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September 28, 2017

VIA E-MAIL AND HAND DELIVERY

Attorney Melanie Bachman
Executive Director/Staff Attorney
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: **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.

Dear Attorney Bachman:

In connection with the above-referenced Docket No. 461A, enclosed please find an original plus fifteen (15) copies of the Proposed Findings of Fact of The Connecticut Light and Power Company Doing Business as Eversource Energy.

Very truly yours,

Marianne Barbino Dubuque

MBD/mkw
Enclosures

cc: Service List dated July 11, 2017 attached (with enclosure)

{W2932853}

LIST OF PARTIES AND INTERVENORS
SERVICE LIST

Status Granted	Document Service	Status Holder (name, address & phone number)	Representative (name, address & phone number)
Applicant	☒ E-Mail	Eversource Energy	Kathleen Shanley Manager-Transmission Siting Eversource Energy 56 Prospect Street Hartford, CT 06103 kathleen.shanley@eversource.com Raymond Gagnon Director – Transmission Projects Eversource Energy 56 Prospect Street Hartford, CT 06103 Raymond.gagnon@eversource.com Jeffery Cochran, Esq. Senior Counsel, Legal Department Eversource Energy 107 Selden Street Berlin, CT 06037 **jeffery.cochran@eversource.com** Marianne Barbino Dubuque Carmody Torrance Sandak & Hennessey LLP 50 Leavenworth Street Waterbury, CT 06702 mdubuque@carmodylaw.com Anthony M. Fitzgerald, Esq. Carmody Torrance Sandak & Hennessey LLP 195 Church Street New Haven, CT 06509 afitzgerald@carmodylaw.com
Party Approved on July 23, 2015	☒ E-Mail	Office of Consumer Counsel	Lauren Henault Bidra, Esq. Staff Attorney Office of Consumer Counsel Ten Franklin Square New Britain, CT 06051 Lauren.bidra@ct.gov

Status Granted	Document Service	Status Holder (name, address & phone number)	Representative (name, address & phone number)
Party Approved on July 23, 2015	☒ E-Mail	Office of Consumer Counsel continued	Joseph A. Rosenthal, Esq. Principal Attorney Office of Consumer Counsel Ten Franklin Square New Britain, CT 06051 Joseph.rosenthal@ct.gov
Intervenor Approved on September 1 , 2015	☒ E-Mail	Parker Stacy 1 Kinsman Lane Greenwich, CT 06830 pstacy@optonline.net	
Intervenor Approved on September 1, 2015	☒ E-Mail	Field Point Estate Townhouses, Inc.	Carissa Depetris Dwight Ueda Field Point Estate Townhouses 172 Field Point Road, #10 Greenwich, CT 06830 carissa.depetris@gmail.com d_ueda@yahoo.com
Intervenor Approved on September 1, 2015	☒ E-Mail	Christine Edwards 111 Bible Street Cos Cob, CT 06807 SeeEdwards@aol.com	
Intervenor Approved on September 1, 2015	☒ E-Mail	Richard Granoff, AIA, LEED AP Granoff Architects 30 West Putnam Avenue Greenwich, CT 06830 rg@granoffarchitects.com	
Grouped Intervenor Approved on September 1, 2015	☒ E-Mail	Anthony Crudele Bella Nonna Restaurant & Pizzeria 280 Railroad Avenue Greenwich, CT 06830 bellanonnagreenwich@gmail.com	
Intervenor Approved on September 1, 2015	☒ E-Mail	Cecilia H. Morgan 3 Kinsman Lane Greenwich, CT 06830 cecimorgan@aol.com	

Status Granted	Document Service	Status Holder (name, address & phone number)	Representative (name, address & phone number)
Grouped Intervenor Approved on September 17, 2015	☒ E-Mail	Joel Paul Berger 4208 Bell Boulevard Flushing, NY 11361 communityrealty@msn.com	
Grouped Intervenor Approved on October 1, 2015	☒ E-Mail	Meg Glass 9 Bolling Place Greenwich, CT 06830 glass50@hotmail.com	
Party Approved on January 12, 2016	☒ E-Mail	The Honorable Peter J. Tesei First Selectman Town of Greenwich 101 Field Point Road Greenwich, CT 06830 ptesei@greenwichct.org	David A. Ball, Esq. David E. Dobin, Esq. Cohen and Wolf, P.C. P.O. Box 1821 Bridgeport, CT 06601 dball@cohenandwolf.com ddobin@cohenandwolf.com (203) 368-0211 (203) 394-9901 – fax
Intervenor Approved on May 25, 2017	☒ E-Mail	Morningside Circle Association	P. Jude Collins, President Morningside Circle Association 67 Circle Drive Greenwich, CT 06830 (203) 918-1076 Mail@morningsidecircle.org

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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 281 Railroad Avenue, Greenwich, Connecticut, and two 115-kV transmission circuits extending between the proposed substation and the existing Cos Cob Substation, Greenwich, Connecticut, and related substation improvements	**DOCKET NO. 461A** **September 28, 2017**

Applicant's Proposed Findings of Fact

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PREFACE

A. These Findings of Fact supplement the Connecticut Siting Council's previous Findings of Fact in Docket 461, dated May 12, 2016, which are incorporated herein by reference. To the extent these Findings are inconsistent with any of the previous Findings of Fact, these Findings shall supersede the earlier Findings.

B. Based on evidence in the record for Docket 461A, the following Findings from Docket 461 are no longer correct or relevant: **95-108, 202**

I. INTRODUCTION

1. In its Docket 461, on May 12, 2016, the Connecticut Siting Council ("Council") denied "without prejudice" an application from Eversource Energy ("Eversource") for a Certificate of Environmental Compatibility and Public Need ("Certificate") for the Greenwich Substation and Line Project ("GSLP"). The Council's denial of the GSLP was based on several factors, including an insufficient record as to both the proposed new substation and the proposed transmission lines that would feed the new substation; the estimated cost of $140 million; the 30- to 40-year planning horizon; and environmental effects of the proposed transmission line route. (Eversource 1, Vol. 1, Motion, pp. 2 – 3; Council Admin. Notice 43, Record)

2. The Council found that all of the potential alternative solutions to addressing the clear reliability need to upgrade the Greenwich electric system that had been considered in Docket 461 had been shown to be "infeasible", with the exception of a variation of the GSLP, which would include:

    - A new, less costly, substation at Eversource's preferred 290 Railroad Avenue location (which the Council found "more suitable" than the alternate site because of its larger parcel size and distance from adjacent residential areas); and
    - A "Hybrid Alternative" transmission line configuration identified by the Council.

    (Eversource 1, Vol. 1, Motion, p. 3; Council Admin. Notice 43, Opinion pp. 2, 6 – 8)

3. On May 5, 2017, Eversource filed a Petition for Reconsideration ("Motion") with the Council in accordance with Connecticut General Statutes ("CGS") § 4-181a(b), seeking a reopening of Docket 461 and reconsideration of the denial of a Certificate for the GSLP. (Eversource 1, Vol. 1, Motion, p. 1)

4. In its Motion, Eversource presented two projects for the Council's consideration. One, designated the Proposed Modified Project ("PMP"), fully developed and characterizes the Hybrid Alternative transmission line that was initially identified by the Council in Docket 461. The other, initially designated the Alternative Modified Project ("AMP"), was developed in response to requirements established by the Town of Greenwich ("Town"). (Eversource 1, Vol. 1, Motion, pp. 1 – 2)

5. The PMP entailed construction of an overhead line within the Metro-North Railroad right-of-way ("ROW"), which is under the control of the Connecticut Department of Transportation, Rails Division ("ConnDOT Rails"). Eversource developed this Project in close coordination with engineers from ConnDOT Rails, and filed its Motion after determining that it would be able to

obtain the necessary permission to construct the line within the ConnDOT ROW. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 2). However, on July 7, 2017, after Eversource had filed its Motion, officials of ConnDOT Rails more senior than the engineers with whom Eversource had been dealing suddenly advised Eversource that ConnDOT Rails would not issue a license for the transmission line routing proposed for the PMP because of conflicts with its own operations. Accordingly, Eversource formally withdrew the transmission line routing in the PMP from consideration and the AMP transmission line routing became part of Eversource's proposed Project. (Eversource 4, pp. 1, 2; Transcript 2, July 25, 2017, pp. 100 – 101; Eversource 5)

6. In support of its Motion, Eversource notified property owners along the routes of both the PMP and the AMP and abutters of the proposed and alternative locations of the new Greenwich Substation that the Motion would be filed. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 22)

7. Eversource served a copy of its Motion on the parties and intervenors in Docket 461, as referenced in the Council's Service List dated February 1, 2016. Since this proceeding is a continuation of Docket 461, all such parties and intervenors were also parties and intervenors to this proceeding, unless they asked that their status be revoked. Pet Pantry Super Discount Stores, LLP and Greenwich Chiropractic and Nutrition asked that their intervenor status be revoked. On May 26, 2017, Morningside Circle Association was granted intervenor status. Subsequently, Eversource served Morningside Circle Association with a copy of its Motion. (Eversource 1, Vol. 1, Motion, pp. 13 – 14; Council Decision on Request for Intervenor Status, May 26, 2017)

8. Accordingly, the parties in this proceeding are the applicant, the Office of Consumer Counsel, and the Town of Greenwich. The intervenors are Parker Stacy, Field Point Estate Townhouses, Inc., Christine Edwards, Richard Granoff, Bella Nonna Restaurant & Pizzeria, Cecilia Morgan, Joel Paul Berger, Meg Glass, and Morningside Circle Association. (Service List, July 11, 2017)

9. The GSLP is identified in the Independent System Operator – New England ("ISO-NE") Regional System Plan as Project ID Number 1533. On February 11, 2014, ISO-NE issued an I.3.9 technical approval for the original GSLP. If the Council approves the Project, Eversource will apply for an amendment of this technical approval when the Council determines the final configuration of the Project. (Eversource 2, Q-CSC-05, Q-CSC-06)

II. COUNCIL PROCEDURES

10. On May 25, 2017, the Council voted to grant Eversource's Motion to Reopen its May 12, 2016 denial without prejudice of the GSLP based on changed conditions pursuant to CGS § 4-181a(b). (Record)

11. On June 14, 2017, the Council held a pre-hearing conference on procedural matters for parties and intervenors to discuss the requirements for pre-filed testimony, exhibit lists, administrative notice lists, expected witness lists, and the filing of pre-hearing interrogatories. (Hearing Procedure Memo dated June 16, 2017)

12. Per the discussion at the pre-hearing conference on June 14, 2017, a total of 13 signs were planned to be installed regarding the July 13, 2017 public hearing at designated locations throughout the Town. Eversource was unable to secure permission from ConnDOT to place three of its signs on ConnDOT property in time prior to the Council's field review. In an effort to satisfy the request of Morningside Circle Association to place a sign at the original "Sign 2" location, a sign was placed at the nearest location for which Eversource could obtain permission in time, which is on the

Town's property approximately 225 feet north of the Indian Field Road/Sound Shore Drive Intersection. (Eversource 3)

13. The Council conducted a public field review of the proposed Project on July 13, 2017, beginning at 2:00 p.m. (Council's Hearing Notice dated May 26, 2017; Council's Field Review Notice dated June 28, 2017)

14. Pursuant to CGS § 16-50m, the Council, after giving due notice thereof, held a public comment hearing on July 13, 2017, beginning at 6:30 p.m., at the Greenwich Library, Cole Auditorium, 101 West Putnam Avenue, Greenwich, Connecticut. (Council's Hearing Notice dated May 26, 2017; Transcript 1 – July 13, 2017 at 6:30 p.m., pp. 1, 3)

15. The Council held evidentiary hearings on July 25, 2017, beginning at 11:00 a.m.; on August 29, 2017, beginning at 11:00 a.m.; and on September 5, 2017, beginning at 1:00 p.m. All evidentiary hearings were held at the Council's offices at Ten Franklin Square, New Britain. (Transcript 2 – July 25, 2017, 11:00 a.m.; Transcript 3 – August 29, 2017, 11:00 a.m.; Transcript 4 – September 5, 2017, 1:00 p.m.)

