

**STATE OF CONNECTICUT**  
**CONNECTICUT SITING COUNCIL**

<p>The Connecticut Light &amp; Power Company Application for a Certificate of Environmental Compatibility and Public Need for the Connecticut Portion of the Interstate Reliability Project that traverses the municipalities of Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam, Thompson, and Windham, which consists of (a) new overhead 345-kV electric transmission lines and associated facilities extending between CL&amp;P's Card Street Substation in the Town of Lebanon, Lake Road Switching Station in the Town of Killingly, and the Connecticut/Rhode Island border in the Town of Thompson; and (b) related additions at CL&amp;P's existing Card Street Substation, Lake Road Switching Station, and Killingly Substation.</p>	<p style="text-align:center"><b>Docket No. 424</b></p> <p style="text-align:center"><b>October 1, 2012</b></p>
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**POST-HEARING BRIEF OF**  
**THE CONNECTICUT LIGHT AND POWER COMPANY**

The Connecticut Light and Power Company

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## INTRODUCTION AND SUMMARY

The Interstate Reliability Project (Interstate) is the product of eight years of study. The Independent System Operator, New England (ISO-NE) has determined that Interstate is needed for the reliability of the Southern New England and Connecticut electric supply systems, and has confirmed that determination in three different studies - published in 2008, 2011, and 2012. Connecticut's Department of Energy and Environmental Protection ("DEEP") has incorporated Interstate in the base case of the state's Integrated Resource Plan; and DEEP "supports the need for this project and believes it deserves Siting Council approval." (*DEEP Comment Letter d. June 21, 2012, p. 2*) In addition to serving multiple needs to maintain reliability and so "keep the lights on," Interstate will provide many other benefits to the state, such as providing better access to efficient, low-cost generation, enabling access to renewable resources, and providing a margin of protection against sudden retirements of existing generation plants. Several of the multiple needs that Interstate meets are now upon us, and require that it be constructed as soon as possible.

No agency of the State, including the Office of Consumer Counsel (a party to this proceeding) has questioned the need for Interstate, its proposed route, or its estimated cost. The only participants in the proceeding who raised any question about the need for the project were the NRG parties, who did so through submission of unsworn comments, rather than by testimony that could be subjected to cross examination; and Victor Civie, whose criticisms served his own interests but lacked force, logic, and expertise.

There is no practical and feasible alternative that would address the reliability problems that Interstate resolves, and extensive analysis has shown that the proposed Project is the most cost-effective transmission solution. There is no justification for the extraordinary expense of constructing any part of the project underground, which would unreasonably burden Connecticut ratepayers.

The Connecticut portion of Interstate will be constructed almost entirely within a wide existing right-of-way (“ROW”) that traverses mostly rural and relatively sparsely settled terrain. Each new 345-kV line will be constructed alongside existing transmission lines, so that its visual impact will be moderate and incremental. No new substations or switching stations will be required – all of the necessary terminal improvements will be made at existing substations and switching stations. CL&P is taking extraordinary care to minimize construction effects on the abundant water resources along the route. Both DEEP and the Connecticut Audubon Society support this project because, among other things, clearing and vegetation maintenance for the new line will increase scarce scrub/shrub “open field” habitat, with significant beneficial effects for wildlife diversity. “DEEP believes that the lack of significant resource concerns identified for the construction of the new 345-kV transmission line attests to the proposed route being a logical and prudent solution for addressing the identified capacity and reliability issues....” (*DEEP Comment Letter d. June 21, 2012, p. 8*) CL&P has agreed to minimize the effects of the project by implementing extensive mitigation measures that have been suggested by DEEP, by an agricultural landowner, and by CL&P itself.

Because CL&P has taken full advantage of available “no-cost” EMF reduction strategies, magnetic field levels at the edges of the existing ROW, and at nearby homes, will be essentially equivalent to the pre-project field levels. In some cases, including at the one school that is located nearby the line, the post-construction magnetic fields will actually be lower than those that will exist prior to construction.

In Docket 370, the Council recognized that the NEEWS Plan, of which Interstate is a key component, provides a long-term plan for improving the electric power grid of the state and the region. As it did with the Greater Springfield Reliability Project (“GSRP”) and the Manchester to Meekville Junction Project in Docket 370, the Council should approve Interstate, and so advance the important NEEWS Plan toward completion.

The Project should be constructed entirely overhead, which is the most cost-effective, environmentally compatible configuration, and is consistent with all of the standards that the Council must apply in ruling on transmission line applications. However, the Council should defer making a definitive choice with respect to the particular configuration of the overhead line in at least one, and possibly two areas - certain federal lands in the Mansfield Hollow area, and Hawthorne Lane in Mansfield.

The following sections of this brief discuss the foregoing points in more detail.

#### **STATEMENT OF THIS PROCEEDING**

The Connecticut Light and Power Company (“CL&P” or “Applicant”) has applied to the Connecticut Siting Council (“Council”) for a Certificate of Environmental

Compatibility and Public Need for the portion of Interstate to be located in the State of Connecticut (the “Project”).

Interstate is a joint undertaking of CL&P, a wholly-owned subsidiary of Northeast Utilities, and The Narragansett Electric Company and New England Power Company, both of which are wholly-owned subsidiaries of National Grid USA (collectively “National Grid”). Interstate includes the construction of new 345-kilovolt (“kV”) transmission lines and related modifications and improvements to existing 345-kV and 115-kV transmission lines and facilities in northeastern Connecticut, northwestern Rhode Island and south-central Massachusetts. In this application, CL&P seeks approval to construct the Connecticut portion of Interstate (the Project).

