February 16, 2016

Mr. Robert Stein
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Docket No. 461 - CSC 461 Greenwich Substation and Line Project

Dear Mr. Stein:

This letter provides the response to requests for the information listed below.

Response to OCC-06 Interrogatories dated 02/02/2016
OCC-073, 074, 075, 076, 077, 078, 079 *, 080, 081, 082, 083

Very truly yours,

John Morissette
Project Manager
Siting
As Agent for CL&P
dba EversourceEnergy

cc: Service List

* This response is proprietary and confidential and is available only to signatories of the nondisclosure agreement.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference 01/12/2016 Hearing Transcript ("Tr.") at 129. Provide the town location for each indoor bulk transmission substations in CL&P's territory. Explain the circumstances under which service provision requires an indoor bulk transmission substation.

Response:
At present, Eversource does not have any bulk transmission substations in Connecticut that are entirely indoor. A portion of Eversource's Norwalk Substation in Norwalk, CT includes 345-kV GIS equipment located within a building. The need for indoor bulk substation GIS equipment arises from lack of space to construct an outdoor, air insulated substation. When space is limited, GIS equipment is used due to its compact design. The GIS equipment is installed inside a building for ease of maintenance and protection from the elements.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Provide the following: a) circuit mile distance from Cedar Heights substation to the North Greenwich substation, and b) circuit mile and direct route mile distances from Cos Cob substation to the North Greenwich substation.

Response:

a) The circuit mile distance from Cedar Heights Substation to North Greenwich Substation is 10.3 miles.

b) The circuit mile distance from Cos Cob Substation to North Greenwich Substation is 6.55 miles and the direct route mile distance is 5.28 miles.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference 01/12/2016 Tr. at 90-91. Regarding the North Greenwich and Cos Cob Substations:

a) Does the Company plan to have the capability of feeding North Greenwich Substation through both Cos Cob and through the New Greenwich Substation? If so, was this cost included in the Company's original cost estimate? If not, provide the cost.

b) If the New Greenwich Substation is built, what use will be made of the Cos Cob Substation, apart from providing backup feeding for the North Greenwich substation? Will the existing 27.6kV and 13.2kV transformers be retained or removed? What will be housed there? What are the Company's plans for future use of the property and building? What is the proposed disposition of the 13.2kV transformers 35K-6X and llR-5X which provide redundant supply for Metro North's signal control system?

Response:
a) No. North Greenwich Substation will continue to be supplied by Cos Cob Substation. However, as indicated in the Company's response to Q-OCC-058, Eversource plans to provide an interconnection between the proposed Greenwich Substation and North Greenwich Substations at the 13.2-kV voltage level, which can backup most of the load of the North Greenwich Substation.

b) With the proposed Greenwich Substation built, Cos Cob Substation will retain the 27.6-kV and 13.2-kV transformers. Apart from feeding North Greenwich Substation, Cos Cob Substation will continue to feed the Prospect Substation 27.6-kV load, the Greenwich secondary network and Greenwich Hospital. There are no short term plans to change the control enclosures or any related equipment. The existing 13.2-kV 6X and 5X transformers will remain in place and will continue feeding four 13.2-kV circuits and providing the redundant supply for Metro-North's signal control system.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Within the Company's territory, what is the average distance from a bulk transmission substation to a distribution substation? What are the Company's standards regarding acceptable and unacceptable distances?

Response:
Within Eversource's Connecticut territory the average distance from a bulk substation to a distribution substation is approximately 4.01 miles. Eversource does not have a standard for distance between substations which is dependent on the system voltage and load.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference Response to OCC-60. If the New Greenwich substation is built, what are the plans for the Prospect and Byram substation properties? Provide all costs associated with eliminating the two transformers in Byram and the four in Prospect.

Response:
As described in Section E.4.4 of the Application and LF-010, the Prospect Substation property will be retained for use as a 27.6-kV switching station. As described in Section E.4.4 of the Application, the Byram Substation property would be retained for voltage regulation equipment. The estimated cost to remove the 27.6-13.2-kV transformers and the associated 13.2-kV switchgear at Prospect Substation would be approximately $250,000. The estimated cost to remove the 27.6-13.2-kV transformers and the associated 13.2-kV switchgear at Byram Substation would be approximately $600,000.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Discuss in detail the level of redundancy the Company provides the majority of customers in its territory, including but not limited to the following topics:

a) Regarding serving substations, does the Company generally provide service fed through two substations, with one serving as a backup in case the other substation should be out of service? Provide a response for bulk transmission substations and for distribution substations.

b) Regarding bulk transmission lines, does the Company arrange to have an equal number of backup transmission lines for most of its customers, e.g., for the 115kV pair from South End- Stamford that serves Greenwich, would the Company normally have an additional pair of backup lines to cover any situation in which the main transmission pair was out of service?

c) Discuss temporary load transfers. Are most customers served from substations that have temporary load transfer capability to transfer to, and receive load from, another substation? Discuss the limits on temporary transfers, e.g., time, capacity, etc. Identify the temporary transfer capabilities within Greenwich.

