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VIA HAND DELIVERY

March 20, 2018

Mr. Robert J. Shea
Presiding Officer
Energy Facilities Siting Board
One South Station
Boston, MA 02110

RE: EFSB 15-04 D.P.U. 15-140/ 15-141
NSTAR Electric Company d/b/a Eversource Energy and
New England Power Company d/b/a National Grid

Dear Presiding Officer Shea,

Enclosed please find the Town of Winchester's Appeal of the Decision of the Siting Board.

Very truly yours,

Wade M. Welch

WMW/knc
Enc.
cc: Service list

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COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD

Petition of NSTAR Electric Company d/b/a Eversource Energy and New England Power Company d/b/a National Grid for Approval to Construct and Maintain a New 345-kV Underground Transmission Line in Woburn, Winchester, Stoneham, and Wakefield Pursuant to G.L. c. 164, § 69J.	EFSB 15-04
Petition of NSTAR Electric Company d/b/a Eversource Energy and New England Power Company d/b/a National Grid for Approval to Construct and Operate a New 345 kV Underground Transmission Line in Woburn, Winchester, Stoneham, and Wakefield Pursuant to G.L. c. 164, § 72.	D.P.U. 15-140
Petition of NSTAR Electric Company d/b/a Eversource Energy and New England Power Company d/b/a National Grid for Individual and Comprehensive Zoning Exemptions from the Zoning Ordinance of the City of Woburn and the Zoning By-law of the Town of Wakefield Pursuant to G.L. c. 40A, § 3.	D.P.U. 15-141

THE TOWN OF WINCHESTER'S APPEAL OF THE DECISION OF THE SITING BOARD

This is an Appeal by the Town of Winchester pursuant to M.G.L. c. 25 §5 and M.G.L. c. 164 §69P of the Final Decision of the Energy Facilities Siting Board dated February 28, 2018. The Town of Winchester, an intervenor in the proceedings, being aggrieved by the Decision, files this Petition with the Siting Board claiming that the Decision was based on errors of Law, was unsupported by substantial evidence, was arbitrary and capricious, was based on insufficient statements of findings and reasons necessary to establish that the Companies had met their burden of proof under M.G.L. c. 164 §69J and §72, was not made in accordance with the requirements of M.G.L. c. 164 §69P and otherwise not in accordance with Law.

The Decision described above is defective as follows:

1. The findings in Section IV that an HVED cable system is superior to an HPFF-PTC system for construction for the project, page 54.
2. The findings of Section V that the primary route including the Cross/Washington segment in Winchester and Woburn is superior the primary route with the Green Street, Woburn alternative segment also noticed by the Companies.
3. The findings of Section VI and VII that the Board's environmental impacts review did not require enhanced analysis and review of the impacts of the project to the Environmental Justice Neighborhood in Winchester and Woburn directly affected by the project.
4. The findings of the Decision in regard to the impacts of magnetic fields.
5. The Findings pursuant to G.L. c.164 §72 that the new line as proposed by the Companies is necessary for the purpose alleged and will serve the public convenience and is consistent with the public interest, subject to Conditions A through U.
6. The ultimate approval of the line as proposed by the Companies pursuant to the G.L. c. 164 §69J, subject to Conditions A through T.

Accordingly, this Petition seeks that the Decision of the Siting Board be modified or set aside as further described herein.

I. Town's Appeal of the Decision Findings on Route Selection, Section V, VI

A. Standard of Review

The Town agrees that Massachusetts General Law chapter 164 §69J requires an applicant to demonstrate that it has considered a reasonable range of siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts while ensuring a reliable supply. Decision page 34.

However, the Town of Winchester submits that the two-pronged test set forth in the Decision is not dispositive of whether the applicant has met its burden under M.G.L. c.164 §69J. Decision p. 34-35.

The two-prong test described in the decision is based on methodology that the Siting Board has developed aid it in determining if an applicant has met its burden under c. 164 §69J. As noted in the decision p. 35, the Siting Board has in another case approved the Companies decision not to notice an alternative route to be reasonable. Colonial Gas Company EFSB 16-01 28.

The Town submits that the Companies meeting of the two-pronged test provided in Siting Board's precedent while "generally" useful, does not establish that the Companies have met their burden under M.G.L. c.164 §69J. M.G.L. c.164 §72.

The Town submits that in this case the Companies three step approach described in Section V B pages 35-47 did not satisfy the mandates of M.G.L. c.164 §69J.

B. Route Selection

The Town does not criticize the methodology adopted by the companies at the onset of the route selection process as it is consisted with Siting Board precedent established to aid in determining that the companies had not overlooked a superior route.

As noted in Page 39 footnote 37 of the Decision the Companies based estimated costs for the initial candidate routes using a per linear foot cost for trenching in street plus per unit cost added for trenchless crossings. The Companies developed individual cost estimates for HDD (horizontal directional drill) crossings and for the bridge crossing of the MBTA Lowell line on the primary route with the Green Street variation.

As noted on page 41 paragraph 3: The Companies noticed the Green Street variation, a route segment the Companies examined as a potential alternative to part of the primary route.

Prior to the Hearing the Companies had noticed the route options shown on Table 5 of the Decision page 43. At the opening session of the Hearing Winchester set forth its position that the central route with the Green Street Noticed Alternative was its preferred route. ITR pp 14-44. TOW 21, Winchester's Initial Brief page 45.

As 1TR 44-44 indicated, the Town's discussion of the Holton Street variation was introduced in TOW 21 in response to the Hearing Officers procedural order and to provide context to Town Manager's Richard Howard's pre-filed testimony but was not considered a viable route option by the Town in light of the objections of Woburn, Stoneham and Wakefield and also the fact that it was not noticed prior to the Hearing.

Contrary to Table 6 pp 44 of Decision, the Town of Winchester was not the proponent of the overhead/underground route. The record shows that this route was originally suggested by Intervenor Curley and at the time of the Hearings suggested for continued inclusion on JP-6 by Stoneham.

We agree with the Decision that the route selection process should be objective, and data driven.

We agree that the Decision correctly states that the burden is on the applicant to establish that it has considered a reasonable range of practical facility siting alternatives and that the proposed facilities are sited in locations that minimized costs and environmental impact. Decision pg8.

In terms of the Companies burden, it is not only a legal requirement but a logical one as well, given the disparity between the Companies vast resources and the municipalities limited experience in the study of routes. Accordingly, the Town relies on the Siting Board proceedings to ensure that the Companies meet their statutory burden.

In the case at bar there is little question that both the Companies and the Town of Winchester used the same impact categories in the route selection process. The Town notes that when comparing the Green Street segment to the Cross-Washington Street segment, ratio scores and weighing of the remaining common route elements does not significantly alter the scoring process. This is so because other than these two segments the rest of the route is identical. The Town relies on the Stoughton case for prior Siting Board precedent that the use of segmentation in this case is appropriate because the scoring of the remainder of the route is identical. When it suited the companies, it used segments too. It "segmented" lines into East and West segments with nodes for more granular comparison. Yet, when the Noticed Alternative: Green Street is segmented and compared with its common nodes, Cross and Washington Streets segment, the Companies refuse to respond to a more granular approach introduced during the Town's direct case and instead returns to its initial scoring analysis at the time of the filing of the petition. The failure of the Siting Board to require the companies to respond to the objections to the Cross-Washington Street Route segment as opposed to the Green Street segment were arbitrary and capricious, and based on an error of law.

Using segments is not new. It allows for more granular review and when one on one, allows for direct comparison of raw data for each category. See Stoughton, EFSB 04-1; D.T.E. 04-5/04-7. "During the proceeding, concerns were raised about two aspects of the Company's environmental assessment: the use of segmentation and length-weighting, and the level of consideration given to permanent impacts at the new switching station site. The Company has stated that it evaluated the routes in segments because it could not meaningfully rank the routes as a whole on most criteria, as the routes ran for considerable distances through suburban and urban areas...The decision to segment the routes was a thoughtful response to this problem. ... many environmental criteria are best evaluated as a single number: total acres of disturbed wetlands, total number of streams crossed, total square footage of tree clearing or disturbance. Length-weighting the raw scores for these types could bias the environmental assessment in favor of the shorter routes."

In the Woburn-Wakefield routing analysis, we see two examples of the bias described by the Stoughton Decision as described in Section 6 of the Decision. The Noticed Alternative (the southern route) is the shortest route and with line weighting with a per foot cost, the Noticed Alternative is the lowest cost. It also scores very well for the same reason with the environmental categories. Yet, unanimously, all the parties, all municipalities and the Companies, did not endorse this route due to the challenges to construction and the extreme traffic if this route were chosen essentially cutting off the main route from Stoneham to Winchester and isolating the former Winchester Hospital, now Lahey Hospital, off of Forest Street. The Companies have not even determined nor documented the details including means and methods and cost to cross Route 93.

A second example is Green Street, a Noticed Alternative vs the Preferred Route, using selected common nodes at the intersections of both segments. JP-6. The Companies state that Green Street Noticed Alternative does not score as well as Cross and Washington Streets Route because the scoring is a result of its longer length. When applying a standard cost per foot, because the Green St segment is longer, it is then purports to be more costly. Winchester contends that additional factors should be considered for construction because Green St contains a RR ROW which is much easier to construct within it than a roadway with traffic. There are a number of raw scores that when compared one to one, Green Street scores better.

There were a number of errors or omissions by the Companies that are not addressed in the Decision. First for the sake of consistency, the Companies use a database whether it is accurate or not. The Decision supports this methodology.

The Companies depended on MassGIS database. There are inaccuracies in the MassGIS database. The Companies and supported by the Decision rely on the database because consistency is more important than accuracy.

Winchester's consultant simply segregated the data so that the two segments, Green St and Cross and Washington Streets could be directly compared from common node to common node. The Companies data was used to determine the raw data within the 16 categories. Where data from the Companies were not available to determine this exactly, Ms. Ohanesian sought to use accurate data in both municipalities, Winchester and Woburn, by reviewing multiple sources of data as documented in COM-TOW-18(5):
The Town's analysis used the following sources:
All data from the Companies which was the predominantly used
Google Earth
MassDEP which is a subset of MassGIS
Data from Winchester Engineering
Data by field survey

As the Companies Consultant, Mr. David Klinch, states in his testimony, COM-DCK-1, use of Google Earth mapping is not necessarily problematic; however, it is problematic when the resultant data is compared against MassGIS data.

Accurate data is accurate data no matter what the source. There is no evidence that the Companies confirmed all the MassGIS data to ensure its accuracy.

The Decision p. 59-60 states: The Companies argue that competing routes are best evaluated in their entirety from end to end – that is from Woburn Substation to Wakefield Junction Substation – using consistent data sources (Companies Brief citing Exh. JP-1 at 5-41). The Companies contend that they used consistent data sources to inform their scoring, including MassGIS data, USGS topographic maps, aerial photography, the Massachusetts Department of Environmental Protection ("MassDEP") Massachusetts Contingency Plan ("MCP") database and field reconnaissance (Companies Brief at 62, citing Ex. JP-1, at 5-41).

Winchester has no argument with the data or their methods, only that when data is introduced that is accurate, it should it be accepted from another database, such as Google Earth or MassDEP.

Winchester's Exhibit COM-TOW-18(5) incorporates all data from the Companies. See COM-TOW-18(1) through (4). All data is transparently documented. Winchester was forced to use this method because the Companies insist upon:

1) Not simply comparing the two segments with common nodes, one to one without the balance of the Preferred Route or any other route. Only the two segments are germane to Winchester's argument.
2) Mixing this data with Stonham's Main Street Hybrid Route.
3) The Companies contend that the end-to-end route comparisons they performed demonstrate that the Primary Route is superior to the other routing options as stated in the Decision p. 60.

In the Decision p. 60, it states: In response to concerns expressed by Winchester and Stoneham, the Companies also provided a more granular scoring analysis of the Green Street Variation and the Main Street Hybrid, as compared to the portions of the Primary Route where these route variations diverge from the Primary Route (Companies Brief at 69-77). In making such comparisons, the Companies argue that it is imperative that the respective route segments being compared have common beginning and end points (aka "nodes") so as to provide meaningful comparative information (Companies Reply Brief at 9 n.9, 10; Ex. COM-DCK-1(R) at 4-5). The Companies argue that comparing competing route segments that are delineated

solely by municipal boundaries and not connected by common nodes does not yield useful data (Companies Reply Brief at 9 n.9, 10; Ex. COM-DCK-1(R) at 4-5; Tr. 1, at 87-89).

