

**STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL**

<p>The Connecticut Light & Power Company Application for a Certificate of Environmental Compatibility and Public Need for the Stamford Reliability Cable Project, which consists of construction, maintenance, and operation of a new 115-kV underground transmission circuit extending approximately 1.5 miles between Glenbrook and South End Substations, Stamford, Connecticut and related substation improvements.</p>	<p style="text-align:center">DOCKET NO. 435</p> <p style="text-align:center">March 21, 2013</p>
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**DIRECT TESTIMONY OF RAYMOND GAGNON AND PETER NOVAK
ON BEHALF OF THE CONNECTICUT LIGHT AND POWER COMPANY
CONCERNING ENGINEERING, DESIGN, SITING, CONSTRUCTION,
OUTREACH AND EMF CHARACTERISTICS OF THE STAMFORD
RELIABILITY CABLE PROJECT**

INTRODUCTION

Q. Please identify yourself.

A. [Mr. Gagnon] I am Raymond Gagnon, Director - Transmission Projects, employed by Northeast Utilities Service Company (“NUSCO”), agent for The Connecticut Light and Power Company (“CL&P”). My resume is attached (See Tab 1 – Resumes).

[Mr. Novak] I am Peter Novak, Senior Engineer – Transmission Line & Civil Engineering, employed by NUSCO, agent for CL&P. My resume is also attached (See Tab 1 – Resumes).

Q. What is the relationship of NUSCO to the applicant, CL&P?

A. NUSCO and CL&P are both wholly-owned subsidiaries of Northeast Utilities. NUSCO provides administrative and engineering services to the NU operating company subsidiaries, including CL&P. NUSCO has provided the in-house resources for the development of the Stamford Reliability Cable Project (the “Project”).

Q. Does the Company expect to call on any other personnel to respond to planning or engineering issues?

A. NUSCO employees, including Anuj Mathur, Christopher Soderman, Amanda Mayhew, Robert Russo and Christopher Swan, may be called upon to respond to questions relating to specific siting or engineering design topics. In addition, the Company may call Dr. William H. Bailey of Exponent, Inc. The resumes of potential witnesses are attached (See Tab 1 – Resumes).

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

A. I have supervised the preparation and submission of the Application and interrogatory responses with the assistance of the Project Manager, Anuj Mathur. The Application was compiled under my supervision by NUSCO staff and engineering and environmental consultants.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide a high-level summary of the Project. I will cover ten primary topics:

1. Overview and General Location of the Underground Circuit;

2. Substation Modifications;
3. Preferred Route With Canal Street Option;
4. Need;
5. Construction;
6. Environmental;
7. Electric and Magnetic Fields;
8. Safety and Security;
9. Outreach; and
10. Statutory Compliance.

In addition, my testimony includes miscellaneous corrections or clarifications.

1. **OVERVIEW AND GENERAL LOCATION OF THE UNDERGROUND CIRCUIT**

Q. Please describe the Project.

A. 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.

Q. Please briefly describe the purpose of the Project.

A. The Project would strengthen the reliability of the electric 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.

Q. Please indicate the location of the new underground circuit.

A. Figure ES-1, provided as Attachment 1, illustrates the Preferred Route for the Project. The Preferred Route is approximately 8,000 feet in length, the shortest of the three routes considered by CL&P, and is located primarily along city streets.

Q. Please describe the Preferred Route in more detail.

A. The Preferred Route consists of seven underground segments as follows:

Segment 1: The route starts at the Glenbrook Substation and heads southerly down Lincoln Avenue to a location past Sheridan Street where it turns westerly onto private property (735 feet);

Segment 2: The route continues westerly across the Metro North Railroad (“MNRR”) corridor, using a 140-foot jack and bore crossing, connecting to Scott Place and extending westerly to the Culloden Road intersection (480 feet);

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);

Segment 4: A short route segment is required to cross East Main Street/Route 1 as the route continues southwestwardly, connecting into North State Street (175 feet);

Segment 5: The route then continues southwestwardly along North State Street and then bears left onto South State Street crossing under the elevated I-95 roadway (975 feet);

Segment 6: The route continues southwestwardly 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); and

Segment 7: The route then extends easterly along Manhattan Street terminating in the CL&P South End Substation (350 feet).

Q. What route identification criteria were considered by CL&P?

A. CL&P considered constructability, existing utilities impacts, operations and maintenance, permits and right-of-way/easements, proximity to schools and licensed day-care centers, surface disruption impacts, scheduling impacts, length of route, coordination with other local projects, environmental resources, costs, proximity to public services and public transportation facilities.

Q. What route selection objectives for the transmission circuit were considered by CL&P?

A. CL&P applied the following set of route selection objectives for the transmission circuit, which have been established based on 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 on environmental resources;
- Minimize adverse effects on 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.