Response:

a) Eversource's design criteria provides for a backup source to customers fed by a bulk substation except for customers fed by a secondary network. By design a secondary network is fed by a common source.

Of the 90 Connecticut distribution substations, 47 are islanded (no backup). However, Eversource has a program approved by PURA to provide a backup source or eliminate those islanded substations.

b) Eversource's typical transmission design provides two sources to a substation via 115-kV transmission lines. Under normal conditions, one source is sufficient to serve the substation's customers for the foreseeable future. However, maintenance on the transmission system and unplanned outages can and will occur. The second source provides the ability to do maintenance work on one of the two sources to the substation without interrupting service to the customers. The second source also provides continuity of service during an unplanned outage, e.g. a lightning strike causes one of the transmission supply lines to trip.

c) Please refer to answer a) as part of this response. The temporary load transfers have a 24-hour limit. The temporary transfer capacity is generally about 100 amps average per feeder. Greenwich has about 11 MVA of temporary load transfer

capacity. Eversource uses this temporary transfer capacity at Cos Cob Substation to transfer load to achieve the reduction from the 2-hour permissible load rating of 135 MVA to the 24-hour rating of 124 MVA.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference Response to OCC-64. Is Metro-North usage included in the sales total for Greenwich? If so, provide the sales total excluding Metro-North.

Response:
Yes. Metro North usage was included in the Greenwich sales in the Company's response to Q-OCC-64.

For the sales total including excluding Metro-North, please see confidential Attachment 1.

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Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference 01112 Tr. at 89-91. If the New Greenwich substation is built, what will happen to service in Greenwich if the substation goes down?

Response:

Once the proposed Greenwich Substation is built and in-service, approximately half of the existing load currently supplied by the Cos Cob Substation's 27.6-kV system will be supplied by the Greenwich Substation (customers representing about 70 MVA of load). Thereafter, in the event that the entire Greenwich Substation is out-of-service (all three transformers), presuming that automatic switching equipment is installed (as planned), and after operation of the automatic switching equipment, electric service to customers representing 47 MVA (or 67% Greenwich Substation load at the time) would not be affected. In addition, electric service to customers representing the remaining 23 MVA (or 33% of the Greenwich Substation load at the time) could be restored manually through operator actions, depending on the system conditions.

An event causing the loss of an entire, multiple transformer substation is unlikely. Consequently, Eversource substation planning criteria covers the loss of a single element (one transmission line, one transformer, etc.).

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Provide a table listing the transformers at Cos Cob and at each substation served out of Cos Cob. For each transformer, list the kV stepdown type (e.g., 115-kV to 27.6 or 13.2-kV, etc.) and the disposition of each if the New Greenwich substation is built. Also list each transformer in the proposed New Greenwich substation, the stepdown type, and identify the current transformer it would replace.

Response:

Existing Substation Transformer	**Transformer Voltage**	**Disposition of existing transformer if Greenwich Substation is built**
Cos Cob 1X	115-27.6kV	Continue to supply customer load at 27.6kV
Cos Cob 2X	115-27.6kV	Continue to supply customer load at 27.6kV
Cos Cob 3X	115-27.6kV	Continue to supply customer load at 27.6kV
Cos Cob 5X	115-13.2kV	Continue to supply customer load at 13.2kV
Cos Cob 6X	115-13.2kV	Continue to supply customer load at 13.2kV
North Greenwich 1X	27.6-13.2kV	Continue to supply customer load at 13.2kV
North Greenwich 2X	27.6-13.2kV	Continue to supply customer load at 13.2kV
North Greenwich 3X	27.6-13.2kV	Continue to supply customer load at 13.2kV
Prospect 1X	27.6-13.2kV	Transformer removed
Prospect 2X	27.6-13.2kV	Transformer removed
Prospect 3X	27.6-13.2kV	Transformer removed
Prospect 4X	27.6-13.2kV	Transformer removed
Byram 1X	27.6-13.2kV	Transformer removed
Byram 2X	27.6-13.2kV	Transformer removed

Proposed Substation Transformer	**Transformer Voltage**	**Existing transformer(s) being replaced**
Greenwich 1X	115-13.2kV	Various transformers at Prospect and Byram Substations
Greenwich 2X	115-13.2kV	Various transformers at Prospect and Byram Substations
Greenwich 3X	115-13.2kV	Various transformers at Prospect and Byram Substations

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference Response to OCC-49, and Application, p. E-8, Table E-2 and footnote 10. Should the actuals for Prospect be 42.8 for 2014, and 47 for 2015?