Winchester agrees:

1) that it is fair and relevant that more granular scoring will result in a clearly superior route solution when comparing these simple segment, the Green Street Variation from node to node to the segment of Cross and Washington Streets
2) the route segments' have both common beginning and end nodes for comparison
3) The Green Street segment was noticed by the companies

So, the only argument between Winchester and the Companies is to the accuracy of the data. Winchester and its consultant have strived to 1) exclusively use the Companies data except where the Companies' own testimony shows it to be inaccurate, 2) where there are exceptions gather the most accurate and up to date data in a prudent and objective way, using databases and field reconnaissance that are agreeable, ie Google Earth and MassDEP as testified by the Companies.

If both Winchester's data and the Companies data was correctly reported in the decision, it would have found as follows:

Residential Use – Companies Data of Structures was used because Companies did not provide Residential Units for both segments. The portion of Washington St in Woburn needs to be counted to have a more perfect node to node comparison. To perfect the data, 19 more structures were added to the Cross and Washington Segment. Winchester would have been happy to add 3 more to make 21 although Mr. Klinch's is off because 19+3 is 22, for the Cross and Washington Segment, because it further supports Winchester's argument that Green Street Variation is a better route.

Residential Structures:
Green St 107
Cross/Wash 143 (using Mr. Klinch's number despite the arithmetic)

Use of Residential Units, Winchester was happy to use the Residential Units instead because the numbers are so close it does not make much of a difference and even though there is no evidence as to how Mr. Klinch derived the units:
Green St 172
Cross/Wash 179

Commercial or Industrial Land Use: Agreement

Sensitive Receptors:
Again, Winchester would have been happy, if available at the time, to use Mr. Klinch's data: Green St 0 sensitive receptors and Cross/Wash has 5. Ms. Ohanesian's survey and study of Google Earth of both Winchester and Woburn determine: Green St 3 and Cross/Washington 13. Either way, Cross/Wash has more sensitive receptors than Green St. Yes, Ms. Ohanesian's data is inconsistent with Mr. Klinch's from MassGIS, but who's is accurate. In either case, Green Street is the better choice for Sensitive Receptors.

Public Transit Facilities:
In Mr. Klinch's testimony, he does not address this characteristic, because Ms. Ohanesian pointed out the inaccuracy, but used the value of the Companies so that the EFSB would see how ridiculous this is and inaccurate. The Companies claim there is a Public Transit facility on the abandoned RR ROW. One only needs to Google the location or by field reconnaissance to see that the Bus Stop is located on Main Street/Route 38, not on the abandoned RR ROW. Even when testifying to this, the Companies and the EFSB do not believe the Winchester expert.
Green St: 0 Cross/Wash: 0

Historic Resources: Agreement

Potential for Traffic Congestion: Agreement
Winchester used the Companies' values even though Washington St in Winchester is narrower than shown in EFSB-T-22(1). Ms. Ohanesian submitted Google Earth snapshots of the street with and its measurements, see COM-TOW-18(6) through (9). In the Companies' response to Mr. Stewart of Wakefield, the Winchester portion of Washington Street is less than 30 feet. The narrower streets if counted would lean the scoring to Green St as a better route.

High Impact Crossing: Agreement
Again, Winchester defers to the Companies' value, even though it has submitted testimony by a MADOT renowned "GO TO" company that the Commonwealth relies on, that an installation of a modular utility bridge will take place over night and cost substantially less. A High Impact Crossing is defined by the Companies as a multi-month activity. Again, why does the EFSB reject the testimony Winchester experts recommended by the Commonwealth of Massachusetts? DOT

The value of the High Impact Crossing for Green Street should be 0, not 1, again if so, leaning the better route to be Green St.
Further, the 3 trenchless crossings at Cross and Washington Streets will be multi-month as testified by the Companies' Kate McEaney and Beverly Schultz. The Companies as discussed in this Decision, still do not know if their trenchless crossing will be by Jack and Bore or Pipe Jacking which is less risky but takes longer. Either way the 3 trenchless crossings (2 have a

common jacking pit) (See Construction Drawings), but still there are 3 bores (which are technically the crossing). Winchester believes they are each multi-month endeavors. But, the Town used the Companies' data even though it does not make sense.

Public Shade Trees: Agreement
Wetlands: Agreement
ACECS or ORW's: Agreement

Potential for Subsurface Contamination: Disagreement with the Companies' values: Green St 4 and Cross/Wash 0.
Winchester disagrees with the Companies' data. Ms. Ohanesian used the MassDEP site. There is only one open site in the area for both segments in the MassDEP site. This is along the Cross/Wash segment. There are 4 closed sites along Green St Variation, and most are away from the RR ROW and small gasoline/oil type spills. The one active site is in a location that if there is any flow, the water sheds towards the Aberjona River crossing the Cross/Wash segment. Winchester does not agree with the values provided by the Companies because their interpretation of this data does not make sense. Their interpretation of the data makes it appear they did not review each of the open and closed MassDEP site information to determine the impact on the environment. We expected the EFSB to review this information. Winchester's values are Green St: 0 and Cross/Wash: 1.

Length: Agreement
Again, there is no credit for a shorter roadway path reducing traffic impacts and congestion, plus the added advantage of few utilities crossing an abandoned RR ROW. Further, the excavation does not have to be performed through pavement and restored as pavement, and the depth of excavation does not have to be anymore than what is prescribed, protecting the capacity of the transmission line.

Street Width: Disagreement of Companies values: Green St 7 Cross/Wash: 3
Winchester's objective measurements are from curb to curb, which can be clearly seen in COM-TOW-18(3)-(4) and (6) to (9). The Companies' testimony indicate road closure for Cross Street. Cross St and Washington Street in Winchester are 30 foot or less in width. Winchester concedes that the measurements made by Bay State were not all along straight lengths curb to curb. In curved areas, the measurements are using the hypotenuse, and therefore are a little longer. This makes sense. However, measurements should have been done in a straight sections for consistency as shown in the COM-TOW-18(6)-(9). Ms. Ohanesian performed the same 1000 foot unit measures and determined the following values for sections less than 30 feet wide are: Green St 5 Cross/Wash: 8

Utility Density: Agreement, so Mr. Klinch should not have argued this in his testimony. Winchester used the Companies' values even though the methods in determining the utility density is not transparent and cannot be figured out.

Angles greater than 30 degrees: Agreement

Trenchless Crossings:
This is where the Companies' data and construction drawings are self evident. There are no Green St segment Trenchless Crossings by the Companies' own testimony. Winchester defers to using the Companies' value of 2 for the trenchless crossing for Cross/Wash, even though by its drawings, there are 3 where 2 use 1 common pit (So there are 5 pits and 3 bores (crossings)). This should be counted as 3, or at least 2-5/6. But again, Winchester will use the Companies' value of 2 for Cross/Wash segment. However, Winchester will use a value of 0 for trenchless crossings for Green Street based on the Companies evidence in its JP-1 Petition.

Summary:
Given all the errors, omissions and misjudgments of the Companies and Mr. Klinch, and given Winchester has deferred to use the Companies' data, except where readily evident the data is inaccurate (even with deferring to the Companies data even when it is not completely accurate), the scoring favors the Green St Variation as the best score (lowest score) as 20.08 (weighted) or 9.08 (non-weighted) versus Cross and Washington Streets segment as a higher score of 24.76(weighted) and 13.88(unweighted).

If Winchester values were used for all categories for the reasons given above, Green Street variation segment would score even better.

This analysis and discussion of Mr. Klinch's comments shows that Winchester is extremely conservative in its analysis. It used the Companies' data in all cases except where there glaring errors, omissions, or mis-interpretations. There were only 5 categories where Companies data was adjusted. Public Transit Facilities and Trenchless Crossings were the Companies' inaccuracies by its own evidence.

Sensitive Receptors either way favors Green St.

Only Potential Subsurface Contamination and Street Width, Winchester is in disagreement given the evidence of the MassDEP site information and Street Measurements using "straight" curb to curb measurements and using the same method of counting the 1000-foot sections.

Perhaps the best example of the failure of the Companies to satisfy their burden of proof on route selection and the error in the Decision in allowing this to occur is the finding Montvale Ave RR Bridge crossing.

Record Request TOW-2 (Tr. 3, at 410) states that "the Companies' current understanding that this crossing, if pursued, would actually need to be completed on the north side of Montvale Avenue."

The Companies' conceptual design is so tenuous that the location of the bridge in the drawing is on the "South" side of the bridge.

Further, during the September 23rd hearing (see Tr. 3, at 403-410), the Companies panel testified that the cost of such easements and the ability of the Companies to obtain such easements are unknowns meaning that the Companies have done very little to understand, estimate and provide costs and traffic impacts for this Noticed Alternative which needs to be as ready to compare and build as the Preferred Route.

Demetrios Sakelleris who is responsible for answering this question is an Electrical Engineer.

Mr. Klinch testified that he had no opinion specific to the engineering design of a bridge. 8TR1504-5.

As part of Winchester's direct case, the Town offered the testimony of Mr. Michael Weiss with over 30 years with American U-Tel bridge and whose name was provided by the same Commonwealth of Massachusetts DOT engineers that the Companies had contacted. Mr. Weiss was described by these DOT engineers as the MASSDOT "Go-To" contractor for utility bridges both permanent and temporary. Mr. Weiss and his colleagues at American U-Tel (referencing Utilities including Telephone wire and cable) deliver and install modular bridges historically and currently as pointed out. The modular bridge that supports traffic across the Mystic River from Main Street to Riverside Ave (Rte 38/60/16) in Medford Square is an example given in the testimony of Mr. Weiss and is referenced in the Mystic-Woburn 15-05 Petition.

Mr. Weiss and Ms. Ohanesian met with MADOT engineers for their criteria and concerns. After two site visits and taking measurements, Mr. Weiss working with American U-Tel engineers, provided 2 designs, for a truss or girder bridge (11 TR 2018) one on the North side and one on the South side, to provide choice. Either design is in the $400,000 range and will be installed overnight. Concrete abutments would be installed in one or two weeks. See 11TR1962-2022, TOW-MW-1.

Table 5 of the Decision is in error. The modular bridge is not attached to the existing bridge. It is a utility bridge supporting static and relatively light loads as compared to a traffic bridge. See Decision page 43.

Further on the bridge issue, the decision states on page 70, that the testimony and analysis provided by the Town of Winchester regarding this cost estimate lacks detail and is insubstantial. Accordingly, the decision accepts the Companies so called high level cost comparison as acceptable for use in their route selection process. This finding shifts to the Town the burden of proof required of the Companies to fulfill their c. 164 §69J burden.

An administrative agency has some discretions to admit or evaluate expert testimony so long as it does not act arbitrarily Pagel Inc. v. SEC 803 Fed 942, 947; Foxboro Associates v. Board of Assessor of Foxborough 398th Mass. 679, 690. For example, an agency may exclude expert testimony that is irrelevant or strike expert testimony if it lacks any probative value, i.e. it is not based on a legally complainant foundation, Board of Assessor v. Ogden Suffolk Downs 398 Mass 604, 606-607

The broad standard of admissibility that allows administrative agencies to admit hearsay also allows agencies to consider opinion testimony from lay and expert witnesses without being bound by the evidentiary rules that limit the admissibility of such testimony in court. In determining the necessary of particular expert testimony an agency may take its own expertise into account. An agency must use caution if it intends to rely on its own expertise, however, for it may not sit as a silent witness when expert testimony is required to establish an evidentiary basis for its conclusions, Lang City v. Board of Registration of Chiropractors 396 Mass. 374, 381.

When expert testimony is conflicting a decision to credit certain testimony must be based on substantial evidence Paul v. Shalala 29 Fed 208, 210 (5th Cir, 1994).

In this case the Town's expert testimony of Ms. Ohanesian and Mr. Weiss was not rebutted by the Companies.

If the Siting Board tentative decision had continued the analysis of the Cross-Washington primary route segment with the Green Street variation, the advantages of the latter segment might have been better analyzed. Unfortunately, contrary to the requirements of the G.L. c164 §69J, the decision concluded that the Green Street segment did not warrant continued inclusion in the analysis of section 6, although the decision includes the New Salem variation because of its status as a potential work around. The decision does not explain a basis for this distinction. Decision p.70.