III. MUNICIPAL OUTREACH

16. Shortly after the Council's May 2016 ruling in Docket 461, Eversource reached out to Town representatives and held a kick-off meeting on June 28, 2016. At this meeting, the parties agreed to work on project design and energy efficiency/distributed generation issues on separate tracks, and proceeded to do so. This meeting was followed by many project work sessions – approximately one per month – as well as conference calls, and correspondence. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 16)

17. During its meetings with Town representatives, Eversource made numerous presentations and answered many pointed questions concerning such subjects as the deficiencies of the Greenwich electric supply system; distribution and transmission reliability criteria; the comparative reliability of overhead and underground lines; the pros and cons of the two sites under consideration for the new Greenwich Substation; and many potential solutions that Eversource studied on its own initiative or at the request of the Town. These included at least eight potential distribution solutions with variations, all of which Eversource found to be impractical, ineffective, or unreasonably expensive. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 16)

18. At a January 13, 2017 small group "technical meeting" of Town representatives and Eversource engineers, Eversource presented its perspective that all distribution solutions were inferior to a transmission solution from a reliability perspective and, in fact, were also comparable or more expensive. Ultimately, the Town representatives stated that the Town would support either a transmission or a distribution solution that met certain essential criteria, including:

    - All supply lines would need to be installed underground.
    - The underground cables would have to use solid insulation (such as cross-linked polyethylene [XLPE] cable) rather than insulating fluid.
    - The new substation would need to be entirely indoor and located on the north side of Railroad Avenue.
    - The supply line route could traverse Bruce Park, provided that it would be installed in the center of paved roadways, with no more than one set of vaults, with no construction in

parkland, and no tree removal or trimming. The affected roads would be paved curb to curb after construction.

- No horizontal directional drilling would be used in the Project.

(Eversource 1, Vol. 1, Pre-filed Testimony, p. 17; Greenwich 1, Pre-filed Testimony, pp. 7, 8)

19. With assistance from the Town, Eversource proceeded to design, engineer, and evaluate a transmission project that would meet the Town's requirements, which the Town clarified and elaborated as the effort proceeded. The result is presented in Eversource's application as the AMP (the "Project"). (Eversource 1, Vol. 1, Pre-filed Testimony, p. 18)

20. By letter to the Town dated February 1, 2017, Eversource stated that it was evaluating the new underground project supported by the Town, in comparison to the hybrid alternative, to determine if the underground project had a reasonable chance of being found to be consistent with the requirements of the Council. The letter stated that, depending on the outcome of that evaluation, Eversource would present either the new underground project route or the hybrid alternative route to the Council as its preferred route, and the other as an alternative. (Transcr. 3, p. 164)

21. However, the Town opposed the presentation to the Council of both a "hybrid" solution and the all-underground solution that the Town favored as equally acceptable solutions to the Greenwich need. (Transcr. 3, pp. 159 – 161, 211 – 213)

22. On July 11, 2017, a small Eversource team of civil engineering and construction experts and an arborist met with a delegation of Town officials, including the First Selectman and the Superintendent of the Parks and Trees Division of the Department of Recreation, and performed a joint walk-down of the Alternate Modified Route (the "Proposed Route") through Bruce Park. Eversource pointed out locations where it believed tree trimming would be necessary, a few locations where there were constraints that would make it difficult to stay completely within the pavement, and some potential vault locations. The parties also discussed construction practices and post-construction restoration. (Eversource 8, pp. 1 – 2)

23. The Town has expressed conditional support for the route of the Project now proposed, provided that the Council finds that the Project now proposed is needed. (Town 1, Pre-filed Testimony, pp. 8, 9)

IV. STATE AGENCY COMMENTS

24. On May 26, 2017, the Council solicited written comments on Eversource's application from the following state agencies: Department of Energy and Environmental Protection ("CT DEEP"), Department of Public Health ("DPH"), Public Utilities Regulatory Authority ("PURA"), Department of Economic and Community Development ("DECD"), Connecticut Airport Authority ("CAA"), State Historic Preservation Office ("SHPO"), Department of Emergency Services and Public Protection ("DESPP"), Department of Agriculture ("DOA"), Council on Environmental Quality ("CEQ"), Office of Policy Management ("OPM"), and Department of Transportation ("ConnDOT"). (Council's Hearing Notice Package, May 26, 2017)

25. After meeting with a senior ConnDOT official on June 14, 2017, Eversource received a letter from ConnDOT dated July 5, 2017, stating that a license to occupy the Metro-North Railroad ("MNR") ROW, which would have been required in order to proceed with the Proposed Modified Route,

would be inconsistent with ConnDOT's needs and policies. This letter was filed with the Council as part of Eversource's supplemental pre-filed testimony dated July 10, 2017. (Eversource 4)

26. On September 7, 2017, the Council received a letter from ConnDOT dated August 31, 2017, outlining its concerns regarding Eversource's proposed pipe jacking route for the Project. The letter stated that ConnDOT endorses the AMP's proposed pipe jacking route, so long as its concerns will be adequately addressed. (ConnDOT comments dated August 31, 2017)

27. ConnDOT recommends the placement of proposed splice vaults outside the traveling roadway for Indian Field Road, Woods Road, Museum Drive and Railroad Avenue. For Arch Street, ConnDOT recommends that the splice vaults be placed outside the traveling roadway and within the parking lot on the north side of Arch Street. ConnDOT has no concerns with proposed splice vaults within Davis Avenue. (ConnDOT comments dated August 31, 2017)

28. ConnDOT is opposed to the crossing of Interstate 95 ("I-95") by attaching the cable system to the underside of the overpass bridge following Indian Field Road south. ConnDOT will require an in-depth review of pipe jacking to cross beneath I-95 to address any concerns about the crossing of the Exit 4 off-ramp (southbound), crossing of the Exit 4 on-ramp (northbound), and the crossing of I-95. ConnDOT prefers that the pipe jacking pits be placed as far as possible from the I-95 northbound and southbound edge of the travel way (outside the clear zones). (ConnDOT comments dated August 31, 2017)

29. ConnDOT will require a highway encroachment agreement, highway encroachment permit(s), rails license agreement and right of entry(s), and a Metro-North license agreement. (ConnDOT comments dated August 31, 2017)

30. ConnDOT prefers the installation of the cable system as close as possible longitudinally to Sound Shore Drive, which would be as far away as possible from I-95. (ConnDOT comments dated August 31, 2017)

31. The following agencies did not respond with comment on the Motion: CT DEEP, DPH, PURA, DECD, CAA, SHPO, DESPP, DOA, CEQ, and OPM. (Record)

V. PROJECT NEED

32. In contrast to the GSLP, the Project is designed to address existing electric service needs in the Town based on a peak load that has already occurred, rather than to provide improvements that will be adequate for a 30- to 40-year planning horizon, assuming an annual 1% growth in peak load. (Eversource 1, Vol. 1, Motion, p. 1; Transcr. 3, pp. 19-23)

33. The current need for the Project is the same system need that the Council identified in its Findings of Fact and Opinion for Docket 461. At that time, the Council concluded that "the current electric system serving Greenwich is antiquated and was designed to serve much lower load demands than exist today", and that "the proposed GSLP, or some variation thereof, is necessary for the reliability of the electric power supply of the Town of Greenwich." (Council Admin. Notice 43, Opinion, pp. 4, 6; Eversource 1, Vol. 1, Pre-filed Testimony, p. 2)

34. Eversource has deferred construction of a new bulk substation in Greenwich for more than 20 years by making incremental improvements. In 2011, Eversource concluded that no more incremental projects could address the Town's issues. (Transcr. 2, p. 99)

35. The need for a new substation in Greenwich to address reliability concerns was identified by public announcement in 2011 by Eversource. Although load growth was an additional concern, it was not the primary concern at that time. (Transcr. 3, pp. 25 – 27)

36. In light of the Council's conclusion that the scope of the GSLP was unnecessarily large and costly, Eversource determined to assess the needed scope of system improvements based upon the historical 2013 peak load on the Greenwich 27.6-kV system served by the Cos Cob Substation, which was 130.5 MVA. Eversource believed that this peak load, which had occurred within the last three years, could reasonably be deemed representative of current conditions. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 4)

37. With its Motion, Eversource is no longer presenting any load forecasts as a need for this Project. Instead, it is accepting the largest load in the last five years, which occurred in 2013, and is proposing purely a reliability project to address multiple issues on the distribution system in the Town. The 130.5 MVA is an actual measured load in 2013. This historic load was used as a design load for this Project. (Transcr. 2, pp. 11 – 12; Eversource 2, Q-CSC-02)

38. Since the Council's decision in May 2016 regarding Docket 461, there have been additional instances of cable failures and overloads on the Greenwich system. On July 10, 23, and 25, 2016, a series of cable faults and overloads occurred on the Greenwich 27.6-kV and 13.2-kV systems, which showed feeder deficiencies in addition to those of the Cos Cob – Prospect feeders, including 27.6 feeders from Cos Cob to the North Greenwich, Byram, and Mianus Substations. The July 25 events resulted in the loss of 388 customers for 142 minutes. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 7)

39. Eversource ran a set of contingency simulations assuming the 130.5 MVA peak load. The results of the simulations confirmed the same reliability deficiencies in the existing system identified by the Council in its May 2016 decision: potential overloads of the distribution feeders supplying power to Prospect Substation from Cos Cob Substation; and potential transformer overloads at Cos Cob and Prospect Substations. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 4)

40. The 4X transformer at Prospect Substation would be overloaded under N-0 peak load conditions using the 2013 loading MVA. The loss of any of three substation transformers at peak load will overload the others. In addition, because the 3X transformer is not connected to any of the other transformers at the Prospect Substation, its loss results in temporary load interruption without regard to the available capacity of the other transformers. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 5)

41. The figure below shows transformer overloads at Prospect Substation using the 2013 loading MVA.

Transformers	Nameplate MVA	2013 Loading MVA	% Nameplate	N-1 % of Nameplate (N/O = <100%)				N-1 % of Emergency Rating (N/O = <100%)			
22E-1X	15	13.3	89%	O.O.S	168%	N/O	N/O	O.O.S	133%	NO	N/O
22E-2X	12.5	11.9	95%	202%	O.O.S	N/O	225%	158%	O.O.S	N/O	176%
22E-3X	12.5	9.8	78%	N/O	N/O	O.O.S	N/O	N/O	N/O	O.O.S	N/O
22E-4X	15	16.2	108%	108%	108%	108%	O.O.S	N/O	N/O	N/O	O.O.S
Total	55	51.2									

(Eversource 1, Vol.1, Pre-filed Testimony, p. 6)

42. Improving the Prospect Substation to add additional transformational capacity is not a feasible solution. There is no room for additional 27.6-kV feeders, and the site is located in a 500-year flood plain. Requirements of PURA and the Council adopted after storm events in 2012 are such that if the substation were rebuilt, all of its critical elements would have to be located at least one foot above the 500-year flood level. The cost of such construction makes rebuilding impractical. (Eversource 1, Vol.1, Pre-filed Testimony, p. 6)

43. The Cos Cob Substation has three 115-kV to 27.6-kV transformers. In the 2013 peak load condition, the loss of any one of these transformers placed the remaining transformers into their emergency ratings. (Eversource 1, Vol.1, Pre-filed Testimony, p. 6)

44. The figure below shows the worst-case scenario at Cos Cob Substation, loss of the 11R-1X transformer.

Transformers	MVA		%	N-1	2-hr	% of 2-hr	22- hr	% of 22-
	Nameplate Rating	2013 Load	Nameplate Rating		Rating	rating	rating	hr rating
11R-1X	50.4	26.8	53%	O.O.S		O.O.S		O.O.S
11R-2X	46.7	52.1	112%	66.4	67.5	98%	62.00	107%
11R-3X	46.7	51.6	110%	64.1	67.5	95%	62.00	103%
Total Load MVA		130.5		130.5				

(Eversource 1, Vol. 1, Pre-filed Testimony, p. 6)

