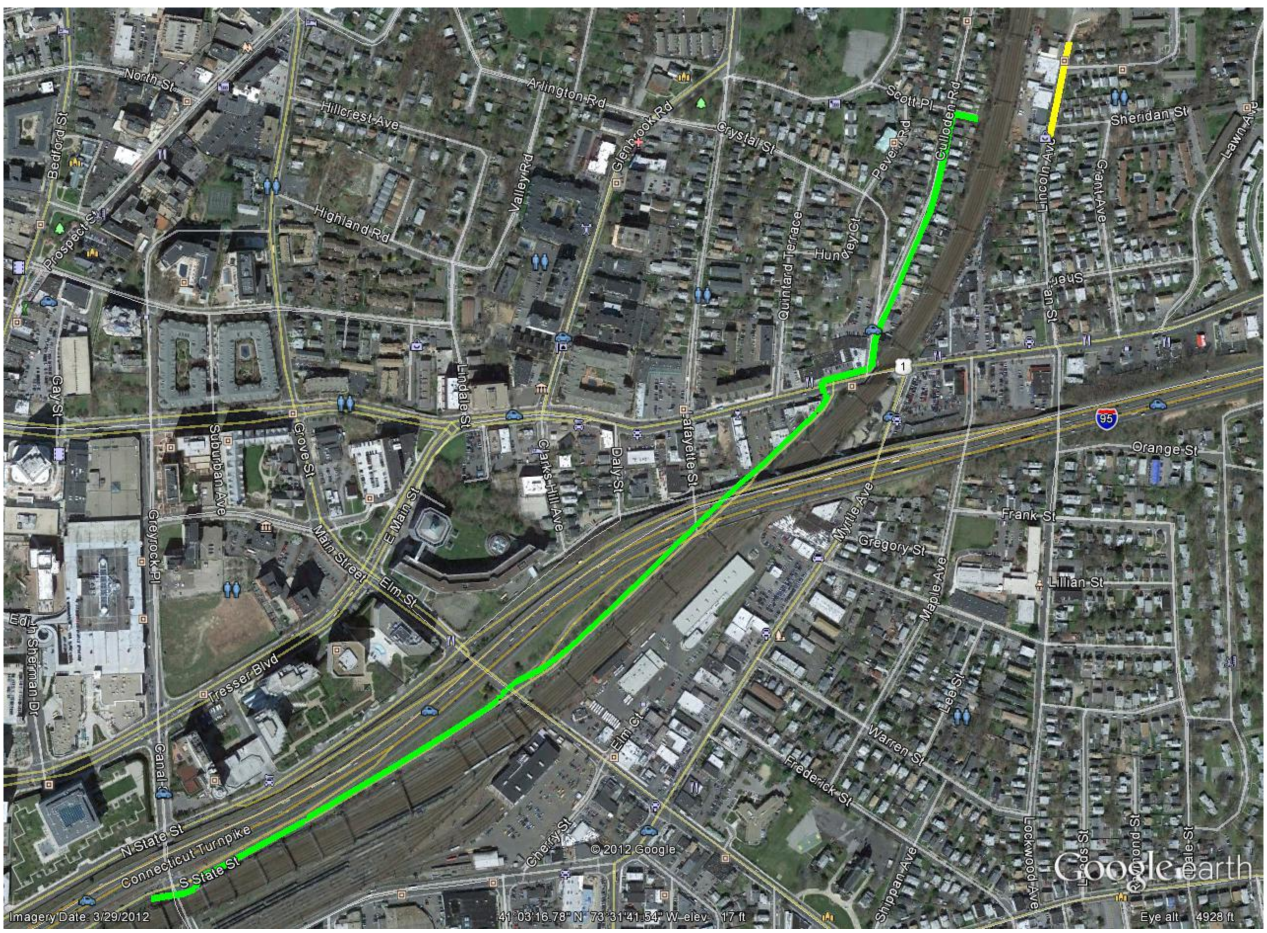


Figure I-5. GoogleEarth™ View of EMF Measurement Along Proposed Route

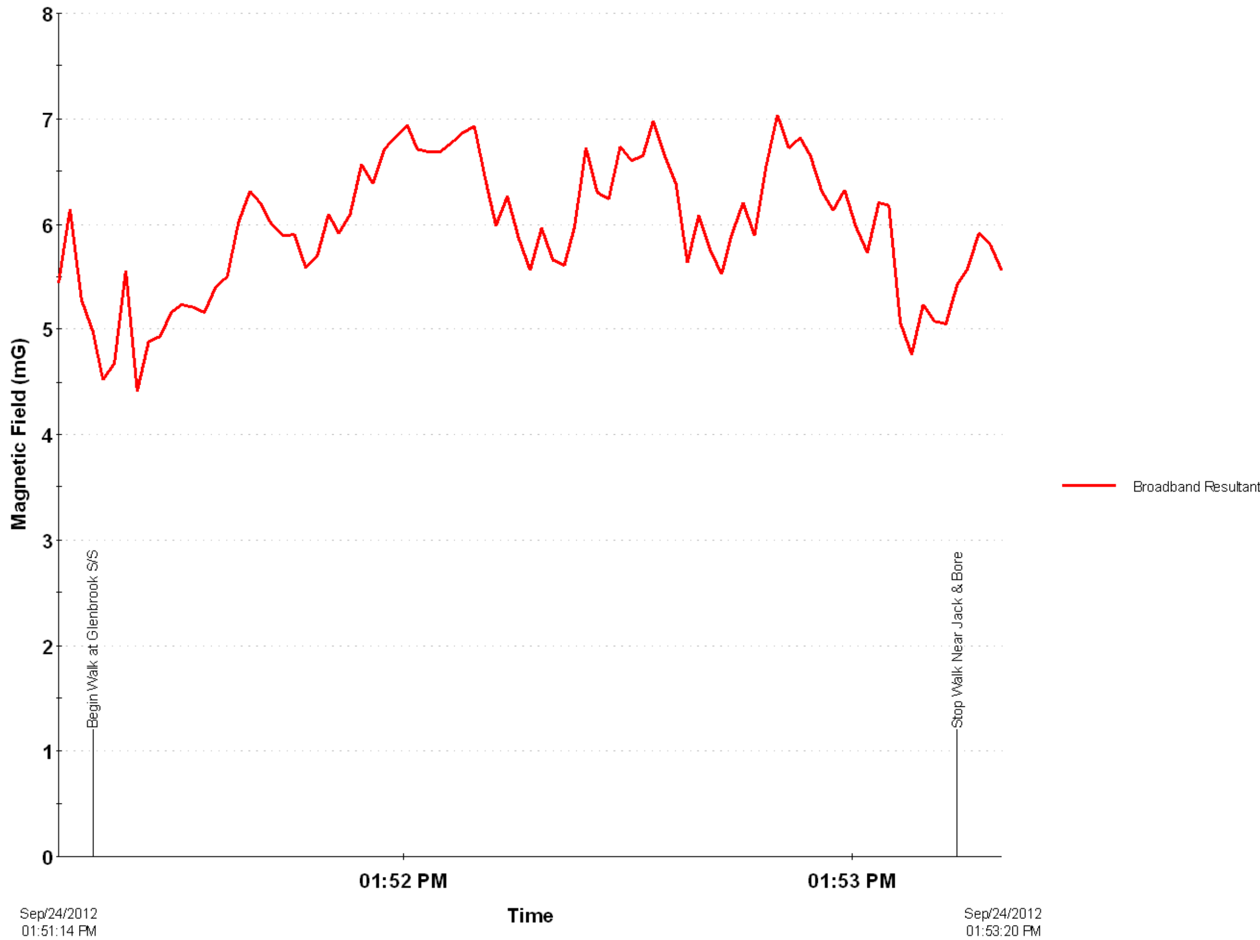


Figure I-6. MF Measurement Results Along Path 1

Table I-3: Path 1 MF Measurement Summary

MF Levels – Path 1 (milliGauss, mG)		
