January 5, 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 CSC-03 Interrogatories dated 12/14/2015
CSC-001

Response to HD-02 Late Filed Exhibits dated 12/08/2015
LF-008, 009, 010, 011, 012, 013, 014

Response to OCC-05 Interrogatories dated 12/22/2015
OCC-064, 065, 066, 067, 068, 069, 070, 071, 072

Very truly yours,

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

cc: Service List

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

Question:
Reference Supplemental Direct Testimony of Kenneth Bowes, Raymond Gagnon and Jacqueline Cardell, dated September 29, 2015, which states on p. 6, that Greenwich is the third highest user in the Company's service territory. Provide a table listing 2014 annual usage information for: Greenwich, Stamford, Hartford, Waterbury, Danbury, New Britain, Norwalk, Bristol, Manchester, and West Hartford.

Response:

The requested table is shown below.

CL&P dba Eversource Energy
2014 kWh Sales by Town

Town	Total kWh
STAMFORD	1,387,706,218
HARTFORD	1,140,616,182
GREENWICH	869,829,569
WATERBURY	807,157,464
DANBURY	715,078,553
NORWALK/EAST NORWALK/S NORWALK	566,618,937
BRISTOL/FORESTVILLE	518,066,074
MANCHESTER / BUCKLAND	466,375,240
NEW BRITAIN	426,186,933
WEST HARTFORD	422,091,034

Source: Sales and Load Forecasting

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

Question:
Reference the Response to OCC-50. Provide a revised table with information added for: Cos Cob, Mianus and Tomac substations, and Greenwich Network.

Response:
The attached revised table includes the additional data for Cos Cob, Mianus and Tomac substations, and the Greenwich Network.

Attachment

		Data in MVA					
Substation	**Data**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Cos Cob 27.6kV	Incoming Feeder Capacity	Transmission					
	Substation Permissible Load	135*	135*	135*	135*	135*	135*
	Actual Peak	119.7	121.8	128.2	130.5	107.7	114.8
Tomac	Incoming Feeder Capacity	Transmission					
	Substation Permissible Load	53**	53**	53**	53**	53**	53**
	Actual Peak	46.6	48.9	49	43[a]	35[a]	37
Mianus	Incoming Feeder Capacity	25.5	25.5	25.5	25.5	25.5	25.5
	Transformer Capacity	25	25	25	25	25	25
	Actual Peak	20.8	22.4	20.3	23.7	17.8	18.5
Greenwich Secondary Network	Incoming Feeder Capacity	129***	129***	129***	129***	129***	129***
	Transformer Capacity	17	17	17	17	17	17
	Actual Peak	8.5****	8.6****	9.1****	9.3****	7.7****	8.2****
Prospect	Incoming Feeder Capacity	116	116	116	116	116	116
	Transformer Capacity	55	55	55	55	55	55
	Actual Peak	51	55	49	51.2	44	47
North Greenwich	Incoming Feeder Capacity	68	68	68	68	68	68
	Transformer Capacity	35.65	48.15	48.15	75	75	75
	Actual Peak	27.2	15.8[b]	24.6[b]	31	34.1[c]	36[c]
Byram	Incoming Feeder Capacity	30	30	30	30	30	30
	Transformer Capacity	25	25	25	25	25	25
	Actual Peak	28.1	24.1	27.6	15.9	18.6[c]	18.4[c]

*Bulk Substation Permissible Load of 135 MVA is a 2-hour rating; after 2 hours the load must be reduced to 124 MVA.

**Bulk Substation Permissible Load of 53 MVA is based on 23 MVA of backup from Cos Cob.

***Rating based on five 27.6-kV feeders. These feeders also supply customers that take service at 27.6-kV voltage, as well as Prospect and Byram Substations and one transformer at North Greenwich Substation.

**** There are no meters that measures aggregate power transmitted on the secondary Network. Load is estimated to be 7.12 percentage of the total 27.6-kV system load.