45. Unlike other bulk substations in the Eversource System, excess load caused by the loss of a transformer cannot be transferred from Cos Cob to another substation. However, 6 MVA of load can be transferred to the Cos Cob 13.2-kV system. Under the 2013 system peak condition assumed in the current planning analysis, the ability to off-load that relatively small amount of power is sufficient to relieve the overloads on the transformers that remain in service after the failure of a single transformer. Without the ability to transfer the 6 MVA to the 13.2-kV system, there would be no way to bring the remaining transformers down into their normal operating range after 24 hours except for a natural decline in load or shedding of customer load. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 8)

46. The largest emergency mobile transformer that could be temporarily installed in the Cos Cob Substation has a capacity of only 30 MVA, which would be insufficient to support the 2013 peak loading on either the 2X or 3X transformers. Should one of these transformers be lost from service, the substation has to be manually reconfigured so that the mobile unit takes over the duty of the 1X transformer (which feeds North Greenwich) and the 1X transformer is configured to assume the duty of the transformer that is out of service. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 8)

47. Any plan for resolving Greenwich's distribution system deficiencies should take into account the relatively small reliability margin at the Cos Cob Substation, which would likely disappear with 6 MVA of load growth, and the operability restrictions presented by the unequal loading of the

transformers when a mobile unit must be substituted for one of the permanent transformers. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 8)

48. Two of the three transformers at Cos Cob Substation (the 11R-2X and the 11R-3X) are connected by a common bus served by a single circuit breaker. A fault on the bus or on the breaker would cause the loss of the entire load served by those transformers. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 8)

49. Eversource bases its cable rating on the Institute of Electrical and Electronics Engineers ("IEEE") standards, the Association of Edison Illuminating Companies ("AEIC") standards, and industry accepted practices. Eversource has used emergency ratings for its equipment over many decades to avoid capacity additions. Assigning an "emergency rating" to a cable allows it to be operated above its rated capacity for a limited time. Because loading the cable above its rated capacity will reduce cable life, many other utilities do not use emergency ratings. Eversource is reevaluating whether it should use emergency ratings, especially for locations like Cos Cob Substation where there is no other backup. (Transcr. 4, p. 66)

50. Whenever load is shifted to another feeder such that it experiences an overload, the feeder sustains loss of life. Eversource projects that a two-percent loss of life results every time a feeder is overloaded. This results in a loss of reliability on the feeder. (Transcr. 4, p. 67)

51. The 130.5 MVA peak load level is not the sole indicator of need for the Project. It was the peak load assumption that was used in contingency testing of the Greenwich distribution system which, like the previous testing reported in Docket 461, revealed multiple criteria violations. Additional load flow analyses were conducted using actual peak load levels observed in 2014-2016, which were lower than the 130.5 MVA load. These analyses also showed criteria violations and confirmed the need for the Project. In addition, as recognized by the Findings and Opinion in Docket 461, some of the deficiencies in the Greenwich distribution system are related to the age and condition of equipment, such as the Prospect Substation transformers, which are not load-dependent. (Eversource 2, Q-CSC-01)

52. The table below illustrates the additional load flow analyses that were conducted using actual peak load levels observed in 2013 – 2016 in the Town.

Demand 130.5 MVA				
Single Contingency Scenarios - 2013				
Feeders	Load relative to Normal cable ratings			
11R51	O.O.S.	151%	140%	122%
11R52	117%	O.O.S.	109%	95%
11R55	114%	117%	O.O.S.	97%
11R58	73%	73%	69%	O.O.S.

Demand 107.7 MVA				
Single Contingency Scenarios - 2014				
Feeders	Load relative to Normal cable ratings			
11R51	O.O.S.	127%	118%	102%
11R52	98%	O.O.S.	91%	80%
11R55	95%	98%	O.O.S.	82%
11R58	61%	61%	58%	O.O.S.

Demand 114.8 MVA				
Single Contingency Scenarios - 2015				
Feeders	Load relative to Normal cable ratings			
11R51	O.O.S.	135%	125%	109%
11R52	104%	O.O.S.	97%	85%
11R55	101%	104%	O.O.S.	87%
11R58	65%	65%	62%	O.O.S.

Demand 115.6 MVA				
Single Contingency Scenarios - 2016				
Feeders	Load relative to Normal cable ratings			
11R51	O.O.S.	136%	126%	110%
11R52	105%	O.O.S.	98%	86%
11R55	102%	105%	O.O.S.	88%
11R58	65%	65%	62%	O.O.S.

(Eversource 2, Q-CSC-01)

53. There are four 27.6-kV feeders from Cos Cob to Prospect Substation. The cables operate in parallel, so that if one is lost from service, its load is automatically redistributed to the remaining three cables. Contingency simulations showed overloads on the feeders at loads much lower than the 2013 peak. Overloads on one or more of the feeders were seen at loads as low as approximately 82 MVA, or approximately 63% of the 130.5 MVA peak in 2013. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 5)

54. Because the four feeders from Cos Cob to Prospect Substation are not all of the same length and, therefore, have different impedances, in many conditions the capability of the feeders left in service was insufficient to accept flow from one or more feeders lost from service, without overloading. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 5)

55. Prospect Substation was not designed such that if any one of the four feeders between Prospect and Cos Cob Substation goes down, the remaining feeders have sufficient capacity to serve the load. As soon as one feeder is lost, overloads occur. This is because there are other loads served besides Prospect Substation, which include the underground network and the Byram load. As currently

configured, substation load, customer load and network load are served on the same feeders. Though this design would not be replicated by Eversource today, it was done out of necessity to defer investments in the Town over the last 40 years. (Transcr. 3, pp. 30 – 37)

56. Eversource customers in Greenwich experience reliability that is far below the state average. (Transcr. 2, p. 102)

57. In 2016, the average electricity customer in Connecticut saw approximately 16 months between power interruptions. In Greenwich, electricity customers see less than 10 months between power interruptions. (Transcr. 2, p. 104)

58. During a brief heat wave in July 2017, the load at Cos Cob Substation was at 112.5 MVA. Even though this was a lower level than was experienced in 2015 and 2016, Eversource experienced an inability to serve Greenwich customers because of capacity issues. The Town of Greenwich was the only location in Connecticut where there was an outage that could not be restored because the feeder capacity was not available. (Transcr. 2, pp. 16 – 18)

59. Of the 100 Worst SAIDI (System Average Interruption Duration Index) Circuits in Connecticut, 14 of these circuits emanate in Greenwich and are dedicated to Greenwich customers, and two more are Stamford circuits that feed Greenwich customers. Of the 100 Worst SAIFI (System Average Interruption Frequency Index) Circuits in Connecticut, 11 circuits emanate in Greenwich and are dedicated to Greenwich customers, and two are Stamford circuits that feed Greenwich customers. (Eversource 14, Q-TOWN-080)

60. A portion of the outages in the Town are due to weather related events. Although the Project would not prevent such an outage, it would provide redundancy and automation to pick up customers on the faulted portion of the circuits. (Transcr. 3, p. 82)

61. There are already many storm-hardening programs in place in Greenwich, but they are not part of this Project; they are ongoing PURA projects. (Transcr. 3, pp. 82 – 83)

62. Even though the Town has begun to take more steps to adopt energy efficiency measures, such measures will not change the need for the proposed Project. While the Town has demonstrated good intentions, it has not produced, as yet, any concrete results. However, the measures may, if implemented, extend the life of the Project. (Transcr. 2, pp. 92 – 93, 111; Transcr. 3, 193-202.)

VI. PROJECT COST

63. The estimated capital cost for the Project is approximately $98.9 million, subdivided by component as follows:
    - Cable system: approximately $57.1 million (approximately $52.5 million and $4.6 million for the transmission and distribution portions of the line, respectively)
    - Proposed Greenwich Substation at 290 Railroad Avenue: approximately $28.2 million (approximately $14 million for transmission and approximately $14.2 million for distribution)
    - Proposed modifications at Cos Cob Substation: approximately $12.7 million
    - Proposed modifications at the Prospect Substation: approximately $0.9 million

    (Eversource 1, Vol. 1, Exh. B, p. A-17; Eversource 1, Vol. 1, Exh. A, p. A-27)

64. The table attached hereto as "Exhibit A" provides the allocation for the currently proposed Project into regional transmission ("PTF"), local transmission ("LNS"), and Distribution cost components. (Eversource 12, Q-CSC-063)

65. The actual additional cost of extending the underground transmission line to 290 Railroad Avenue instead of 281 Railroad Avenue is $0.9 million, not $1 million, which is an incremental value. (Transcr. 3, p. 7; Eversource 12, Q-CSC-069)

66. Table A below modifies information provided to the Council in Docket 461 to include the currently proposed Project route (previously called the AMP route), and the variations requested. Table B below offers more detail on the component costs of the variations. The two different potential substation sites at 281 and 291 Railroad Avenue are shown as separate projects with the current proposed route and variations to offer additional clarity in the comparison of the substation sites and cost impacts.

Table A - GSLP in format of F.O.F 465

			Projects as proposed during original Docket 461	
Component	Currently Proposed GSLP (XLPE AMP Route) - Term at 281 RR Ave (Pole Yard)	Currently Proposed GSLP (XLPE AMP Route)- Term at 290 RR Ave (Pet Pantry)	FOF - 465 Originally Proposed Project - Preferred Route	FOF - 465 Originally proposed Southern Alternative
Transmission Line	$52,515,678	$53,415,678	$72,000,000	$71,000,000
Cos Cob Modifications / Distribution upgrades (incl Prospect)	$18,208,282	$16,512,750	$16,000,000	$16,000,000
New Greenwich S/S	$28,992,801	$28,136,749	$52,000,000	$52,000,000
Total	$99,716,761	$98,065,177	$140,000,000	$139,000,000

Table B - GSLP Estimated costs in additional detail per Q-CSC-063

			Projects as proposed during original Docket 461	
Component	Currently Proposed GSLP (XLPE AMP Route) - Term at 281 RR Ave (Pole Yard)	Currently Proposed GSLP (XLPE AMP Route)- Term at 290 RR Ave (Pet Pantry)	FOF - 465 Originally Proposed Project - Preferred Route	FOF - 465 Originally proposed Southern Alternative
Cos Cob SS	$12,669,170	$12,669,170	$12,000,000	$12,000,000
Greenwich S/S - Total	$28,992,801	$28,136,749	$52,000,000	$52,000,000
Greenwich SS Trans	$12,291,548	$13,961,853	$35,000,000	$35,000,000
Greenwich SS Dist	$16,701,253	$14,174,896	$17,000,000	$17,000,000
Transmission Line (total)	$52,515,678	$53,415,678	$72,000,000	$71,000,000
Prospect Removal	$952,837	$952,837	$1,000,000	$1,000,000
Distribution Feeder Relocation	$4,586,275	$2,890,743	$3,000,000	$3,000,000
Totals	$99,716,761	$98,065,177	$140,000,000	$139,000,000
Project Component	Additional Cost to GSLP	Additional Cost to GSLP		
Pipejacking Underneath I-95 (Vol 1, Ex. B, sec. A.5.1.1)	$1.5M	$1.5M		
Architectural Building to replace wall enclosure	$0 (incl)	$1.4M		
Project Component	Reduced Cost to GSLP	Reduced Cost to GSLP		
Cofferdam Variation (Vol 1, Ex. B, sec. A.4)	$1.8M	$1.8M		
Wall Enclosure only - no architectural building	$1.2M	$0 (incl)		

(Eversource 12, Q-CSC-069)

67. Applying the factors in the Council's 2012 *Life-Cycle Cost Studies for Overhead and Underground Transmission Lines*, the life-cycle cost for the proposed transmission lines in the route designated in the AMP is approximately $89.1 million. (Eversource 1, Vol. 1, Exh. B, pp. A-17 – A-18)

68. The majority of the Project costs are non-pool transmission facility ("non-PTF") components and as such would be recovered in local transmission rates. The upgrades at Cos Cob Substation are considered a pool transmission facility ("PTF"); therefore, Eversource would apply to ISO-NE to seek regional cost recovery for the upgrades at Cos Cob Substation. The remaining Project costs would be recovered through Eversource's local transmission rates for the non-PTF components and distribution rates for the distribution components. (Eversource 2, Q-CSC-059, Q-CSC-060; Transcr. 2, p. 156)