Maximum	**Average**	**Median**
7.03	5.95	5.97

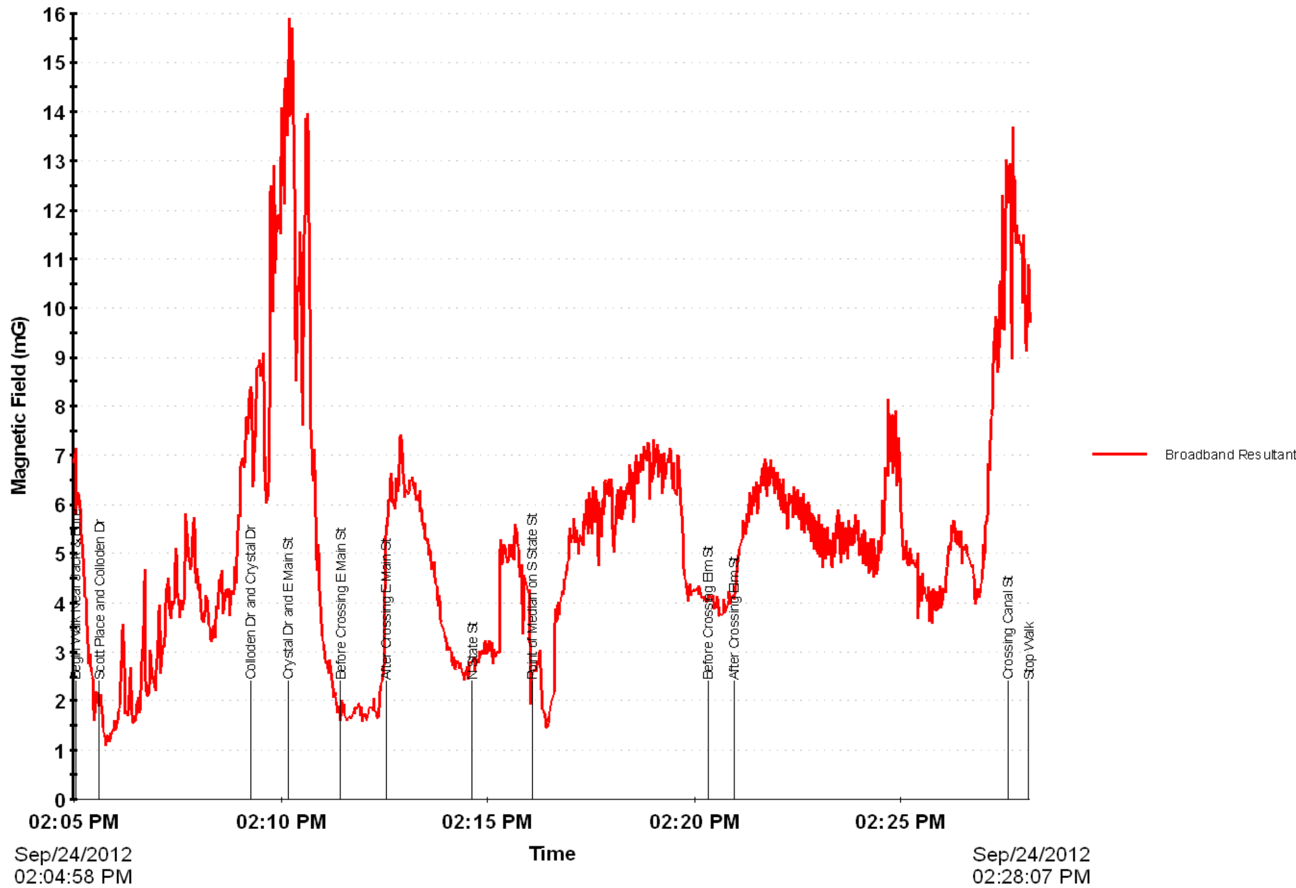


Figure I-7. MF Measurement Results Along Path 2

Table I-4: Path 2 MF Measurement Summary

MF Levels – Path 2 (milliGauss, mG)		
Maximum	**Average**	**Median**
15.9	5.2	4.97