Response:
As listed in the Company's response to Q-OCC-49, the actual peak loads for Prospect Substation were 44 MVA in 2014 and 47 MVA in 2015. Table E-2 of the Application showed projected peak loads for 2014 and beyond. Footnote 10 to Table E-2 incorrectly listed 42.8 MVA as the 2014 peak for Prospect Substation, which was the Prospect Substation load that occurred on July 2, 2014. However, a higher peak load of 44 MVA occurred on September 2, 2014 at Prospect Substation, which became the actual peak for 2014.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference Response to OCC-47. Expand the information categories in the response and provide a table that includes the following information for each of the existing transformers at Cos Cob, North Greenwich, Byram, and Prospect substations, and for each of the transformers at the proposed New Greenwich substation:

a) nameplate rating;

b) maximum forced oil/forced air rating;

c) Eversource's summer normal rating;

d) type of step down (e.g., 115kV to 27.6kV, 115kV to 13.2, etc.);

e) permissible load capacity;

f) short-term emergency or peak rating; and

g) maximum short-term MVA loading for each substation and the conditions that it includes (e.g., transformer out of service, etc.).

Response:
See the attached table.

Q-083 Response:

Questions a) through f)
Area shaded in BLUE was provided in response to OCC-047.

Transformer	Nameplate Ratings (MVA) [Note 1]	Maximum Forced Oil/Forced Air rating (MVA)	Eversource's Summer Normal Rating (MVA)	Type of Stepdown (Voltages in kV)	Permissible Load Capacity (MVA)	Short Term Emergency Load Limit (MVA)
Cos Cob 1X	30.24/40.32/50.4	50.4	61	115-27.6	61	67
Cos Cob 2X	28/37.3/46.7	46.7	61	115-27.6	61	67
Cos Cob 3X	28/37.3/46.7	46.7	61	115-27.6	61	67
Cos Cob 5X	15/20/25	25	30	115-13.2	30	32
Cos Cob 6X	18/24/30	30	38	115-13.2	38	39
North Greenwich 1X	15/20/25	25	29	27.6-13.2	29	33
North Greenwich 2X	15/20/25	25	29	27.6-13.2	29	32
North Greenwich 3X	15/20/25	25	29	27.6-13.2	29	33
Prospect 1X	12/15	15	15	27.6-13.2	15	19
Prospect 2X	10/12.5	12.5	12.5	27.6-13.2	12.5	16
Prospect 3X	10/12.5	12.5	12.5	27.6-13.2	12.5	16
Prospect 4X	12/15	15	15	27.6-13.2	15	19
Byram 1X	10/12.5	12.5	12.5	27.6-13.2	12.5	16
Byram 2X	10/12.5	12.5	12.5	27.6-13.2	12.5	16
Greenwich 1X	36/48/60	60	67	115-13.2	67	72
Greenwich 2X	36/48/60	60	67	115-13.2	67	72
Greenwich 3X	36/48/60	60	67	115-13.2	67	72

Note 1: Multiple MVA ratings are provided where the transformer has multiple stages of cooling. The lowest rating is the "self-cooled" rating which does not rely on fans or pumps. The second and third rating depends on fans and pumps for additional cooling. Eversource's "Normal" and "Emergency" ratings assume that all fans and pumps (where provided) are operable and in service. All transformers in the above table except the Cos Cob 1X have only fan cooling for the second and third stages of ratings. The Cos Cob 1X is the only transformer in the above table which has both fans and oil pumps for the second and third stages of cooling.

Question g)

Substation	Maximum short term Loading per substation (MVA)	Conditions of short term loading
Cos Cob 27.6kV	135	1X transformer out of service, 2X and 3X transformers limited to a total of 135 MVA for two hours. After two hours, load must be reduced to 124 MVA.
Cos Cob 13.2kV	32	6X transformer out of service.
North Greenwich	75	One transformer out of service.
Prospect	55	One transformer out of service.
Byram	25	One transformer out of service.