Q. What other routes were considered by CL&P?

A. Figure 3, provided in Attachment 2, depicts the two routes that were considered in addition to the Preferred Route, namely the Preferred Route With Variation and the Alternate Route.

Q. How does the Preferred Route With Variation generally differ from the Preferred Route?

A. The Preferred Route With Variation is slightly longer, but avoids the need for a jack and bore crossing of the MNRR corridor and the two property easements associated with that crossing. This route would travel along East Main Street/Route 1 that is included in the City's Stamford Urban Transitway ("SUT") Project.

Q. How does the Alternate Route generally differ from the Preferred Route?

A. The Alternate Route is the longest of the three routes and it would require a third property easement in addition to the two easements associated with the jack and bore crossing of the MNRR corridor that both the Alternate Route and Preferred Route include.

Q. Explain the SUT Project.

A. SUT is an extensive roadway improvement project of the City of Stamford. 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 in 2013), the City plans substantial improvements along Myrtle Avenue and East Main Street (Route 1).

Q. Did CL&P consider an overhead route for the Project?

A. Yes. Due to the highly urbanized environment between the two affected substations and the absence of open space to locate a transmission line in the immediate vicinity, CL&P focused its analysis on existing ROWs – public roads, railroads and limited access highways.

Q. What was the outcome of the overhead route analysis?

A. I-95: A route along I-95 was rejected because ConnDOT policies limit the longitudinal occupation of interstate corridors and the I-95 corridor is raised above grade for most of the Project area.

MNRR: Similarly, MNRR policies limit colocations, and potential conflicts arise with developments abutting the railroad as well as construction obstacles with above- and below-grade railroad crossings. In addition, as shown in Figure 7 in Appendix A of the Application, the MNRR corridor is already occupied with multiple overhead transmission lines and therefore is significantly congested.

Q. Did you consult with the City of Stamford regarding the routing of the Project?

A. Yes. 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 areas. Therefore, CL&P avoided focusing on potential cable routes primarily in streets included in both SUT Phase I or Phase II.

Q. In addition to the City’s recommendation, what other factors were considered in CL&P’s selection of the Preferred Route?

A. In selecting the Preferred Route, CL&P carefully considered cost, length, encroachment or involvement of other public agencies, underground utility congestion and impact to existing schools or licensed day-care centers.

Q. Does the Preferred Route avoid schools, licensed day-care centers or any other “statutory” facilities?

A. Yes. As described in more detail in Section F.11 of the Application, particularly Table F-3 (see pages F-11 to F-12), there are no statutory facilities with 600 feet of the Preferred Route.

Q. Has CL&P’s preference as to the Project route changed since the filing of the Application?

A. Yes, as more fully described in Section 3 herein, for a short segment of the route near South End Substation, CL&P developed an alternative path in response to a request from ConnDOT to explore alternatives to the use of Atlantic Street. That path is now incorporated into the Preferred Route With Canal Street Option, which is favored by CL&P, ConnDOT and City officials.

Q. What is the estimated cost of the Project?

A. \$46.9 million.

Q. What is the estimated cost of the underground transmission circuit work?

A. \$43.9 million.

Q. Does CL&P expect that the costs of the Project will be “regionalized”?

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

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

A. Connecticut’s electricity customers (not just CL&P customers) would pay approximately 25% of the Project costs, assuming all costs were to be regionalized.

Q. What is the anticipated timetable for construction?

A. Approximately one year.

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

A. December, 2014.

2. SUBSTATION MODIFICATIONS

Q. Briefly describe the South End Substation.

A. The South End Substation is located on CL&P-owned property on Manhattan Street, which property consists of 0.8 acre.

Q. What modifications to the South End Substation are planned for the Project?

A. CL&P plans the following modifications at the South End Substation. Installation of: a riser pole on which the cable termination bushings would be installed; 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; lightning arresters on the riser pole structure; and the control cables for the MOD in the existing conduits already installed. In addition, substation protection and control work would also be performed.

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

A. Yes.

Q. What would be the tallest height of the new structures at South End Substation?

A. The tallest proposed structure, a riser pole with lightning arresters, to be installed within the fenced-in substation would be approximately 37 feet in height. This structure would be substantially lower than the height of the existing tallest structure, which has a total height of approximately 100 feet.

Q. In 2011, the Council approved modifications to the South End Substation in its decision on Petition No. 999. Please describe those planned modifications.

A. In Petition No. 999, CL&P proposed the installation of new equipment within the existing fence line including four disconnect switches, one circuit switcher, two circuit breakers, and a 115-kV to 13.2-kV, 60 MVA transformer. And, CL&P proposed expansion of the existing ring bus to a four position ring bus to accommodate the new equipment and an existing cement block control house to accommodate a better battery backup system. CL&P is coordinating with the City of Stamford officials regarding landscaping at the South End Substation as part of Petition No. 999. Landscaping would be performed after completion of construction at the substation.