[a] Load transferred to Waterside.

[b] Reading from 2 of the 3 substation transformers. One of the meters was not available at this time.

[c]Reading included temporary switching load

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

Question:
Reference Response to OCC-4. Regarding the annual revenue requirements associated with the proposed project, the Company lists the transmission estimate at $18 million and the distribution estimate at $3.6 million.

a. Is the Company estimating that CL&P ratepayers' share would be two-thirds of the $18 million, equaling $12.1 million, for transmission, and $3.6 million for distribution? If not, then provide and explain the estimated annual revenue requirement for CL&P ratepayers.
b. Provide the CCF for transmission that is grossed up for federal and state income taxes.
c. Provide the estimated kWh rates for transmission and distribution for CL&P ratepayers by rate class. The revenue requirements should include all taxes, including grossed up requirements for all federal and state income taxes. Provide estimated total usage by rate class, and demonstrate how the rates cover the revenue requirement.

Response:

a. CL&P ratepayers' share of the estimated annual transmission revenue requirement is approximately $10.2 million. This represents CL&P's load ratio share for the PTF and non-PTF costs of the project. The estimated distribution revenue requirements for CL&P ratepayers is $3.6 million.

b. The estimated carrying charge factor of 15% referenced in Q-OCC-004 is grossed up for federal and state income taxes.

c. Attachment 1 and Attachment 2 contain summaries of transmission and distribution kWh rates for CL&P ratepayers by rate class. It is important to note that since the distribution portion would not be recovered unless approved in CL&P's next rate case, an estimate is being provided based on the allowed revenues in the Company's most recent rate case (Docket No. 14-05-06RE01).

CL&P Transmission Allocation
by Rate Class

		(A)	(B) = (A)/Total	(C) = (B) * Target	(D)	(E) = (C) / (D)
	Rate	12 CP kW Demands by Rate Class	Allocation Percentage	**Transmission Revenue Target (in thousands) $ 10,200**	12 Months Ending 2015 Billed MWh Sales	c/kWh
1						
2	1	1,724,771.7	42.619%	$ 4,347.2	8,461,357	0.051
3	7	1,159.5	0.029%	$ 2.9	6,156	0.047
4		1,725,931.2		$ 4,350.1	8,467,513	0.051
5	5	344,862.4	8.522%	$ 869.2	1,828,278	0.048
6	Small Group					
7	18	33.9	0.001%	$ 0.1	878	0.010
8	27	2,380.3	0.059%	$ 6.0	13,961	0.043
9	29	578.2	0.014%	$ 1.5	3,232	0.045
10	30	592,865.2	14.650%	$ 1,494.3	3,274,981	0.046
11		595,857.6		$ 1,501.8	3,293,052	0.046
12	35	194,404.4	4.804%	$ 490.0	1,148,294	0.043
13	37	214,402.0	5.298%	$ 540.4	1,285,066	0.042
14		408,806.3		$ 1,030.4	2,433,361	0.042
15	40	21,485.6	0.531%	$ 54.2	115,379	0.047
16	41	2,426.3	0.060%	$ 6.1	15,081	0.041
17	55	108,742.4	2.687%	$ 274.1	672,530	0.041
18	56	327,402.1	8.090%	$ 825.2	2,029,159	0.041
19	57	160,374.7	3.963%	$ 404.2	1,064,104	0.038
20	58	317,591.7	7.848%	$ 800.5	2,032,837	0.039
21	115	6,852.6	0.169%	$ 17.3	53,500	0.032
22	116	11,858.8	0.293%	$ 29.9	92,563	0.032
23	117	2,977.5	0.074%	$ 7.5	23,425	0.032
24	39	11,552.6	0.285%	$ 29.1	235,489	0.012
25	119	194.1	0.005%	$ 0.5	1,319.53	0.037
26	Total	4,046,916.0	100.000%	$ 10,200.0	22,357,591	0.046

Note: Average rate class KW demands in Column (A) are coincident to the Company's 12 monthly system peaks.

