DOCKET NO. 461A - Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a 115-kilovolt (kV) bulk substation located at 290 Railroad Avenue, Greenwich, Connecticut, and two 115-kV underground transmission circuits extending approximately 2.3 miles between the proposed substation and the existing Cos Cob Substation, Greenwich, Connecticut, and related substation improvements. Reopening of this docket based on changed conditions pursuant to Connecticut General Statutes §4-181a(b).	}	Connecticut
	}	Siting
	}	Council
		November 9, 2017

Opinion

Introduction

On June 26, 2015, The Connecticut Light and Power Company doing business as Eversource Energy (Eversource), applied to the Connecticut Siting Council (Council) for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction, maintenance, and operation of a new 115-kilovolt (kV) bulk substation located at 290 Railroad Avenue, Greenwich, Connecticut, and two 115-kV underground transmission circuits extending approximately 2.3 miles between the proposed substation and the existing Cos Cob Substation including related substation improvements in Greenwich, Connecticut (Greenwich Substation and Line Project or GSLP).

In addition to the applicant, 12 parties and intervenors participated in the original Docket 461 proceeding, which consisted of 6 evidentiary hearings and a public comment session. Common concerns shared and expressed by the parties, intervenors and other interested persons included, but were not limited to, impacts to the community, impacts to Bruce Park, lack of effective communication with the Town of Greenwich (Town), lack of demonstration of the public need for the GSLP, lack of exploration of potential alternatives and exorbitantly high project costs.

On May 12, 2016 the Council voted to deny without prejudice a Certificate to Eversource for the GSLP based on the following issues:

- The cost of the GSLP, as presented, was exceedingly high;
- The design and associated cost of the GIS substation, including a position for a third transmission line, was not warranted;
- The proposed GSLP route through Bruce Park would have an adverse environmental effect and did not conform to the 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 (FERC Guidelines);
- An alternative transmission line route along the Metro-North Railroad (MNRR), referred to as the Hybrid Alternative, was not thoroughly developed for Council consideration. The Hybrid Alternative may be less costly and would be consistent with the FERC Guidelines;
- No immediate need for the GSLP was found as the projected load at the Cos Cob Substation and Prospect Substation in years 2014 and 2015 did not occur; and
- A lack of communication with the Town to develop a mutually suitable solution to meet the Town's electric needs.

Jurisdiction

The Council does not have jurisdiction over electric distribution facilities. The Council's jurisdiction under Connecticut General Statutes (C.G.S) §16-50i(a) extends over electric transmission line facilities with a design capacity of 69-kV or more and electric substation facilities designed to regulate the voltage of electricity at 69-kV or more. Under the Public Utility Environmental Standards Act (PUESA), the Council's charge is to balance the need for adequate and reliable public utility services at the lowest reasonable cost to consumers with the need to protect the environment and ecology of the state. A public need exists when a facility is necessary for the reliability of the electric power supply of the state. Although the Council's jurisdiction is limited to transmission level supply, in this case, electric distribution and electric transmission components are intertwined.

Under C.G.S §16-50p, the Council shall not grant a Certificate, either as proposed or modified by the Council, unless it shall find and determine the nature of the probable environmental impact of the facility alone and cumulatively with other existing facilities, including a specification of every significant adverse effect relative to electric and magnetic fields, impact on and conflict with the policies of the state concerning the natural environment, ecological balance, public health and safety, scenic, historic and recreational values, agriculture, forests and parks, air and water purity and fish, aquaculture and wildlife, and why the adverse effects are not sufficient reason to deny the application.

In the case of an electric transmission line, the Council shall also find and determine an appropriate design of the facility including what portion of the facility shall be located overhead; that the facility conforms to a long range plan for expansion of the electric power grid of the electric systems serving the state and interconnected utility systems and will serve the interests of electric system economy and reliability; that the facility design is cost effective and the most appropriate alternative based on a life-cycle cost analysis of the facility and are consistent with the purposes of the PUESA, the Council's Electric and Magnetic Fields Best Management Practices (EMF BMP) and FERC Guidelines.