The exhibits to Mr. Weiss' testimony indicate that the Bridge can be easily constructed as described by Mr. Weiss entirely within the DOT right of way.

The low impact and inoffensive modular construction described by Mr. Weiss was never considered by the Companies, as Mr. Klinch confirmed at 8TR 1508.9 and in his response to Winchester IR-RS-16 Subsection 13.

In the Decision Section V Route Selection, the Siting Board initially identifies the proper standard for its review. It then immediately deviates from the correct standard by referencing its so called two prong test. Pg. 34-35. It then cites with apparent approval the three-step route selection process used by the Companies in this proceeding. Pg. 35-49.

The Decision then references Winchester's Direct Case asserting that the Primary Route with the Green Street variation is superior to the Primary Route. Pg 49-52.

The Decision cites the Companies response that the Primary Route is the best route evaluated based upon environmental impact and reliability in accordance with the Siting Board precedent (Exh. JP1 at 5-57; Companies Brief at 85) Decision pg. 59.

The Decision then goes into an extensive analysis of the Companies scoring analysis and the Companies criticism of Winchester's use of differing Raw data. Pg. 59-63

On page 64, the Decision summarizes discussion of the Companies response with the following: "The Companies aver that they have analyzed and addressed the environmental and construction related concern of Stoneham and Winchester in particular and will continue to work cooperatively with these municipalities throughout the project." (Companies Reply Brief at 3).

In its analysis and finding on Route Selection, the Decision notes "the importance of the Siting Board's reliance on an objective data-driven route selection process to ensure that on an overall project-wide basis, proposed facilities are sited in locations that minimize environmental impacts and costs and ensures reliability." Pg. 67.

The Decision then goes into a discussion of so called "general issues on the record to be resolved (1) the selection of appropriate impact categories, ratio scores, and weighting (2) the accuracy and consistency of data sources; and the use of end-to-end Route comparisons vs. segment-to-segment Route comparisons. Decision pg. 67.

The Town submits that this focus in Route scoring misses the thrust of Winchester's objection to the Decision's selection of the Primary Route over the Primary Route with Green Street variation:

(1) Scoring of the Green Street Variation should be based on correct data, not simply data used because it was from consistent sources and it was the data used at the time the Petition was filed
(2) The Town's evidence introduced in its direct case is entitled to evidentiary weight when determining whether the Primary Route is superior to the Primary Route with Green Street variation.
(3) It is the Companies burden, pursuant to G.L. c. 164 §69J, based on all evidence, to establish that the Primary Route is superior to the Primary Route with Green Street variation on the basis of minimizing environmental impacts and costs and ensuring reliability.

Instead the Siting Board concludes its analysis and findings on Route Selection with the following findings: "The Siting Board notes that the Primary Route with Green Street variation would result in greater environmental impacts and would be more expensive to construct than the Primary Route or the Noticed Alternative.

The Siting Board concludes therefore that the Primary Route with Green Street variation offers no compelling advantage for the project that warrants its continued inclusion in the analysis Section VI below. The Siting Board notes that the Green Street variation is not required as a work around to avoid significant construction impediments. Page 70-71.

The Siting Board Conclusion is as follows:
Based on the route selection process described above, the Siting Board finds that the Companies have: (1) developed and applied a reasonable set of criteria for identifying and evaluating alternatives routes in a manner that ensures that they have not overlooked or eliminated any routes that are clearly superior to the proposed project; and (2) identified a range of practical transmission line routes with some measure of geographic diversity. Therefore, the Siting Board finds that the Companies have demonstrated that they examined a reasonable range of practical siting alternatives and that the proposed facilities are sited in locations that minimize cost and environmental impacts.

The Town submits that this finding is insufficient as a matter of Law as to the issue of the Green Street variation as:

(1) It is not based on the correct legal standard but on its own criteria which is not consistent with the statutory requirement

(2) It is not based on clear and detailed findings in order to enable the Supreme Judicial Court to determine that the decision in this matter is free from error of law. Costello v. Department of Public Utilities, 391 Mass 527 (1984).
(3) It is not based on substantial evidence
(4) It is arbitrary and capricious in that it either ignores or refuses to consider relevant evidence properly introduced by the Town in its direct case which challenged the selection of the Primary Route without the Green Street variation as inconsistent with the requirements of G.L. c. 164 §69J and §72.
(5) It rejected the Town's argument that the project required enhanced public participation requirements and enhanced impact reviews under the "Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs" issued on January 31, 2017 and is therefore in error as a matter of law.

Finally, in response to the Decisions argument that the Town's support of the Green Street segment is based on reasonable self-interest as opposed to an objective data driven route selection process, the Town of Winchester refers to the Joint Petition which states that Woburn had originally suggested use of the Green Street as an alternative to the Main Street (Route 38) Petition 5.5, 1.2 at page 5-30 and that Green Street scored favorably to the Preferred Route in ease of construction criteria 5.45.

The Siting Board Decision on page 4, footnote 2 concludes that the defined project parameters used by MEPA in Section 17 of the current EJ Policy exclude this project from its Enhanced Public Participation and Enhanced Analysis of Impact and Mitigation procedures denoted in paragraph twenty of this Policy which reads as follows:

20. **Enhanced Public Participation and Analysis of Impacts and Mitigation Under the Energy Facilities Siting Board ("Siting Board")**

The Siting Board shall continue to use enhanced public participation procedures in its review of energy facility petitions, based on the defined project parameters used by MEPA noted in Section 16 above. The Siting Board shall continue to require petitioners to translate public hearing notices into languages relevant to affected EJ populations and to publish such notices in both English and foreign-language media outlets, as well as to post notices in community locations that reach EJ populations. In addition, the Siting Board shall continue to require that translators be available at public comment hearings for project locations where EJ populations are present.

Pursuant to the EJ Policy, the Siting Board shall continue to use enhanced analysis of impacts and mitigation procedures in its review of proposed energy facilities, based on the defined project parameters used by MEPA noted in Section 17 above. The Siting Board is required by statute to assess air, water resource, wetlands, solid waste, visual, noise, and local and regional land use and cumulative health impacts for proposed generating facilities of 100 megawatts or more. For other jurisdictional facilities, the Siting Board is required by statute to assess land use impact, water resource impact, air quality impact, solid waste impact, radiation impact and noise impact. Decisions issued by the Siting Board include measures to mitigate such impacts for the affected communities, with enhanced review required where EJ populations are present. The Siting Board considers the term "cumulative health impacts" to encompass the range of effects that a proposed facility could have on human health due to exposure to noise, electromagnetic fields, substances emitted during construction and operation of the facility, and possible effects on human health unrelated to substances. In addition, cumulative health impacts would include consideration of compound effects caused by proximity to multiple energy, industrial, or transportation sources. The Siting Board considers these effects in the context of existing baseline health conditions and existing background conditions and, when appropriate, likely changes in the contributions of other major emissions sources.

MEPA's defined project parameters set forth in paragraph 16 and 17 requiring either an ENF or an EIR do not exclude analysis under Section 20 of the Policy because the Siting Board is exempt from MEPA requirements. G.L. c.164 §69I, cited with approval by the Decision page 153, footnote 128.

Accordingly, the Decision is legally in error on this point. Town's Exhibits 2 and 5 and the testimony of the Town witnesses previously referenced indicates the significant increased impact to the Environmental Justice area in Winchester and Woburn which would be largely eliminated by the use of the Green Street variation segment as opposed to the Cross/ Washington segment on the Preferred Route.

Despite the Petition's conclusion that the Preferred Route was superior due to potential impacts to commercial business and due to the claimed previously discussed truss bridge high impact crossing of the Lowell line, it was retained for scoring and ultimately noticed by the Companies for the Siting Board hearing. (Petition 6.8.1 pg. 42) based on geographical diversity considerations which was one of the arguments adopted by Winchester in the Siting Board's proceedings.

The Town submits that the Siting Board should have made its decision on whether the Green Street segment is clearly superior based upon the best data available including all the evidence introduced at the hearing. The Companies have suggested that there is a lot of granularity that is used in their day to day routing decisions, that data is great, but does not replace boots on the ground, as each route is made up of a variety of small segments.

The Town of Winchester agrees and suggests that the railroad crossing at Montvale Ave was viewed as an insurmountable construction barrier from the outset and the Green Street alternative, although clearly superior, was improperly scored in its comparison with the Cross/Washington Street segment due to this misjudgment. The Companies rush to judgment on their perceptions of the difficulty of crossing the railroad at Montvale Avenue is indicated in their Petition and in their testimony throughout the hearing. See for example, Petition 5.4.4.8, 5.5.1.2. See also the documents provided by the Companies attached to TOS-4, where a truss attached to the bridge is discussed by email with Ray Stinson of Mass D.O.T. among others forwarded to Mike Koehler on October 2, 2016. TOS-4 pp 1-14. It is also confirmed at the hearing by the testimony of the Companies' witness. 2Tr.216-217, 3Tr.404-416, 6Tr.1042, 1042, 1048-1049, 1051, 1054-1055, 8Tr.1422-1423, 1501-1502. See for example, Mr. Klinch's response to TOW-RS-16(b), which asked "Have the Companies considered a small width modular bridge that can be quickly installed just for the transmission line", and he responded:

> "The Companies are not aware of modular bridges available for permanent use that do not require installation of abutments or bearing plates, the construction of which is one of the most time-consuming parts of bridge construction necessary to support the Project components. Further, the span to be crossed by a truss bridge (or pre-fab/modular bridge) is roughly 100 feet. Delivery of such a bridge to the installation location would entail obvious difficulties, and would in any circumstance still require the use of a crane and other heavy equipment on Montvale Avenue, similar to that required for a truss bridge. The Companies do not believe that a pre-fabricated or modular bridge would be significantly faster or less expensive to build or incur fewer disturbances to traffic and nearby residents and there would also need to be substantial tree clearing to accommodate the installation of the bridge and the proposed ductbank. The Companies are not familiar with the maintenance of needs and requirements of such a component (modular bridge), adding additional concerns to such proposal."

If the Companies had used the boots on the ground approach they claim to value, or investigated the information proposed in this question as a springboard idea to improve construction and reduce costs of design of Green Street which was suggested by Woburn, as one of the many routes to be objectively considered by the Companies, they could have met with Mr.

Stinson at the site, as did Mr. Weiss and Ms. Ohanesian in 2016, and become knowledgeable about the Modular Bridge option proposed by Mr. Weiss to the Town.

This by itself represents a critical failure in the Companies' route selection process.

A. Cost Comparison of Green Street Segment to Cross and Washington Street

One of the basic criteria that G.L. c164 §69J requires an applicant to demonstrate is that its proposed facilities are sited on locations that minimize cost.

The Cost Estimates of the Preferred Route have changed during this Petition Process and in particular the Preferred Route transmission portion of this project ($72.6M JP-1 Section 6, page 6-40, $96.2M from EFSB-C-1 and $91.6M from RR-EFSB-10). The Decision at page 20 sets the planning cost estimate for the project at 96.2 million for the transmission line.

Since cost estimates are only as good as the level of detail of the design, the Cost Estimates are only based on draft conceptual drawings. There is at least a significant margin of error or level of confidence of +/-25% contingency as stated in RR-EFSB-10 of October 6, 2016 for the Preferred Route.

It is worth noting that Eversource has failed to respond to Winchester's request for a detailed breakdown of its cost estimate in in a format typical of transmission line detail estimates used by the industry; see TOW-C-2 so that the different technologies could be compared but would also provide how each line item was estimated.