69. The cost of a pedestrian bridge crossing of Indian Harbor is included in the estimated cost of the Project, and would be recovered as a non-PTF transmission component of the Project through Eversource's local transmission rates. These costs would be borne by the wholesale transmission

customers of CL&P, WMECO and PSNH. (Eversource 1, Vol. 1, Exh. B, p. A-11; Eversource 11, Q-CSC-061-RV01; Eversource 12, Q-CSC-064)

70. The incremental cost of the Greenwich Substation design preferred by the Town (AIS all-indoor substation design), as compared with an open air substation enclosed by a masonry wall, is $1.4 million. This cost is included in the estimated Project cost. Because it is a distribution component of the Project, CL&P's retail customers would bear 100% of the cost of the building and all architectural treatments. (Eversource 11, Q-CSC-061-RV01; Eversource 12, Q-CSC-064)

71. If the new Greenwich Substation is constructed at 281 Railroad Avenue, the transmission costs would be lower, but the distribution costs would be higher, as compared to 290 Railroad Avenue. (Transcr. 2, p. 125)

72. The costs to comply with the Town requested conditions would be composed of the following:

- All-indoor substation with architectural enclosure: The incremental cost of the substation design preferred by the Town, as compared with the AIS enclosed by a masonry wall, is $1.4 million. This cost is included in the estimated cost of the AMP.
- Pedestrian bridge attachment: Utilizing a pedestrian bridge to cross Indian Harbor is estimated to cost approximately $1.8 million more than using an open trench with a cofferdam and approximately $850 thousand more than utilizing Horizontal Directional Drilling ("HDD"). This cost is included in the estimated cost of the AMP.
- I-95 bridge attachment: The Town condition to attach the transmission lines to the Indian Field Road overpass is the least cost alternative to I-95. However, ConnDOT has stated that it is "heavily opposed" to attaching the cable to the underside of the Indian Field Road overpass as it poses and safety and maintenance concerns. If the cables cannot be attached to the overpass, a jack and bore would be utilized to cross under I-95, at a cost of $1.5 million more than attaching to the Indian Field Road overpass. The estimated cost of the AMP assumes that the cables would be attached to the bridge.
- Construction in Bruce Park: The challenges with construction within Bruce Park are associated with requiring all work and equipment to be confined to the paved roadways and not performing any vegetation removal. Eversource does not have an estimate of the incremental cost of the additional time and complexity of the construction effort that would result from compliance with these conditions. Eversource's primary concern is that the Project cannot be constructed while strictly complying with these conditions.
- Arch Street Vault: Initially, Eversource was concerned with respect to challenges to locating the Arch Street Vault in the public parking lot if ConnDOT would not allow it to be installed in the paved surface of Arch Street. However, Eversource may install the vault in the parking lot pursuant to its franchise right to locate its facilities in "public grounds". Accordingly, there should be no incremental cost above the estimated AMP cost related to the Arch Street Vault.

(Eversource 11, Q-CSC-61-RV01)

VII. PROJECT ALTERNATIVES

73. There is no practical and feasible distribution alternative to the Project. Even with a lower load, distribution solutions are not practical or cost effective, in comparison to a transmission solution. In particular, efforts to improve the electrical path between the Prospect and Cos Cob Substations by adding feeders or upgrading the existing feeders failed to prevent overloads because of the

structural problem of the different identified impedances. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 16; Eversource 11, Q-CSC-026; Transcr. 3, pp. 178-193)

74. At the request of the Town, Eversource reconsidered whether some combination of distributed generation, energy storage, and demand response could substitute for a project that would require transmission improvement. As it did initially in Docket 461, Eversource concluded that there was no practical or cost-effective non-transmission alternative. (Eversource 1, Vol. 1, Pre-filed Testimony, p. 16)

75. In response to information and requests from Parker Stacy regarding Tesla's products for battery storage systems, Eversource determined that to achieve 5 MW of energy storage, a total of 2,667 Powerwall system units would need to be installed in Greenwich. The total cost for installation of 2,667 units is in the range of $18 - $22 million. This cost does not include the replacement of the batteries at the end of their useful life, which would require a similar investment every 10 years, and installation of infrastructure to ensure correct operation of the batteries. Additionally, installation of a Powerwall system would not eliminate the need to invest an additional $184 million in non-transmission alternatives for solar PV (50% output at peak - $105 million); fuel cells ($78 million), and demand response ($1 million) to meet the Town's need with non-transmission alternatives. (Eversource 13, Q-STACY-002; Eversource 9, Q-STACY-001)

VIII. TRANSMISSION LINE ROUTE AND CONFIGURATION ALTERNATIVES

76. The Project's proposed double-circuit transmission line route design would extend between the existing Cos Cob Substation and the proposed new Greenwich Substation at 290 Railroad Avenue. (Eversource 12, Q-CSC-063)

Transmission Line Route

77. The proposed double-circuit transmission line route designated in the AMP would extend for approximately 2.3 miles between the existing Cos Cob Substation and the alternate new Greenwich Substation at 281 Railroad Avenue. (Eversource 1, Vol. 1, Exh. B, p. A-10)

78. The cables for each of the circuits would exit, underground, from Cos Cob Substation. Each set of cables would follow a separate route within and exiting from the substation before crossing Sound Shore Drive. The circuit routes would converge in the railroad commuter lot north of Sound Shore Drive. From there, the circuits would be installed in a common duct bank and follow the same route to the west/southwest, crossing beneath I-95 before traversing ConnDOT Highway property, parallel to Sound Shore Drive. The lines would then follow Sound Shore Drive to the intersection with Indian Field Road. After crossing I-95, the cable system would continue south along Indian Field Road then turn west to Bruce Park Drive. From Bruce Park Drive, the cable system would intersect with and continue south along Wood Road, traversing Bruce Park beneath the paved surface of the roadway, then turning west along Davis Avenue, crossing Indian Harbor, and intersecting with Indian Harbor Drive. The cable system would be aligned along Indian Harbor Drive to Museum Drive and then to Arch Street, crossing beneath I-95 along Arch Street near I-95 Exit 3. At the intersection of Arch Street and Railroad Avenue, the cable system would turn west to follow Railroad Avenue and terminate at the alternate Greenwich Substation at 281 Railroad Avenue. (Eversource 1, Vol. 1, Exh. B, pp. A-10 – A-11)

Indian Field Road Overpass

79. The transmission line route would cross I-95 by way of Indian Field Road near I-95 Exit 4. In this area, Indian Field Road is elevated above I-95. At the Town's suggestion, Eversource evaluated attaching the cables to the I-95 overpass of Indian Field Road. Though technically feasible, Eversource determined it was not the most practical or cost-effective option. In meetings with ConnDOT, Eversource was told that ConnDOT was "heavily opposed to using the bridge attachment to cross the highway"; and ConnDOT later confirmed that opposition in a comment letter to the Council. Eversource determined that using trenchless technology, known as pipe jacking, to install the cable system beneath I-95 would be a viable alternative. (ConnDOT Comments dated August 31, 2017; Eversource 1, Vol. 1, Exh. B, p. A-11)

80. Eversource prepared a preliminary analysis for use of an overhead line configuration for the Indian Field Road overpass. When factoring in the additional underground route needed to get to an overhead location, the need for riser structures, and required traffic control, Eversource determined that there would be no cost savings associated with the use of an overhead segment. Further, ConnDOT has indicated that it does not want any overhead structures in the median between an onramp/offramp on I-95. Therefore, Eversource determined that such an overhead configuration would not be a feasible solution for this location. (Transcr. 2, p. 36)

81. If a jack and bore were used to cross I-95, Eversource would likely locate its jacking pit in the median between the exit ramp and I-95. Eversource favors the east side because it would be a shorter length for the cable. Eversource is in the process of locating subsurface utilities and determining where the cable would be installed; however, it expects that the proposed underground electric transmission jack and bore would likely be located at an elevation above the existing Town force main which is likely 15 to 20 feet deep. The operation would likely require approximately 30 days. Eversource would manage the worksite to be free of any traffic shutdowns. (Transcr. 2, pp. 44 – 46)

IX. PROJECT DESCRIPTION

82. The Project would consist of a new, approximately 2.3-mile double-circuit 115-kV underground transmission line along the Proposed Route between Eversource's existing Cos Cob Substation and a new Greenwich Substation to be located at 290 Railroad Avenue (or an alternate substation location at 281 Railroad Ave.). The route of the transmission line would extend along public roads, mostly south of and generally parallel to I-95. Eversource also proposes to make modifications to its existing Cos Cob and Prospect Substations. (Eversource 1, Vol. 1, Exh. B, pp. A-1, A-8)

115-kV Transmission Line

83. A new, double-circuit underground 115-kV transmission line would be installed to link Cos Cob Substation to a proposed Greenwich Substation at 290 Railroad Avenue (or an alternate substation location at 281 Railroad Ave.). This underground line would consist entirely of cross-linked polyethylene ("XLPE") dielectric cable. (Eversource 1, Vol. 1, Exh. B, p. A-8)

84. The proposed transmission line would comprise two XLPE cable circuits, each of which would consist of three phases, so that the cable system would include six cables in total. Each phase of each circuit would consist of one 3500-kcmil copper-conductor cable insulated to 115-kV with approximately 0.75 inch of XLPE insulation. Each cable would be approximately 4.6 inches in diameter. (Eversource 1, Vol. 1, Exh. B, p. A-8)

85. Three electric cables would be installed in PVC ducts encased in concrete. Except for short distances at their terminal points and splice vaults, the two circuits would be encased in a common concrete duct bank. Smaller conduits would also be installed in the duct bank for the communications, temperature monitoring, and ground continuity cables. (Eversource 1, Vol. 1, Exh. B, p. A-8)

86. Along the Proposed Route, Eversource estimated that eight splice vault locations would be required with two vaults at each splice location (one for each circuit), for a total of sixteen vaults. The approximate dimensions for the splice vaults would be 7 feet deep by 7 feet wide by 22 feet long. The splice vaults would be located either within road ROWs (to the extent that space is available given the locations of other existing underground utilities) or on private property adjacent to the road ROWs. (Eversource 1, Vol. 1, Exh. B, p. A-9)

87. Although the Town would prefer that Eversource avoid putting any splice vaults in Bruce Park, if possible, the length from Indian Field to the Davis Avenue underpass is roughly 4,000 feet, which is too long a cable pull between splice vaults. This length makes it infeasible to avoid placement of a vault in Bruce Park. (Transcr. 4, p. 43)

88. Eversource has performed sample checks on what it has currently proposed for splice vault locations along the Proposed Route, and believes the proposed lengths are sufficiently short and straight enough to allow their current proposed locations. However, final details regarding the number and location of the splice vaults would be provided in Eversource's D&M plan. (Transcr. 3, pp. 109 – 110)

89. The proposed 115-kV transmission line would be designed to operate at a nominal voltage of 115,000 volts and would provide approximately 192 MVA of summer normal line capacity. (Eversource 1, Vol. 1, Exh. B, p. A-10)

90. The 192 MVA capacity of the underground cable associated with the Project is based on the following set of design assumptions. Greenwich Substation is being designed for two 60 MVA bulk substation transformers. The design includes provisions to upgrade the two original 60 MVA transformers to 80 MVA transformers in the future as needed. The 115-kV transmission underground cable would be sized to accommodate the potential future installation of the 80 MVA transformers because it is prudent to design and install cable that can accommodate future expansion without exposing the area to additional underground construction. The 192 MVA of 115-kV underground cable capacity provides an alternative supply for Cos Cob load. If an emergency occurred requiring Cos Cob load to be transferred to Greenwich, the two 80 MVA transformers could serve 120%, or 192 MVA, of their normal rating for up to two hours. (Eversource 9, Q-TOWN-58)