As proposed, Interstate would consist of the construction and operation of approximately 75 miles of new 345-kV lines predominantly within existing overhead transmission line ROWs in Connecticut, Rhode Island, and Massachusetts; reconductoring of a 115-kV line in Rhode Island; and upgrading of various substations and switching stations in Connecticut, Rhode Island and Massachusetts. The proposed new 345-kV lines would extend from CL&P’s Card Street Substation in Lebanon, Connecticut, to CL&P’s Lake Road Switching Station, and from there to National Grid’s West Farnum Substation in Rhode Island and National Grid’s Millbury Switching Station in Massachusetts. (*PFOF*<sup>1</sup> ¶ 106)

The sections of 345-kV transmission lines between the Card Street Substation and the Connecticut/Rhode Island state line, for which CL&P seeks the Council’s approval,

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<sup>1</sup> “*PFOF*” refers to CL&P’s Proposed Findings of Fact in this Docket, filed on October 1, 2012.

would be approximately 36.8 miles long. Except for two segments in the Mansfield Hollow area where the ROW may have to be expanded to accommodate the new 345-kV line, the Connecticut portion of Interstate would be developed within existing CL&P ROWs that are approximately 300 feet wide (or more). Use of CL&P's existing ROWs, where linear utility uses are already established, is consistent with the Federal Energy Regulatory Commission's ("FERC") "Guidelines for the Protection of Natural, Historic, Scenic, and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities," as required by Conn. Gen. Stats. § 16-50p(a)(3)(D). (*Council Admin. Notice Item 5*)

In addition, Card Street Substation, Lake Road Switching Station and Killingly Substation would be modified. All improvements to these stations can be accommodated within the fence lines of the existing properties. The Card Street Substation occupies approximately 10-acres of a 150-acre property owned by CL&P, which has housed the substation since 1960 and 345-kV facilities since 1969. The Lake Road Switching Station is located within an easement area granted to CL&P, consisting of approximately 3.5 acres, and has been in operation since 2001. The Killingly Substation occupies a portion of an approximately 29.4-acre property owned by CL&P and has been in operation since 2006. (*PFOF ¶¶ 147, 149, 150*); *CL&P Ex. 1, Vol. 1, pp. 1-13, 1-14*)

## **DISCUSSION**

This portion of the Brief summarizes the evidence showing that:

- The Project is needed (Section I);
- The environmental effects of the Project are acceptable. (Section II);

- Overhead construction of all segments of 345-kV transmission lines from Card Street Substation to Lake Road Switching Station to the Connecticut/Rhode Island state line is consistent with the Council's EMF Best Management Practices and with statutory requirements (Section III).

Appendix A to this Brief lists conclusory findings that the Council is directed to make by PUESA in order to issue a certificate, and provides citations to the relevant paragraphs of the PFOF which support those findings.

**I. THERE IS A PUBLIC NEED FOR THE PROJECT FOR REGIONAL RELIABILITY**

**A. The Project Is Needed To Ensure Reliable Electric Service To the State and Region (Conn. Gen. Stats. § 16-50p(a)(3)(A))**

***1. The Southern New England Electric System Does Not Currently Meet Applicable Mandatory Reliability Standards***

**a. Background**

Interstate is the product of more than six years of planning studies. A Working Group convened by ISO-NE, consisting of CL&P and National Grid planners, together with outside consultants, conducted a comprehensive analysis of the deficiencies in the Southern New England electric supply system. These studies considered limitations on east-west power transfers across Southern New England, and transfers between Connecticut and southeast Massachusetts and Rhode Island. As a result, the Working Group discovered reliability problems that were affected by interstate transfer capabilities and constraints in transferring power generated in (or imported into) eastern Connecticut and across central Connecticut to the concentrated load in southwest Connecticut.

Thereafter, the NEEWS projects were developed to remedy the deficiencies identified by the Working Group in the reliability of the electric transmission system. (*CL&P Ex. 1, Vol. 1, pp. 2-16, 2-17; PFOF ¶¶ 53-56*)

Once the needs to resolve the Southern New England electric supply system deficiencies were identified and transmission solutions were formulated to address those needs, the next step was for CL&P and National Grid, the affected transmission owners, to analyze the electrical options determined by the Working Group and to select a preferred solution for each component of NEEWS. For Interstate, the Solution Report was initially completed in August, 2008. (*CL&P Ex. 1, Vol. 1, p. 2-21; Vol. 5*) The 2008 Solution Report contains a thorough discussion of the five electrical solution options identified by the Working Group plus a routing variation on one option. The option selected, based on greater system benefit, lower cost and lesser environmental impacts, was the new 345-kV lines that are the essential components of the Project. (*CL&P Ex. 1, Vol. 5, Ex. 3*)

b. 2011 Needs Reassessment for Interstate

As part of its responsibilities under Section 4.2(a) of Attachment K to its FERC-approved Open Access Transmission Tariff (*see Council's Admin. Notice Item 15*), ISO-NE began conducting needs reassessments for all NEEWS projects in 2008. ISO-NE first confirmed the need for both the Rhode Island Reliability Project and the Greater Springfield Reliability Project. Both projects are now under construction after the receipt of all siting and permitting approvals in 2010. (*CL&P Ex. 1, Vol. 1, p. 2-22*)

Thereafter, ISO-NE completed a report for Interstate in April 2011 known as the 2011 Needs Reassessment. *(CL&P Ex. 1, Vol. 1, p. 2-24; Vol. 5 (redacted); CEII filed under protective order)* In the 2011 Needs Reassessment, ISO-NE:

- re-confirmed the existence of serious thermal and voltage violations in Connecticut, Massachusetts and Rhode Island starting as early as 2015;
- confirmed specifically a need for increased transfer capability into Connecticut; and
- confirmed the previously documented deficiency in the system's capability to move power across that interface from resources in the east to load in the west, and documented a new problem of insufficient transmission capacity to move power from the newly constructed generation resources in the west to load centers in the east.