In RR-EFSB-10, the company states that its "more advanced estimates of the costs associated with all trenchless crossings" were included to create an apple to apples comparison. It further stated that it included individual high-level cost estimates at the High Impact locations which can be considered, as stated a "more advanced" estimate. However, Winchester and its consultants challenge how this more advanced estimate can include a "standardized" cost of $500,000 for each trenchless Jack and Bore, even though the design was supposedly advanced. Using a standard number confirms that the Companies do not know the cost at each specific, unique Jack and Bore trenchless crossing. At this point in time, the Companies, knowing of all the jack and bore trenchless crossings since at least 2015, should have an individual estimate for each unique crossing, and that the jack and bores, particularly the two (2) sequential jack and bores (2 bores with a common pit) at Cross St RR crossing and the Aberjona River, as well as the (1) jack and bore at Washington St's Aberjona River Crossing in front of the Cancer Center Hospital Facilities of the Preferred Route should be detailed with a cost breakdown for each. The Companies further response to EFSB-34, (12 Tr. 2290) adds nothing to their analysis as the Companies have continued use of standardized cost at $500,000 for each the Jack and Bore. There is no specific individual costs or details for the Cross and Washington Street segment provided with diligence to compare costs to the Green Street Variation. 12 Tr. 2283-86

Green St Variation Costs compared to Cross and Washington Costs

Since the Companies do not provide the apples to apples cost of the Green St Variation Segment to the Cross and Washington Segment, we can only compare the entire routes from end to end, again, not allowing for the transparent view of this binary choice.

Although in RR-EFSB-10 are the comparison of the entire routes, the following table provides information to compare the Green St Variation Segment to Cross and Washington Segment.

The following Cost Summary includes items about the Montvale Ave Bridge crossing and the gas replacement program based on testimony and estimates which need to be considered, although the Companies testified that it is not considered. 12TR 2298. The Gas Replacement Program, discussed at 6Tr.1079 through 1097, has no estimates associated with it, so the purpose of this Gas Replacement item is to show that there will be some added unknown costs to the Jack and Bores which are not considered in the Reponses requested by Record Request RR-EFSB-10 and there must be some consideration given to this complex task to install gas replacement lines PRIOR to the installation of the Proposed Transmission Line. The testimony shows that the task of installation cannot be done at the same time which means that Winchester's Streets will be open for much longer than expected, and its utilities further compromised by the replacement programs. It is also important to note there is no testimony that there is replacement of gas lines along the Green Street Variation, only along the Preferred Route. Further, it is expected there are no gas lines that are to be replaced along the RR ROW within the Green Street Variation.

An important issue is that 1) at a 4.5% difference this is well within the Companies' "Level of Confidence" or margin of error of the estimate of +/-25%, 2) the cost of the American U-Tel Bridge estimate was not included, a difference of over $2.6M, and 3) the Gas Replacement costs were not included and the cost of the program for the Preferred Route are unknown.

There are also many costs associated with the time, duration, traffic congestion, detours, and higher Emergency Response times that were discussed in the testimony, but not included in the comparison. Overall Green Street Variation street excavation work is 2800 feet less than the Cross and Washington Street segment using the rail road right of way which is 3400 feet long. This is a significant savings in duration, traffic congestion, and utility congestion which affects residents, businesses and regional commuters. This results in 26% less street excavation. Furthermore, there is no Gas Replacement proposed for Green Street. The table below shows a realistic analysis of the difference in cost between the Companies Cross Street and Washington Street segment and the Green Street segment.

Adjustments to Estimate with Estimates in Evidence ($Million)	Preferred Route	Central Route with Green Street Variation	Difference between Preferred Route and Central Route with Green Street	Percentage of Entire Route
	$91.60	$95.90	$4.30	4.5%
Black & Veatch Truss Bridge ($3M)		$(3.00)		
American U-Tel (MA DOT Contractor) ($300-400K)		$0.40		
Subtotal	**$91.60**	**$93.30**	**$1.70**	**1.8%**
Note the complicated Trenchless J&B Crossings use a standard value which does not reflect the particular costs with this narrow and difficult area and is the reason why Eversource is still at this late date looking into alternatives methods to cross the Cross St RR and Aberjona River as discussed in the Testimony, such as asking private abutters to use their parcels instead of the street.				
Using an estimate of +25% for the Confidence Level (or lack thereof) Jack and Bores using a standard cost 500K for each at this area = 1.5M x 0.25=375K	0.375			
Subtotal	**$91.98**	**$93.30**	**$1.33**	**1.4%**
Other items not considered which would reduce the Green St Variation is the reduction in Police Details, Traffic Congestion and Detours, Emergency Response with an overnight duration to install the American U-Tel bridge versus the months of work to accomplish the Jack and Bores on Cross and Washington Streets (180 days x $800/day for 2 police x 4 details =	0.576			
Versus 1 night with 1 detail with 2 police at $800		0.0008		
Subtotal	**$92.55**	**$93.30**	**$0.75**	**0.8%**
Gas Line Replacement at only the Cross and Washington Streets Jack and Bores along Preferred Route (no evidence of Green Street Variation of Gas Line Replacement and not along RR ROW) Estimate will probably add over $1M to the crossings to relocate, remove, replace to eliminate interferences or to maintain the 2 foot spacing to Town utilities as promised, however to be extremely conservative an estimate of $750K is used.	0.75			
Total	**$ 93.30**	**$ 93.30**	**$ (0.00)**	**0.0%**

Based on the record, cost is not a significant factor in the choice between the two segments. Also, based on the record, the Companies' panel was unable to produce substantial evidence to rebut the conclusion that Green Street is clearly superior. The Companies did not produce any evidence to dispute the testimony of Mr. Cram, Fire Chief Nash, or Police Chief Peter MacDonnell regarding the traffic impacts to the Town as a result of the anticipated closings of both Cross and Washington Street for extended periods of time. The Companies disagree with the testimony of Town Engineer Beth Rudolph of long term road closings on Cross Street in the Town's direct case. The Companies rebuttal evidence on this point was Ms. Schultz, who relied on oral construction advice from Bond Brothers and McCourt, 8TR 1498-99. Testimony in the Town's direct case provides evidence of increased traffic over the years along Cross Street, an east-west connector between the two main routes, Rte 38 (Main St) and Washington Street. Any construction, restricting traffic, whether a closure of one lane, or closure of the entire roadway for months has considerable environmental impacts and cost implications not detailed with the Companies so called "advanced," yet "standardized" jack and bore costs for this jack and bore with 2 bores, especially at the narrow 23-foot width at the RR bridge. As testified the depths of the excavation at this Cross St location are deep to clear the RR bridge and the Aberjona River, which results in the need for jack and bores. The record shows that deep excavations and jack and bores are at risk for "hot spots," a key cause of failure. This makes Cross St, a main east-west thoroughfare, especially vulnerable for future failures and their consequential road closures.

If the Siting Board Decision had continued the analysis of the Cross-Washington primary route segment with the Green Street variation, the advantages of the latter segment might have been better analyzed.

II. Discussion of Section 6 Findings

Aside from the Town's scoring dispute with the Companies regarding the choice of the Cross/ Washington Street segment as opposed to the Green Street segment, the Town's direct case offered substantial evidence of the fatal failure of the Companies to rebut the Town's prefiled case, in particular regarding public safety, constructability difficulties, traffic issues, and environmental issues. In addition to its prefiled testimony and exhibits, the Town offered at the Hearing testimony of Richard Howard, Town Manager; Kenneth Cram, Traffic Consultant; James Gill, Public Works Director; Beth Rudolph, Town Engineer; and Ms. Ohanesian, Consultant. Their testimony and exhibits provided substantial evidence of the failure of the Companies to provide adequate construction drawings, or a meaningful traffic management plan. The Companies approach to Winchester's direct case can be summed up as we do not know but we will look into it and get back to you. The Companies offered no evidence to rebut Winchester's evidence that the use of the Green Street segment eliminated most of Winchester's concerns. The Companies approach was their initial scoring analysis made further study of Green Street irrelevant. The Companies failure to provide any meaningful reply to Winchester's

direct case included any challenge to the Police and Fire Chief's concerns. This lack of response does not meet the standard of proof required of the Companies under the statue c.164§69J and §72. The failure of the decision to address this inadequacy at any point but especially in section VI was error.

Rather than requiring the Companies to answer direct Winchester's argument that even using the issues set forth in the Companies scoring analysis the Green Street route was clearly the better choice, the tentative decision allows the Companies to avoid answering the Town's factual arguments on Green Street and instead allows the Companies, claiming to be following Siting Board precedent to do a straw man comparison of the preferred route to the so called noticed alternative, although the Siting Board agreed that this route has no public or municipal support. This comparison does not provide any evidence that the Companies have satisfied then burden of proof under G.L. c.164§69J and §72. See Prefiled Testimony, TOW-RH-1, TOW-BR-1, TOW-JN-1, TOW-PM-1, TOW-JG-1, TOW-GO-1, TOW-KC-1. See exhibits TOW-3, 4, 6, 7, 14. See TR volume 9, pg. 1655-1753.

The failure of the decision in section 6 to require an analysis of the preferred route including the Green Street segment renders the decision insufficient to meet the requirements of c.164 §69J. The demonstration that the proposed route is superior to the noticed alternative route on the basis of balancing environmental impact, cost and reliability of supply is a faulty analysis and not legally sufficient under G.L. c.164 §69J and §72, as the evidence shows even on the most superficial examination that the proposed alternative route is clearly inferior to the preferred route in every respect.

Unlike the Green Street alternative, the noticed alternative eliminates none of the railroad or waterbody crossings on Cross Street, Winchester, but adds a HDD crossing under I-93 at the Winchester-Stoneham line, likely requiring private property staging. D80-81.

The Companies admit that no final decision has been made on which method would be used for each waterbody crossing and for the MBTA railroad bridge crossing on Cross Street (D pg. 83). Compare the acceptance of this evidence in the tentative decision with the previous discussion describing the rejection of the modular bridge evidence proposed by Winchester for the Green Street segment.

Also note the Companies statement that land use along the primary route and the noticed alternative is primarily residential and the projects land use impacts along both routes are comparable. Contrast this with the Companies argument regarding the comparison of the preferred route with the noticed Green Street segment.

Winchester's argument regarding land use impacts are correctly stated on pages 86 through 87 of the Decision. Contrast this with the lack of information provided in the Tentative Decision whether these impacts would be reduced or eliminated by the use of the Green Street alternative.

Of particular note is the Companies reference to National Grid's plan to replace gas lines the details of which is entirely unsupported in the record, Decision page 89.

In its analysis and findings, the Decision notes the lack of detail as to construction likelihood for railroads and water ways but rather than requiring further evidence on this issue, finds that a report to the Siting Board 30 days before starting construction is sufficient to meet the Companies burden. Again, compare this approach to the tentative decisions rejection of the Town's evidence on the modular bridge crossing the Montvale Ave tracks.

In discussion of potential traffic management impacts the Companies conclude the traffic management challenge are similar along both the primary and noticed alternative routes. Tentative decision 101.

Winchester's concerns regarding traffic are correctly summarized on pages 103 through 104. The decision notes that the Companies dispute the extent and scope of necessary road closures. (Decision p. 106-107).

The Town argues that most of Winchester's concerns would be eliminated by the use of the Green Street segment. In reference to environmental impacts, the Decision find they are comparable (133). In reference to costs, the Companies estimated cost of the new line along the primary route is $96.2 million. As previously noted, the $91.6 million cost used in the comparison of the preferred route and the preferred route with the Green Street segment does not include the costs of the specialized trenchless crossings on the Cross and Washington Street segment.

The Siting Board concluded that the construction estimate for the project along with the primary or noticed alternative route would not be significantly different. Compare this methodology and analysis with the Companies argument and the tentative decision finding in regard to Green Street.

The Decision notes that the noticed alternative route has no known public support and no party asserts that by noticed alternative route is superior.

However, the Decision concludes that the companies have provided sufficient information to determine whether the project has achieved a proper balance among cost, reliability and environmental impacts.

The Decision finds that the project constructed with and without the New Salem Street variation would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability and costs, page 135.

As set forth above, the Town objects to the basis that these findings, as they are not supported by adequate subsidiary findings, are not supported by substantial evidence, and do not meet the standard of proof required by the Siting Board of the Companies under G.L. c.164 §69J and therefore contrary to law.

In sum, the decision applies an incorrect legal standard to the companies burden in identifying siting alternatives. Further, the decision allows the companies to avoid a meaningful comparison of its preferred route to its own noticed alternative of Green Street. Satisfaction of the Siting Board two-pronged test set forth in the Decision pages 34-35 is not sufficient on the facts of this case to satisfy the requirements of G.L. c.164 §69J and §72.