Changed Conditions

On May 5, 2017 Eversource submitted a Petition for Reconsideration of the Denial of a Certificate of Environmental Compatibility and Public Need for the Greenwich Substation and Line Project to the Council and the original Docket 461 service list based on changed conditions pursuant to C.G.S. §4-181a(b) (Motion to Reopen).

In its Motion to Reopen, Eversource identified changed conditions to the Project's capacity, design and cost since the Council's May 12, 2016 denial without prejudice, including, but not limited to:

a. Altered the design of the GSLP to account for current electric needs rather than to provide improvements with a 30 to 40 year planning horizon;
b. Designed a system to meet reliability needs based on 130.5 MVA of peak load on the Greenwich 27.6-kV system;
c. No longer use a ten year load growth forecasting that anticipated one percent load growth per year;
d. Two potential GSLP project routes and substation sites were developed for consideration upon Eversource's consultation with the Town after the Council's Docket 461 decision; the Proposed Modified Project (PMP) and the Alternate Modified Project (AMP);
e. Developed a transmission line route that avoids, to the extent possible, environmental impact to the Town-owned Bruce Park, consistent with the FERC Guidelines;
f. Reduced costs of both the PMP and AMP from than the original GSLP presented in Docket 461;

g. Redesigned the new Greenwich Substation that does not use costly gas-insulated switchgear;
h. Use of Cross-linked Polyethylene (XLPE) cable instead of a High Pressure Fluid Filled (HPFF) cable design for all underground transmission line installations;
i. Consultations with the Town in an attempt to develop feasible alternatives as well as a feasible GSLP route; and
j. Consultations with the Town to develop demand side management programs to promote energy efficiency.

At a meeting held on May 25, 2017, after considering all comments submitted by parties and intervenors to the original proceeding regarding the Motion to Reopen, the Council voted to grant Eversource's Motion to Reopen. The reopening allowed the Council to consider changed conditions, public need and alternate locations for the proposed electric substation and electric transmission circuits (Modified GSLP).

The Council held one public comment hearing session in Greenwich and three public evidentiary hearing sessions at the Council's office in New Britain. All parties and intervenors had the opportunity to meaningfully participate in the re-opened proceedings.

Public Need

As stated in the Council's Docket 461 decision, *"the proposed GSLP, or some variation thereof, is necessary for the reliability of the electric power supply of the Town of Greenwich"*. The Council's position has not changed in this regard. Greenwich is at the farthest southwest extent of Eversource's electric network in Connecticut and is electrically isolated from other areas of the State. The geographic isolation resulted in a unique and unreliable electric system that was designed in the 1950's, where most of Greenwich is serviced by a single bulk power substation, the Cos Cob Substation. The Cos Sob Substation distributes power to three distribution substations in Greenwich; the Prospect, Byram and North Greenwich Substations through a system of 27.6-kV distribution feeders. The current system was designed to serve much lower load demands than exist today. The area of Greenwich with the highest load demand is west of Indian Harbor, in the vicinity of the existing Prospect Substation.

To examine the resiliency of an electric system, the loss of various electric system elements are modeled to determine electric system weaknesses and vulnerabilities. Good electric system planning attempts to resolve an identified contingency weakness or even multiple contingency events occurring at once.

Part of the reliability concerns for the Modified GSLP include a system of four 27.6-kV distribution feeders that emanate from the Cos Cob Substation and simultaneously serve the Prospect Substation, certain large customers, and the Greenwich Network, a distribution system that serves the downtown area of Greenwich. Certain contingency events can cause one or more of the feeders to operate above service limits or, during multiple contingency events, result in load shedding and the loss of power to customers. Operation of the feeders beyond their current design thresholds can shorten their operational life. These four feeders also have a history of not operating to design standards even under normal load conditions and as such, Eversource has made repeated repairs to the feeder network in an attempt to maintain system reliability.

Reliability concerns are also an issue at the Cos Cob Substation where contingency modeling for the loss of a 115-kV to 27.6-kV transformer could result in the remaining transformers serving the Greenwich 27.6-kV loads to operate beyond their nameplate ratings, shortening the operational life of the equipment. Finally, the existing Prospect Substation is currently at the end of its lifespan and, in its current design, would not be able to serve load within nameplate ratings during certain contingency events. Under a worst case contingency scenario of the loss of the entire Prospect Substation, 99 percent of the substation load cannot be served by other electric supply sources.