*(CL&P Ex. 1, Vol. 1, pp. 2-24, 2-25)*

c. 2012 Follow-Up Studies Needs and Solutions

In March of 2012, due to new planning information, ISO-NE undertook analyses to update its 2011 Needs Reassessment and 2011 Solution Report. ISO-NE recently released draft versions of those studies, which were filed by CL&P in this Docket under protective order. Significantly, ISO-NE not only confirmed the need for Interstate, but also recognized that the need for Interstate would be more pressing based on the risk of additional generation retirements beyond those assumed by ISO-NE. Specifically, foreseeable generation retirements will create greater need for eastern and western New England and Connecticut transfer capability. *(CL&P Ex. 30, pp. 2, 11-12)*

2. ***The Project Will Address Critical Reliability Issues In Connecticut and the Southern New England Region***

a. New England

The principal purpose of Interstate is to better integrate the electric supply systems of Connecticut, Rhode Island and Massachusetts for the benefit of the entire New England control area. (*CL&P Ex. 1, Vol. 1, p. 2-36*) In its 2012 need analyses, ISO-NE found that for N-1 contingencies, when power was transferred west to east, thermal and voltage violations occurred on the 328 line in Rhode Island (running from Sherman Road to West Farnum) and on the 115-kV path from Connecticut to Rhode Island along the shoreline. For N-1-1 contingencies, the thermal and voltage violations were more severe, including west to east (345 kV and 115 kV), east to west (345 kV and 115 kV), in Rhode Island (115 kV) and in Connecticut (115 kV). (*CL&P Ex. 30, Revised Ex. A, Slides 11-12*) Accordingly, ISO-NE concluded that Interstate, as modified in 2012<sup>2</sup>, was needed to properly address these reliability issues. (*CL&P Ex. 30, Revised Ex. A, Slide 16*)

Modeling of the New England electric supply system as it exists today and with approved additions that are in the process of being added, conducted in accordance with applicable reliability standards and criteria, established:

- Today, the Rhode Island transmission system is subject to thermal overloads and voltage collapse under design contingencies that it is required to withstand. Interstate will resolve these criteria violations by providing two new 345-kV lines into the West Farnum Substation (RI). (*CL&P Ex. 29, p. 36; CL&P Ex. 32, pp. 136, 137; CL&P Ex. 8, p. 137; Tr. 8/30/12, pp. 117, 118, Carberry; Tr. 8/28/12, pp. 122-127, Oberlin; ISO-NE 2, p. 15; see PFOF ¶¶ 69, 72, 80, 84*)

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<sup>2</sup> The Updated Solution Study modified Interstate to include changes and additions in Rhode Island and removed the 310 Loop and a planned expansion of the Card Street Substation in Connecticut.

- Today, thermal overloads occur on the transmission system as it attempts to move power from western New England and Greater Rhode Island into Eastern New England when that power is needed to make up for deficiencies in Eastern New England. Interstate will resolve these criteria violations by providing a new 345-kV import path from the West Farnum Substation into the Millbury Switching Station in Massachusetts. (*CL&P Ex. 29, p. 34; CL&P Ex. 32, pp. 136, 137; ISO-NE 2, p. 15; Tr. 8/28/12, pp. 122-127, Oberlin; see PFOF ¶¶ 72, 79-81*)
- By 2017, thermal overloads will occur on the transmission system as it attempts to move power from eastern New England and Greater Rhode Island into western New England when that power is needed to make up for deficiencies there. Interstate will resolve these criteria violations by providing a new 345-kV line into the Card Street Substation in Connecticut via the Lake Road Switching Station and the West Farnum Substation. (*CL&P Ex. 29, p. 35; CL&P Ex. 32, pp. 136, 137; ISO-NE 2, p. 15; Tr. 8/28/12, pp. 122-127, Oberlin; see PFOF ¶¶ 72, 79-81*)

It is important to note that, although these power-flow simulations modeled the effect of predicted future energy efficiency measures, they did not model the effect of thousands of megawatts of retired generation capacity that has been predicted both by ISO-NE and by DEEP. The effect of any such retirements would be to make the needs for Interstate occur sooner and be more acute. (*See, PFOF ¶ 73*)

b. Connecticut

Although Interstate is a regional reliability project, it will meet reliability needs specific to Connecticut, and will provide significant benefits to Connecticut electric consumers.

(i) Eliminating Thermal Overloads on the Connecticut Transmission Lines

By 2015, thermal overloads will occur on the Connecticut transmission system as it attempts to import power from eastern New England and Greater Rhode Island

when that power is needed to make up for supply deficiencies in Connecticut. The new 345-kV line into the Card Street Substation in Connecticut via the Lake Road Switching Station and the West Farnum Substation will resolve these criteria violations as well as the western New England violations. (*CL&P Ex. 29, p. 35; CL&P Ex. 32, pp. 136, 137; ISO- NE 2, p. 15; Tr. 8/28/12, pp. 122-127, Oberlin; see PFOF ¶¶ 69, 79*)

Of all the New England States, Connecticut is the least able to import power to supplement its internal supply resources. New Hampshire, Vermont, and Rhode Island have enough import capability to serve 100% of their peak load under N-1 contingency events; Massachusetts and Maine can import slightly less than 50% of their peak load. However, Connecticut will only be able to import approximately 33% of its peak load even with GSRP in service. This increased import capability will provide desirable flexibility to maintain reliability in light of potential changes in system conditions that could occur on short notice. (*CL&P Ex. 1, Vol. 1, pp. 2-36, 2-37*) CL&P expects that, with the completion of Interstate, Connecticut's import capability will increase substantially, by an estimated 800 MW. (*CL&P Ex. 1, p. 2-36*) This increased import capability will benefit Connecticut electric customers by improving their access to lower cost, efficient generation resources located along the Millbury – West Farnum – Lake Road corridor. Without Interstate, the path by which power from these generators would be imported is constrained so that under some conditions they cannot all operate at the same time. (*Tr. 8/30/12, pp. 124-126, Zaklukiewicz; PFOF ¶85*)