III. Appeal of Decision's Findings Regarding Cable Technology Alternatives

HVED (XLPE) versus HPFF-PTC(PTC)
The Decision page 20 states: The Companies considered two types of underground transmission line cable technologies for the Project: (1) an HVED cable system, and (2) a high-pressure fluid-filled pipe-type cable ("HPFF-PTC") system (Ex. JP-1, at 4-18). The Companies presented an analysis of the reliability, environmental impacts, and cost of the two cable technologies (id. at 4-18 to 4-20).

With respect to reliability, the Companies' testify that PTC is more reliable than HVED. See COM-DAS-1 Attachment A p6:

"Reliability

Consideration of fault rates of both XLPE and HPFF cable is necessary to assess projected reliability. ISO-NE reviewed testimony and white papers provided to the Connecticut Siting Council (CSC), as well as consulted with various cable experts on the reliability of both HPFF and XLPE cable technologies. Evaluation considered the cable manufacturing processes, splice technology, quality control processes and testing, as well as installation methods.

Information in Docket 272 showed fault rates for three-phase 345-kV cable, expressed as number of events per year, per 100 miles of single phase cables as follows:

Cable Type	Actual (per 100 miles of cable per year)
HPFF in steel pipe	0.5
XLPE in Duct - Optimistic	0.64
XLPE in Duct - Realistic	2.02
XLPE in Duct - Pessimistic	9.93

While HPFF may be slightly more reliable than XLPE, both cable types can be operated reliably."

The Companies concede that HPFF is more reliable than XLPE. The word slightly is not an objective adjective. Using objective numbers, Realistic XLPE in Duct has 2.02/0.5 = 4.04 times as many faults as HPFF in steel pipe. Given the Companies have had to already De-Rate its design due to soil conditions and depth tested in only a few sites along the line, it may be reasonable to lean towards a more "Pessimistic" value.

Further, this is the first use of 3500kcmil XLPE based on the testimony that the Companies do not know where else it has been installed. This unique size means there are unique splices. With uniqueness, there is no history of reliability. Historically 345kV PTC has been used for decades. The one HVED 345kV line installed by Eversource has already has faulted once after its energization in 2009. The existing PTC 345kV lines that have operated through Winchester have not faulted in decades.

Further, since the 3500kcmil XLPE will be the first of its kind, the splices and the splice technicians are exclusive to the manufacturer and therefore limited to the manufacturer's resources. It is troublesome that the Companies' testified that they do not know of another 3500kcmil installation. Did they ask the manufacturer who they intend to procure for installation of the conductor and its splices?

With respect to meeting need, Winchester's consultant Mr. Peter Tirinzoni proposed an HPFF-PTC system also as shown in Ex. TOW-20(Revised) with a 30-inch width which exceeded the Companies design requirement of 1040MVA as provided TOS-ED-8 dated July 8, 2016 confirming that EFSB-PA-4 was the correct number. Note there were a few different numbers provided by the companies on May 6, 2016 in TOS-ED-1.

Mr. Tirinzoni developed valid calculations that are documented in evidence and transparent (see series of testimony and exhibits, Pre-File testimony and COM-TOW-29 through 47. This workable design exceeds the design criteria set forth by the Companies of 1040MVA for Summer LTE rating.

The design is a 1-10 inch Pipe with Conductor and with 1 – 5 inch Circulation line. As testified by Mr. Tirinzoni, both the 10-inch Pipe with the 5-inch Circulation or return pipe fit in a 30-inch-wide trench. Further, in Mr. Tirinzoni's testimony, the 5-inch Circulation line is not required to be in the same trench space but has the benefit of flexibility to be routed parallel but a different space in the roadway. This configuration is extremely flexible which makes it much easier to thread through utility congestion of the route's underground space.

In the Decision, it states that: The Companies stated that to meet the need, the minimum summer LTE of the Project would need to be 1200 MVA for an HPFF-PTC system and 1040 MVA for an HVED cable system (Ex. COM-DAS-1, at 4).

The Design Criteria is the Need or Requirement being discussed and is the Summer LTE of 1040MVA stated in EFSB-PA-4. This should not be confused with transmission solutions and their capacities. Winchester rejects that 1200MVA is a Need.

In the Companies' Petition, there was no mention or evidence that there were different Needs for different technology solutions. There is no supporting evidence as to how the 1200MVA number was derived as a different Need. This "new" Need was conveniently introduced after the Towns' consultant provided a 1-Pipe PTC system meeting the Design Criteria provided to the EFSB, at about the same cost as the Companies' Proposed Project with HVED.

Related to this 1200MVA need assertion, there is testimony stating that design for PTC (and as all transmission solutions including XLPE), accounts for the different impedance values between XLPE and PTC. Typically, XLPE cable systems do have a higher impedance compared to PTC systems so there is a possibility that more current would flow along the PTC circuits, due to it being the path of least resistance. Winchester's consultant testified and agreed that impedence is one of the design factors. He discussed that PTC capacity can be increased with increased circulation and cooling. The Companies' Mr. Sakellaris agreed. He testified that cooling can increase capacity by 15-20%. PTC is so advantageous in mitigating heat that even if this 1200MVA were to be the requirement, with Mr. Sakellaris' conservative 20% increase, Mr. Tirinzoni's design with cooling would at 20%, be 1041MVA x 1.20 = 1249MVA, exceeding the 1200MVA. Note that a heat exchanger and shunt reactor are less than 1% of the Project if needed to mitigate impedance differences. Winchester again even with this discussion, objects to the 1200MVA value as Need and there is no supporting evidence as to how it is derived.

As discussed in Mr. Tirinzoni's testimony, PTC has many more ways of increasing capacity than HVED (XLPE) (even after it is installed). The design of a transmission solution takes into account many factors that reduce capacity including soil conditions, moisture, depth, temperature, and impedance. The advantage of PTC with a Circulation line can increase

capacity by removing heat by: 1) smoothing or eliminating hot spots with circulation, 2) faster circulation 3) heat exchangers 4) chillers. Mr. Tirinzoni testified these methods can increase capacity by 30%. The disadvantage of HVED (XLPE) is that it can do none of the above which is why it must be designed with a much larger contingency. If installation conditions are poorer than expected, the line may be de-rated, which is the situation as of October 2017. As of October 2017, the HVED line is derated by 25% to 800MVA from Summer and Winter Normal operating ratings of 938MVA and 997MVA respectively. This is a significant reduction or loss which has a dollar value and future reliability impact. The ISO-NE region electric customers are now forced to buy a line that is 25% lower in capacity. If selected PTC technology, given its flexibility, it would not have to derate its design. What other conditions that are not yet known will cause the HVED design to be de-rated further? At what cost? What is its reliability?

The Companies in their Petition (JP-1) make no mention of a 1 Pipe system with Circulation. This industry accepted design practice was skipped or overlooked by the Companies. They jumped to a more expensive 2 PTC design which exceeds the 1040MVA design need and beyond. And, it is more costly than a 1 PTC system, as both Mr. Tirinzoni and the Companies estimate.

Why did the Companies skip over a 1-Pipe with a Circulation Pipe Design? This is a superior design because it meets the Need as defined by the Companies and is the about the same cost or possibly less than the HVED proposed (see Mr. Tirinzoni's estimates in IR-EFSB-TOW-5 Inserted as page 11).

The 1200MVA is NOT the Need per EFSB-PA-4. 1040MVA is the Summer LTE design requirement that must be reached by each transmission solution. There is no evidence put forth of how the Companies derived this 1200MVA. In Mr. Sakellaris' testimony, COM-DAS-1, he agrees that Mr. Tirinzoni's Design meets the 1040MVA but introduces the 1200MVA as a higher value to reach, even though the 1040MVA is the Summer LTE Need as described in EFSB-PA-4. As discussed above, even if this value of 1200MVA needs to be reached, with Mr. Tirinzoni's design can reach 1249MVA or more using the conservative 20% value by Mr. Sakellaris.

Again, Mr. Tirinzoni's 1-10inch Pipe and 1-5-inch Circulation line meets the Summer LTE Criteria, and with the flexibility of cooling meets the Companies introduced value of 1200MVA which has no supporting evidence as to how it is calculated.

During the course of this Petition application process, it has become clear that the Companies have made many errors, omission and changes.

The Companies use of their own criteria is tenuous. See chart of Timeline of Changes related to Line Rating or Capacity, attached as Table 1, following page 34 of this section III. See how the Companies do not adhere to their own standard as evidenced by the Ratings Criteria to Calculate Ratings in RR-TOW-5(1). After multiple Record Requests, finally, in November 14, 2016, after the hearings, the Town received this criterion. Now, in October 17, 2017 we see how they did not apply their own criteria in their Original Calculations. See TOW-RS-18 response by the Companies, for example, the Companies use 105 deg C instead of 90 deg C for their Maximum Calculation of LTE for XLPE. This is only one of several differences. In seeing that both Eversource (NSTAR) and National Grid responded to the problematic and costly De-Rating of the Proposed Project Line from 938MVA Summer Normal and 997MVA Winter Normal to 800MVA for both (a 25% decrease in capacity – with major cost implications), it appears in the calculations provided, some are from Eversource and some are from National Grid, mixing and matching, and who may have different criteria to calculate ratings which are NOT in evidence.

The most recent changes to-date was the reduction of winter and summer normal ratings in August of 2017. This reduction does not use the values in the criteria provided to Winchester in response to RR TOW-5(1) in November of 2016. It appears that the reduction in normal ratings and the rejection of its own criteria was required in order to preserve the 1249MVA promised by the Companies to support the use of XLPE.

To design the 1 Pipe PTC with 1 Circulation line, Mr. Tirinzoni, a former Eversource Underground Transmission Senior Engineer, used his experience and applied inputs that he knew were industry standards and acceptable to Eversource in CT where he oversaw the design and installation of the longest 345kV XLPE line in the USA routed 14.8 miles from substation to substation. Ms. Ohanesian, who was Manager of Transmission Engineering at Eversource (formerly NSTAR) where Mr. Sarkellaris continues to be currently on staff also provided guidance. However, without the exact criteria from the Companies, which had been asked for prior to his testimony and not received until after the close of the Hearing, Mr. Tirinzoni used a conservative design input having the experience of working at Eversource.

In the Decision, it is stated: Further, the Companies stated that they design transmission system solutions with a reasonable margin of capacity, rather than just meeting the minimum LTE value, to ensure the transmission system would meet current and future system needs, consistent with good engineering practice.

Eversource and National Grid described the HVED system as consisting of three conductors, each individually insulated by an extruded plastic material, such as cross-linked polyethylene ("XLPE"), contained within a single concrete duct bank (Ex. JP-1, at 4-19; EFSB-PA-4).14 The Companies stated that a single-cable HVED system would be sufficient to meet

the identified need and would provide a summer LTE rating of 1249 MVA (Ex. JP-1, at 4-19; EFSB-PA-4).

We note that without even installing the XLPE line, it is already derated to 800MVA for Summer and Winter Normal so the Companies can maintain the Summer LTE without using their Ratings Criteria (RR-TOW-5(1)). The input values for the various temperature and moisture related variables used are not the same and not as conservative so the Companies could reverse engineer with a lower Normal of 800MVA to lower the Pre-Load in order for them to maintain the 1249MVA of their proposed design. This value is the Design Minimum plus a necessary Contingency because XLPE lacks flexibility in mitigating hot spots. Black & Veatch, the Companies' transmission engineering consultant, notes in Note 6 that Ampacity must be considered as J&Bs (jack and bores) are typically the hot spots. (Attachment EFSB-CM-2(1) p2 of 95)

The advantage as testified by Mr. Tirinzoni and Mr. Sakellaris and the Companies in other cases including Mystic-Woburn, is that PTC design capacity can be increased by adding:

1) Faster circulation
2) Heat Exchangers
3) Chilling

In COM-DAS-1, Mr. Sakellaris states that he agrees that with such facilities as Heat Exchangers, the capacity of a PTC line can be increased by 15-20%. In conservatively using Mr. Sakellaris' number of 20%. 1041MVA x 1.20 = 1249MVA, exactly the capacity of the Companies' Proposed Line without any De-Rates.

Certainly, the 1249MVA capacity number using Mr. Sakellaris' 20% value exceeds the Companies' 1200MVA for impedance (with no evidence in the record of calculations) and certainly meets the XLPE Design value.