I.3.2 Calculations of EMF from Transmission Lines

CL&P calculated pre- and post-construction electric and magnetic field levels using methods described in the Electric Power Research Institute's *AC Transmission Line Reference Book – 200-kV and Above, Third Edition* and *Underground Transmission Systems Reference Book*. With accurate input data, the equations in these references will accurately predict electric and magnetic fields measured near power lines. The inputs to the calculation are data regarding voltage, current flow, circuit phasing, sheath and wire bonding, conductor and cable sizes and locations. The fields associated with power lines were estimated along profiles drawn perpendicular to the lines assuming flat terrain, at a point of lowest conductor sag for overhead transmission lines (30 feet for lowest conductor of an overhead 115-kV line and at a point of shallowest depth for the underground transmission line (45 inches for the uppermost power cable). All calculations were made for a height of 1 meter (3.28 feet) above ground, in accordance with standard practice (IEEE Std., 644-1994, R2008).

Because most of the Preferred Route is parallel to overhead transmission lines along the railroad, it was necessary to calculate the fields to account for the interactions between the proposed underground transmission line and the existing overhead transmission lines. Three distinct calculation sections were developed to account for the location of the existing overhead transmission lines relative to the proposed underground transmission line.

A calculation of magnetic fields first requires determining the currents that will flow on the affected lines under each set of conditions to be studied. For the Southwest Connecticut transmission system, these currents are determined by modeling the transmission system with a specific system load level, generation dispatch, and direction/magnitude of power transfers in or out of Connecticut. Each condition to be studied is selected in a conservative way so as to lead to calculation results that would likely be higher than actual magnetic field values under the assumed loading condition. CL&P calculated magnetic fields for existing lines under pre-Project conditions in 2014 and for the proposed and existing lines under post-Project conditions in 2019 for three system loading conditions, Annual Peak Load ("APL"), Peak-Day Average Load ("PDAL"), and Annual Average Load ("AAL"). The calculations for Average Annual Load are the most useful for comparing before and after field levels for any 'typical' day, so these results are presented below in profiles and tables. Additionally, magnetic field levels at the edges of the

ROWs and at 25-foot intervals are also presented for the base design and alternative designs at AAL, APL and PDAL, together with associated electric field levels, in Appendix D.3.

I.3.2.1 System Load and Generator Dispatch

Per the EMF BMP, CL&P analyzed the system under varying load conditions with reasonably appropriate generator dispatches. All transmission lines were assumed in service. Only transmission projects with PPA approval in accordance with Section I.3.9 of the Tariff, as of the April 2012 RSP Project Listing, were included in the study base case. There are no system topology changes that are relevant to this study area when considering the 2019 system model. Loads assumed on the transmission system for New England are summarized in Table I-5 below. Generator dispatch is summarized in Table I-6 below. To yield conservatively high results for projected magnetic fields, these generator dispatches included turning off all generators at Cos Cob and Waterside Power.

Table I-5: New England System Loads

Load Case	Description	2014 Load (MW)	2019 Load (MW)
Annual Peak Load (APL)	90/10 Summer Peak ISO-NE L+L	31250	33335
Peak Day Average Load (PDAL)	85% of 90/10 Peak	26563	28335
Average Annual Load (AAL)	Annual Hourly Average	15000	15000

Table I-6: Connecticut Generator Output

Generator	2014 Generator Output (MW)			2019 Generator Output (MW)		
	AAL	PDAL	APL	AAL	PDAL	APL
Norwalk Harbor 1	164	164	164	164	164	164
Norwalk Harbor 2	172	172	172	172	172	172
Norwalk Harbor 10	Off	Off	Off	Off	Off	Off
Bridgeport Energy 10	180	180	180	180	180	180
Bridgeport Energy 11	90	90	90	90	90	90
Bridgeport Energy 12	170	170	170	170	170	170
Bridgeport Harbor 2	Off	Off	Off	Off	Off	Off
Bridgeport Harbor 3	375	375	375	375	375	375
Bridgeport Resco	57	57	57	57	57	57
Cos Cob 10	Off	Off	Off	Off	Off	Off
Cos Cob 11	Off	Off	Off	Off	Off	Off
Cos Cob 12	Off	Off	Off	Off	Off	Off
Cos Cob 13	Off	Off	Off	Off	Off	Off
Cos Cob 14	Off	Off	Off	Off	Off	Off
Waterside Power 1	Off	Off	Off	Off	Off	Off
Waterside Power 2	Off	Off	Off	Off	Off	Off
Waterside Power 3	Off	Off	Off	Off	Off	Off

I.3.2.2 Calculated Magnetic Fields between Glenbrook Substation and Jack and Bore Location on Lincoln Avenue (facing West)