Q. What is the status of those modifications?

A. The new equipment installed as part of the South End Substation ring bus modification is complete. The construction required for installation of the 115-kV to 13.2-kV, 60 MVA transformer is expected to begin in late summer 2013.

Q. Briefly describe the Glenbrook Substation.

A. The Glenbrook Substation is located on CL&P-owned property on Hamilton Avenue, which property consists of 4.9 acres with a back entrance located on Lincoln Avenue.

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

A. CL&P plans the following modifications at the Glenbrook Substation. Installation of: a 115-kV circuit breaker; a cable termination; a motor operated disconnect switch with motor operated ground switch to act as the line MOD for the cable line; lightning arresters on the termination structure; 3 potential transformers (“PT”) for relaying; and the control cables for the breaker, PTs and MOD in the existing trench. In addition, substation protection and control work would also be performed.

Q. Would all of the modifications take place within the existing fenced-in area?

A. Yes.

Q. What would be the tallest height of the new structures at the Glenbrook Substation?

A. The tallest proposed structure, a termination structure with lightning arresters, to be installed within the fenced-in substation would be approximately 22 feet

in height. This structure would be substantially lower than the height of the existing tallest structure, which has a total height of approximately 65 feet.

Q. Is there any other work planned at Glenbrook Substation in the near future?

A. Yes, possibly. In 2010, Glenbrook Substation experienced the failure of a circuit breaker. To prevent a failure in the future, CL&P is currently investigating the use of 115-kV coupling capacitors (“CC”) on nine positions (three CCs per position) at Glenbrook Substation. If the CCs are determined to be necessary, then on five of the line positions, CL&P would mount the CCs on existing steel structures. The other four line positions would likely require the addition of foundations and steel structures.

Q. Will the appearance of the Glenbrook Substation be altered by these CCs?

A. No, the CCs are similar in appearance and height to existing equipment and structures within the substation.

Q. What is the estimated cost of the modifications to South End and Glenbrook Substations?

A. Approximately \$3 million.

Q. What is the service life of the equipment?

A. In excess of 40 years.

3. **PREFERRED ROUTE WITH CANAL STREET OPTION**

Q. Please describe the Preferred Route With Canal Street Option.

A. Starting out from South End Substation, the Preferred Route With Canal Street Option would run easterly along Manhattan Street, turn northerly on Pacific Street, cross private property to connect onto Canal Street, head northerly on Canal Street and cross under the MNRR to merge onto the Preferred Route centerline in South State Street.

Q. What is the purpose of the Preferred Route With Canal Street Option?

A. The Preferred Route With Canal Street Option would avoid Atlantic Street. ConnDOT plans to lower Atlantic Street by as much as 5.5 feet as part of the MNRR Bridge Replacement Project, thus leaving the street surface very near bedrock.

Q. What is CL&P's position on the Preferred Route With Canal Street Option?

A. CL&P carefully evaluated the Preferred Route With Canal Street Option and found it to be feasible as noted in CL&P's Supplemental Filing on March 15, 2013. Based on the advantages outlined in the Supplemental Filing, CL&P now favors the Preferred Route With Canal Street Option. Because City officials asked CL&P to avoid SUT roads, CL&P did not initially consider the Preferred Route With Canal Street Option given that it involves Canal Street, a SUT Phase I road.

Q. What is the City's position on the Preferred Route With Canal Street Option?

A. The City favors the Preferred Route With Canal Street Option.

Q. What is the ConnDOT's position on the Preferred Route With Canal Street Option?

A. ConnDOT favors the Preferred Route With Canal Street Option.

Q. Were the affected private property landowners contacted about the Preferred Route With Canal Street Option?

A. Yes, there are two private property owners who would be affected. Each of them was contacted about the potential routing on their property. In addition, copies of the Supplemental Filing were delivered to them, along with information on CL&P's project website, the Council's docket and a copy of the Council's hearing notice.

4. NEED

Q. Please describe briefly the efforts to improve the reliability of the transmission system in Southwest Connecticut.

A. Since 2002, several major improvements to the transmission system in Southwest Connecticut ("SWCT") have been completed. Those improvements have included: Bethel-Norwalk (Docket No. 217), Long Island Cables (Docket No. 224), Middletown to Norwalk (Docket No. 272) and Glenbrook Cables (Docket No. 292).

Q. What would the Project accomplish?

A. The Project would create a more reliable electric transmission system serving the Stamford-Greenwich Sub-area and eliminate violations of national reliability standards that occur today in this Sub-area. The Project would also address increasing demand for electricity from robust economic development efforts in Stamford.