In the original Docket 461, in addition to reliability concerns associated with the current design of the Greenwich electric system, Eversource used load growth forecasting that anticipated one percent of peak load growth per year at both the Cos Cob Substation and Prospect Substation as part of the need for the GSLP. The projected peak loads did not materialize, but rather decreased significantly in Years 2014 and 2015. Part of the peak load demand has been offset in the Greenwich area through energy efficiency and distributed generation projects. Continued use of these measures, as well as incorporation of demand response projects, could lead to further decline in peak load demand. The other factor in the decrease in peak load demand was the absence of weather conditions that cause a dramatic increase in load over the past few years. Years 2012 and 2013 had some sustained periods of high heat and humidity which increases peak demand. Last year, although very hot, did not have sustained periods of high heat and humidity.

Eversource is proposing the Modified GSLP to address current distribution reliability concerns, as well as to address reliability issues identified through electric system contingency planning. Unlike the original Docket 461 project, Eversource is no longer projecting load growth in this area and load growth is not part of the need for the Modified GSLP.

Based on contingency modeling and the current operational design of the Cos Cob Substation power supply and feeder network, the Council finds, and the Town acknowledges, the current distribution feeder system is antiquated and subject to repeated failures during normal operation, as well as during contingency events. The Modified GSLP would alleviate loads on the existing feeder system by directly transferring the Prospect Substation load to a 115-kV transmission source rather than rely on a 27.6-kV distribution feeder source. The 27.6-kV distribution feeders would remain in place to serve the Greenwich Network, certain large customers, and the Byram Substation, creating less operational stress on the feeders under both normal and contingent conditions.

The Modified GSLP would allow Eversource to have the capability to transfer load between the Cos Cob Substation and the proposed Greenwich Substation at the transmission level and provide automatic electric supply backup to most of the customers in Greenwich in the event of an outage on one of the transformers at the Cos Cob Substation or at the new Greenwich Substation. There is no capability in the current electric system for this redundancy. This capability is consistent with Eversource's current electric system design in that if one power supply source is unavailable, the remaining bulk substation would be able to supply necessary power. This project is similar to other projects in the State where a new substation is constructed or an existing substation expanded to improve electric system reliability.

Eversource has anticipated a need for an additional substation in Greenwich since 1971 when it acquired the 290 Railroad Avenue property. Since that time, Eversource has undertaken multiple measures to defer the expense of a new substation. In 2011, Eversource announced plans for a new substation for the purpose of serving load west of Indian Harbor. The Town, in its 2011-2012, 2013-2014, 2014-2015, 2015-2016 Annual Reports, recognized the need for reliable energy as well as a new substation.

The Town has expressed concern regarding the reliability of the two 115-kV transmission circuits that feed the Cos Cob Substation, the 1740 and 1750 lines. Both circuits are located on common structures and are the only source of power to the Cos Cob Substation and as such, if both circuits were out of service, almost all of Greenwich would lose power. Contingency events associated with the 1740 and 1750 lines are not the subject of the Proposed Project. Additionally, the Town has not proposed any modifications to the 1740 and 1750 lines in its proposed reliability solutions and further, acknowledges separation of the lines to improve reliability would be very costly.

The Town has expressed concern regarding the reliability of the Tomac Substation, a 115-kV to 13.2-kV substation in the southeast area of town that serves a small portion of Greenwich load. It was built in the early 1990's to relieve load off of the Cos Cob Substation and is served by a single transmission source. Although the Proposed Project is not designed to address issues at Tomac, the Council notes Eversource has a project planned in the short term to improve distribution service out of Tomac by converting a 4.8-kV distribution system that serves about a thousand customers to a 13.2-kV distribution system[1], an upgrade that will provide backup power to these customers, and a project planned in the long term, in accordance with an electric system priority list, to provide two sources of transmission level service to Tomac instead of one.