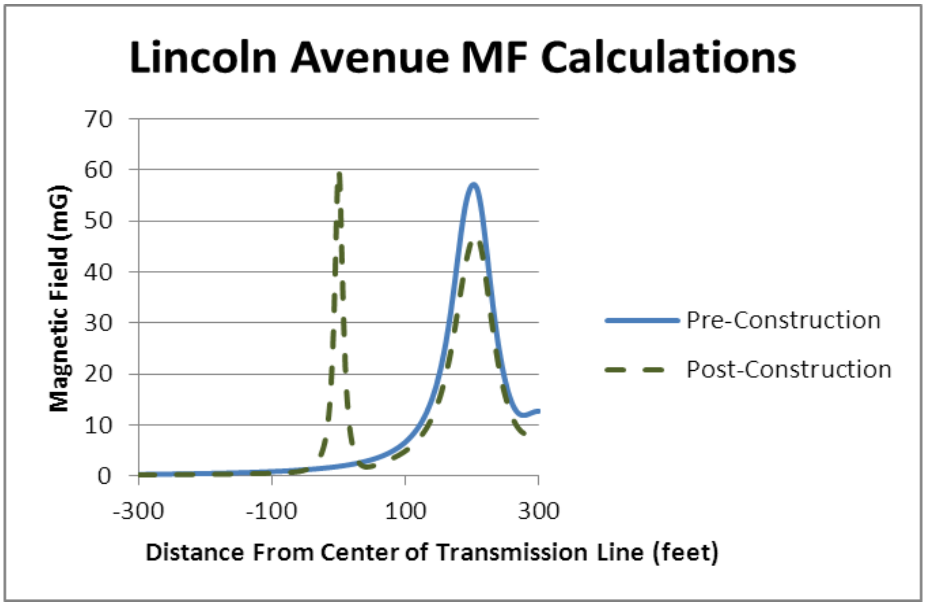


Figure I-8. Calculated Magnetic Fields Along Lincoln Avenue

I.3.2.3 Calculated Magnetic Fields for Culloden Road (facing West)

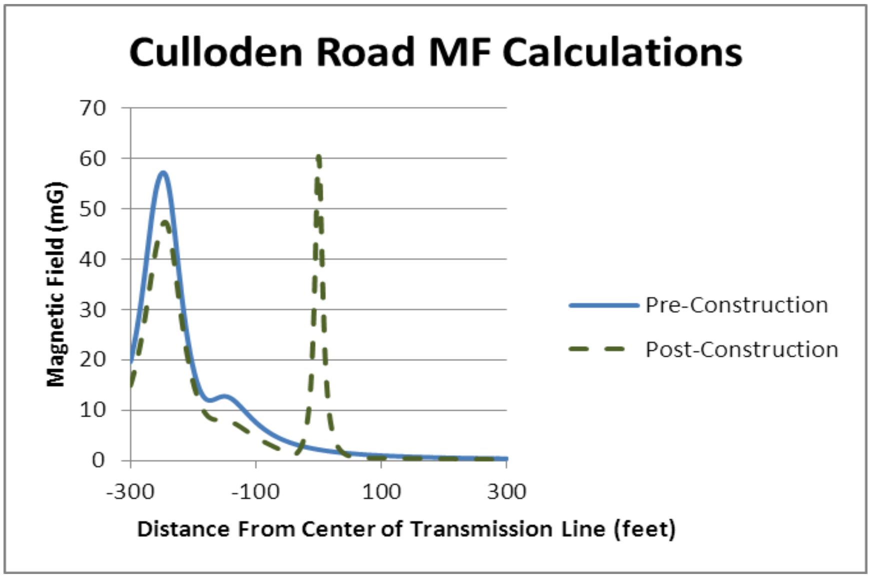


Figure I-9. Calculated Magnetic Fields Along Culloden Road

I.3.2.4 Calculated Magnetic Fields for State Street (facing West)