Q. How would the Project further enhance the reliability of the transmission system in SWCT?

A. The Project would build off of the strong power source at the Norwalk Substation and extend the benefits of (1) the SWCT 345-kV loop that resulted from the Bethel to Norwalk and Middletown to Norwalk Projects and (2) the 115-kV Glenbrook Cables farther west into the Stamford-Greenwich Sub-area.

Q. Explain how the Project would extend these benefits.

A. The Project would extend these benefits by providing a new source of electric supply directly to the South End Substation and by allowing the redistribution of power flows on the transmission lines that presently serve Stamford, including those serving the Tomac, Waterside and Cos Cob Substations. In so doing, the Project would relieve post-contingency event overloads on the 115-kV transmission lines serving these substations and increase system voltage levels, thereby creating more reliable power supplies to meet area customer demands.

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

A. Yes. The long-range plan currently contemplates a new substation in Greenwich and additional transmission connections to the new substation.

Q. When do you expect the related components of the long-range plan to be in-service?

A. In CL&P's 2012 Forecast of Loads and Resources, CL&P listed the Greenwich Substation with an in-service date of 2017.

Q. Did CL&P consider a “no action” alternative?

A. Yes. A “no action” alternative was rejected because doing nothing to eliminate violations of national and regional reliability standards and criteria would be inconsistent with CL&P’s obligation to provide reliable electric service.

Q. Are there any system alternatives to the Project?

A. No.

Q. Did CL&P consider non-transmission alternatives?

A. Yes, as discussed in Section B.4 of the Application, CL&P considered central generation, energy efficiency and load curtailment as part of its analysis of non-transmission alternatives. CL&P’s analysis is more fully outlined in the CEII Appendix filed in this docket under protective order approved by the Council on February 21, 2013.

Q. What was the outcome of CL&P’s analysis of non-transmission alternatives?

A. CL&P concluded that there are no practical non-transmission alternatives that would resolve the reliability criteria violations that the Project would address.

Q. How was the need for the Project determined?

A. The need for the Project was identified by a working group led by Independent System Operator-New England (“ISO-NE”), which consisted of members from ISO-NE, Northeast Utilities (“NU”) and The United Illuminating Company (“UI”).

Q. Is the Project listed in ISO-NE’s annual Regional Service Plan?

A. Yes, the Project has been listed in the ISO-NE’s Regional Service Plan since 2011. In 2012, the Project was classified by ISO-NE as “planned”.

Q. Did CL&P provide copies of the MCF and the Application to the Connecticut Energy Advisory Board (“CEAB”)?

A. Yes.

Q. Did CL&P request that the CEAB grant an exemption for the Project from its request for proposal (“RFP”) process?

A. Yes, on October 19, 2012, CL&P requested an exemption.

Q. What were the primary reasons for CL&P’s exemption request?

A. CL&P cited a number of reasons in its request including: the short length of the Project, its short lead time, the urgent need for the Project and the unavailability of non-transmission alternatives (thereby making it unlikely that the RFP process would result in a reasonable alternative), consistency with the CEAB’s Preferential Criteria, including that the Project is environmentally benign, and the reliability purpose of the Project.

Q. Did the CEAB act on CL&P’s exemption request?

A. Yes, at its meeting on February 1, 2013, the CEAB approved CL&P’s request for an exemption for the Project from the CEAB’s RFP process. (See Tab 2)

5. CONSTRUCTION

Q. What construction steps would be followed for the installation of the underground circuit?

A. The construction would occur in several stages and generally consist of the following activities:

- 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 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; conducting studies of soil and groundwater conditions and preparing plans for handling; and identifying locations of construction storage yards and construction support areas and obtaining approvals for use.
- Construction Procedures – CL&P would deploy appropriate erosion and sedimentation controls (i.e., catch basin protection, silt fence or straw bales) at locations where pavement or soils would be disturbed, excavation of the trench for the duct bank, installation of the conduits in sections of 10-20 feet long, and backfilling the trench.

Q. Has CL&P identified potential storage and staging areas?

A. No. To the extent possible, such areas would include CL&P property, previously developed sites (such as paved parking lots), vacant land or properties previously used for construction support, depending on the parcel size requirements and location in relation to the Project route. Final locations would be identified in the Development and Management (“D&M”) Plan.

Q. What area of the duct bank trench would be open at any given time and how would public safety be maintained during non-work hours?

A. 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.

Q. Please explain the location of splice vaults and how public safety would be maintained during construction.

A. 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 sidewalk pressure; cable weight/length that can fit on a reel and be safely shipped) and land constraints.

Q. How much clearing would be required for the installation of the underground circuit and splice vaults?

A. CL&P expects that all splice vaults would be located within the existing paved roadways, so no clearing of vegetation would be required for the splice vaults. CL&P expects limited clearing along the private properties that are included in the

Preferred Route With Canal Street Option and between MNRR and Scott Place for all routes except the Preferred Route With Variation.