CL&P Distribution Allocation
by Rate Class

		(A)	(B) = (A)/Total	(C) = (B) * Target	(D)	(E) = (C) / (D)
	Rate	Allowed Revenues (in thousands)	Allocation Percentage	**Distribution Revenue Target (in thousands) $ 3,600**	12 Months Ending 2015 Billed MWh Sales	c/kWh
1						
2	1	520,712.0	50.221%	$ 1,808.0	8,461,357	0.021
3	7	308.0	0.030%	$ 1.1	6,156	0.017
4		521,020.0		$ 1,809.0	8,467,513	0.021
5	5	95,306.0	9.192%	$ 330.9	1,828,278	0.018
6	18	40.0	0.004%	$ 0.1	878	0.016
7	29	411.0	0.040%	$ 1.4	3,232	0.044
8	27	924.0	0.089%	$ 3.2	13,961	0.023
9	30	188,637.0	18.193%	$ 655.0	3,274,981	0.020
10		189,561.0		$ 658.2	3,288,942	0.020
11	35	38,948.0	3.756%	$ 135.2	1,148,294	0.012
12	37	38,418.0	3.705%	$ 133.4	1,285,066	0.010
13		77,366.0		$ 268.6	2,433,361	0.011
14	40	6,202.0	0.598%	$ 21.5	115,379	0.019
15	41	767.0	0.074%	$ 2.7	15,081	0.018
16	55	15,915.0	1.535%	$ 55.3	672,530	0.008
17	56	52,075.0	5.022%	$ 180.8	2,029,159	0.009
18	57	17,626.0	1.700%	$ 61.2	1,064,104	0.006
19	58	40,040.0	3.862%	$ 139.0	2,032,837	0.007
20	115	2,796.0	0.270%	$ 9.7	53,500	0.018
21	116	15,243.0	1.470%	$ 52.9	92,563	0.057
22	117	758.0	0.073%	$ 2.6	23,425	0.011
23		16,001.0		$ 55.6	115,988	0.068
24	39	1,337.0	0.129%	$ 4.6	235,489	0.002
25	119	375.0	0.036%	$ 1.3	1,319.53	0.099
26	Total	1,036,838.0	100.000%	$ 3,600.0	22,357,591	0.016

Note: Allowed Revenues in Column (A) are consistent with the Company's filing in Docket No. 14-05-06RE01.

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

Question:
Reference Response to OCC-31, including attachment. Based on the response, it appears that the Company's peak demand forecast for Cos Cob was calculated beginning with the actual peak demand for 2013, the highest peak demand of the six years (2011- 2015) listed. The actual 2013 peak was then increased by a compounded 1% per year for the years 2014, 2015 and 2016 to derive a forecast of 134.4 MVA for 2016. The actual peaks for 2014 and 2015 were ignored. For the years 2017 through 2022, the Company continued to increase the peak demand forecast by a compounded 1% each year. The response does not indicate that the forecast is based on normal weather or any analysis of cooling degree days, or any weather normalization calculations, or any specific look at energy efficiency measures in Greenwich, past, present or future. Rather, the response states that the forecast is based on "the hot temperatures and high heat indices that occurred during the 2013 summer." The response also does not indicate that the compounded 1% increase per year forecast is based specifically on Cos Cob usage. In light of the response to OCC-31:

a. Explain the following Company testimony from the October 6, 2015 hearing transcript ("Tr.") at 52 and 157:

   MR. ASHTON: Okay. We talked a bit about the peak load at Cos Cob. I assume that's all weather normalized. Is that fair to say?

   THE WITNESS (Bowes): Yes, it is.

   MR. ASHTON: And what are the conditions on when you, quote, weather normalize?