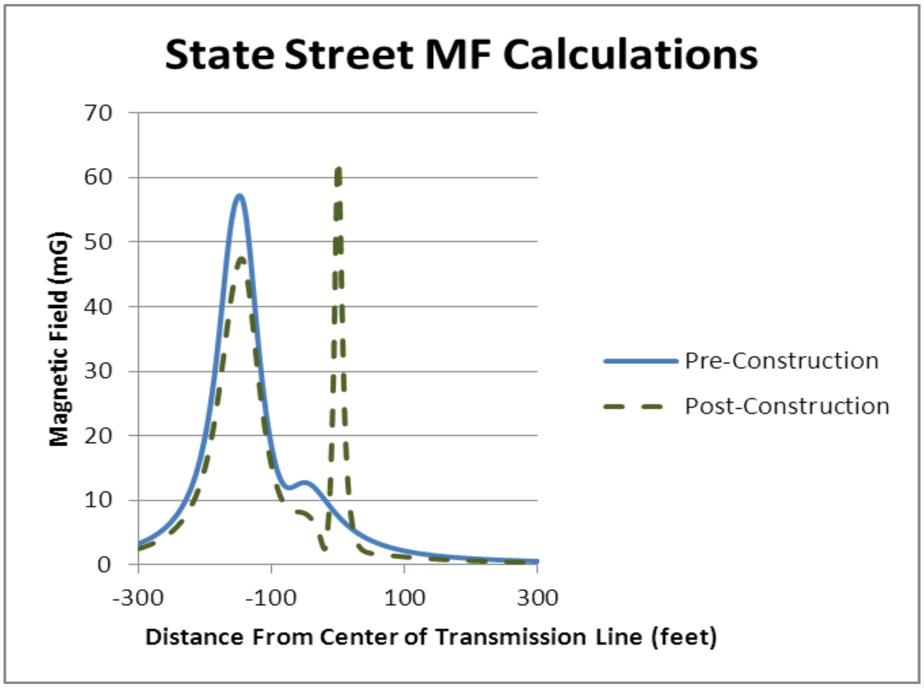


Figure I-10. Calculated Magnetic Fields Along State Street

I.4 UPDATE ON EMF HEALTH RESEARCH

In its BMP issued on December 14, 2007, the Council recognized the consistent conclusions of "a wide range of public health consensus groups," as well as their own commissioned weight-of-evidence review (p. 4). The Council summarized the current scientific consensus by noting the conclusions of these public health groups, including a review by the World Health Organization ("WHO") in 2007 and previously published reviews by the National Institute for Environmental and Health Sciences ("NIEHS", 1999), the International Agency for Research on Cancer ("IARC", 2002), the Australian Radiation Protection and Nuclear Safety Agency ("ARPANSA", 2003),[6] the National Radiological Protection Board of Great Britain ("NRPB", 2004), and the Health Council of the Netherlands ("HCN", 2005). The Council summarized the current scientific

[6] ARPANSA released an updated evaluation of EMF research and a draft standard in 2006, which is largely consistent with those of WHO and other national and international health agencies.

consensus as follows: there is limited evidence from epidemiology studies of a statistical association between estimated, average exposures greater than 3-4 mG and childhood leukemia; the cumulative research, however, does not indicate that magnetic fields are a cause of childhood leukemia, as animal and other experimental studies do not suggest that magnetic fields are carcinogenic. The Council also noted the WHO's conclusion with respect to other diseases: "the scientific evidence supporting an association between ELF magnetic field exposure and all of these health effects is much weaker than for childhood leukemia" (EMF BMP, pp. 2-3).

Based on this scientific consensus, the Council concluded that precautionary measures for the siting of new transmission lines include "the use of effective no-cost and low-cost technologies and management techniques on a project-specific basis to reduce MF exposure to the public while allowing for the development of efficient and cost-effective electrical transmission projects" (p. 4). The EMF BMP also stated that the Council will "consider and review evidence of any new developments in scientific research addressing MF and public health effects or changes in scientific consensus group positions regarding MF" (p. 5).

Accordingly, in its March 16, 2010 decision approving the Greater Springfield Reliability Project, the Siting Council evaluated extensive evidence concerning recent developments in EMF health effects research, including commentary from the CT DEEP's Radiation Division, and concluded that: "There is no new evidence that might alter the scientific consensus articulated in the Council's 2007 EMF BMP document." (Docket 370, Opinion at 12; *and see* Findings of Fact par. 284-286)

To assist the Council in evaluating the most up-to-date research, CL&P commissioned William H. Bailey, Ph.D. and colleagues at Exponent to provide a report that systematically evaluates recent peer-reviewed research and reviews by scientific panels, specifically including any published since those considered in the Council's Docket 424 proceeding. Exponent's report, which is provided in Appendix D.4 includes a review of research and reviews published from May 1, 2011 through July 31, 2012. These reports demonstrate that the conclusion reached by the Council in the BMP Proceeding in 2007 and in Docket 370 in 2010 remains sound. Significantly, Exponent's report concludes:

In conclusion, no recent studies provide evidence to alter the conclusion that the research suggests EMF exposure is not the cause of cancer or any other disease process at the levels we encounter in our everyday environment (Appendix D.4, p. 46).

I.5 SUMMARY OF ACTIONS DEMONSTRATING CONSISTENCY WITH COUNCIL GUIDELINES

CL&P has provided EMF measurements and calculations, alternative transmission line designs where appropriate, and an update of EMF research in accordance with the Council's Application Guide and the BMP for the proposed transmission line from the Glenbrook Substation to the South End Substation.

I.6 EMF REFERENCES

Connecticut Light & Power Company Application to the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need for the Interstate Reliability Project (Docket 424)

Connecticut Siting Council Electric and Magnetic Field Best Management Practices for the Construction of Electric Transmission Lines in Connecticut. December 14, 2007 (2007b). http://www.ct.gov/csc/lib/csc/emf_bmp/emf_bmp_12-14-07.doc

Department of Transportation, Federal Railroad Administration (DOT/FRA). October, 2006. EMF Monitoring on Amtrak's Northeast Corridor: Post-Electrification Measurements and Analysis. Final Report DOT/FRA/RDV-06/01.

Institute of Electrical and Electronics Engineers (IEEE). 1990. IEEE guide for the design, construction, and operation of safe and reliable substations for environmental acceptance. IEEE Std. 1127-1998.

Institute of Electrical and Electronics Engineers (IEEE). IEEE recommended practice for instrumentation: specifications for magnetic flux density and electric field strength meters - 10 Hz to 3 kHz. IEEE Std. 1308-1994, R2001.

Institute of Electrical and Electronics Engineers (IEEE). IEEE standard procedures for measurement of power frequency electric and magnetic fields from AC power lines (Revision of IEEE Std. 644- 1987) IEEE Standard 644-1994, R2008.

Regulations of Connecticut State Agencies, §16-50j-59(18)

Savitz DA, Pearce NE, Poole C. Methodological issues in the epidemiology of electromagnetic fields and cancer. Epidemiology Rev, 11:59-78, 1989.

J. MUNICIPAL AND COMMUNITY OUTREACH

Pursuant to Conn. Gen. Stat. §16-50*l*(e), the MCF was completed and delivered to the City of Stamford's Chief Elected Official on September 7, 2012, beginning the 60-day municipal consultation process. After the 60-day period, by letter dated December 13, 2012, Michael A. Pavia, Mayor of the City of Stamford, provided comments to the Council supporting the Project. A copy of Mayor Pavia's comments are included as Appendix E.5.