Connecticut's increased transfer capability will also provide a capacity margin that will both provide 'insurance' against future Connecticut generator retirements –

whether due to economics or unforeseen sudden events – and to allow for building new, more efficient generation with lower emissions at the sites of generators that are taken out of service. *(CL&P Ex. 1, Vol. 1, p. 2-37; Tr. 8/30/12, pp. 112, 113, Zaklukiewicz)*

- (ii) Eliminating conditions on neighboring systems that threaten Connecticut reliability

In addition to eliminating thermal overloads on lines within Connecticut, Interstate will eliminate thermal overloads on critical lines in Massachusetts that provide power to Connecticut customers; and will address the conditions that could cause a voltage collapse in Rhode Island that could easily spread into Connecticut. *(Tr. 8/30/12, pp. 124-126, Zaklukiewicz)*

- (iii) Providing an essential link to the new regional transmission network to facilitate access for low-emission and/or renewable energy sources

With the implementation of Interstate by 2015, there will be a capacity margin that will allow older, high-emission generating plants that have become uneconomic to retire. Interstate will also allow, if economic to do so, some of those retired generating units to be re-powered with cleaner burning fuels.

Also, the Connecticut Renewable Portfolio Standards (“RPS”) require that, starting in 2007, escalating annual percentages of retail load must be served by each of three classes of renewable generation, including wind and solar energy. In its review of the 2010 Integrated Resource Plan, the Department of Public Utility Control (“DPUC”) (now Public Utility Regulatory Authority (“PURA”)) concluded that “there is considerable uncertainty” as to whether Connecticut can meet renewable resource

adequacy requirements after 2013. If Connecticut continues to require that significant in-state energy needs be met with renewable resources, renewables will have to be imported from outside the state, likely from northern New England and Canada. While Interstate will not by itself provide Connecticut with direct access to such resources, it will serve as an essential link to the new regional transmission network necessary to do so. *(CL&P Ex. 1, Vol. 1, pp. 2-37, 2-38; Tr. 8/28/12, p. 97, Rourke)*

(iv) Increasing Connecticut's generation resources

The Lake Road Generating Plant, located in Killingly (Dayville), Connecticut, consists of three independent combined-cycle generating units with a total capacity of approximately 750 MW. Although physically located in Connecticut, Lake Road was not considered to be electrically located in Connecticut. The Lake Road Plant was connected to the Connecticut system by a single 345-kV line that also served as an import path from eastern New England and Greater Rhode Island. With the loss of this line (an N-1 event), Lake Road would lose its connection to Connecticut. *(CL&P Admin. Notice Item 26, pp. 3-4)* With the construction of Interstate, there will be a second 345-kV connection from Lake Road to the heart of the Connecticut system, via the new 345-kV line from Lake Road Switching Station to the Card Street Substation. Because of this direct path, the units at Lake Road Generating Plant will continue to be available even if the Connecticut import interface is lost. *(CL&P Admin. Notice Item 26)*

Accordingly, ISO-NE has recognized that, with the completion of Interstate, the Lake Road Generating Station will be electrically in Connecticut. Therefore, its total capacity will count toward Connecticut's Local Sourcing Requirement. The Local

Sourcing Requirement is the minimum amount of generating capacity that must be electrically located within an import-constrained load zone to meet system-wide resource adequacy requirements. (*CL&P Ex. 16, p. 41*)

**3. DEEP Supports the Approval of the Project**

DEEP has included Interstate in the base case of its 2012 Integrated Resource Plan. (*DEEP Comment Letter d. June 21, 2012, p. 2*). Similarly, the then Department of Public Utility Control, included Interstate in its 2010 Integrated Resource Plan. (*CL&P I, p. 2-39*). Thus, “the Interstate Reliability Project has been relied upon to insure that Connecticut, and the region, have sufficient resources to meet reliability requirements.” (*DEEP Comment Letter d. June 21, 2012, p. 2*).

“To the extent that the Interstate Reliability Project reduces stress on the system, improves system resiliency, and enables new, renewable generation to replace dirty retiring units, DEEP strongly supports the continued development and progress of this project....In conclusion, **DEEP supports the need for this project and believes it deserves Siting Council approval.**” (*DEEP Comment Letter d. June 21, 2012, p. 2, emphasis added*)

**4. There Has Been No Effective Opposition to the Need for Interstate**

a. NRG

The NRG Companies are parties to this action. However, they offered no testimony in opposition to the Project. Had they done so, of course, they would have been cross-examined. Instead, NRG submitted unsworn comments, which were immune

from cross examination. (*NRG Comment Letter d. Aug. 24, 2012*) In this letter, NRG urged the Council not to approve the Project, but to wait to see if it is needed or not. (*Id.*, pp. 2-4). The premise of this position was that ISO-NE's latest follow-up study of the need for the Project did not clearly indicate a need for it before 2022. (*Id.*, p. 2). This premise was demolished by the ISO-NE witnesses, who explained that because of the very small differences in projected net load between 2022 (the model year for the *2012 Follow-Up Need Report*) and 2015 (the base year for the *2011 Updated Solution Report*), the years of need declared in the *2011 Updated Solution Report* remain valid. That is *now* for the Rhode Island reinforcements, 2011 (which is also now) for the west-to-east transfer capability increase, and 2017 for the east-to-west transfer capability increase. (*Tr. 8/28/12, pp. 122-127, Oberlin*) Implicit in Mr. Oberlin's analysis was that the need for additional Connecticut import capability remained at or near 2015, as declared in the *2011 Updated Solution Report*. (*Id.*, *2011 Updated Solution Report*, p. 137)