   THE WITNESS (Bowes): I don't know specifically. I know we use multiyear average, in this case a three-year average. (Tr. at 52)

   And

   MR. ASHTON: I want to make sure we haven't got Russians numbers here. I asked you earlier about the 135.5 peak on Cos Cob in 2017. You answered that was weather, a weather normalized peak. Remember?

   THE WITNESS (Bowes): Because it's forecasted, yes. (Tr. at 157)

b. Explain how the Company's forecast basis relates to normal weather and to the Cos Cob peak demand. Provide the Company's definition of weather normalization.

c. Explain the low usage numbers for the 2010 Annual Usage MWh.

Response:

a. The ISO-NE Capacity, Energy, Loads and Transmission (CELT) report load forecast of 1.2% growth for southwest Connecticut is weather normalized. The Eversource load forecast of 1% growth is not weather normalized.

b. Please refer to Eversource responses FPET-03 Q-FPET-009, CSC-01, Q-CSC-012. Eversource's substation planning and design criteria takes in consideration the past peak year load to perform future load projections and the Company's load forecast for the Greenwich Project Area as validated with its forecast for the southwest Connecticut Forecast Area and the ISO-NE's forecast in the CELT report for southwest Connecticut; the Company's forecasted growth of 1% for the Greenwich Project Area is applied to the past actual peak year load to perform the load projections. This design process effectively mitigates the potential of overloading substation power transformers and other equipment under any future extreme weather conditions. The capacity of the power transformers is most challenged during prolonged hot conditions**,** which can lead to transformer failures. A failure of a power transformer is the most critical and severe of all system impacts and it takes the longest time to recover from therefore creating a situation with the highest number of customers adversely impacted. A transformer failure at Cos Cob would be more impactful than at many other substations in that Cos Cob load cannot be transferred to another bulk substation. Cos Cob Substation has no other bulk substation to transfer load to making it an "islanded" area.

Weather normalization is taking a historical actual peak load data and converting it to weather-normalized peaks by multiplying weather factors (developed from an historical analysis of MW load per degree day), times the difference between actual and normal temperatures, and adding or subtracting this product to or from the historic peak to yield the estimated normalized peak load. Temperature differences from normal are calculated for three weather variables: mean daily temperature for the peak day, mean daily temperature for the day before the peak day and a THI (Temperature Humidity Index).

c. Please refer to Eversource's response OCC-02, Q-OCC-022 - f.

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

Question:
Reference the response to OCC-32. Is there a standard for how far away from Greenwich the responder is who is dispatched to respond to substation incidents? Does the Company always have a responder within 15 minutes, 20 minutes, or some other arrival time to the Greenwich substation?

Response:
The first responders for substation events in Greenwich would be based out of the Stamford or Norwalk area work centers and would be dispatched directly from their field work locations by the Operations Center. For after hour events, the company generally requires the responder to be within 30 minutes of the area work center location.

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

Question:
Explain the Company's view on the pros and cons of high pressure gas-filled cable. Has the Company ever used this type of cable?

Response:
There is currently no proven reliable GIS termination for 115-kV high pressure gas-filled (HPGF) pipe type cable. Since the Greenwich Substation will require a GIS interconnection, HPGF is not an acceptable cable system for the Project.

While HPGF is not an acceptable cable system for the Project, the pros and cons for of HPGF cable system are listed below.

The advantages of HPGF cable are as follows: HPGF cable is filled with nitrogen gas, which is an inert, non-toxic gas that is common in the atmosphere. Any leak of nitrogen gas is readily dissipated into the atmosphere, without hazard or damage to the environment resulting from the leak; consequently, there is no need to collect the released gas. HPGF cable systems have a simple gas control unit installed at one end of each circuit. The gas control unit has no moving parts; therefore, only minimal maintenance of the gas control unit is required.