At numerous meetings over the past three years, CL&P has consulted with City of Stamford officials, including Mayor Pavia, regarding the issue of electric service reliability provided by CL&P to the City of Stamford. The focus of the meetings was largely to communicate CL&P's desire to improve electric service reliability via a transmission infrastructure upgrade between Glenbrook Substation and South End Substation. The following bullets present meeting dates and briefly summarize the subject matter.

- January 19, 2010 - Preliminary discussion of overview of transmission and distribution projects with Mayor Pavia.

- March 9, 2010 - Preliminary meeting with Stamford's then Land Use Bureau Chief, Robert Stein to discuss the Project overview.

- April 20, 2010 - Route planning discussion with Stamford's Operations Director, Ernie Orgera and Engineer, Lou Casolo.

- February 17, 2011 - Capital projects briefing (SRCP and New England transmission projects) with Mayor Pavia and key staff members.

- March 26, 2012 - SRCP update briefing with Operations Director Orgera and Engineer Casolo.

- May 24, 2012 - SRCP overview briefing with Operations Committee of the Stamford Board of Representatives (Stamford's legislative body).

- June 13, 2012 - Joint meeting with CL&P, City engineers, City operations personnel, and the ConnDOT, to discuss project route alternatives.

- July 10, 2012 - Follow-up meeting with CL&P, City engineers and City operations personnel and ConnDOT, to continue discussions regarding the Project route.
- July 19, 2012 - Meeting with Stamford Partnership Board of Directors to present the Project overview.
- August 9, 2012 - Meeting with Mayor Pavia, Operations Director Orgera, City Engineers, Lou Casolo and Ann Brown to discuss Project Open House and Preferred Route.
- August 14, 2012 - Joint project update meeting with CL&P, City engineers, City operations personnel and ConnDOT.
- August 22, 2012 - Project Overview to Business Council of Fairfield County leadership.
- September 26, 2012 - Site visit to proposed railroad crossing at 80 Lincoln Avenue with MNRR, ConnDOT, CL&P engineers.
- September 26, 2012 - Joint project update meeting with CL&P, City engineers, City operations personnel, ConnDOT and MNRR.
- October 9, 2012 - Project Overview to Neighborhood Revitalization Zone at Community on Training & Employment Center, Stamford.
- October 22, 2012 - Project Overview to Southwest Regional Metropolitan Planning Organization.
- November 14, 2012 - Project Overview to Stamford Chamber of Commerce.
- November 15, 2012 - Meeting with Stamford Partnership Board, including East Side Partnership and Glenbrook Neighborhood Association representatives, on proposed project and rescheduled Open House.
- November 27, 2012 - Joint project update meeting with CL&P, City engineers, City operations personnel, ConnDOT and MNRR.
- January 8, 2013 - SRCP Open House held at Stamford Government Center.

CL&P contacted the Stamford Environmental Protection Board and the Planning and Zoning Commission Boards (collectively “the Boards”) and communicated to the Boards the nature and location of the Project. The Environmental Protection Board was created by Ordinance in 1974 (Ordinance 74-286 Supplemental) as a multi-purpose City agency combining the duties and authorities of a local Inland Wetlands Agency, (Conn. Gen. Stat. §22a-42), local Conservation Commission (Conn. Gen. Stat. §7-131a), and local Flood and Erosion Control Board (59 CFR).

Additionally, CL&P distributed brochures to City of Stamford residents who reside proximate to the proposed Project. The brochures generally explained what the Project is, why it is needed, what local residents can expect to see in their neighborhoods and when the construction is scheduled. See Appendix E.1 for a copy of the brochure.

J.1 PERMITS, APPROVALS AND CONSULTATIONS

Table J-1 identifies the permits and approvals that would be required for the construction and operation of the Project and summarizes the federal and state agency consultations that CL&P has conducted to date.

Table J-1: Permits Applicable to the Project

Agency	Permit	Date Submitted/ Anticipated Submittal	Date Received/ Anticipated Receipt	CSC Application Location
Federal				
U.S. Fish and Wildlife Service	Clearance - Endangered Species Act (7 U.S.C. §136, 16 U.S.C. §460 et seq.)	Consultation initiated January 17, 2012	January 17, 2012	Appendix B, Agency Correspondence
Connecticut				
Connecticut Siting Council	Certificate of Environmental Compatibility and Public Need - Conn. Gen. Stat. §16-50*l*(a)(1)	First Quarter, 2013	Fourth Quarter, 2013	N/A
Connecticut Natural Diversity Data Base	Clearance - Endangered Species Act (Conn. Gen. Stat. §26-303 to §26-315)	Consultation initiated March 7, 2012	March 19, 2012	Appendix B, Agency Correspondence
Connecticut Historic Preservation Office	Cultural Resource Consultation - Section 106 of the National Historic Preservation Act	Consultation initiated May 31, 2012	July 25, 2012	Appendix B, Agency Correspondence
Connecticut Department of Transportation	– Highway Encroachment Permit – Railroad Right of Entry Permit[1]	Fourth Quarter, 2013 Fourth Quarter, 2013	First Quarter, 2014 First Quarter, 2014	N/A
CT DEEP, Office of Long Island Sound Programs[2]	Coastal Zone Consistency Certification			
Local				
City of Stamford	Municipal Consultation Filing under Conn. Gen. Stat. §16-50*l*(e)	September 7, 2012	N/A	Bulk Filing

[1] CL&P will also need to enter into a License Agreement with MNRR to cross under the railroad tracks.

[2] CL&P is presently consulting with the CT DEEP regarding the need for this certification. If this is required CL&P would work to acquire the certification. CL&P met with the City environmental planning staff who determined that the Project is exempt from the coastal area management approval process.