The original Docket 461 application included the retirement of the obsolete Byram Substation, rated at 25 MVA of peak load, with load from the substation to be served by the new Greenwich Substation. The Proposed Project no longer includes the retirement of the Byram Substation. Eversource would continue to monitor the condition of the equipment at the substation and replace equipment, as necessary. Eversource may be able to retire the substation if load demand decreases, with load transferred to the new Greenwich Substation.

Project Alternatives

During the original Docket 461 proceeding, various alternatives to the GSLP were examined, including transmission, distribution, interconnection, generation, demand side management alternatives as well as energy efficiency measures. Prior to the submission of the Modified GSLP, Eversource met with the Town to discuss project alternatives, including potential distribution solutions, and energy efficiency measures within the Town. Due to the localized nature of the reliability issue, Eversource, with the Town's consultant, examined eight distribution alternatives prior to submission of the Modified GSLP to the Council. In addition, other distribution scenarios were explored during the re-opened proceeding. None of these potential distribution designs were deemed viable due to design flaws, reduced reliability, or excessive cost when compared to the Modified GSLP.

A simple rebuild of the Prospect Substation would be an expenditure to support the 27.6-kV system, a voltage Eversource intends to phase out over time, and would not resolve the current reliability issues associated with the current feeder design, or provide a reliable source of power during transformer contingency events at Cos Cob Substation, or prevent service interruption to customers resulting from the loss of the Prospect Substation itself.

Discussions with the Town also included energy efficiency initiatives for both Town-owned facilities and private investments to mitigate the electrical demand and usage within the Town. The Town has undertaken energy efficiency projects at Town-owned facilities, hosted community light-bulb swaps and is working with the Chamber of Commerce to establish a business outreach program. Larger projects, such as demand side energy sources, are not currently proposed. Another technology, battery storage systems, is currently being examined by DEEP but there are no projects currently being developed in Connecticut. Energy efficiency and demand side energy sources can be effective in reducing peak loads, but would not serve to eliminate the reliability issues associated with the current design of the Cos Cob to Prospect 27.6-kV distribution feeder system, the objective of the Modified GSLP.

[1] The Public Utilities Regulatory Authority has exclusive jurisdiction over electric distribution in the state.

Proposed Project

Two alternatives for the Modified GSLP were initially presented to the Council, the PMP and the AMP. The PMP consisted of an overhead-underground transmission line route and a new open-air insulated substation at 290 Railroad Avenue. It was developed in response to the Council's Docket 461 decision regarding the feasibility of constructing a less expensive overhead route along portions of the MNRR right-of-way that is consistent with the FERC Guidelines as it would utilize an existing right-of-way occupied by the MNRR and other utility services. The PMP route, initially referred to as the "Hybrid Alternative" during the original Docket 461 proceeding, would be north of Bruce Park, thus avoiding impacts on the sensitive environmental and recreational resources of the park. Upon initial consultation with Connecticut Department of Transportation (DOT) representatives, the PMP was deemed viable and the transmission line route was fully developed with details for overhead and underground transmission line segments and a new substation. The PMP estimated cost was $78 million.

After the filing of the Motion to Reopen, Eversource was contacted by DOT Rails informing Eversource that senior DOT officials oppose the installation of the PMP transmission line within the MNRR right-of-way. Written correspondence from DOT Rails was submitted to Eversource on July 14, 2017 indicating the DOT would not issue a license to Eversource for use of the MNRR right-of-way and stating there would be too many outages to existing rail service, manpower is not available to Eversource for necessary construction support, and the installation of the overhead transmission towers would exacerbate the already congested nature of the existing rail corridor, encumbering future expansion of the railroad.

On July 17, 2017, Eversource submitted correspondence to the Council indicating that it must withdraw the PMP from consideration and that the AMP would now be referred to as the Proposed Project. For the Proposed Project, both the 290 Railroad Avenue and 281 Railroad Avenue sites are viable locations for the Project substation, either as an open-air design or indoor design.