91. After the proposed new transmission line is constructed, the main feeders that serve the Prospect and Greenwich network would be retained to feed the underground network and provide redundancy; however, there would no longer be the same capacity on the feeders. Additionally, the feeders from Prospect Substation to Byram Substation and from Cos Cob Substation to Byram Substation would remain. (Transcr. 2, pp. 23, 27 – 28)

Pedestrian Bridge/Cofferdam Crossing of Indian Harbor

92. The Town proposed that Eversource construct a pedestrian bridge just north of the existing Davis Avenue Bridge in order to cross Indian Harbor, which is perpendicular to Davis Avenue. The bridge would be designed to carry the proposed transmission line and its associated conduits over the harbor. The Town reasoned that the proposed pedestrian bridge would minimize disruption to Indian Harbor or potential conflicts with the existing Davis Avenue Bridge, which is scheduled for replacement in the future. Although Eversource prefers to utilize a cofferdam to facilitate the crossing of Indian Harbor in this area, the Project cost estimate includes the construction of the pedestrian bridge, as preferred by the Town. (Eversource 1, Vol. 1, Exh. B, p. A-11)

93. The proposed pedestrian bridge deck would be eight feet wide and constructed of wood, with cables suspended underneath. (Transcr. 2, p. 7)

94. The majority of the pedestrian bridge would be constructed on site because it would be a fairly lengthy structure. (Transcr, 2, p. 67)

95. Utilizing a pedestrian bridge to cross Indian Harbor is estimated to cost approximately $1.8 million more than using an open trench with a cofferdam, and approximately $850 thousand more than utilizing HDD. (Eversource 11, Q-CSC-061-RV01)

96. Eversource is concerned that the pedestrian bridge crossing of Indian Harbor would be less secure and reliable than installing the cable in a trench across this waterway via the use of a cofferdam. Eversource has concerns regarding ongoing maintenance of the pedestrian bridge, which it would want the Town to assume, along with accepting ownership of the bridge. (Eversource 8, p. 5)

97. If the cofferdam were constructed to cross Indian Harbor, north of the existing Davis Avenue Bridge, it would be a temporary dam that would allow for dewatering on site. (Transcr. 2, pp. 64 – 65)

98. The cofferdam crossing would be located in the same general location as the proposed pedestrian bridge. It would be possible to cross Indian Harbor on the south side of the existing Davis Avenue Bridge utilizing a cofferdam; however, Eversource would need to acquire land rights across private property located on the west side of the harbor. (Eversource 2, Q-CSC-49)

99. The cofferdam would not extend completely across Indian Harbor; rather, approximately half of the waterway at a time would be dammed, so that water would be able to flow between Indian Harbor and the pond area. (Transcr. 2, pp. 65 – 66)

New Greenwich Substation

100. The proposed Greenwich Substation would have two automatic loop scheme ties between feeders emanating from different buses at the proposed Greenwich Substation, four automatic loop scheme ties with Cos Cob Substation, three automatic loop schemes with North Greenwich Substation, and three automatic loop schemes with Byram Substation. (Eversource 2, Q-CSC-024)

101. Eversource's preferred site for the new Greenwich Substation is 290 Railroad Avenue. This preference is based upon the commercial nature of the neighborhood, slightly less cost to distribution ratepayers, and the position for a mobile transformer. However, 281 Railroad Avenue is a viable option. Although a brick wall could be used to surround the site at 281 Railroad Avenue,

additional sound mitigation measures may be required if the all-indoor substation design is not approved. (Transcr. 2, pp. 123 – 125)

102. The site at 290 Railroad Avenue is larger, and it would be simpler and less expensive to connect the distribution feeders there, as compared to 281 Railroad Avenue. (Eversource 8, p. 3)

290 Railroad Avenue

103. The 290 Railroad Avenue site is the same site proposed by Eversource in Docket 461. However, Eversource has reduced the scope and cost of the proposed substation. (Eversource 1, Vol. 1, Exh. A, p. A-5)

104. Nearly the entire 0.81-acre parcel is currently developed and covered by impervious surface. As the Council found in Docket 461, the site is "located in a highly-urbanized area and is developed as a commercial property." (Eversource 1, Vol. 1, Exh. A, p. B-1; Council Admin. Notice 43, FOF No. 372)

105. The proposed Greenwich Substation would be an open-air insulated station ("AIS") configuration, rather than a gas-insulated station as proposed in Docket 461. (Eversource 1, Vol. 1, Exh. A, p. A-5)

106. The proposed Greenwich Substation would contain one 115-kV circuit breaker and two 60-MVA transformers. Two 115-kV underground termination structures would each be protected by a circuit switcher. Two circuit switchers would protect the two transformers. Two disconnect switches would be located on each side of a tie breaker. The substation would also have two neutral reactors. There would be a position for a third underground termination structure and disconnect switch for future use. (Eversource 1, Vol. 1, Exh. A, p. A-6)

107. Two new 115-kV solid dielectric XLPE underground transmission lines would exit the proposed Greenwich Substation from two new terminal structures, each approximately 15 feet in height. (Eversource 1, Vol. 1, Exh. A, p. A-6)

108. One lightning mast, approximately 65 feet in height, would be installed at the proposed Greenwich Substation. (Eversource 1, Vol. 1, Exh. A, p. A-6)

109. One 13.2-kV switchgear enclosure, approximately 85 feet long by 24 feet wide by 14 feet high, would be installed at the proposed Greenwich Substation. A control enclosure, with dimensions of 42 feet long by 14 feet wide by 12 feet high, would include new protection and control equipment, a new battery system and a toilet. (Eversource 1, Vol. 1, Exh. A, p. A-6; Council Admin. Notice 43, Eversource 1, p. G-3 (switchgear enclosure height))

110. A 15-foot-tall brick veneer wall would surround the entire proposed substation site at 290 Railroad Avenue. (Eversource 1, Vol. 1, Exh. A, p. A-6)

111. The two 60-MVA transformers would be in service, and would share the load at all times. Eversource would account for loss of one of the transformers so that the overall substation rating would be 60 MVA. (Transcr. 2, pp. 30 – 31)

112. The proposed Greenwich Substation would include a triangular open area in the southwest portion of the substation for placement of a mobile transformer. (Transcr. 2, pp. 75 – 76)

113. If an all-indoor substation, as proposed for 281 Railroad Avenue, were constructed at 290 Railroad Avenue instead, then Eversource could possibly connect a temporary transformer with temporary cables exiting the enclosure, and maintain physical protection while doing so. It would likely require temporary fencing for both the mobile transformer and the cabling that would enter the building. (Transcr. 2, pp. 81 – 82)

114. A mobile transformer would be important because if one of the transformers is out of service and the second one is lost, then Eversource would have to take emergency actions and serve the load that was normally fed from the Greenwich Substation using the mobile transformer. The mobile transformer would enhance reliability under stressed conditions, although loss of the second transformer is unlikely. (Transcr. 2, pp. 150 – 151)

115. Although the Town has concerns regarding the construction of the new Greenwich Substation next to the Airgas facility, Eversource still believes – as it did in Docket 461 – that it can build the new Greenwich Substation at 290 Railroad Avenue safely in proximity to Airgas. There is no applicable code or standard that would preclude siting a substation in this location. (Transcr. 2, pp. 60, 126; Transcr. 3, pp. 244 – 245)

116. If the new Greenwich Substation is constructed at 290 Railroad Avenue, use of the same type of architectural enclosure proposed for 281 Railroad Avenue may resolve the Town's concern about the proximity of the substation to the Airgas facility. (Eversource 8, p. 3)

281 Railroad Avenue

117. The alternate Greenwich Substation would be constructed on a 0.75-acre site at 281 Railroad Avenue. The site, which is industrially zoned, is owned by Eversource and used for storing materials including utility poles. The location was presented as an alternate site in Docket 461. (Eversource 1, Vol. 1, Exh. B, pp. A-5, A-7)

118. As requested by the Town, the proposed Greenwich Substation at 281 Railroad Avenue would have an architecturally enhanced building enclosure surrounding the entire substation except for a roof opening above the transformers and circuit switchers. (Eversource 1, Vol. 1, Exh. B, pp. A-5, A-7)

119. Components of the Greenwich Substation at this location would include two 60-MVA transformers, one 115-kV circuit breaker, 13.2-kV switchgear, two circuit switchers, two new 115-kV solid dielectric underground transmission line exits, two neutral reactors, a battery room and a toilet. (Eversource 1, Vol. 1, Exh. B, p. A-5)

120. There is no room at 281 Railroad Avenue for placement of a temporary mobile transformer. In such a case, Eversource would need to seek temporary rights off of the substation site to locate the mobile transformer. (Transcr. 2, pp. 77, 86)

121. The proposed façade of the Greenwich Substation at 281 Railroad Avenue would consist of a standing seam metal roof system, and would be sided with "HardiePlank" over fire retardant sheathing. (HardiePlank is a proprietary fiber cement non-flammable siding product.) Architectural glazing would be opaque shatterproof glass. Man doors would be hollow metal, and overhead coiling doors would be composed of painted galvanized steel slats enclosing sprayed-in-place polyurethane insulation. The building frame would consist of structural columns and beams, and

open web joists with purlins supporting the roof; siding would be supported by cold formed metal girts and studs. (Eversource 2, Q-CSC-044)

122. If the new Greenwich Substation is constructed at 281 Railroad Avenue as an indoor substation, rather than as an AIS open-air substation, the additional cost would be approximately $1.4 million. (Eversource 11, Q-CSC-061-RV01; Transcr. 2, p. 80)

123. The cost to construct a 15-foot tall brick wall to enclose an AIS substation at 281 Railroad Avenue would be approximately $1.2 million. (Eversource 12, Q-CSC-069)

124. Either type of AIS substation design – an open air or all-indoor substation – could be constructed at either 281 or 290 Railroad Avenue. (Eversource 2, Q-CSC-45)

Substation Modifications

125. The existing Cos Cob Substation is located in the southeastern portion of Greenwich, off Sound Shore Drive. Eversource currently utilizes 0.47 acre of a 1.5-acre Eversource-owned property for its existing substation equipment and operation. It also utilizes 0.59 acre of a 1.44-acre easement provided by the State of Connecticut. The Project would require an approximately 0.80-acre expansion of the existing substation. The existing substation fence would be moved to accommodate this expansion. (Eversource 1, Vol. 1, Exh. A, p. A-7)

126. The proposed expansion of Cos Cob Substation would not affect the adjacent Town fence that was installed to delineate Cos Cob Park. (Eversource 1, Vol. 1, Exh. A, p. A-7)

127. The proposed expansion area at Cos Cob Substation was reduced by 0.035 acre as compared to Docket 461 by pulling the perimeter fence in by 3 feet from the Town Park fence. (Eversource 2, Q-CSC-30)

128. Although the proposed electrical changes to Cos Cob Substation are the same as those detailed in the Docket 461 Project Application, Eversource has revised the footprint of the modifications. In addition, the Project would include the installation of the following facilities, which were not included in the original GSLP plans:

- One 115-kV double breaker for the 1703 line.
- Reconfiguration of the existing 1020 line-terminal position to accommodate an in-line PASS M0.
- Two 65-foot-tall lightning masts.
- New retaining walls as required to protect the Town Park property line and the existing MNR substation.