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

A. Construction vehicles would access the Project route via city and state roads along the route.

Q. Where would construction vehicles park?

A. During work hours, construction vehicles would park within the protected area of the construction site. Traffic cones and police presence would ensure safe traffic flow. After hours, such vehicles would be parked in staging areas.

Q. How would CL&P access the underground circuit for maintenance?

A. CL&P would only access the underground circuit for maintenance through the vaults. The area directly around the splice vault would be cordoned off and police retained to control traffic flow.

Q. How would CL&P access the splice vaults for maintenance?

A. 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. Traffic control and barriers would be used to cordon off the entry point to provide a safe working area.

Q. Please explain the work that would be required on private properties along the Preferred Route.

A. The Preferred Route would include installation of duct bank and cable across private properties using open trench construction. In addition, the jack and bore

crossing of the MNRR between Lincoln Avenue and Scott Place would cross private property.

Q. What would the area covered by the Preferred Route look like once the construction is completed?

A. The road surface, as well as any off-road surface, would be returned to its original state after construction.

Q. What construction steps would be followed for the modifications to the substations?

A. The construction would occur in several stages and would generally consist of the following activities.

- Site Preparation, including installing temporary soil erosion and sedimentation controls (e.g., silt fence, straw bales), creating temporary access to the sites for heavy construction equipment, and grading and drainage improvements to create a level work area;
- Foundation Construction, including excavation, form work, steel reinforcement, and concrete placement;
- Installation of Equipment, including erection of steel-support structures for electrical equipment, (e.g., insulators, buswork, and disconnect switches), control and power conduits and ground-grid conductors, riser pole structure at the South End Substation and a termination structure at Glenbrook Substation, relay and control equipment; and
- Final Cleanup, Site Security and Restoration, including removal of construction debris and landscaping.

6. **ENVIRONMENTAL**

Q. What approach was used to characterize existing environmental conditions for the Project?

A. To characterize existing environmental conditions for the Project, CL&P and its consultant, AECOM:

- Conducted comprehensive research to compile existing baseline environmental data along and in the vicinity of the Project;
- 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”); and
- Consulted with federal, state and local agencies.

Q. Please describe generally the environmental features along the Preferred Route.

A. The topography along the Preferred Route is predominantly characterized by flat and gently sloping areas with elevations ranging between 10 and 20 feet above sea level. Because the Preferred Route is almost entirely along roads, except for the area of about 350 feet between Lincoln Avenue and Scott Place, vegetation is extremely limited and almost exclusively located along the road shoulder, adjacent to the route. Here, vegetation consists mainly of plant species common in neighborhoods,

commercial/industrial facilities, railroad ROW and other highly disturbed urban habitats (e.g., roadsides, unmaintained areas).

Q. Please describe the principal types of land use along the Preferred Route.

A. The principal types of land use along the Preferred Route are commercial/industrial, retail and residential. Some neighborhoods are located along the northern portion of the Preferred Route, namely on Lincoln Avenue, Scott Place, Culloden Road and Crystal Street.

Q. Please summarize the status of the cultural resource studies of the Preferred Route.

A. Heritage Consultants conducted the preliminary archaeological assessment for CL&P and concluded that no additional archaeological investigations were warranted based on the remote potential for intact soils to be present, given the continuing redevelopment of the I-95 corridor and intensity of construction within the Project limits. The State Historic Preservation Office concurred with Heritage's conclusion.

Q. What would CL&P do to mitigate any potential environmental effects?

- A. To mitigate any potential environmental effects, CL&P would:
- Prepare a 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.

Q. Does CL&P anticipate any adverse effects from the Project on topography and geology?

A. No. Grading would not be required to install the circuit within existing road ROWs.

Q. Does CL&P anticipate any adverse effects from the Project on wetlands or watercourses?

A. No. There are no wetlands or watercourses proximate to the Preferred Route. The Project would cross the East Branch of the Rippowam River, a tidal watercourse that is contained in an underground culvert. The crossing would occur over the top of that underground culvert.

Q. Does CL&P anticipate any adverse effects from the Project on floodplains?

A. No. The Preferred Route is not within any mapped flood hazard areas.

Q. Does CL&P anticipate any adverse effects from the Project on groundwater resources or water quality?

A. No. The Project area is within densely developed urban areas where groundwater is not used for direct potable water supply.

Q. Does CL&P anticipate any adverse effects from the Project on vegetation, rare plants wildlife or habitats?

A. No. There are no state or federal listed species in the Project vicinity.

Q. Does CL&P anticipate any adverse effects from the Project on coastal resources?

A. No. Project construction activities would occur in previously developed commercial/industrial areas and neighborhoods and would have no effect on access to the shoreline. Although a portion of the Preferred Route is within a Coastal Area Management Boundary, the Project would not adversely affect the resources that the Connecticut Coastal Management Act protects.