b. Victor Civie

The only party who offered testimony asserting that the Project is not needed was Victor Civie, one of the owners of a "concept subdivision" that is crossed by the existing ROW and 345-kV line, and which would be crossed by the new line as well. In his pre-filed testimony, Mr. Civie asserted, without elaboration or explanation, that "past projects have satisfied the public need for power," so that there is no longer any need for Interstate. (*Civie Ex. 3, p. 1*). Mr. Civie's theory became apparent, however, in his cross-examination of the ISO-NE witnesses. Mr. Civie stressed in his questioning that in ISO-NE's power-flow simulations, the existing Card Street to Lake Road (No. 330) 345-kV

lines does not overload. Rather, other lines are overloaded when the 330 line is removed from service. (*Tr. 8/28/12, pp. 55-67, 127-132*) Therefore, he argues, the overloads can be avoided simply by not suffering the loss of the 330 line; and he suggested that ISO-NE chose to model this line as out of service just to produce violations that would need to be fixed. (*Tr. 8/28/12, p. 130, Civie*) However, as Mr. Oberlin explained, ISO-NE is required to model this contingency by the applicable reliability criteria. (*Tr. 8/28/12, p. 130, Oberlin and see NERC TPL-001-2.B.R3 & Table 1; TPL-002-0.B.R1 & Table I; Council Admin. Notice Item 19, ¶ 5.4*)

Mr. Civie also suggested that the overloads that occurred on 115-kV lines serving Connecticut when the No. 330 345-kV line was lost could be addressed by increasing the current-carrying capacity of the overloaded lines, rather than constructing a new 345-kV line. (*Tr. 8/28/12, p. 56, Civie*) Mr. Oberlin of ISO-NE agreed that this was so “if you could actually upgrade [those lines] to handle the amount of power” (*Tr. 8/28/12, p. 56, Oberlin*); but he stressed that, in any event, that strategy would only eliminate the overloads on the Connecticut lines, which is only one of the issues that Interstate is designed to solve. (*Tr. 8/28/12, p. 55, Oberlin*) In order to eliminate all of the overloads addressed by Interstate using this approach, “You would have to do...upgrade after upgrade after upgrade.” (*Tr. 8/28/12, p. 55, Oberlin*)

Notwithstanding that he has some engineering credentials, Mr. Civie has no training or experience in electric system planning or operation. (*Tr. 8/30/12, pp. 27-29, Civie*) Moreover, as Mr. Civie admitted, he has an obvious personal interest in obstructing the Project – he would like to induce CL&P to buy his property rather than

exercise its rights to build on it. (Tr. 8/30/12, p. 21, Civie) There is no reason why the Council should accept Mr. Civie's quixotic suggestions rather than the product of eight years of planning studies by the authorized Planning Authority for New England, not to mention the opinions of highly qualified and deeply experienced experts such as Messrs. Laskowski, Oberlin, Rourke, and Zaklukiewicz.

**5. *There Are No Practical System Alternatives That Would Properly Resolve The Reliability Problems Addressed By The Project***

a. No Action

Doing nothing to eliminate violations of national and regional reliability standards and criteria would sacrifice electric system reliability and expose CL&P and National Grid to federal fines for failing to take action to address known violations of mandatory NERC standards. (PFOF ¶¶ 26, 95) This is not a responsible course of action that the Siting Council could properly require.

b. Non-Transmission System Alternatives

There are no practical non-transmission alternatives to the Project. In some cases, electric reliability needs can be met by means other than improvements to the transmission system. For instance, where the reliability problem is simply a lack of sufficient generation resources to reliably serve the load in a defined area, it may be possible to meet the reliability need through building new generation in the area, reducing demand in the area, or through some combination of these strategies.

In other cases, the only practical means of resolving transmission reliability criteria violations is through improvements to those transmission systems. As experts

from ICF International, Inc. (Judah Rose, Maria Scheller, and Kenneth Collison) established, this is such a case.

ICF's detailed analysis, presented in their December 1, 2011 report (*See CL&P Ex. 1, Vol. 5, Ex. 5 and CEII Appendix*) strongly supports the conclusion that there is no practical and cost-effective non-transmission alternative to the Project. ICF carefully evaluated generation additions, demand reductions and combinations of the two, but was unable to find a non-transmission alternative that solved the thermal violations in Southern New England that ISO-NE identified. Significantly, ICF noted that even if sufficient generation were available, implementation of non-transmission alternatives could not solve the thermal violations that Interstate addresses because of the following challenges:

- the hypothetical non-transmission alternatives likely would involve numerous power plants and demand resources at multiple locations,
- absence of centralized multi-state procedures for non-transmission alternative implementation,
- risk of over-reliance by ISO-NE on demand response,
- greater financial risk for ratepayers due to likelihood of contracts for differences to make up revenue shortfalls,
- very high capital costs,<sup>3</sup> and
- unavailability of region-wide allocation of the costs of the NTA.

These challenges are not present with the transmission solution presented by Interstate.

(*CL&P Ex. 1, Vol. 5, Ex. 5; CL&P Ex. 31, p. 22*)

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<sup>3</sup> ICF calculated the average cost of incremental demand-resources-only at 25 times the capital cost of Interstate. ICF also calculated the lowest capital cost for a hypothetical combination non-transmission alternative with aggressive demand resources to be \$15.1 billion, about 30 times the capitalized cost of Interstate. (*CL&P Ex. 31, p. 23*)

In his testimony, Mr. Judah Rose of ICF elaborated on the problems with producing generation in multiple locations, particularly in multiple states, as an NTA. Mr. Rose noted that economic incentives in the form of contracts for differences (“CFD”) would be necessary. However, there is not now in place any statutory structure or state-supported generation projects using CFD in Rhode Island or Massachusetts. He also noted that the three states involved with Interstate would have to agree on the type and location of generation. Therefore, the Record demonstrates that such multi-state subsidized generation projects are not feasible. *(Tr. 8/2/12, pp. 49-50, Rose)*