The Companies stated that a single-cable HPFF-PTC system would consist of three insulated conductors within a direct-buried steel pipe, filled with mineral oil dielectric fluid ("MODF") (Ex. JP-1, at 4-18). To obtain the capacity required for the Project, the Companies stated that a two-cable HPFF-PTC system would be required and would provide a summer LTE rating of 1348 MVA (id. at 4-19; Ex. EFSB-PA-4).

Winchester does not refute these statements although there is no evidence of how these are calculated. However, Mr. Tirinzoni answered the same questions by the EFSB for 1 and 2 pipe calculations, see IR EFSB-TOW-4. However, MODF (mineral oil) may not be the most accurate nomenclature as more recent formulae of dielectric fluid does not include mineral oil. See MSDS sheet submitted into record by the Companies.

Winchester has put forth a viable and calculated design with transparent evidence as to its capacity. Winchester agrees to achieve a 1249MVA capacity that a Circulation line is required with cooling. Winchester objects to the number of 1249MVA which is the Companies' HVED Design Capacity required because it needs significantly more contingency than a PTC, because PTC does not need the same level of contingency as HVED XLPE due to the circulation which smooths out hot spots, plus heat exchange and cooling could be added in the future if needed after installation. With HVED XLPE if there is a problem with heat or hot spots due to poor soils or depth, there are no options to mitigate other than to De-Rate, as the Companies are now doing prior to petition approval, prior to final design drawings, prior to excavation and as-built knowledge of the thermal resistivity soils throughout the entire route.

If the Companies need to De-Rate further if they find the soils condition are not conducive to enough heat transfer and may lead to hot spots and runaway heating, there is a significant cost to the ISO-NE communities served and to the Capacity Market. These costs of this De-Rated design compared to the original offered in the Companies' JP-1 Petition application are not addressed. Costs is one of the three important factors in evaluating the projects. Simply, these de-rate issues and associated costs can be mitigated with PTC and its inherent design flexibility.

The Companies stated that an HPFF-PTC system would require a fluid return line for cooling, pressurizing systems at the Woburn and Wakefield Junction Substations, chillers or heat exchangers to maintain thermal conditions, additional shunt reactor capacity, and a cathodic protection system (Ex. COM-DAS-1, at 4).

Winchester disagrees and points to evidence that there is already a Pressurization Plant with 2 spare positions for Pressurization at Woburn and a second plant is not required, but preferred, at the Wakefield Substation citing TOS-PA-5. Only a heat exchanger and shunt reactor capacity would be needed. The costs of these are in evidence and add up to less than 1% of the entire project.

Cathodic Protection has nothing to do with Capacity and is an expected component of every PTC system to protect it from corrosion. The costs are included and minimal. There is already a Cathodic Protection system in place in Woburn as described in testimony and TOS-PA-5e.

The Companies stated that a single-cable HPFF-PTC system would provide a minimum summer LTE rating of 754 MVA without a fluid return line or a maximum summer LTE rating of 997 MVA with a fluid return line (Exhs. EFSB-PA-4; COM-DAS-1, at 4). Winchester points out that the calculations for these numbers are not in evidence and given the tenuous changes in

use of their own criteria in the Companies response referenced as TOW-RS-18, it cannot be determined how these numbers are calculated or if they are valid

The Companies defined the construction trench as the width of the pavement that would need to be cut in order to install the duct bank (Tr. 4, at 711).

Mr. Tirinzoni's Design has a trench of only 30 inches wide which is a foot and a half less than the 48 inches proposed by the Companies design for HVED. With the HVED being 65% deeper than the not so typical 5 foot dept as stated by the Companies, the cut will be much wider than 48 inches. Further if the companies are excavating below 15 feet, the HVED design may need to be derated even further once soil conditions are excavated. This is why HVED (XLPE) needs so much contingency in its design. The smaller cut is another reason why the costs are the same or less than HVED (XLPE). The ease of routing or threading the smaller PTC cross section of 1 10-inch pipe and 1 5-inch pipe results in a shallower depth of excacation which is another reason the costs are the same or less that the HVED.

In the Decision it is stated that: The Companies described differences between the two cable technologies with respect to the construction footprint, ease of installation, environmental impacts, performance, and cost. The Companies stated that the HVED cables are larger in diameter and heavier than HPFF-PTC and therefore would be delivered in shorter lengths, requiring a greater number of manhole vaults for cable splicing (Ex. JP-1, at 4-19). However, the Companies stated that HVED manhole vaults are simpler to construct compared to HPFF-PTC manholes vaults (id.). The distance between manholes, minimum number of manhole covers, inside length of manholes, and width of construction trench for each cable technology is presented in Table 2.

Winchester does not disagree with this. The HVED conductor is larger, heavier, and shorter requiring almost 60% more manholes than PTC.

However, the Companies stated that HVED manhole vaults are simpler to construct compared to HPFF-PTC manholes vaults (id.). This is an incorrect statement.

A manhole vault construction means and methods is the same for XLPE or PTC. The excavation and installation is the same except for the size. The Companies testify that the HVED Manhole Vault length is 32 feet. The HPFF-PTC Manhole vault for one or two pipe design is the same at 20-22 feet.

It is obvious that it is simpler to construct a 22-foot vault than a 32-foot vault which is almost 1.5 times the size (requiring a bigger cut, more excavation, equipment that has a greater capacity to lift and maneuver, more restoration paving).

The ease or simpleness of installing a 22-foot vault is obviously more than a 32-foot vault.

The correct distance between manholes, minimum number of manhole covers, inside length of manholes, and width of construction trench for each cable technology is presented in Table 2.

Of particular concern is statement on page 33 of the Decision, an amendment proposed by the Siting Board staff dated February 26, 2018 as follows:

"The record shows that a single-cable HPFF-PTC would need fluid recirculation, pressurization, and chillers, as well as shunt reactors, to increase capacity and control voltage, and with such equipment, the cost would increase by approximately $20 million, not including land costs for expanded above-ground facilities."

This statement is not supported by substantial evidence. The record has numerous testimony that conflicts with this statement that followed this statement in the proceeding timeline.

One, HPFF-PTC fluid is needed for PTC systems. However, there is no supporting calculations to the volume, as a 5-inch pipe is much smaller in volume than a 10-inch pipe. We do not know what input the Companies used to calculate volume which affects cost.

Two, the velocity of circulation flow for the speed of the pumps is not calculated. There is no supporting evidence. It affects how much heat is taken away with just re-circulation. This bears upon how many heat exchangers are needed, if any, for the capacity of the line to meet the required "Need." The Need for Transmission is 1040MVA (EFSB-PA-4). The Companies estimate at 20% with cooling with Heat Exchange is that a Single PTC can provide 1250MVA (COM-DAS-1).

PTC is feasible and has the capacity to meet the Companies' "PTC Need" of 1249MVA per COM-DAS-1 and at the same cost as HVED (see TOS-PA-5 and RR-TOW-4).

Even if heat exchange and a pressurization plant were needed or as stated in COM-DAS-1 3 Heat Exchangers and a Pressurization Plant are only $3.63M, not $20Million as purported by Mr. Sakellaris. The $3.63M is the sum based on the Companies' testified numbers for heat exchangers and pressurization plants

There is land space at both Wakefield and Woburn stations for additional equipment if

needed, and there is additional space in the adjacent right-of-way. TOS-PA-5

Three, Pressurization Plants with at least 2 spare positions are available at Woburn Station. Even if the Companies do not prefer to use the spare positions, the Companies testified that a position to connect the hydraulic pipe can be added to one of the manifolds for negligible costs compared to the $140M for this HVED project. Another Pressurization Plant is not needed as a redundant one in Wakefield is a "preference as" testified in both written and verbal testimony 3 times.

Four, there is no supporting evidence or calculations as to how many heat exchangers or if any chillers are needed. In COM-DAS-1, Mr. Sakellaris states 3 heat exchangers may be needed. In other testimony, the Companies state that heat exchangers are $1M each installed.

Five, if a shunt reactor is needed, there is testimony, in RR-TOW-4 that says "Referring to Tr. 6, at 1,205, Eversource has not fully studied installing a second 345-kV shunt reactor at Woburn Substation for a single-cable HPFF-PTC design, "which continues to discuss feasible options for locations for a shunt reactor at Woburn Station. There is no evidence that states that a shunt reactor cannot be placed at Wakefield substation also. Note this testimony shows that the HVED project also needs shunt reactors and continue to discuss these locations, which is in conflict with Mr. Sakellaris' testimony indicating there is no room

Six, there is land space at both Wakefield and Woburn stations for these components and there is additional space in the adjacent right-of-way as discussed in the testimony and shown in the drawings documenting the land areas. It is normal practice, if needed to use right of way space. So there is no supporting evidence of added costs for land that is actually studied, only testimony of feasible options.

Further if a mid-point heat exchanger needed, the Companies agree that the land in Stoneham is feasible for a heat exchanger. See RR-TOS-8.[1]

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[1] RR-TOS-8
Does Eversource own land in Stoneham, such as a parcel between Central Street and Tremont Street off of Elm Street, that would be suitable for the midpoint turnaround that would be necessary for the single-cable HPFF-PTC cable design?

Response: Eversource owns a distribution substation on the parcel referenced in the question. A detailed analysis of the available space at the site and the extent of possible site expansion would need to be completed to determine if a new heat exchanger could fit within the existing property. A below-grade study would also need to be completed to identify the hydraulic piping routing into and out of the heat exchanger.
If adequate space is available, then this site could potentially be used as a midpoint turnaround if the Project were to be built using the single-cable HPFF-PTC design using the Preferred Route along Elm Street. This parcel makes sense only if the Project were routed along Elm Street to minimize the distance between the parcel and the line

Seven, the $20Million as amended is not the correct testimony. First, it is one sentence, not two. Second, the testimony states per COM-DAS-1

"I estimate that the proposed HPFF-PTC design proposed by Mr. Tirinzoni, including a new pump plant at Wakefield Junction Substation and three new heat exchangers (one at each line terminal and one at the midpoint turnaround) would cost approximately $20 million more than the proposed Project."

The Companies own testimony refutes this testimony:
1 Heat Exchanger installed - $1M (RR-TOS-7)
Therefore 3 heat exchangers based on the very conservative cost estimate equals $3M
1 Pressurization Plant installed - $630,000 (TOS-PA-5)
Total = $3.6M at most.

There are no land costs due to land needed to be acquired. These costs are "INSTALLED" meaning that the land and foundations are prepared.

Further, if additional ancillary equipment is required as contended by the Companies, Mr. Tirizoni's cost estimates show that the single PTC design is about the same as the proposed HVED. However, within the margin of error between $96.4 for PTC and $100.7 for HVED, there over $4M to accommodate 3 Heat Exchangers and 1 Shunt Reactor installed and still be the "same" cost estimate, noting no Pressurization Plant is required.

TABLE 1

Timeline of Changes related to Line Rating or Capacity

Date	CHANGES, ERRORS, OMISSIONS	TOW COMMENTS
September 25, 2015 Original Submission	2018 Peak 206A 2018 Average 64.4A	Gradient Report June 4 2015 JP-1 Appendix 6-6 p.6 Table 3.1 EFSB-MF-4 040715
May 13, 2016 CHANGED	2018 Peak 251.1 2023 Peak 251.35 2023 Average 251.35	TOW-MF-5 051316 EFSB-MF-9 (Supp.) Gradient Report May 13, 2016 Revised Peak and Average ratings were not calculated correctly. EMF is therefore higher.
April 7, 2016 Submitted	Required Need - Summer LTE 1040 MVA Summer Normal 938 MVA Winter Normal 997 MVA	EFSB-PA-4 040716 Winter Normal is within 4% of Summer LTE.
May 6, 2016 ERROR	Required Need - Summer LTE 1092 MVA (not correct)	TOS-ED-1 050616
July 8, 2016 Confirm Error and Corrected	Required Need - Summer LTE 1040 MVA	TOS-ED-8 confirms EFSB-PA-4
July 8, 2016	(e) Companies respond: The depth at which there may be a need to address potential impacts to capacity requirements depends on the conditions of the installation, including, but not limited to: ambient temperature of soils, **thermal resistivity of soils,** moisture content of soils, and characteristics of the proposed fill. This needs to be considered on a case by case basis. The **Companies are confident that the HVED conductor specified for this Project will provide the required capacity, with sufficient margin, at anticipated burial depths.**	070816: TOS-ED-8(e) At this time, the Companies response omitted December 2015 soils information and did not adjust their HVED design to De-Rate its capacity for normal operations. Companies ignored a PTC 1 Pipe with Circulation Return Line Design stating that a 1 Pipe design did not satisfy Need. By ignoring industry practice, skipped Circulation and jumped to a 2 Pipe Design. The confidence evidently has no basis especially with the inflexibility of HVED XLPE. All that can be done is De-Rate.