In addition to the lack of a proven, reliable termination technology, the disadvantages of HPGF cable also include the following: Nitrogen gas has relatively low dielectric strength, which results a thicker paper insulation, which in turn leads to lower ratings for the HPGF cable systems when compared to HPFF. Additionally, there is no method to increase the HPGF cable ratings once installed.

The Company’s affiliate, NSTAR Electric Company dba Eversource Energy has two HPGF cables that transition to open air substation terminals installed in Boston area.

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

Question:
What is the narrowest Metro North Railroad ("MNRR") right of way in which the Company has: distribution poles; other distribution infrastructure; transmission poles; other transmission infrastructure; and 115 k V transmission poles or infrastructure? What is the smallest radius of clearance in which the Company has the same categories of infrastructure within the MNRR? For each category, describe the infrastructure and the location.

Response:
The Company has transmission lines in a number of MetroNorth Railroad ("MNRR") corridors. These installations are identified in the attached table indicating the right-of-way width, year of construction, voltage and endpoints. The corridor from Norwalk Junction towards Honey Hill Road in the Town of Wilton (as identified in the attached table) also supports a distribution circuit on the same structures as the transmission line. This is the only Eversource distribution line occupying MNRR corridors in a parallel manner.

The clearances required have changed over the years as the National Electrical Safety Code ("the Code") has evolved. Additionally, the type of construction may dictate which particular rules within the Code apply. Per the current (2012) edition of the Code, the minimum clearance radius is a horizontal clearance of 6.8 feet from a 115-kV conductor to a railroad catenary wire when both lines are displaced by a 48 MPH wind. Additional (larger) clearance requirements in other directions (e.g. vertical) would also apply.

Overhead Transmission Lines in Metro-North Railroad Corridors

Start		End		Voltages	Year of	Minimum ROW Width
Point	Town	Point	Town	(kV)	Construction	(feet)
Cos Cob S/S	Greenwich	South End S/S	Stamford	115	1971	25
South End S/S	Stamford	Ely Ave Jct (1967)	Norwalk	115	1967	44
South End S/S	Stamford	Rowayton Jct (1937)	Norwalk	115	1937	40
Ely Ave Jct	Norwalk	Fairfield (1967)	Westport	115	1967	No Defined Width/ Line Mounted on RR Bridge Structures
Grist Mill Rd	Wilton	Norwalk Jct	Wilton	345/115	1941/2007	80 ft
Norwalk Jct	Wilton	Honey Hill Rd	Wilton	115/27.6	1941	40 (Easement)/ 60 (Agreement)
Pequonnock S/S (UI)*	Bridgeport	Ely Ave	Norwalk	115	1992	No Defined Width/RR Circuits on Eversource Poles

* Eversource owns the portion of this line between Ely Ave Junction and the Fairfield Town Line.

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

Question:
Reference response to OCC-53. Explain why the overhead route through the Greenwich Avenue historic district was deemed not viable.

Response:
An Overhead Northern Route through the Greenwich Avenue Historic District was deemed not viable due to the high costs associated with creating a new overhead ROW through a highly developed, densely populated section of Greenwich. This route would have required traversing densely populated residential areas as well as highly developed commercial areas including the Greenwich Avenue Historic District and the Greenwich Municipal Center Historic District. Based on the high level of impacts to all of downtown Greenwich, including the historic districts, and the need for new easements or property acquisitions for a new overhead ROW, this route was removed from further consideration.

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

Question:
Reference response to OCC-61. The response is missing an answer to this piece of the interrogatory: "Explain in detail all assumptions on geologic conditions used in the estimates, and the basis for each such assumption." Provide the missing answer.

Response:
The project estimates have been prepared assuming that approximately 20% of the soil to be removed during construction would be rock. Eversource validated the rock assumptions used in the estimates by performing soil borings, review of the Bedrock Geological Map of Connecticut and field walk downs along in the project area. Soil borings give the soil information only at the locations of the borings. Eversource used the information from the soil borings taken in each area and interpolated to derive the percentage of rock used in the estimates.