Since their December 1, 2011 study, ICF examined ISO-NE’s 2012 analysis and found that it corroborated ICF’s conclusions that Interstate is the appropriate solution to resolve the identified Southern New England thermal overloads, which cannot be resolved even with greater amounts of passive demand resources. *(CL&P Ex. 31, p. 25)*

ICF not only recognized the need for Interstate but also found, as did ISO-NE, that the need for a robust transmission system becomes greater when actual potential and generation retirements are considered, including supply resources that have been lost since CL&P’s application was filed. *(CL&P Ex. 31, pp. 5-7)*

Finally, Mr. Rose’s testimony reflects that the bulk upgrades in the transmission solution offered by Interstate provides a layer of protection against future uncertainties. Those uncertainties include retirements not accounted for by ISO-NE, unexpected load growth or poor performance of energy efficiency measures, which could stress the transmission grid. *(Tr. 8/2/12, pp. 53-54, Rose)*

**B. The Project Conforms To A Long-Range Plan For Expansion Of The Electric Power Grid Of The Electric Systems Serving The State And Interconnected Utility Systems (Conn. Gen. Stats. § 16-50p(a)(3)(D))**

In order to grant a certificate for an electric transmission line, the Council must find that “the facility conforms to a long-range plan for expansion of the electric power grid of the electric systems serving the state and interconnected utility systems”. (*Conn. Gen. Stats. § 16-50p(a)(3)(D)*) There is no doubt that Interstate satisfies this requirement. Interstate, and the NEEWS Plan of which it is a part, has been developed as part of the ISO-NE Regional System Plan (“RSP”) Process, which the Council has recognized as the basic tool for long-term system planning in New England. The components of the NEEWS projects have been a part of each RSP since the “SNETR” plan was initially presented in 2005. (*Council Admin. Notice Item 33, FOF # 29; ISO-NE 2, p. 8; CL&P Ex. 16, p. 43*)

Moreover, as the Council specifically recognized in Docket No. 370, the NEEWS Projects are in themselves a long-range plan for Southern New England.<sup>4</sup> (*Docket No. 370 Opinion, p. 3*) NEEWS addresses multiple transmission deficiencies in the southern New England region by improvements to the interconnected transmission systems of three different operating companies in three states. (*CL&P Ex. 1, Vol. 1, p. ES-3*) Finally, the NEEWS Projects have been closely designed and integrated with the completed 345-kV transmission loop in SWCT. (*CL&P Ex. 16, p. 43*)

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<sup>4</sup> The Council’s Opinion states: “The GSRP would advance NEEWS, which is a comprehensive long-range regional plan for expansion that addresses electric transmission concerns throughout New England.”

**C. The Project Will Serve The Public Need for Economic Service And Serve The Interests Of System Economy (Conn. Gen. Stats. § 16-50p(a)(3)(D))**

**1. *The Project Will Provide the Needed Improvements at the Lowest Reasonable Cost***

In designing Interstate, the ISO-NE Working Group consistently identified the electrical solution option that offered the most system benefit at the lowest cost, and with the fewest adverse environmental effects. (*CL&P Ex. 1, Vol. 5, 2008 Solution Report, p. 3-1; CL&P Ex. 8, 2011 Updated Solution Report, p. 136; CL&P Ex. 32, 2012 Follow-Up Solution Report, p. 31*) These studies leave no doubt that a new 345-kV connection from Card Street to Lake Road to West Farnum to Millbury is the preferred electrical solution. The proposed route for these improvements in Connecticut, entirely overhead and almost entirely on existing rights-of-way, is clearly the most cost-effective, least environmentally damaging practical alternative. (*See generally, CL&P Ex. 1, Vol. 1, Vol. 1A, Vol. 5*) The only aspects of the Project that will make it less than optimally cost effective will be the incremental cost of any EMF BMP configurations ordered by the Council, which would be consistent with other statutory policies of the state.

Because the Project (with the likely exception of EMF BMP configurations) will be deemed to have been designed cost effectively in accordance with good engineering practice, and will yield regional benefit, it is expected to qualify for inclusion in New England regional transmission rates, such that Connecticut ratepayers would bear approximately 27% of its cost.

**2. *The Overhead Portions of Interstate Are Cost-Effective And the Most Appropriate Alternative Based on a Life-Cycle Cost Analysis of the Facility and Underground Alternatives to It***

Section 16-50p(a)(3)(D) of the General Statutes requires that when the Council grants a Certificate, it specify “what part, if any, of the facility shall be located overhead... and... that the overhead portions, if any, of the facility are cost-effective and the most appropriate alternative based on a life-cycle cost analysis of the facility and underground alternatives to such facility...” Accordingly, a transmission line applicant and the Council must assess the practicality and life-cycle cost of an all-underground alternative to a proposed overhead transmission line. The Record in this matter demonstrates that the development of the new 345-kV lines in an all-underground line configuration between Card Street Substation and the Connecticut/Rhode Island state border would not be cost-effective or preferable to the proposed overhead line configuration.