TABLE 1

Date	CHANGES, ERRORS, OMISSIONS	TOW COMMENTS
		A new line will need to be installed sooner. 997 MVA Winter Normal at $96.4M is now 800 MVA at $96.4M. Same cost for less capacity.
August 23, 2016 CHANGED	Required Need - Summer LTE 1040 MVA Summer Normal 800 MVA Winter Normal 800 MVA	EFSB-PA-4(Rev)
November 14, 2016 provided after Town's consultant provided design based on best practice industry standards, not having this document available.	Ratings Criteria and Values to calculate Ratings	RR-TOW-5(1)
August 23, 2017 DERATE of DESIGN	Design De-rating of Summer and Winter Normal capacity (before even installed) from 938 MVA to 800 MVA (17% reduction). Apparently Companies failed to use soil and depth data from December 2015 to adjust design during Petition Hearings. The GeoTherm Dryout Curves show Thermal Resistivity values even higher (200 C°-cm/W) than 140 to 150 C°-cm/W as selected for Earth at some locations even at 2% moisture. (SEE TOW-RS-18 Supp 102617), It appears that Companies have not used own Ratings Criteria for Temperature input Values. See Ratings Criteria (RR-TOW-5(1)) and Calculations do not match. Even "Original" calculation uses 105 °C instead of Companies' own Rating Criteria of 90 °C for	TOW-RS-18 TOW-RS-18 (Supp) (GeoTherm Dryout Curves) This CHANGE or OMISSION not produced until 1 years after close of hearings. Raises serious issues of whether Companies have met their legal burden in the choice of technologies. Further, if PTC was used, this would not be a problem because with 1 Pipe plus a Return line, CIRCULATION as proposed by our Consultant mitigates hot spots And, for any reason that more cooling was needed, PTC has the flexibility of cooling with heat exchangers. Our experts have questioned the soils and depth, multiple times during testimony. Thus this De-Rate shows that our experts

Date	CHANGES, ERRORS, OMISSIONS	TOW COMMENTS
	Maximum Conductor Temp for LTE. Consequence: Proposed Line Normal Capacity of 800 MVA will be reached sooner than 938 MVA summer or 997 MVA winter. Note Study from 2005-2015 that load (MW) increased from 2018 to 2023 by 5% in 5 years. Cost to region is therefore increased because for the same cost there will be less capacity. There is no statement or address in the Tentative Decision about the cost of this De-Rate or how it affects Reliability and Need in the future.	foresaw this in their testimony a year earlier. See Winchester Motion 091917. Further, unlike the conditions at Cross and Washington Streets, there is no evidence of poor soils along the Green Street Noticed Alternative and along the RR ROW a typical depth of installation is more likely since there are fewer utilities in a RR ROW. Green Street Noticed Alternative with PTC is the perfect solution to this Companies' lack of a clearly superior technology since Dec 2015 soils and depth problems in its design have resulted in a De-Rate of Summer and Winter Normal operating capacity.
Received on October 26, 2017 dated December 15, 2015	Soils Data (OMITTED or Not Diligent until 1 year after close of hearings.) Their witnesses not subjected to Cross examination on significance of change to choice of technology or route selection evidence offered by Companies	TOW-RS-18(Supp.) (GeoTherm Dryout Curves)

TABLE 2

Comparison of Cable Technologies Distance Between Manholes (feet)	Number of Manholes	Inside Length of Manholes (feet)		Width of Construction Trench (inches)	Summer LTE Rating (MVA)
Single-cable HVED system	1,500 to 1,800	28 (at 1600 feet per MH to MH)	30	41	1,249 (questionable given evidence of changes in Criteria input)
Two-cable HPFF-PTC system	2,000 to 3,000	18 at 2500 feet	22	48	1,348
One cable with Circulation	same	same		30 for a 1 Cable with Circulation	1249 with cooling plant and shunt reactor (at less than 1% of total cost)

TABLE 3

Information Request EFSB-TOW-5

Refer to Mr. Tirinzoni's testimony at 8 and Exh. TOW-C-3. Please provide a cost estimate for: (1) the installation of a one-cable HPFF-PTC system, and (2) the installation of a two-cable HPFF-PTC system. Please break down the cost estimate as follows:

Response

A two cable HPFF-PTC system was not part of the scope as a one cable HPFF-PTC system achieves the rating. However, Mr. Tirinzoni calculated an estimate for a two-cable HPFF-PTC system installation at a conceptual level utilizing the unit cost numbers from the one HPFF-PTC system.

Costs (**HPFF-PTC with fluid circulation** to smooth out "hot spots" that can limit circuit ratings. Note accuracy of these conceptual phase estimates is in the order of +/- 30%)	(1) Installation of **one** HPFF-PTC System with a 3500 kcmil copper conductor	(2) Installation of **two-**cable HPFF-PTC system, both with a 3500 kcmil copper conductor	(3) Installation of **one HVED-XLPE** Cable System with a 3500 kcmil copper conductor
	One 10" cable pipe and one 5" fluid circulation pipe	Two 10" cable pipes	One set of three cables, each in their own 8" HDPE conduit
	$Million	$Million	$Million
a) Material Cost of Conduit System	4.3	5.6	4.7
b) Conduit Installation	24.5	35.9	18
c) Manhole Materials and Installation	1.1	1.1	2.8
d) Material Cost of Cable and Dielectric Fluid	15.3	29.9	16.0
e) Cable Installation (including splicing, vacuuming, fluid filling	3.9	9.3	6.3
f) Final Pavement Restoration	7.9	15.7	10.8
g) Other Required Work	39.4	58.5	41.7
h) Total Cost	**96.4**	**156**	**100.3**

IV. Magnetic Fields

Perhaps the most significant advantage of PTC technology as opposed to the XLPE line proposed is that HPFF-PTC results in 5 to 50 times less magnetic field strength than a HVOD system.

The Decision section is referenced on pp 120 to 126.

The Decision states on page 120 that:

A magnetic field is created whenever current flows in a conductor, and therefore the New Line would induce magnetic fields (Ex. JP-1, at 6-34). Magnetic fields increase when current increases, and typically diminish with distance from the electrical conductor (Ex. JP-2, app. 6-6, at 3). Over the years, some epidemiology studies have yielded statistical associations between power-frequency magnetic-fields and diseases such as childhood leukemia (Ex. EFSB-MF-11). In 2007, the World Health Organization ("WHO") concluded that "the evidence for a causal relationship is limited, therefore exposure limits based upon epidemiological evidence are not recommended, but some precautionary measures are warranted." Salem Cables at 83. The Siting Board has recognized public concern about magnetic fields and has encouraged the use of low-cost measures that would minimize magnetic fields along transmission ROWs. See Salem Cables at 88.

Once connected, cables also create electric fields since electric fields are created whenever voltage is present on conductors. However, electric fields are shielded by earth, so underground cables would not create above-ground electric fields (Ex. JP-1, at 6-35). Therefore, this section reviews only the magnetic fields that the Project would induce.

Winchester agrees with these statements.

Winchester asserts that a PTC solution is either the same cost or within reasonable limits of costs currently estimated which is superior than use of low-cost measures on an XLPE Line that cannot eliminate magnetic field (MF).

Evidence and testimony submitted shows that a 1 – 10 inch PTC system with a 5 inch Circulation return pipe Costs are the about the same or less than the Companies' Proposed HVED XLPE at around $96.4M. The PTC technology would eliminate the MF concerns.

Winchester has provided valid evidence that PTC (HPFF) is a cost-effective solution to eliminate the concerns:

1) the 1 10-inch Pipe and 5-inch Circulation Line system is a superior design with 1041MVA Summer LTE capacity exceeding the Companies stated Need of 1040MVA and With Cooling would at least by the Companies' testimony would be 20% higher at 1249MVA would far exceed the 1040MVA requirement. Pipe Type Cable does not require the high level of contingency that XLPE requires.
2) PTC Costs at around are the same or less given the 30-inch-wide footprint versus the 48 inch wide footprint of the XLPE, the shallower PTC trench depth versus the deeper XLPE trench depth, and 18 (or less) 20-22foot long PTC Manhole Vaults versus 28 – 32 foot long XLPE Manhole Vaults, the 20 PTC pulls versus the 80 XLPE pulls, 18 PTC MH splices versus the 84 XLPE MH splices.
3) Even if additional equipment is needed, it is less than 1% of the $143M cost of the Project. A shunt reactor and a cooling system and maybe a tank is less than 1% of this cost given the information provided by the Companies on cost.

The Companies' consultant, Gradient, modeled above-ground 60-Hz magnetic field strengths from "average" and peak projected line loadings for the year 2018 along the Primary Route (Ex. JP-1, at 6-35; EFSB-MF-4). The Companies modeled the expected magnetic fields along a typical line section and at a splice vault (Ex. JP-1, at 6-35).

The Companies' model indicated that for peak loadings for typical line sections, the maximum magnetic field value at three feet above the ground would be 41.2 milligauss ("mG"), dropping to 4.4 mG at a lateral distance of 20 feet (Ex. EFSB-MF-9(S)(1) at 10).

The Companies' model indicates that at splice vaults, the maximum magnetic field value at peak loading would be 53.8 mG, dropping to 11.0 mG at a distance of 20 feet (id.).

The Companies stated that the duct bank they would use for the Project would be of the same design and generally the same depth regardless of route, so Project magnetic fields would be similar regardless of route (Exh. JP-1, at 6-36). The Companies concluded that there would be no significant difference between the Primary Route and Noticed Alternative Route with regard to magnetic field impacts (id.).

Winchester does not disagree with the information and calculations.

Winchester does disagree with the premise to use 2018 or 2023 peak and average. The Companies calculations for MF must be based on the Summer and Winter Normal Operating ratings which can be operated continuously at any time if called for by the system, which is 3 to

4 times as much as the Average and Peak of 2018 and 2023. As the Companies testify, the EMF is correlated to the current ratings.

The gradient report shows that the State of Florida's Siting Board uses Winter Normal for their MF calculations. See Table 2 of both Gradient reports.

Using simply the design Summer and Winter Normal Ratings which can be operated continuously (forever) on Day 1as INPUT makes sense. See Companies response to Curley 3-2 (w)iii that on Day 1 of energization the maximum Normal rating can operate continuously to serve the load. By using Summer and Winter Normal Ratings, as Florida does, it can allow this subject to be more simply calculated and simply discussed. It is consistent with G.L. c. 164 §64J and the public interest to rely on current evidence to determine a superior solution.

In the Decision: The Companies stated that the underground placement of the New Line improves mutual cancellation of magnetic fields from the three phases by locating the phases in closer proximity to each other than is possible in overhead construction, so that field levels are both lower near the conductors and fall away more rapidly with distance (Exh. EFSB-MF-1; Tr. 3, at 586).

The Companies asserted that additional means of mitigating magnetic fields from the Project, such as changing to a higher voltage, increasing street widths, surrounding the set of cables with a single structure of ferromagnetic shielding, and deep burial of the New Line would be infeasible for this Project (Ex. EFSB-MF-1; Tr. 3, at 581-595).

Winchester agrees that based upon the record it is very difficult to mitigate magnetic fields for XLPE.

As described in the Decision Section IV, the Companies rejected an alternative Project design using HPFF-PTC as inferior, based on a balancing of reliability, cost, and environmental impacts

Winchester has provided expert testimony and calculations by experienced engineers who have provided both XLPE and PTC solutions for numerous facilities that have been approved by this Board and CT's siting Board. The 1 – 10inch PTC with the 5-inch Circulation Line is a superior solution. There is no derate with PTC because circulation smooths out hot spots which XLPE cannot. Cost is shown to be about the same or less for this Design versus the Companies Proposed design at around $96M, and Environmental Impacts with a smaller footprint and with a maintained cathodic protection system can operate leak-free for decades as the multiple existing 345kV PTC lines through Winchester have operated for decades. Even if there was a Dig-In, the

dielectric fluid is not carcinogenic and biodegradable. The issue with magnetic field is that there is a concern that it is carcinogenic. PTC has no carcinogenic issues.