Q. Does CL&P anticipate any adverse effects from the Project on recreational and/or scenic resources or visual effects on historical or archeological resources?

A. No.

Q. Does CL&P expect any effects on noise or air quality from the Project?

A. CL&P expects only short-term and highly localized construction-related noise and air quality effects from the Project.

Q. Please describe how noise effects would be minimized.

A. CL&P would employ the following procedures 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; and
- Sound pressure levels at all points along the property lines of both substations would continue to meet state regulations as specified in Regulations of Connecticut State Agencies. §22a-69-3.3,-3.5(a),-3.7,-4(g).

Q. Please describe how air effects would be minimized.

A. CL&P expects 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 Project 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.

Q. What are your conclusions regarding the potential environmental effects of the Project as proposed by CL&P?

A. Based on the existing conditions along the Preferred Route and the proposed design, the construction of the Project and operation of the new underground circuit 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.

7. ELECTRIC AND MAGNETIC FIELDS

Q. What are Electric and Magnetic Fields?

A. Electric fields ("EF") are produced when a voltage is applied to a conductor. The level of an electric field at a given location near to a power line depends on the magnitude of the voltage applied, the arrangement and spacing of the line conductors and the distance from the conductors to the location.

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

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

Q. Has CL&P evaluated the effect of the Project on the current range of levels of EF and MF along the Preferred Route?

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

Q. Has CL&P considered the Council's EMF Best Management Practices?

A. Yes. The design of the Project is consistent with the Connecticut Siting Council's Electric and Magnetic Field Best Management Practices ("BMP").

Q. What do the EMF BMP require?

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

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

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

A. Yes. CL&P retained William H. Bailey, Ph.D. of Exponent to perform such analysis. Appendix D.4 to the Application is a report by Dr. Bailey of his systematic literature review critical evaluation of epidemiology and *in vivo* studies published from May 1, 2011 to July 31, 2012.

Q. What was Dr. Bailey's conclusion?

A. Dr. Bailey concluded that recent studies do not provide sufficient evidence to alter the basic conclusion of the World Health Organization and other health and scientific agencies that the research suggests that EMF exposure is not the cause of cancer or any other disease process at the levels we encounter in our everyday environment.

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

A. The proposed underground line and the existing transmission lines on an existing ROW nearby are the major sources of EMF. 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, and reaching very low levels at relatively short distances beyond substation perimeter fences. The exception is where transmission and distribution lines enter the substation property.

Q. Has CL&P arranged for measurements of existing electric and magnetic field levels along the Project route to be made, as required by the BMP?

A. Yes. Spot measurements of electric and magnetic fields were taken by CL&P on October 18, 2012 at selected locations along the Preferred Route. The measurements were taken on a horizontal transect of the Preferred Route on Lincoln Avenue near the Glenbrook Substation. Nearby sources of EF include the existing overhead transmission lines and overhead and underground distribution lines along Lincoln Avenue.

The measurements are set forth in Table I-2 below.

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

Q. Were any other measurements taken?

A. Yes, CL&P performed measurements walking along the Preferred Route on September 24, 2012 and recorded two paths: Path 1: Lincoln Avenue between Glenbrook Substation and the location of the jack and bore underneath the railroad tracks; and Path 2: a continuous path from Scott Street toward South State Street to a location between Canal Street and Atlantic Street.

These measurements are set forth in Tables I-3 and I-4, respectively below.

Table I-3: Path 1 MF Measurement Summary

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

Table I-4: Path 2 MF Measurement Summary

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

Q. What type of information do these measurements provide?

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

Q. Did CL&P provide calculated estimates of EF and MF along the Project route before and after the proposed construction, as required by the Council’s BMP?

A. Yes.

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

A. As described more fully in Section I at I.3.2, CL&P estimated (1) annual peak load (APL) conservatively from ISO-NE’s projected 90/10 system peak loads, (2) peak-day average loads (PDAL) over 24 hours at 85% of the system’s hourly peak load

(based on the 90/10 peak-load days) and (3) annual average loads (AAL) based on the annual hourly average loads.