K. General Project Schedule

Major milestones established for the Project are as follows:

- MCF Submitted to the City of Stamford – September 7, 2012
- Open House –January 8, 2013
- Connecticut Siting Council Filing – January 18, 2013
- Decision and Order – Fourth Quarter, 2013
- Construction Start – First Quarter, 2014
- Construction Complete – Fourth Quarter, 2014

Page intentionally left blank.

L. BULK FILING OF MUNICIPAL DOCUMENTS

A bulk filing of municipal regulations and documents that were submitted to the City of Stamford is being provided solely to the Council and includes the below referenced regulations, plans and submittals.

II.A Abutter Information (Notice, List, Map);

II.B City of Stamford Inland Wetlands and Watercourses Regulations;

II.C City of Stamford Zoning Regulations and Amendments;

II.D City of Stamford Zoning Map;

II.E City of Stamford Master Plan, October 23, 2002;

II.F *2006-2015 Regional Plan of Conservation and Development*; and,

II.G Stamford Reliability Cable Project Municipal Consultation Filing.

Page intentionally left blank.

M. GENERAL GLOSSARY OF TERMS

(not all terms are used in this document)

115-kV:	115 kilovolts or 115,000 volts.
AAL:	Annual Average Load.
AC:	Alternating Current. An electric current which reverses its direction of flow periodically. (In the United States this occurs 60 times a second -60 cycles or 60 Hertz). This is the type of current supplied to homes and businesses.
ACI:	American Concrete Institute.
Alternate Route:	The underground route described in Section D.1.3.
Ampere (Amp):	A unit of measure for the flow of electric current. A typical home service capability (i.e., size) is 100 amps; 200 amps or more is required for homes with electric heat.
ANSI:	American National Standards Institute.
APL:	Annual Peak Load.
ARPANSA:	Australian Radiation Protection and Nuclear Safety.
Arrester:	Protects lines, transformers and equipment from transient overvoltages due to lightning and switching surges by carrying the charge to ground. Arresters serve the same purpose on a line as a safety valve on a steam boiler.
ASCE:	American Society of Civil Engineers.
BMP:	Best Management Practices.
Bus:	A conductor capable of carrying large amounts of current in a substation.
C&D Plan:	*Conservation and Development Policies Plan for Connecticut 2005 – 2010.*
Cable:	A fully insulated conductor usually installed underground but in some circumstances can be installed overhead.
CCMA:	Connecticut Coastal Management Act.
CCVT:	Capacitor coupling voltage transformer.

CEAB:	Connecticut Energy Advisory Board.
CEEF:	Connecticut Energy Efficiency Fund.
CEII:	Critical Energy Infrastructure Information.
CELT:	Capacity, Energy, Loads, and Transmission.
Certificate:	Certificate for Environmental Compatibility and Public Need issued by the Connecticut Siting Council.
C.G.S.	Connecticut General Standards.
Circuit:	A system of conductors (three conductors or three bundles of conductors) through which an electric current is intended to flow and which may be supported above ground by transmission structures or placed underground.
Circuit Breaker:	A switch that automatically disconnects power to the circuit in the event of a fault condition. Located in substations. Performs the same function as a circuit breaker in a home.
CL&P:	The Connecticut Light and Power Company.
Conductor:	A metallic wire, busbar, rod, tube or cable which serves as a path for electric current to flow.
Conduit:	Pipes, usually PVC plastic, typically encased in concrete, for underground power cables.
ConnDOT:	Connecticut Department of Transportation.
CONVEX:	Connecticut Valley Electric Exchange.
Council:	Connecticut Siting Council.
CT DEEP:	Connecticut Department of Energy and Environmental Protection.
DAL:	Drastic Action Limit.
dB(A):	Decibel, on the A-weighted scale.
DCT:	Double Circuit Tower.
Demand:	The total amount of electric power required at any given time by an electric supplier's customers.
DESPP	Connecticut Department of Emergency Services and Public Protection.

DG:	Distributed Generation.
Distribution:	Line, system. The facilities that transport electrical energy from the transmission system to the customer.
D&M Plan:	Development and Management Plan.
DR:	Demand Resources.
DSM:	Demand Side Management.
Duct:	Pipe or tubular runway for underground power cables (see also Conduit).
Duct Bank:	A group of ducts or conduit usually encased in concrete in a trench.
EE:	Energy Efficiency.
Electric Field (EF):	Result of voltages applied to electrical conductors and equipment.
Electric Transmission:	The facilities (69-kV+) that transport electrical energy from generating plants to distribution substations.
EMF:	Electric and magnetic fields.
EMF BMP:	*Electric and Magnetic Fields Best Management Practices For the Construction of Electric Transmission Lines in Connecticut* (approved December 14, 2007).
EPA:	United States Environmental Protection Agency.
ERO:	Electric Reliability Organization.
Fault:	A failure or interruption in an electrical circuit (short circuit).
FCA:	Forward Capacity Auction.
FEMA:	Federal Emergency Management Agency.
FERC:	Federal Energy Regulatory Commission.
FMDB:	Field Management Design Plan.
FTB:	Fluidized Thermal Backfill.
G:	Gauss; 1G = 1000 mG (milligauss); the unit of measure for magnetic fields.
GIS:	Geographic Informational System.

Glacial till: These deposits are predominantly non-sorted, non-stratified sediment and are deposited directly by glaciers. These deposits consist of boulders, gravel, sand, silt, and clay mixed in various proportions.

Ground continuity conductor: A conductor laid parallel to a cross-bonded or single point bonded cable circuit to provide a continuous metallic ground connection between the grounding systems at the ends of the route and along the run.

HAER: Historic American Engineering Record.

HCM: Health Council of the Netherlands.

HDD: Horizontal Directional Drilling.