The Companies stated that there are no federal standards for occupational or residential exposure to 60-Hz magnetic fields, and that such state guidelines as exist are not based on health effects (Exhs. EFSB-MF-9(S)(1) at 3; EFSB-MF-11).

However, the Companies identified a guideline for both acute and chronic exposure of the general public to 60-Hz magnetic fields, as provided by the International Commission on Non-Ionizing Radiation Protection ("ICNIRP"), of 2,000 mG (Exhs. EFSB-MF-9(S)(1) at 4; EFSB-MF-12).

The Companies noted that the predicted magnetic fields from the Project fall below the ICNIRP guideline (Ex. EFSB-MF-9(S)(1) at 9).

Again, Winchester does not agree with this "predicted" MF because only 2018 and 2023 information is used instead of the continuous operating ampacity of Normal Summer and Winter which is 3 to 4 times higher and can be operated on Day 1. Further, the Town notes that on the record once the project is approved the line is operated as necessary based on how the transmission system evolves. The Siting Board does not limit the loading on facilities once the line is operational. See Companies response to Curley 3-2 (w)iii.

The Companies noted further that all modeled magnetic field levels, including maximum values at peak load, "fall below the Massachusetts ROW-edge magnetic-field guideline of 85 mG" (id. at 11; Ex. JP-1, at 6-35).

Referring to the HDR report which uses Summer LTE of 1040MVA and Winter Normal which is within 4% of this ampacity, Summer LTE of 1040MVA was used in the analysis because the Winter Normal was redacted and the numbers are so close that they theoretically calculate the same numbers within 4 %. The 3 configurations shown, Horizontal (which was not included in the Gradient report even though it is a Companies' configuration for shallow depth in its drawings and specifications for at least 10% or 4400 feet of the linear project) is above 500mG, vertical and typical Delta configurations are above 300mG above the duct bank. If the XLPE duct bank is installed on one side of the road or in the sidewalk, homes can be closer than 20 feet and this is where the 85mG is exceeded. Further, is the Delta configuration is not perfectly installed, if one duct is 1.5 inch out of triangular configuration for cancellation, the magnetic field can increase by 29%.

The fields modeled by Winchester's consultants were about 29 percent greater, using the wider spacing (Tr. 10, at 1772-1777; Winchester Brief at 29, citing RR-EFSB-29) as shown in

Delta Configuration of the Companies Construction Drawings submitted in evidence and to the Towns. The Companies did not give Gradient their Construction Delta Configuration which will be as testified used as the configuration in the typical HVED XLPE duct bank.

Gradient used a more perfect triangle, which more perfectly cancels magnetic fields,and did not use the Proposed Companies Delta Configuration shown in the Drawings provided to the Towns. Therefore, the Proposed Construction Delta Configuration's magnetic field is 29% more than the theoretical calculated by Gradient. Above, in their own testimony the Companies say it is infeasible to decrease or compact the triangular configuration. The Companies did not give Gradient their Construction Delta Configuration to calculate. Winchester's experts have the experience which lead them to review the construction drawing for the conductor configuration and not just rely on the theoretical report put forth by Gradient on behalf of the Companies. The public relies on the Board to also vet these differences to protect the public's environment and health and to determine a superior technology. Winchester asserts that the Board should protect the public from this 29% or more increase in MF if the installation is not perfectly installed per the Gradient configuration.

Winchester and Stoneham assert that modeled magnetic fields can be inaccurate representations of later measured field strengths (Ex. TOW-TOS-DH-1; Tr. 10, at 1772). Additionally, the Town of Stoneham argued that although the Companies did not predict peak currents to increase during the forecast period of 2018 to 2023, there is no guarantee that power flows on the line will not increase significantly over the next 40 years, producing corresponding increases in magnetic fields (Stoneham Brief at 27, citing Ex. TOW-MF-5).

The approach should be to use the Summer and Winter Normal continuous operating capacity which can be used Day 1 of energization. These values are 3 to 4 times greater than the 2018-2023 study Peak and Average.

The Town of Winchester argues that with line currents at the maximum rating of the line, magnetic fields well above 85 mG would occur above and along 4,400 linear feet of the Project (Winchester Brief at 30-33). Using Winter Normal ampacity and Horizontal configuration as calculated in the documentation in evidence, we believe gradient would calculate the same. The formulae are the same.

Trench Configuration	Current (Amp)	HDR (0 Feet)
Inverted Delta	64.4	13.87
Inverted Delta	206	43.89
Inverted Delta	1740	369.3
Horizontal	64.4	20.72
Horizontal	206	66.26
Horizontal	1740	559.7
Vertical	64.4	12.77
Vertical	206	40.86
Vertical	1740	345.1

Winchester and Stoneham advocate the use of HPFF-PTC, which the towns contend results in five to 50 times less magnetic field strength than an HVED system (Ex. TOW-TOS-PT-1, at 7; TOW-GO-1, at 10; Winchester Brief at 29; Stoneham Brief at 27-28).

The Companies argue that although HPFF-PTC would likely provide a numerically lower value for magnetic fields than an HVED system, the technologies are equivalent with regard to public health impact because the above-ground magnetic fields produced by either technology are well below established public health guidelines (Companies Reply Brief at 28, citing Tr. 4, at 707-708). The Companies argue that there is no evidence in the case that the New Line would operate at the LTE, as postulated by the Towns (Companies Reply Brief at 43). The Companies argue that the cables will be placed at the distances modeled by Gradient, and not further apart as suggested by the Towns (id. at 41, citing Ex. EFSB-MF-9(S)(1) at 17; RR-EFSB-30; RR-EFSB-30(1)).

The Companies argue that even at the highest levels posited by Winchester and Stoneham, neither towns made any assertion that projected magnetic fields associated with the Project would produce magnetic field exposures that would adversely affect the health and safety of residents and abutters (Companies Reply Brief at 39-40).

Winchester's position is that of the EFSB with respect to the causal relationship to childhood leukemia. We do not know for certain. However, Winchester has provided a superior solution that also eliminates the EMF issue at reasonable cost with the solution of its PTC Design.

The Companies have argued that the magnetic fields projected for the project are far below all health-based guidelines, as well as below 85 mG (Companies Reply Brief page 40)

Winchester disagrees as:

1) The Companies did not use the Summer and Winter Normal ratings to calculate the MF which is evidenced as higher than 85mG.
2) The Companies did not provide Gradient with its Construction Typical Delta so the MF could be 29% higher (and if it is installed more than 16 inches apart because construction is never perfectly installed as designed, the MF will be greater).
3) The Companies did not calculate all configurations for the cross section as shown on their Construction drawings, in particular the Horizontal configuration which per the record as testified by the Companies is at least 4400 feet of the project.

The Decision states: The record shows that for typical cable layout locations, maximum magnetic field levels at peak loading are 41.2 mG directly above the cables, dropping to 4.4 mG at a distance of 20 feet. The record shows that magnetic fields from average power flow and expected peak power flow are very similar. The maximum magnetic field from the Project, at peak loading, would be 53.8 mG above splice vaults, dropping to 11.1 mG at a distance of 20 feet. The Siting Board evaluates magnetic field impacts based on expected power flows on a transmission line, rather than those based on line ratings. See Walpole-Holbrook at 72-73, 77; East Eagle at 114-116, 123. The Companies' reliance on expected power flows, rather than the physical capacity of the cables (e.g., LTE rating), is appropriate.

The Town submits that the record shows that the Companies intend to maintain the cable spacing presented in their magnetic field modeling as the standard arrangement for the Project, but their testimony conflicts with this statement. The Companies also state that they cannot reduce the spacing between the conductors

There is no evidence that the Drawings have been changed to compact the Delta Spacing to 14 inches apart. There is evidence by the Companies testimony COM-BAS-1, that they cannot reduce the spacing so that the Companies maintain Reliability. Therefore, the Gradient study of MF is incorrect and the HDR calculations are correct using the 14 and 16 spacing increasing the MF by 29%. Keeping the spacing means that all of the testimony for the Delta configuration is not true because the Companies did not provide Gradient with the spacing they are going to build.

The Town appreciates the concerns displayed by both the Companies and the Siting Board during the public outreach prior to and during the hearings on this subject.

What was not made clear to the Town until after the filing of the Petition is the largely undisputed evidence that HPFF-PTC results in 5 to 50 times less magnetic field strength than a HVED system, D pg. 123. See Petition section 4 pg 18-20, section 6 pg. 34-36.

The Companies argue that no additional mitigation is warranted because the projected magnetic field levels associated with the anticipated operation are far below all health-based guidelines as well as below 85mG.

As previously argued in this response the Town has provided a HPFF-PTC system this reduces any health-based risks to a minimal as oppose to the HVED system. The Town is currently supporting the HPFF-PTC system being installed in Winchester as part of the Mystic to Woburn Project EFSB-15-13 because it used HPFF-PTC technology. As for the HVED technology proposed here, Winchester's position is that the minimization of health risks claimed by the Companies are simply not proven by substantial evidence. See for example RR-EFSB-29 Magnetic Field Analysis and Measurements October 11, 2016, also Response to Donald L. Haes, Jr. COM-TOW-6-14 dated September 12, 2016, TOS-RH-1 filed on behalf of both Winchester and Stoneham. Also, testimony of Donald L. Haes Jr. 9TR 1744-5, 10TR 1760-1, 1764-65, 1770.

As previously noted the Town appreciates the concern of the Siting Board relating to the mitigation of potential MF health risks associated with the proposed HVED cable systems. The Siting Board after considerable comment and questions at the public hearing on the Tentative Decision required as a special consideration that the Companies further evaluate. Condition P:

> " The Siting Board directs the Companies to further evaluate any site-specific additional magnetic field mitigation that can be feasibly engineered into the project design, particularly for close residences 20-30 feet from the New Line. The Companies shall file a compliance filing as soon as practicable, but not less than 90 days prior to the commencement of construction in residential areas, identifying additional feasible magnetic field mitigation. The Companies may commence construction at substations and in commercial areas, and may perform site preparation work."

The Town suggests that this condition, although well intentioned, does little to protect the health and welfare of the residents impacted by the line.

The Companies have already stated on several occasions that the MF concerns articulated by the Towns and general public are not well founded as HVED magnetic fields are safe and no additional mitigation measures for MF are required.

Further, the Companies on this record have on several occasions advised that there are no additional low-cost mitigation measures that are practical.

The Board's additional condition P, the product of which will not be received until 60 days before construction commences, cannot be expected to satisfy the Town's and the public's great concern on this public health issue at the expense of waiver of its appellate rights.

The Town emphasizes here that the Woburn to Wakefield line cannot be constructed using a combination of HVED and PTC cable, and therefore once the HVED cable is procured by the companies, the cost of substitute PTC would be cost prohibitive.

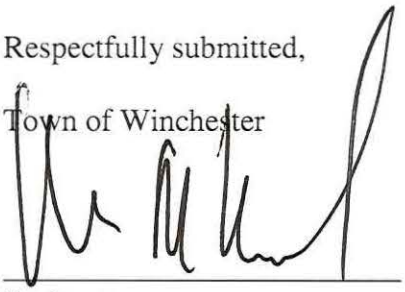
Based upon the foregoing, the Town of Winchester objects to the Decision finding on page 34 that the record shows that an HVED cable system is superior to an HPFF-PTC system for the project based on capacity, cost, potential environmental impact, and reliability. Therefore, the Siting Board finds that in balance the project is superior to the other alternatives identified with respect to providing a reliable energy supply for the Commonwealth with minimum impact on the environment at the lowest possible cost.

V. Conclusion

Based upon the forgiving the Town submits that the Siting Board approval set forth in Section XII of this Decision should be reversed and remanded to the Siting Board for further proceedings pursuant to G.L. c. 25 §5 and G.L. c.164 §69P.

Respectfully submitted,

Town of Winchester



By its attorney,
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Dated: March 20, 2018

CERTIFICATE OF SERVICE

I certify that I have this day served the foregoing Town of Winchester's Appeal of the Decision of the Siting Board upon the Energy Facilities Siting Board and the Service List in the above-docketed proceeding in accordance with the requirements of 980 C.M.R. 1.03 (Siting Board's Rules of Practice and Procedure).

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Dated: March 20, 2018