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

Q. How would you characterize the nature of the calculation estimates for MF levels?

A. The MF calculations will yield conservatively high estimates.

Q. How are the estimated pre-Project and post-Project magnetic field levels presented in the Application?

A. Appendix D.3 of the Application presents the calculations. In addition, the Application provides 3 figures illustrating the pre-project and post-project curves of MF along Lincoln Avenue, Culloden Road and State Street, respectively, covering a distance of 300 feet from the center of the transmission line in each direction. An example of these figures (from p. I-17 of the Application) for Lincoln Avenue is provided below:

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

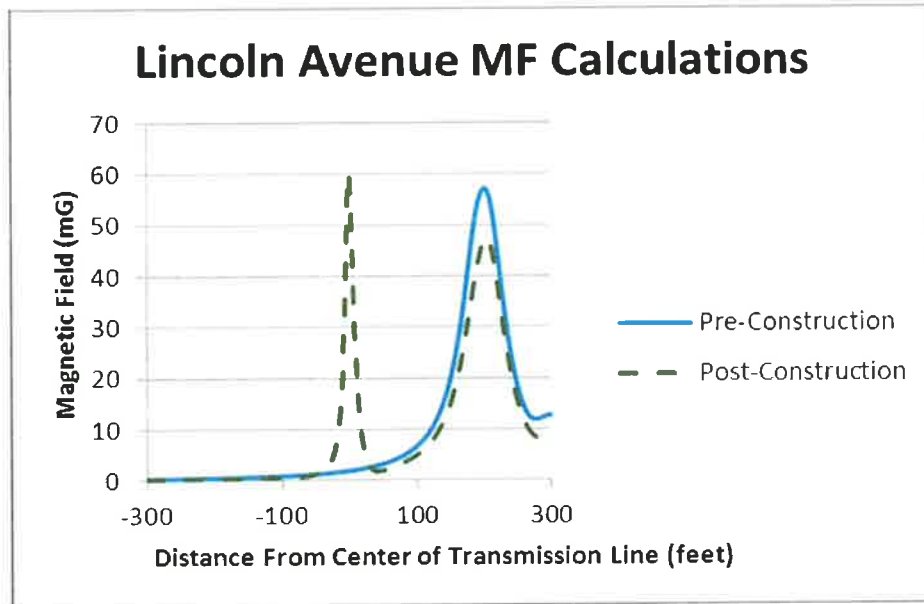


Figure I-8. Calculated Magnetic Fields Along Lincoln Avenue

Q. Did CL&P provide a Field Management Design Plan (“FMDP”) as required by the Council’s BMP?

A. Yes, CL&P’s FMDP is included in Section I of the Application as Appendix D.2.

Q. For the Preferred Route, are there any adjacent public or private schools, licensed child day-care facilities, licensed youth camps or public playgrounds?

A. No.

Q. Are there any residential areas adjacent to the Preferred Route?

A. There are 2 areas with groups of homes adjacent to the Preferred Route that the Council might consider to be residential areas. These areas, located on Lincoln Avenue and Culloden Road, were treated as BMP focus areas in the FMDP.

Q. Please provide a summary of these focus areas.

A. The Lincoln Avenue focus area has 6 residences on the south side along a length of 450 feet. The Culloden Road focus area has 31 residences on both sides along a length of 800 feet.

Q. Did CL&P consider “no cost” magnetic field mitigation measures for these focus areas?

A. Yes, the base design for the Project includes two “no cost” magnetic field mitigation measures as follows: minimizing the spacing between the cables and arranging the phases of the underground line to achieve better cancellation with the field from the existing transmission lines.

Q. Did CL&P consider “low cost” magnetic field mitigation measures?

A. There were no “low cost” magnetic field mitigation measures available that provided significant reduction at or outside the edges of the roadway.

Q. What measures did CL&P consider?

A. CL&P considered high-pressure fluid-filled cables, shielding plates (e.g., conductive and steel), increased cable depths and cancellation loops. However, CL&P dismissed all of these options due to high costs, technical difficulty or limited effectiveness.

Q. Has CL&P complied with all of the requirements in the relevant provisions of the statutes concerning EMF and the Council’s BMP?

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

Q. Please summarize CL&P's efforts to comply with the statutory and BMP requirements concerning EMF.

A. CL&P has complied with the statutory and the BMP requirements regarding EMF, as follows:

- CL&P has provided an update of scientific research and group positions re: MF;
- CL&P has provided measurements and calculations that were developed in accordance with the BMP; and
- CL&P has prepared an FMDP with a base design that incorporates standard utility practice with no-cost MF mitigation design features.

Q. Has the Company complied with other MF standards?

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

8. SAFETY AND SECURITY

Q. Would the proposed underground transmission cable and substation modifications pose any safety risk to the public?

A. No. The construction of the proposed underground transmission cable and modifications to Glenbrook and South End Substations would not pose a safety threat or create any undue hazard to the general public, including persons or property. All work

would be designed and constructed in accordance with all applicable national, electric utility industry, state and, to the extent practical, local codes.

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

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

Q. What fire protection systems are maintained at the Glenbrook and South End Substations?

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

9. OUTREACH

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

A. Yes, we initiated the municipal consultation process with the City of Stamford on September 7, 2012, more than 60 days before the Application filing. There is no other municipality within 2,500 feet of any portion of the Preferred Route or alternate routes discussed in this Application. Mayor Pavia, the chief elected official of

Stamford, provided a letter of support for the Project to the Council (See Appendix E.5 of the Application).