HDPE: High-density polyethylene.

Heritage: Heritage Consultants, Inc.

HPFF: High Pressure Fluid Filled.

HVDC: High Voltage Direct Current.

Hz: Hertz, a measure of the frequency of alternating current; one cycle/second.

IAPC: International Agency for Research on Cancer.

IEC: International Electrical Commission.

IEEE: Institute of Electrical and Electronic Engineers.

ISO: Independent System Operator.

ISO-NE: ISO New England, Inc.; referred to as New England's Independent System Operator.

kcmil: 1000 circular mils, approximately 0.0008 sq. in.

kV: kilovolt, equals 1000 volts.

kV/m: Electric field strength measurement (kilovolts/meter).

kW: Kilowatt.

kWh: Kilowatt hour.

l.f. Linear feet.

Line: A series of overhead transmission structures which support one of more circuits; or in the case of underground construction, a single electric circuit.

Load: Amount of power delivered as required at any point or points in the system. Load is created by the power demands of customers' equipment (residential, commercial, and industrial).

LTE: Long-Term Emergency.

Magnetic Field (MF): Produced by the flow of electric current; usually measured as magnetic flux density in units called gauss (G) or milliGauss (mG) – 1/1000 Gauss.

Magnetic Flux Density: Level of magnetic field.

MCF: Municipal Consultation Filing.

MNRR: Metro-North Railroad

mG: milliGauss (see Magnetic Field) – 1/1000 Gauss.

MOD: Motor-Operated Disconnect switch.

MVA: Megavolt Ampere. Measure of electrical capacity equal to the product of the voltage, the current and the square root of 3 for three-phase systems. Electrical equipment capacities are sometimes stated in MVA.

MW: Megawatt. Megawatt equals 1 million watts, measure of the work electricity can do.

N: Normal.

NAAQS: National Ambient Air Quality Standards.

NDDB: Natural Diversity Data Base (CT DEEP).

NEPOOL: New England Power Pool.

NERC: North American Electric Reliability Council.

NESC: National Electrical Safety Code.

NPCC: Northeast Power Coordinating Council.

NRBP: National Radiological Protection Board of Great Britain.

NRCS:	Natural Resources Conservation Service.
NRHP:	National Register of Historic Places.
NU:	Northeast Utilities.
NUSCO:	Northeast Utilities Service Company.
NWI:	National Wetlands Inventory.
OATT:	Open Access Tariff.
OH (Overhead):	Electrical facilities installed above the surface of the earth.
PAC:	Planning Advisory Committee.
PDAL:	Peak-Day Average Load.
Phases:	Transmission (and some distribution) AC circuits are comprised of three phases that have a voltage differential between them.
PPA:	Proposed Plan Application.
Preferred Route:	The underground route described in the Executive Summary ES.3 and Section D.1.1.
Preferred Route With Variation:	The underground route described in Section D.1.2.
PT:	Potential transformer. Type of transformer that measures voltage potential for metering.
PUESA:	Public Utility Environmental Standards Act.
PURA:	Public Utilities Regulatory Authority.
PVC:	Polyvinyl Chloride.
RCSA:	Regulations of Connecticut State Agencies.
RFP:	Request for Proposal.
Right-of-way (ROW):	ROW; corridor of land within which a utility company holds legal rights necessary to build, operate and maintain power lines.
Riser Pole:	Transmission structure, used to transition from underground cable to overhead conductor, consisting of a single tubular steel column with horizontal arms to support cable terminations.

RSP:	Regional System Plan.
RTDR:	Real-time demand response.
RTEG:	Real-Time Emergency Generation.
s.f.	Square feet.
SAFNR:	Situation Awareness for FERC, NERC, and the Regions.
SCADA:	System Control and Data Acquisition system – A system installed at the substation which allows control and monitoring from a remote location.
SHPO:	State Historic Preservation Office (State of Connecticut Commission on Culture and Tourism, Historic Preservation and Museum Division).
SRCP:	Stamford Reliability Cable Project.
Splice Vault:	A buried concrete enclosure where underground cable ends are spliced and cable-sheath bonding and grounding is installed.
SRHP:	State Register of Historic Places.
SSURGO:	Soil Survey Geographic database.
STE:	Short-Term Emergency.
Substation:	A fenced-in yard containing switches, power transformers, line terminal structures, and other equipment enclosures and structures. Voltage change, adjustments of voltage, monitoring of circuits and other service functions take place in this installation.
SUT:	Stamford Urban Transitway.
SWCT:	Southwest Connecticut.
SWRPA:	South Western Regional Planning Agency.
Terminal:	The substation or switching station at which a transmission line terminates.
Terminal Structure:	Structure typically within a substation that ends a section of transmission line.
TPL:	Transmission Planning Standard.
Transmission Line:	Any line operating at 69,000 or more volts.

USDA:	United States Department of Agriculture.
USGS:	United States Geological Survey.
UI:	The United Illuminating Company
USFWS:	United States Fish and Wildlife Service.
Vault:	See splice vault.
V/m:	Volts per meter; kilovolt per meter; 1000 V/m = 1 kVm.
Voltage:	A measure of the push or force which transmits electricity. Usually given as the line-to-line root-mean square magnitude for three-phase systems.
Watercourse:	Rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other bodies of water, natural or artificial, public or private.
Wetland:	Land, including submerged land, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial or flood plain by the U.S. Department of Agriculture, Natural Resources Conservation Service. Connecticut jurisdiction wetlands are based solely on soil type; federal jurisdictional wetlands are classified based on a combination of soil type, wetland plants, and hydrologic regime.
WHO:	World Health Organization.
Wire:	See Conductor.
XLPE:	Cross-linked Polyethylene.