The AMP consists of an all underground transmission line route installed within roadways or adjacent road rights-of-way and includes a new substation at 281 Railroad Avenue. It was developed upon consultation with the Town prior to the filing of the Modified GSLP. Although the Town objected to the original GSLP route through Bruce Park and initially supported the concept of the Hybrid Alternative, Eversource designed the AMP to address Town concerns regarding visual impacts of the PMP on Bruce Park, as well as to avoid the Town's sewer main located adjacent to the PMP route within the MNRR.

Environmental Considerations

The Council finds there is no substantial adverse environmental impact associated with the Proposed Project transmission line route. Construction would be confined to paved roadways, parking lots or lawn areas immediately adjacent to roadways.

Although the Proposed Project route through Bruce Park is inconsistent with the FERC Guidelines, as the use of park and recreation lands for right-of-ways are to be avoided where practical, no other alternative currently exists. The Council's and Town's concerns regarding the original Bruce Park route included the use of a HPFF cable design and utilizing Horizontal Directional Drilling (HDD) for the installation of the transmission line through the park or in the park area. The HDD installation would have disrupted park recreational and scenic resources for months.

The Proposed Project uses an alternate design to address these concerns. Specifically, the transmission line would be composed of XLPE cable circuits. The transmission line would be installed underground, within park roadways, thus using previously disturbed areas and rendering the transmission line not visible from park areas. The Town has stated that it is amenable to these design changes. Construction of the project would disrupt park roads, except at Indian Harbor, and would be similar to other road construction projects.

The transmission line would cross Indian Harbor, a north-south oriented tidal waterbody in Bruce Park. Two crossing methods are proposed in the area north of the Davis Avenue bridge; an eight-foot wide pedestrian bridge, where the transmission line would be enclosed within the bottom of the bridge, or a trench installation within the harbor facilitated by cofferdams. After examining the environmental effects as well as the cost of both methods, the Council finds the trench installation preferable. The trench would have minimal environmental effect as it would temporarily disturb harbor sediment and would be installed using cofferdams that would not restrict tidal fluctuations. The trench installation would be approximately $1.8 million less than the pedestrian bridge installation and would not pose an ongoing maintenance issue. The Council appreciates the Town's willingness to accept a trench/cofferdam crossing in lieu of a more costly bridge installation, and is cognizant that the Town prefers a floating platform for construction purposes to minimize disturbance to adjacent shore and lawn areas to the extent possible.

In the area of Indian Field Road, two transmission line crossings of I-95 were initially proposed; an above ground crossing where the transmission line is attached to the underside of the I-95 overpass bridge or a pipe jacking crossing where the transmission line would be installed under the highway. Upon further review by the DOT, the DOT stated that it would only allow the pipe jacking transmission line crossing. The pipe jack locations would be within previously disturbed areas, adjacent to highway ramps, and no substantial adverse environmental effect is anticipated.

Development of a substation at either 290 Railroad Avenue or 281 Railroad Avenue would have no adverse environmental effect since both sites are already used for commercial purposes and are located in a heavily developed urban area. At either site, an open-air substation or an indoor substation could be developed. An indoor substation would cost approximately $1.2 to $1.4 million more than an open-air substation enclosed by a perimeter brick wall.

The 281 Railroad Avenue site, favored by the Town, is partially zoned General Business (GB) and Residential, and abuts predominately residential areas. Given its location and surrounding land use, the Town favors an indoor substation design so that it would appear as a condominium building to mitigate aesthetic and noise concerns. The 290 Railroad Avenue site is entirely zoned GB and abuts other commercial properties. An existing brick building on the parcel would be demolished.

After reviewing both substation locations, the Council finds the 290 Railroad Avenue location preferable as it is entirely zoned GB and is surrounded by established commercial uses, some of which are brick buildings. It is a larger parcel, by approximately 3,000 square feet, than the 281 Railroad Avenue parcel, and thus offers more flexibility in site layout, potential equipment additions, and an easier connection for an emergency mobile transformer. As for the substation design, the Council finds an open-air substation with a perimeter brick wall appropriate for a GB zone. Furthermore, the brick wall and fire walls surrounding the transformers within the substation would provide protection to adjacent properties. An indoor substation design at this location is not warranted given the higher threshold of noise for the surrounding GB zone, predominate commercial nature of the immediate area, and the additional cost that would be borne by Connecticut ratepayers. To increase the setback of the brick wall fronting Railroad Avenue, the Council will order that Eversource increase the setback distance by approximately ten feet.