CL&P identified and evaluated two potential all-underground 345-kV cable - system alignments using a combination of highway and transmission line routes – one primarily underground with a short segment of overhead line and the other entirely underground. CL&P concluded that each of these alignments would be (i) less reliable, (ii) significantly more costly (particularly to Connecticut ratepayers) and (iii) challenging from both environmental and engineering perspectives. (*CL&P Ex. 1, Vol. 1A, pp. 14-40*)

Neither of these all-underground line alternatives would be economically prudent. For the “all-underground” line with a 1.1-mile segment overhead, the initial capital cost is estimated to be approximately \$1.1 billion, as compared to \$193 million for all-overhead lines, with life-cycle costs estimated to be \$1.6 billion, as compared to \$319 million for all-overhead lines. For the entirely “all-underground” alternative, the initial capital cost is also estimated to be approximately \$1.1 billion, with life-cycle costs estimated to be \$1.6 billion. *(PFOF ¶¶ 211, 213, 214)*

These cost differentials become much greater when the cost to Connecticut ratepayers is considered, because the excess cost of underground line construction, as compared to overhead line construction, must be assumed to be “localized” rather than shared by the entire region. The term “localized” means that Connecticut ratepayers would pay 100% of those incremental costs. Interstate is expected to qualify for inclusion in New England regional transmission rates, so that its cost would be shared throughout New England according to company load share. Since, as previously noted, Connecticut accounts for approximately 27% of the New England load, Connecticut ratepayers would bear approximately 27% of the project cost included in regional rates. However, recovery of project costs through regional rates is not automatic. Only costs determined by ISO-NE to be eligible for regionalization according to specific tariff provisions will be included in regional rates. *(PFOF ¶¶ 206, 207, 209)*

ISO-NE Planning Procedure 3 provides, and CL&P’s recent experience has shown, that where a line (or a line segment) that would normally be constructed overhead in conformity with good utility practice is instead constructed underground, the excess

cost of underground line construction will not be included in regional rates, but will be “localized”. The effect of localization of excess underground costs is that Connecticut ratepayers bear 27% of what the cost of an overhead line (or segment) would have been, plus 100% of the difference between that cost and the cost of an underground line (or segment) and any overhead/underground transmission line transition stations. (*PFOF* ¶¶ 207, 209)

Accordingly, for example, the initial capital cost of the all-underground line construction to Connecticut ratepayers would be \$959.1 million, as opposed to \$52.1 million for the overhead line construction; and the difference in the life-cycle costs for the underground alternative, as opposed to the proposed overhead line, would be even greater. Moreover, in addition to this cost for the line, Connecticut ratepayers would also pay a 27% share of the costs for the substations and switching station modifications in Connecticut (assumed to be the same for both overhead and underground line construction) and the same share of the cost of the Rhode Island and Massachusetts construction. (*PFOF* ¶ 216; *CL&P Ex. 17, pp. 68-69*)

These vast cost differences preclude finding that an all-underground line would be more cost-effective, on a life-cycle cost basis, than an all-overhead line, or that it would be a more appropriate alternative than an overhead line.

**II. THE LOCALIZED AND SHORT-TERM ADVERSE ENVIRONMENTAL EFFECTS AND POLICY CONFLICTS OF THE PROPOSED OVERHEAD TRANSMISSION LINES DO NOT JUSTIFY DENIAL OF THE APPLICATION OR AN ORDER THAT THE LINES BE INSTALLED UNDERGROUND (Conn. Gen. Stats. § 16-50p(a)(3)(B)&(C))**

Section 16-50p(a)(3)(B) of the General Statutes requires the Council to find, when it issues a certificate, “[t]he nature of the probable environmental impact of the facility alone and cumulatively with other existing facilities, including a specification of every significant adverse effect, including, but not limited to, electromagnetic fields that, whether alone or cumulatively with other effects, on, and conflict with the policies of the state concerning, the natural environment, ecological balance, public health and safety, scenic, historic and recreational values, forests and parks, air and water purity and fish, aquaculture and wildlife;” and § 16-50p(a)(3)(C) requires the Council to find why these effects do not provide sufficient reason to deny the application. Electric and magnetic fields, and the visual or scenic implications of structure designs that reduce them, will be discussed in following sections of this Brief. With respect to the other listed environmental concerns, CL&P has provided extensive evidence to demonstrate that the Project’s adverse effects on environmental resources will be, for the most part, short term and localized; that CL&P will exercise great care to mitigate those effects; and that the Project will have significant long-term beneficial environmental effects. This evidence is summarized in detail in CL&P’s Proposed Findings of Fact. *PFOF* ¶¶ 269-313, and will be summarized at a high level here.

**A. Substation and Switching Station Modifications**

The proposed modifications to two existing substations (Card Street Substation and Killingly Substation) and one existing switching station (Lake Road Switching Station) would all occur within the fence lines (i.e., the already developed portions) of the existing station sites. As a result, environmental effects would be minor, localized on-site, and short-term (lasting only for the duration of construction). The incremental changes in the appearance of each facility will be negligible. All of the proposed modifications would occur in upland areas and thus would not result in any direct adverse effects on water resources. *(CL&P Ex. 1, Vol. 1, pp. 6-75, 6-76)*

There are no known cultural resource sites (standing historic structures or recorded archaeological sites) in the immediate vicinity of any of the three sites, and no reason to believe that they will be encountered in the previously disturbed station yards where construction will take place. *(CL&P Ex. 1, Vol. 1, p. 6-78)*

**B. Construction and Operation of the New 345-kV Lines**

In general, the Project ROWs extend through less developed areas, with few intersecting public roads. By siting the new lines within CL&P's existing ROW, CL&P has taken great care to avoid, minimize, or mitigate adverse effects to environmental resources.

Although the new transmission lines will modify the visual character of the ROW, the long-term effect will be incremental because one or more overhead transmission lines have been present on the ROW for decades. Moreover, for the most part, the surrounding

forested vegetation and topography preclude long views of the ROW, so that the new lines will not dominate the landscape. *(CL&P Ex. 18, pp. 46-47)*

The construction will have negligible effects on topography and geology, and only minor, short-term highly localized impacts on soils. These effects would primarily occur in the vicinity of work sites along the ROWs or where earth-moving activities are required for off-ROW Project support areas, such as access roads and staging areas. CL&P will develop and implement a soil erosion and sediment control plan, pursuant to CT DEEP requirements, to avoid or minimize the potential for erosion and sedimentation as a result of construction activities.