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

A. Yes. The Project team has held regularly scheduled Project update meetings with representatives of the City of Stamford. In addition, CL&P closely coordinated the January 8, 2013 open house with City officials.

Q. Have you had any contact with the Southwestern Regional Planning Agency (“SWRPA”) other than serving a copy of the Application?

A. Yes. The Project team presented an overview to the Southwestern Regional Planning Agency on October 25, 2012 in South Norwalk.

10. STATUTORY COMPLIANCE

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

A. CL&P sponsored an open house at the Stamford Government Center. As required by section 16-50/(b) of the General Statutes, bill inserts with Project information were mailed to customers. Notices were provided to community organizations and water companies as required by the Council’s Application Guide, and to abutters of the South End and Glenbrook Substations, as required by section 16-50/(b). Legal notices of the Application were published in local newspapers, The Advocate and The Connecticut Post, as required by section 16-50/(b). A copy of the Municipal Consultation Filing was placed in the local library and on the Project website (www.StamfordCable.com). A

project hotline (1-800-793-2202) and transmission project email address (Transmissioninfo@nu.com) were established through which residents and other stakeholders can communicate with Project management. Finally, CL&P distributed brochures concerning the Project to residents proximate to the Preferred Route.

Q. How was information presented at the open houses?

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

Q. Were signs posted informing the public of the Council's public hearing to be held in Stamford on March 28, 2013, in advance of that hearing?

A. Yes. On March 18, 2013, seven 4-foot by 6-foot signs notifying the public of the hearing were posted by members of the Project team at various locations. The signs were posted at: (See Attachment 3)

1. South End Substation – on fence facing Manhattan Street;
2. South State Street just east of intersection with Canal Street;
3. South side of East Main Street at intersection of North State Street;
4. Corner of Culloden Road and Crystal Street;
5. Corner of Scott Place and Culloden Road, near where jack and bore surfaces;
6. Location on Lincoln Street where route turns onto private property for jack and bore; and
7. Glenbrook Substation – on fence facing Lincoln Street.

MISCELLANEOUS

Q. Does CL&P have any corrections or clarifications to the Application?

A. Yes, CL&P has three corrections/clarifications. The first correction/clarification relates to language on page B-10 of the CEII Appendix. As noted in CL&P's interrogatory response Q-CSC-009, according to the North American Electric Reliability Corporation (NERC), a contingency event is the sudden loss of a transmission element such as a transmission line, circuit breaker, transformer, or substation equipment. Therefore, the examples of reasonably foreseeable "contingency events" that should have been listed on page B-10 of the CEII Appendix are generator outages, transmission line outages and substation equipment failures.

The second correction/clarification relates to the HPFF cable. Page D-6 of the Application states that the maximum HPFF cable conductor size is 2750 kcmil copper. CL&P recently learned that the HPFF can be manufactured in larger sizes. However, CL&P has determined that the HPFF system design (cables in a single steel pipe) would not meet the thermal requirements for the Project.

The third correction/clarification relates to the estimated life-cycle cost for the underground cable. On page D-19 of the Application, CL&P stated that the life-cycle cost for the line is \$61.2 million. In preparing for the hearing, CL&P discovered a calculation error. The cost of energy losses was calculated based on an incorrect load factor of 100% instead of 62%. The correct life-cycle cost for the Project is \$60.97 million.

Q. Does CL&P have any additions to the Application?

A. Yes, CL&P has one addition. As set forth in a communication included in Bulk Filing #2, City officials requested that CL&P install a four-inch duct for traffic signaling for the City's future use, consistent with the practice of other utilities conducting work in City streets. Recently, CL&P concluded its evaluation of the City's request and found it to be technically feasible. CL&P expects the cost of this duct to be largely offset by the cost savings achieved with the shorter route if the Council approves the Preferred Route With Canal Street Option -- the route favored by CL&P, ConnDOT and the City. CL&P also believes that the City's request is reasonable given that Canal Street is newly-paved and that the majority of the Project is located within City streets, thus requiring greater resources of the City to coordinate with CL&P than would be necessary if CL&P were able to use ROW corridors or private lands.

CONCLUSION

Q. Please summarize your testimony.

A. CL&P proposes to construct the Stamford Reliability Cable Project in compliance with all statutory requirements, the Council's regulations and applicable industry codes and standards. The new 115-kV underground circuit would be constructed almost entirely within existing roads, using best construction practices.

Q. Does this conclude your testimony?

A. Yes.

Docket No. 435 Stamford Reliability Cable Project
Direct Testimony of Raymond Gagnon and Peter Novak

Tabs

Tab 1 Resumes

Tab 2 CEAB Exemption

Attachments

Attachment 1 – ES – 1

Attachment 2 – Figure 3

Attachment 3 – Sign Photo