(Eversource 1, Vol. 1, Exh. A, p. A-7)

129. The proposed equipment to be removed at Cos Cob Substation would be the same as detailed in Docket 461. (Eversource 1, Vol. 1, Exh. A, p. A-8)

130. The proposed modifications to the Prospect Substation would remain as described by the Council in its Finding No. 274 in Docket 461. (Eversource 1, Vol. 1, Exh. A, p. A-8; Council Admin. Notice 43)

131. The proposed new Greenwich Substation would provide 100-percent backup for the Prospect Substation. (Transcr. 2, p. 144)

132. In contrast to Docket 461, the Project would leave Byram Substation in service with no modifications. (Eversource 1, Vol. 1, Exh. A, p. A-8)

133. After the new Greenwich Substation is constructed, Eversource would look at how the loads in the Town continue to evolve over the next three to five years. If they are stable or declining, then Eversource would look to retire the Byram Substation as well. In effect, the Byram Substation would serve as an insurance policy for the next few years. If it were to be retired, then Byram's existing customers would then be fed by the new Greenwich Substation. (Transcr. 2, p. 26)

134. If the load at Byram Substation increases over the next three to five years, then Eversource would likely change out the 12.5 MVA transformers and recondition the switchgear. (Transcr. 2, p. 27)

135. The Greenwich distribution system would still depend upon the 27.6-kV system and its cables would remain after the Project is built; however, the new Greenwich Substation would allow automated transfers at 13.2 kV, which is not currently present in automated fashion, and would reduce the load on the existing 27.6-kV feeders. (Transcr. 3, pp. 62 – 63, 97 – 98)

X. PROJECT CONSTRUCTION PROCEDURES

136. Eversource would install erosion and sedimentation ("E&S") controls at the limits of its work area and around adjacent catch basins, in accordance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*. The E&S controls would be inspected and maintained through the course of construction along the Proposed Route until all disturbed sites are stabilized. (Eversource 1, Vol. 1, Exh. B, p. C-3)

137. All underground installation work associated with the new transmission line would be conducted within the roadways except for the following locations: the crossing of I-95, the crossing of Indian Harbor in Bruce Park, the ConnDOT Rail parking lot, and the ConnDOT Highway I-95 ROW. (Eversource 1, Vol. 1, Exh. B, p. C-2; Eversource 1, Vol. 2, App. 11, Maps 1 & 2; Eversource 1, Vol. 1, Exh. B, p. A-10)

138. Because the work will occur primarily within public roads, the proposed construction areas for the transmission lines are easily accessible and do not require the development of new entrance/egress points. (Eversource 1, Vol. 1, Exh. B, p. C-2)

139. Trench depths would typically be five feet; splice boxes would typically be approximately nine feet deep. (Transcr. 2, p. 138)

140. While working on the trench along Davis Drive, approximately 200- to 300-foot segments would be blocked off during work, and reopened at the end of the day. The entire road would be closed, given the narrow width of the paved area. Eversource would coordinate with those residences located along Davis Drive that would be affected by the road closure. (Transcr. 2, pp. 74 – 75)

141. Open trench areas would be covered with steel plates at the conclusion of each work day. (Transcr. 2, p. 139)

142. While excavating the trench, Eversource plans to live load dump trucks with excess soil so that no staging would be required in these areas. (Transcr. 2, p. 142)

143. In the event that bedrock is encountered, excavation, drilling, or pneumatic hammer would be used to remove rock. In accordance with the Town's request, no blasting techniques would be considered. (Eversource 1, Vol. 1, Exh. B, p. C-3)

144. To defend against any corrosion from saltwater that might occur when bonding within the splice vaults, Eversource would use an inhibitor such as calcium nitrate, use an epoxy coated rebar for anchoring, and increase the cleared space coverage to four inches from three inches to provide extra protection. (Transcr. 2, pp. 152, 177)

145. Upon completion of construction, Eversource would reestablish previously vegetated, disturbed areas with seed mixtures or plantings, where necessary. (Eversource 1, Vol. 1, Exh. B, p. C-9)

Indian Field Road Overpass

146. If I-95 were crossed by a bridge attachment to the Indian Field Road overpass, and the bridge were to be replaced or rehabilitated, Eversource would coordinate with ConnDOT to develop a construction sequence that would allow for the transmission line to be installed on the new or upgraded bridge prior to removing the existing transmission line. Such a replacement would likely be performed in sections. If so, then Eversource would relocate the ducts from one side of the bridge to the other while ConnDOT reconstructs the bridge one lane at a time. (Eversource 2, Q-CSC-042; Transcr. 2, pp. 42 – 43)

Pipe Jacking

147. The general procedure for a trenchless cable installation under I-95 would include the following:

- Establish staging areas (each approximately 0.5 acre) on each side of I-95, between the Exit 4 on- and off-ramps.
- Within these staging areas, excavate vertical shafts on both sides of the highway. Such excavations would be approximately 15 feet wide, 40 to 50 feet long, and up to 15 feet deep.
- Position a boring machine at the bottom of the bore pit on one side of the highway. The boring machine would be used to bore a 42-inch diameter hole beneath the highway, across to the opposite pit.
- A 42-inch diameter casing pipe would then be installed between the bore pits and the cable ducts pulled into the casing pipe.
- The remaining voids in the casing would be filled with a thermal grout mixture, such as flowfill or thermal concrete.

(Eversource 1, Vol. 1, Exh. B, pp. A-12 – A-13)

148. Final excavation size of the horizontal bore pits would be determined by a number of different factors dependent on the length, bore diameter, soil conditions, and groundwater conditions. Excavation stabilization methods or equipment (such as sloping or a trench box) would be employed to keep workers safe in the bore pit. (Eversource 1, Vol. 1, Exh. B, p. A-13)

Pedestrian Bridge/Cofferdam Construction

149. The general procedure for installing a pedestrian bridge across Indian Harbor would utilize the following general methods:

- Establish erosion and sedimentation controls around the proposed abutment foundations.
- Install sheet piling around the limits of the excavation for the proposed abutment foundations.
- Excavate for abutment foundations.
- Form and place concrete for abutment and abutment foundations.
- Remove sheet piling.
- Install steel truss.
- Form and place concrete for superstructure with conduits formed within the bridge.
- Complete architectural treatments.

(Eversource 1, Vol. 1, Exh. B, p. A-17)

150. If a cofferdam is constructed for the Indian Harbor crossing, the initial part of the cofferdam installation may be done using floating work platforms. Construction of the cofferdam would take approximately 30 days. (Transcr. 2, pp. 67 – 68)

151. If a cofferdam were constructed, the duct bank would be founded on the bedrock. Depending upon the topography of the bedrock, minimal leveling may be required in order to attach the duct bank. (Eversource 2, Q-CSC-49; Transcr. 2, p. 72)

152. The approximate depth of Indian Harbor at the cofferdam crossing is 2.5 feet. The bedrock in Indian Harbor is covered by approximately seven feet of sediment, much of which would require removal and disposal in order to accommodate the lines and the duct banks. On the landside of the harbor, the depth of the duct bank trench would be approximately 5 feet four inches deep. (Transcr. 2, pp. 71 – 72; Eversource 2, Q-CSC-49)

153. Mechanical rock removal in the area of the cofferdam would be required, though no blasting is anticipated by Eversource. (Transcr. 2, pp. 73 – 74)

Greenwich Substation

154. Whichever site, 281 or 290 Railroad Avenue, that is not chosen for the new Greenwich Substation would be used as a material laydown yard and likely also as a site for a construction office. (Eversource 8, pp. 2 – 3)

XI. ENVIRONMENTAL RESOURCES, EFFECTS AND MITIGATION MEASURES

155. In Docket 461, the Council made extensive findings concerning the existing environmental conditions at the sites of the Cos Cob Substation and proposed new Greenwich Substation at 290 Railroad Avenue, and the impacts of the proposed substation construction, all of which remain valid. (Eversource 1, Vol., 1, Exh. A, p. B-1; Council Admin. Notice 43, FOF)

156. All proposed modifications to Prospect Substation are internal to the existing confines of the facility, and would not create any new disturbances beyond its footprint. As a result, no adverse environmental effects would occur. (Eversource 1, Vol. 1, Exh. A, p. B-1)

157. The Cos Cob Substation on Sound Shore Drive consists primarily of previously disturbed and developed land, where both Eversource and the MNR maintain extensive substation and other electrical infrastructure. As with Docket 461, the proposed Cos Cob Substation expansion would affect the area south of the existing fence line in an area that contains a lattice transmission structure and wood pole transmission structure. The proposed expansion would not affect the recreational facilities in nearby Cos Cob Park, and would remain on Eversource and State property. (Eversource 1, Vol. 1, Exh. A, p. B-3; Council Admin. Notice 43, FOF Nos. 372, 374)

158. The proposed design, construction, and operation of the underground transmission supply lines along the Proposed Route would not have significant permanent adverse effects on the existing environment or on the scenic, historic or recreational values of the surrounding area. Eversource has incorporated, and will continue to incorporate, procedures into all phases of the Proposed Route development and implementation to promote environmental protection measures, in accordance with federal, state and local requirements. (Eversource 1, Vol. 1, Exh. B, p. C-1)

Topography, Geology and Soils

Substations

159. As the Council found in Docket 461, "Minimal grading would be required for construction at both the proposed Greenwich Substation site and Cos Cob Substation." (Eversource 1, Vol. 1, Exh. A, p. C-1; Council Admin. Notice 43, FOF No. 383)

160. If the new Greenwich Substation is constructed at 281 Railroad Avenue, some grading and excavation activities would be required prior to installation of new facilities. The removal of the existing paved parking area and necessary earth work (e.g., foundation excavation and trenching) would have negligible, if any, adverse effects on topography, geology and soils. (Eversource 1, Vol. 1, Exh. B, p. C-2)

Proposed (formerly "Alternate Modified") Route

161. Bedrock geology consists of two different formations. The Nodular member of Harrison Gneiss, is the principal bedrock formation along the Proposed Route. Bedrock in the extreme western portion of the Proposed Route (roughly west of Steamboat Road) is identified as Golden Hill Schist. (Eversource 1, Vol. 1, Exh. B, p. B-7)

162. The character of the surficial geology along the Proposed Route is predominantly glacial till of varying thickness over irregular bedrock, as well as artificial fill. As the line route crosses Bruce Park and Indian Harbor, the surficial geology changes to a mix of sand and gravel areas, and depressions/watercourse crossings of outwash and alluvium. (Eversource 1, Vol. 1, Exh. B, p. B-7)

163. Installation of the underground transmission supply lines and proposed pedestrian bridge along the Proposed Route, including pipes, conduits, splice vaults and jack and bore drilling, would require substantial earthwork, which would be temporary in nature as excavations would be backfilled upon completion of the equipment installations. (Eversource 1, Vol. 1, Exh. B, p. C-3)

164. Prior to construction, Eversource would provide its contractors with information and drawings that incorporate Eversource's BMP Manual. The drawings would include specific details as to the procedures and/or methods to be utilized for the selected route and provide information on erosion control, construction site dewatering, spill prevention and control, construction staffing and hours of work, and restoration. (Eversource 1, Vol. 1, Exh. B, p. C-3)

165. Measures would be taken to contain any temporary soil storage piles and to avoid sedimentation into water resource areas and/or catch basins. Typical E&S controls may not be required for excavation, trenching and other construction activities within road ROWs, where the potential for off-site erosion or sedimentation is limited, but would be employed as needed at any off-road ROW work sites. Any temporary controls would be maintained until the disturbed work sites are properly restored, as determined by standard criteria for stormwater pollution prevention and erosion control. (Eversource 1, Vol 1, Exh. B, p. C-3)

166. After the completion of conduit and splice vault installation, disturbed areas would be restored to the appropriate grade. All disturbed areas along the banks of Indian Harbor would be properly restored and protected from erosion. No changes to existing grades are anticipated as a result of the proposed facility installations associated with the Proposed Route. However, if the cables are installed adjacent to, but not within, existing road ROWs, some grading may be required to create a level work area. (Eversource 1, Vol. 1, Exh. B, p. C-3)

167. Excess excavated materials and materials not suitable for backfilling the trench would be disposed of in accordance with applicable regulations. (Eversource 1, Vol. 1, Exh. B, p. C-3)

Water Resources

Substations

168. As the Council found in Docket 461, the proposed Greenwich Substation is not within a 100-year or 500-year flood zone as determined by the Federal Emergency Management Agency. The southern portion of the site is 10 feet from the edge of a designated 500-year flood zone associated with Horseneck Brook. (Eversource 1, Vol. 1, Exh. A, p. B-8; Council Admin. Notice 43, FOF No. 422)

169. Cos Cob Substation is located outside of the 100-year and the 500-year flood zones. (Eversource 1, Vol. 1, Exh. A, p. B-8)