The Council is satisfied that the Project's electric and magnetic fields have been demonstrated to be well below recommended exposure standards established by the International Commission on Non-Ionizing Radiation Protection and the International Committee on Electromagnetic Safety and are not of a concern.

Cost

The cost of the Proposed Project, with the Indian Harbor trench/coffer dam crossing, pipe jacking under I-95, and an open air-substation at 290 Railroad Avenue, is approximately $97.8 million. After the withdrawal of the PMP from consideration, with its estimated cost of $78 million, the Council examined the limited options available before it, and sought to reduce the Project cost to the greatest extent possible, as well as find the most equitable regional cost allocation. Since only one transmission route remained viable, overall Project cost savings were obtained by selecting the trench/cofferdam crossing of Indian Harbor instead of the pedestrian bridge installation ($1.8 million savings), and by selecting the 290 Railroad Avenue Substation with an open-air design rather than an indoor substation design ($1.4 million savings). Additionally, the 290 Railroad Avenue site would provide a modest savings on the distribution cost recovery component of the Project (recovered 100 percent by Connecticut ratepayers), as it is closer to the distribution feeder tie in points than the 281 Railroad Avenue location.

Conclusion

The Council finds the Proposed Project is necessary for the reliability of the electric power supply of the state, serving the interests of electric system economy and reliability, and as such, conforms to a long-range plan for expansion of the electric system serving the state and related interconnected utility systems[2]. The Project is consistent with the Connecticut's Comprehensive Energy Strategy which proposes further investments in grid reliability, and identifies three important components to grid reliability: resource adequacy, transmission security and distribution resiliency.

Although the Proposed Project is seemingly a localized issue, Eversource met with the Town to discuss Project alternatives beyond those initially discussed in the original proceeding. Multiple distribution alternatives were discussed in an attempt to find a local solution, and energy efficiency, demand response and battery storage measures were explored, but unfortunately, none of these alternatives and measures were deemed viable from a cost, reliability, or practicality perspective to solve the identified reliability issues. Quite simply, there are no localized solutions to resolve the identified reliability problems.

Based on the record of this proceeding, the Council finds that conditions have changed since the denial without prejudice of a Certificate in the original Docket 461 proceeding. The Council finds and determines that there is a public need for the facility. The Council also finds and determines that the Proposed Project is not in conflict with the policies of the state concerning the natural environment, ecological balance, public health and safety, air and water purity, and fish, aquaculture and wildlife, together with all other environmental concerns, including EMF, and balanced the interests in accordance with C.G.S §16-50p(a)(3)(B) and C.G.S §16-50p(a)(3)(C). The environmental effects that are the subject of C.G.S §16-50p (a)(3)(B) can be sufficiently mitigated and do not overcome the public need for the facility. Furthermore, the Council finds and determines that the location of the new transmission line will not pose an undue hazard to persons or property along the area traversed by the transmission line pursuant to C.G.S §16-50p (a)(3)(E).

[2] The Proposed Project does not establish a new transmission tie to New York.

The Council will require Eversource to submit a D&M Plan for the Proposed Project to include, but not be limited to, provisions for municipal comment and review; detailed site plans identifying structure and equipment locations as well as temporary and permanent facilities and roadways; wetland mitigation methods for temporary and permanent effects, an erosion and sediment control plan consistent with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*; a Spill Prevention, Control, and Countermeasures Plan; identification of vegetative removal/trimming areas, provisions for post-construction restoration, provisions for inspection and appropriate monitoring of Project construction, and pre-construction and post-construction measurements of EMF.

With the conditions listed above, the Council will issue a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a new 115-kV bulk open-air substation located at 290 Railroad Avenue, Greenwich, Connecticut, and two 115-kV underground transmission circuits extending approximately 2.3 miles between the proposed substation and the existing Cos Cob Substation, including related substation improvements in Greenwich, Connecticut.