170. At the proposed Greenwich Substation site at 290 Railroad Avenue, portions of the northeast and southeast corners of the parcel lie within the Coastal Boundary, totaling approximately 1,120 square feet. The entire Cos Cob Substation is located within the Coastal Boundary. (Eversource 1, Vol. 1, Exh. A, p. B-9)

171. The alternate Greenwich Substation site at 281 Railroad Avenue is not located within a flood zone, and is not encumbered by Hurricane Surge Inundation Areas. No portion of the site is located within wetlands or watercourses. (Eversource 1, Vol. 1, Exh. B, pp. B-8, C-4)

172. In Docket 461, the Council found that the proposed substation work (which has been reduced in scope by this Project) would have no adverse effect on coastal resources, inland wetlands and watercourses, groundwater, or flood hazard areas. These findings continue to apply to the proposed substation construction. (Eversource 1, Vol. 1, Exh. A, p. C-3; Eversource Admin. Notice 43, FOF Nos. 408, 419, 422, 424)

Proposed (formerly "Alternate Modified" Route)

173. The Proposed Route is located within the Southwest Coast Major Drainage Basin. Major surface water bodies include Indian Harbor, Cos Cob Harbor, Greenwich Creek, and Greenwich Harbor. (Eversource 1, Vol. 1, Exh. B, p. B-8)

174. Groundwater beneath the Proposed Route is classified by CT DEEP as both GA and GB. Class GA designations are located primarily within the central portion of the route, and Class GB designations are mapped at proposed and existing substation parcels, as well as the western and eastern ends of the Project area, where dense commercial and industrial development occurs. (Eversource 1, Vol. 1, Exh. B, p. B-8)

175. No water supply wells are located along the Proposed Route. Based on available mapping, the route is not located within an Aquifer Protection Area. (Eversource 1, Vol. 1, Exh. B, p. B-8)

176. Areas along the Proposed Route lie within the 100-year flood zone areas, including locations along Railroad Avenue, Arch Street and substantial portions of Davis Avenue near Indian Harbor. The transmission lines and associated equipment have been designed to be protected adequately from water. (Eversource 1, Vol. 1, Exh. B, pp. B-8, C-6)

177. Portions of the Proposed Route are located within Category 1, 2, 3, and 4 Hurricane Surge Inundation Areas, which encroach upon Arch Street (associated with Greenwich Harbor), Davis Avenue (Indian Harbor), and the Cos Cob Substation property. (Eversource 1, Vol. 1, Exh. B, p. B-8)

178. Several locations along the Proposed Route lie within the Coastal Boundary, including a portion of the underground transmission supply lines. Based on existing land uses and the location and design of the proposed installations utilizing local roads, no adverse effects on coastal resources are anticipated as a result of the Proposed Route. (Eversource 1, Vol. 1, Exh. B, p. C-6)

179. A majority of the transmission supply line route would be located underground within the Coastal Boundary and, therefore, would not alter the natural features of vistas and viewpoints. (Eversource 1, Vol. 1, Exh. B, p. C-6)

180. The transmission lines that require crossing over Indian Harbor affixed to the proposed pedestrian bridge are located within portions of the 100-year flood zone and Hurricane Surge Inundation Areas. Equipment and structures associated with this waterbody would not be affected by their location as they would be designed to be protected from water. (Eversource 1, Vol. 1, Exh. B, p. C-6)

181. The Proposed Route is currently developed with impervious or highly compacted surfaces and contains minimal vegetated or open water habitat. Therefore, the proposed installations would not degrade or destroy essential wildlife, finfish or shellfish habitat. (Eversource 1, Vol. 1, Exh. B, p. C-8)

182. One watercourse was identified proximate to the Proposed Route. The watercourse, which is part of Indian Harbor, is a complex of open water features south of I-95 located interior to Bruce Park. The system generally drains southward into Long Island Sound. The banks are well developed with stone armoring, maintained lawn, sheer bedrock cliffs, and some limited vegetated buffers.

Easterly limits include vegetated buffers and stagnant back-water wetland areas; northern limits are heavily influenced by road debris and possess little wildlife habitat value. Numerous waterfowl likely use the water bodies and adjacent habitats in Bruce Park, including ospreys, double crested cormorants, mute swans, snowy egrets, green heron, Canadian geese, and numerous song birds. (Eversource 1, Vol. 1, Exh. B, p. B-9)

183. Neither the construction nor the operation of the Proposed Route would have any long-term adverse effects on surface or groundwater resources or water quality. Utilization of existing road ROW would minimize conflicts with wetland resources and watercourses located near the route. (Eversource 1, Vol. 1, Exh. B, p. C-4)

184. Underground transmission lines for the Proposed Route would need to cross Indian Harbor. Although some work could occur within the watercourse, Eversource would employ appropriate design considerations to minimize environmental effects to this resource. Once construction is complete, all affected areas would be returned to their original status. (Eversource 1, Vol. 1, Exh. B, p. C-4)

185. Groundwater may be encountered during installation of the transmission supply lines and splice vaults, as well as excavations for pipe jacking pits. A large portion of the Proposed Route traverses areas with groundwater classified as potable (based on CT DEEP's GA classification). If groundwater is encountered, appropriate sampling and dewatering would be performed in accordance with authorizations from applicable regulatory agencies. Options include catch basins, pumping and temporary storage within holding tanks, or the use of vacuum trucks for expedited disposal. (Eversource 1, Vol. 1, Exh. B, p. C-5)

Wildlife and Vegetation

186. The property at 290 Railroad Avenue provides no significant habitat for wildlife. (Eversource 1, Vol. 1, Exh. A, p. B-14)

187. The Cos Cob Substation property provides minimal wildlife habitat, with the exception of ospreys and other birds that perch or nest on taller structures. (Eversource 1, Vol. 1, Exh. A, p. B-14)

188. The areas planned for construction at the substation sites have been previously disturbed and have little, if any, vegetation or wildlife habitat value. (Eversource 1, Vol. 1, Exh. B, p. C-9)

189. CT DEEP's Natural Diversity Data Base ("NDDB") mapping depicts areas of known habitat for state-listed endangered or threatened species, or species of special concern (known as "polygons") on the Cos Cob Substation property. Eversource consulted with CT DEEP NDDB, and the agency determined that no such resources would be impacted by the proposed activities. (Eversource 1, Vol. 1, Exh. A, p. B-14)

190. No mapped areas of Critical Habitat are identified along the Proposed Route. (Eversource 1, Vol. 1, Exh. B, p. B-9)

191. Eversource completed consultations with the U.S. Fish and Wildlife Service ("USFWS") in accordance with Section 7 of the Endangered Species Act through its IPaC system to determine if any federally-listed or proposed, threatened or endangered species or critical habitats exist in proximity to the Proposed Route. Two species listed as "threatened" were identified as potentially occurring within the Project area:

- Northern long-eared bat ("NLEB"): The Project is not within 150 feet of a known occupied maternity roost tree and is not within 0.25 mile of a known NLEB hibernaculum. The nearest NLEB habitat resource to the proposed activity is located in Greenwich ±4.3 miles to the north.
- Red knot: The red knot is a shore bird typically found along the Connecticut coastline during north- and south-bound migration. Not known to occur at inland locations, red knots can be found on Connecticut's barrier beaches from mid-April to the end of May, and then again from July through mid-September. Sometimes non-breeding individuals may linger along Connecticut barrier beaches between migratory periods, and late individuals may pass through on south-bound migration well into November. There is no suitable habitat (either feeding or roosting) for red knot along the Proposed Route; therefore, the Project activities would not result in impact to or an "incidental take" of this species.

(Eversource 1, Vol. 1, Exh. B, pp. B-10, C-9 – C-10)

192. No CT DEEP Fisheries Management Areas exist proximate to the Proposed Route. (Eversource 1, Vol. 1, Exh. B, p. B-10)

193. Vegetation along the Proposed Route consists primarily of maintained lawns and a combination of natural and ornamental trees and shrubs along roadsides and on private properties. Larger trees are found along the southern boundary of the I-95 transportation corridor. Landscaping and older growth trees are found in and around Bruce Park. (Eversource 1, Vol. 1, Exh. B, p. B-9)

194. No significant areas of vegetation exist along the Proposed Route and no negative effects to vegetation or wildlife are anticipated from construction of the Proposed Route. (Eversource 1, Vol. 1, Exh. B, p. C-8)

Historic and Archeological Resources

195. Eversource retained Heritage Consultants, LLC ("Heritage") to review and evaluate historic and archeological resources associated with the Proposed Route. The review revealed that there are four previously identified archeological sites: Cos Cob Railroad Station, Greenwich Avenue Historic District, Cos Cob Power Station Historic District, and the former New York, New Haven & Hartford rail line located within or in close proximity (500 feet). (Eversource 1, Vol. 1, Exh. B, pp. B-10 – B-11)

196. Based on the results of its evaluation, Heritage concluded that the Proposed Route would have a low probability of encountering intact cultural deposits or artifacts of archaeological significance. It further determined that the Project would not have adverse impacts on historic built resources or archaeological deposits. (Eversource 1, Vol. 1, Exh. B, pp. B-11, C-11)

197. Heritage's report was provided to the SHPO on March 13, 2017. The SHPO responded in writing on April 25, 2017, and concurred with the Heritage findings that "no historic properties will be affected by this Project. No further review is requested." (Eversource 1, Vol. 1, Exh. B, p. C-11)

Noise

198. The existing noise environment along the Proposed Route is heavily influenced by traffic noise along local and state roads, including I-95, and the MNR corridor. (Eversource 1, Vol. 1, Exh. B, p. B-11)

199. Construction-related noise for the underground transmission supply lines would be short-term and highly localized in the vicinity of work sites, and would result from the operation of construction equipment, including truck traffic, earth moving equipment, drill rigs, and jackhammers. (Eversource 1, Vol. 1, Exh. B, p. C-12)

200. The underground transmission supply line construction would be aligned within, or immediately adjacent to, busy road ROWs, where the existing noise environment throughout a majority of the Proposed Route is influenced by traffic noise associated with public roads and business districts. In general, construction activities for the underground lines are expected to occur over a 12- to 18-month period and would typically be performed during the daytime when human sensitivity is lower. Eversource expects to further define appropriate work hours for construction activities in coordination with the Town. (Eversource 1, Vol. 1, Exh. B, pp. C-12 – C-13)

201. The conceptual design of an indoor substation at 281 Railroad Avenue includes concrete fire walls around the transformers with an open roof. Acoustic modeling has determined that the concrete fire walls would be sufficient to mitigate noise from the transformers such that the transformer noise at the property line is predicted to be less than the most restrictive limits of applicable state and local noise regulations. Therefore, no additional noise mitigation measures would be needed if the indoor substation design is implemented at the site. If the new substation is constructed as proposed at 290 Railroad Avenue, the projected noise levels at the property lines would comply with applicable levels permitted by both the Town of Greenwich Noise Ordinance and CT DEEP's noise regulations. Noise levels would be at or below the most restrictive regulation, which is the Greenwich Noise Ordinance. (Eversource 2, Q-CSC-054; Eversource 1, Vol. 1, Exh. A, p. C-11)

Air Quality

202. The state is designated as in attainment or is unclassified with respect to the National Ambient Air Quality Standards ("NAAQS") for five criteria air pollutants: particulate matter no greater than 10 micrometers in diameter ("PM10"), sulfur dioxide, nitrogen dioxide, carbon monoxide and lead. The state is designated as being in non-attainment with the 8-hour NAAQS standard for ozone, and the 2006 24-hour fine particulate matter ("PM2.5") standard. Fairfield County is non-attainment for both the 8-hour ozone and the 24-hour PM2.5 standard. Areas of non-attainment have not yet been established for carbon dioxide or other greenhouse gases. (Eversource 1, Vol. 1, Exh. B, p. B-11)

203. The construction and operation of the Proposed Route would result in short-term, highly localized effects on air quality during construction, primarily from fugitive dust and equipment emissions. (Eversource 1, Vol. 1, Exh. B, p. C-13)

204. To minimize the amount of dust generated by construction activities, the extent of exposed/disturbed areas of the Proposed Route at any one time would be minimized. Water may be used to wet down disturbed soils or work areas with heavy tracking, as needed. (Eversource 1, Vol. 1, Exh. B, p. C-13)

Scenic and Recreational Areas, Statutory Facilities and Surrounding Features

205. Four Statutory Facilities are located in close proximity to the Proposed Route:

- A child day care facility at the Putnam Indian Field School (101 Indian Field Road) is located 225 feet east of the Proposed Route.
- The Proposed Route would extend through the road system of Bruce Park.
- Cos Cob Park is adjacent to the Cos Cob Substation and shares a common entrance from Sound Shore Drive.
- Roger Sherman Baldwin Park is located on Arch Street, and abuts a portion of the Proposed Route.

(Eversource 1, Vol. 1, Exh. B, p. B-12)

206. No permanent adverse effects are anticipated to these facilities and features from construction and operation of the transmission line components along the Proposed Route, primarily because of the distances from the Route or the underground construction of the cable system. (Eversource 1, Vol. 1, Exh. B, p. C-13)

Bruce Park

207. Given the Town's concerns regarding construction in Bruce Park, Eversource would attempt to work out a Memorandum of Understanding ("MOU") with the Town concerning the transmission line construction, as it has sometimes done with other towns in which it performs significant underground construction. Typically, such MOU would address subjects such as work hours, traffic control, emergency response, laydown areas, and other topics of local concern. Eversource would expect to negotiate the MOU before filing its draft Development and Management ("D&M") Plan, so that the draft plan would be consistent with the MOU. The provisions of the MOU would be subject to the Council's approval of consistent provisions in the D&M Plan. (Eversource 8, p. 2)

208. Eversource has discussed a construction schedule with the Town such that work in Bruce Park would be completed in the winter. This proposed timing would allow Eversource to potentially close down Woods Road for a duration of three to four months, and still stay within the paved roads to stage much of its work in the park. (Transcr. 2, pp. 140 – 141)

XII. ELECTRIC AND MAGNETIC FIELDS

209. There would be no measurable electric fields ("EF") produced from the underground transmission cables proposed for this Project. (Eversource 1, Vol. 1, Exh. B, p. D-1)

210. Eversource calculated magnetic fields ("MF") from the proposed transmission lines along the Proposed Route; however, existing distribution facilities are the major contributor to MF in the area. (Eversource 1, Vol. 1, Exh. B, p. D-1)

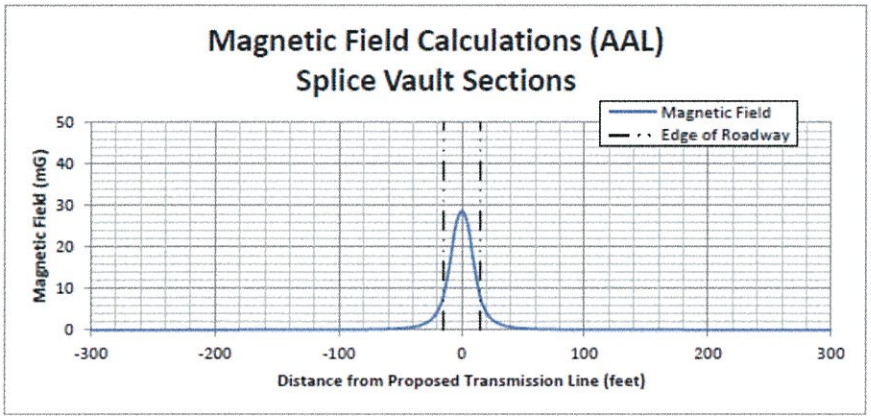
211. The table below summarizes the peak and edge of ROW values for the Proposed Route. The calculations are based on Average Annual Loads ("AAL").

Calculated Magnetic Field Levels (mG;AAL)		
Section	Edge of Road	Max in Road
Underground Duct Bank	0.6	6.7
Underground near Splice Vault	8.1	28.7

(Eversource 1, Vol. 1, Exh. B, p. D-1)

212. In the vicinity of splice vaults, the cables separate for entry into the vault. The calculations assume that the cable circuits are separated 10 feet horizontally and the phase spacing is 2 feet. (Eversource 1, Vol. 1, Exh. B, p. D-3)

213. The chart below illustrates the calculated MF in the vicinity of the transmission line splice vault, based on AAL.



(Eversource 1, Vol. 1, Exh. B, p. D-3)

214. The table below summarizes the MF measurements taken on January 12, 2017, near the proposed Greenwich Substation site on Railroad Avenue.

Field Measured	Minimum	Average	Maximum
Magnetic Field (mG)	3.7	6.6	9.3

(Eversource 1, Vol. 1, Exh. A, p. D-4)

215. In Docket 461, the Council found that no Field Management Design Plan ("FMDP") should be prepared for the portion of the Hybrid route comprised of underground XLPE cable, because there is no "special circumstances" that would require one. That continues to be the case with the proposed underground route. (Eversource 1, Vol. 1, Exh. A, p. D-19; Council Admin. Notice 43, FOF No. 462)

Pedestrian Bridge

216. Because a pedestrian bridge over Indian Harbor would require special construction, separate MF calculations were prepared. The proximity of the cables to the travel surface of the bridge would result in higher fields directly above the bridge surface relative to the remainder of the Project. (Eversource 10a, pp. D-3 – D-4)

217. The table below summarizes the calculated MF for the proposed pedestrian bridge, based on AAL.

Calculated Magnetic Field Levels (mG; AAL) – Revised 7/24/2017		
Section	Edge of Bridge	Max on Bridge
Pedestrian Bridge	27.8	49.4

(Eversource 10a, p. D-4)

218. Reduction of the MF levels immediately above the proposed pedestrian bridge could be achieved by one of three potential techniques:

- Addition of ground continuity conductors
- Installation of a conducting plate such as aluminum or copper
- Installation of a steel plate

(Eversource 10a, p. D-5)

219. If the Council were to approve a project design that incorporates the pedestrian bridge, it would require a FMDP specific to the pedestrian bridge. (Eversource 10a, p. D-5)

220. In contrast to the pedestrian bridge, a trenchless crossing of Indian Harbor would result in low above-ground MF typical to the rest of the Proposed Route. (Eversource 10a, p. D-5)

Compliance with Council's Best Management Practices

221. The Project proposal complies with the Council's *Electric and Magnetic Field Best Management Practices for the Construction of Electric Transmission Lines in Connecticut* ("EMF BMP") by the following means:

- The transmission line would be constructed underground.
- Tabulated calculations of MF are included in the Motion.
- The Project's original application included a report detailing the state of the science regarding research into the health effects of electric and magnetic fields. The report by Exponent was updated through August 31, 2016 and provided by Eversource in the Council's Docket 474.

(Eversource 1, Vol. 1, Exh. A, p. D-19; Council Admin. Notice 43, FOF No. 463; Eversource Admin. Notice 1, Vol. 2, Exh. 2.C.2)

XIII. SAFETY AND SECURITY

222. If the Council approves construction of an all-indoor substation, Eversource would design it based upon all applicable safety codes and standards that pertain to indoor substations. An indoor substation would likely require additional training for first responders concerning entry into the substation to its confined area as compared to a traditional open air substation. The substation design would also include a variety of substation fire detection and suppression tools, such as smoke and heat detection, water systems, and chemical systems like halon. Any water system would be contained on site. (Transcr. 2, pp. 50 – 51)

223. If an indoor substation is constructed, no fence would be needed for security purposes; the all-indoor construction would already provide adequate security. (Transcr. 2, pp. 51 – 52)

224. Since the Council's decision on Docket 461, Eversource has combined all of its labor agreements together for physical workers in Connecticut. This has resolved any jurisdictional issues that limited who could be called to respond to emergency events, thus removing a potential obstacle to a prompt response to emergency calls. (Transcr. 2, pp. 53 – 54)

225. Pursuant to a new labor agreement, Eversource now has emergency responders who are available 24 hours a day, seven days a week, including line crews and substation electricians. Eversource's response time target is 30 minutes. (Transcr. 2, pp. 53 – 55)

226. Eversource Protection & Controls ("P&C") would implement dual transmission line current differential protection schemes over a dedicated, diverse fiber optic communication path. The high speed clearing of faults would protect Eversource equipment from damage and minimize the impact a fault may have on customers. The Eversource P&C standard does not allow automatic reclosing on underground cables because reclosing a faulted cable could result in significant damage to the underground cable. The application of dual high speed protection and no automatic reclosing would provide adequate protection and reduce the potential for excessive collateral damage if a cable fault were to occur. (Eversource 9, Q-TOWN-35)

227. If the Greenwich Substation is constructed at 290 Railroad Avenue, a 15-foot-high wall would be built around the entire perimeter of the substation, which would provide additional fire protection in addition to the firewall around the transformers. (Transcr. 4, p. 45)

228. Although Eversource is not aware of any North American Electric Reliability Corporation rules that address specific tree removal requirements around substations, any trees that overhang the perimeter fence would be trimmed to prevent the use of the trees to gain intrusion by people or animals into the substation. If the trees are considered a hazard and pose a threat of falling into the substation, they may be removed to prevent damage to the substation during storms. Specific tree management activities would be discussed in detail in Eversource's D&M Plans. (Eversource 12, Q-CSC-067)

Respectfully submitted,

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CERTIFICATION

I hereby certify that a copy of the foregoing Applicant's Proposed Findings of Fact has been electronically mailed / sent by U.S. Mail on this 28th day of September, 2017 upon all parties and intervenors as referenced in the Connecticut Siting Council's Service List dated July 11, 2017.

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"EXHIBIT A"

Project Estimates		GSLP Cost Component Allocation			PMP
Project Component	Currently Proposed GSLP	Transmission PTF (regional)	Transmission non-PTF (Network Service)	Distribution	Previous PMP (Not feasible- shown for reference only).
Transmission Line	$52,515,678		$52,515,678		$33,430,842
Greenwich Substation	$28,992,801				$28,136,749
Transmission Component	$12,291,549		$12,291,549		$13,961,853
Distribution Component	$16,701,252			$16,701,252	$14,174,896
Cos Cob Substation	$12,669,170	$12,669,170			$12,669,170
Prospect Substation Modifications	$952,837			$952,837	$952,837
Distribution Feeder Relocation	$4,586,275			$4,586,275	$2,890,743
Project Total	**$99,716,760**	**$12,669,170**	**$64,807,227**	**$22,240,364**	**$78,080,340**
Project Estimates		**Rate Impact**			
Percent of Project	100.00%	12.71%	64.99%	22.30%	
CL&P Customer - % of Load		19.42%	60.44%	100.00%	
Estimated Annual Retail Cost to CL&P Customers	9,849,000	$ 418,000	$ 5,719,000	$ 3,712,000	
Average CL&P Retail Rate ($/kWh)	$ 0.000441	$ 0.000019	$ 0.000256	$ 0.000166	
Estimated Average Monthly Impact to 700 kWh CL&P Retail Customer	**$ 0.309**	**$ 0.013**	**$ 0.179**	**$ 0.116**	
Variations					
Project Component	**Additional Cost to GSLP**				**Additional Cost to PMP**
All Indoor Substation Variation at 290 RR (Vol1, Ex. A, sec. F.1.1)	N/A				$1,400,000
ConnDOT Line Exit Variation (Vol 1, Ex. A, sec. F.2)	N/A				$2,200,000
Two Single Circuit Transmission Line Variation (Vol 1, Ex. A, sec. F.3)	N/A				$10,500,000
Force Main Variation (Vol 1, Ex. A, sec. F.4)	N/A				$700,000
Extension of UG Transmission Line to 290 RR Ave	$1.0M	Note - row added for refinement of costs			
Pipejacking Underneath I-95 (Vol 1, Ex. B, sec. A.5.1.1)	$1.5M	Note - revised for updated costs			N/A
Project Component	**Reduced Cost to GSLP**				**Reduced Cost to PMP**
Cofferdam Variation (Vol 1, Ex. B, sec. A.4)	$1.8M				N/A
Reduction in D feeders for 290 RR Ave	$1.7M	Note - row added for clarity			

(Eversource 12, Q-CSC-063)