Overhead line construction for the Project will span the 54 perennial and 50 intermittent streams that are presently spanned by CL&P's existing transmission lines. *(CL&P Ex. 18, p. 17)* Approximately 1.5 acres of wetlands will be permanently filled as a result of the Connecticut portion of Interstate. Approximately 8.9 acres of wetlands will be temporarily affected by construction work areas, such as crane pads or timber mat access roads; such areas will be restored following the completion of the 345-kV facility installation. To avoid or minimize adverse effects to wetlands, CL&P has attempted to locate new transmission line structures in upland areas wherever possible and to place access roads outside of wetlands where practical. In fact, CL&P was able to relocate 38 of the 57 new transmission line structures originally planned for location in wetlands to upland areas. Nineteen structures could not be so relocated; however, the foundations for these structures result in less than 0.1 acre of permanent fill in wetlands. *(CL&P Ex. 18, p. 28)* For the structures to be located in wetlands, CL&P will attempt to limit temporary

impacts by reducing the size of the crane pad and by re-configuring the crane pad, if practical, to avoid the placement of temporary fill and/or timber mats in wetlands. Further, CL&P will implement wetland compensation measures, as determined based on consultations with the USACE and DEEP, to offset such impacts.

Overall, CL&P will avoid or minimize adverse effects to wetlands and watercourses by implementing various mitigation measures, including design modifications (involving the location of transmission structures outside of wetlands where possible); spanning of all watercourses; installation and use of access roads across smaller streams so as to minimize adverse effects to water quality; and maintenance of riparian vegetation along watercourses to the extent practical. CL&P also will adhere to the conditions of any mitigation measures included in the Council, DEEP, and USACE approvals. (*PFOF ¶¶ 286, 320*)

Furthermore, no new transmission line structures will be located in vernal pools. Four vernal pools will be permanently affected by existing on-ROW access road improvements, and four vernal pool habitats will be temporarily affected by work pads. Tree removal will occur in or near 30 vernal pools. (*CL&P Ex. 18, pp. 39-44*) To the extent possible, CL&P will limit effects to vernal pools from construction. (*See CL&P Ex. 15, Q 30 for CL&P's protocol for vernal pool avoidance and impact minimization.*)

The Project will affect approximately 24 acres of soils classified as prime farmland and 30 acres of soils identified as farmlands of statewide importance, all within CL&P's existing ROWs. CL&P anticipates temporary effects to approximately 20 acres of prime farmlands and to 25.6 acres of farmlands of statewide importance. To minimize

effects, CL&P plans to restore work sites in actively used agricultural fields by decompacting soils by disking or using equivalent methods. (*CL&P Ex. 18, p. 31*) In addition, CL&P committed to implementing measures requested by Mr. Edward Hill Bullard, as outlined in Section 4.1 of CL&P's Supplemental MCF (*see CL&P Ex. 1, Bulk Filing #2*) and in the policy of Northeast Utilities entitled "Transmission Right-of-Way Activities in Agricultural Lands". (*Bullard Ex. 2; Tr. 6/5/12, pp. 88-89, Johnson*)

The Interstate ROW will be maintained in accordance with CL&P's well-established vegetation management program, the objective of which is to maintain safe access to the transmission facilities and to promote the growth of vegetative communities along the ROW that are compatible with transmission line operation, pursuant to federal and state standards. Part of this program also includes invasive species management, including in wetland areas where such measures are carefully designed to avoid adverse effects on any wetland. (*See CL&P Ex. 23 for details regarding CL&P's wetland invasive species control plan.*) Special care will be taken to avoid or mitigate any effects on fisheries, amphibians, and breeding birds.

All of the Interstate construction activities in Connecticut will be in compliance with a detailed Development and Management ("D&M") Plan that CL&P will prepare in consultation with Council staff and subject to Council approval, after a Certificate is issued. To effectively monitor compliance with the D&M Plan, CL&P is planning to implement a pro-active comprehensive environmental training and compliance monitoring program for contractors and employees who will construct the Project.

(*CL&P Ex. 18, p. 58*)

The care that CL&P has taken to minimize the potential impacts of the Project has been recognized by DEEP in the 19 page detailed comment letter it has submitted to the Council. This letter, together with CL&P's comments on it (*CL&P 28b*), which were in turn endorsed by DEEP (*Tr. 7/31/12, p. 15, Carberry*), document the extraordinary degree of compatibility of the Project with its environment. DEEP notes CL&P's "very good record of cooperation...on this project" (*DEEP Comment Letter d. June 21, 2012, p. 5*); "the surprisingly low level of residential or other development along such a long [36.8 mi.] corridor;" and "the extent to which CL&P has been able to shift the locations of proposed new structures to avoid wetlands." (*Id., p. 8*) DEEP inspected and describes every foot of the ROW and the anticipated environmental effects, both of the proposed construction and of each of the line alignment alternatives under consideration. The letter concludes: "DEEP believes that the lack of significant resource concerns identified for the construction of the new 345-kV transmission line attests to the proposed route being a logical and prudent solution for addressing the identified capacity and reliability issues...." (*Id., p. 8*)

The most significant long-term environmental effect of the construction and operation of the line will be the conversion of currently forested habitat to early successional types of habitat and shrub/scrub habitat by reason of expansion of the ROW. (*DEEP Comment Letter d. June 21, 2012, PFOF ¶¶ 287-291*) DEEP estimates the area of such conversion to be 293 acres (based on an average of 90 feet of widening) plus any widening allowed over the federal lands (which now appears to be approximately 5

acres.) Thus, DEEP's estimate of the area to be converted works out to roughly 300 acres. CL&P's estimate, which is based on a more refined calculation that takes into account areas where the ROW is already deforested, such as in agricultural lands, is that there will be approximately 268 acres converted from upland or wetland forest to shrub/scrub habitat. (*PFOF* ¶ 294; *CL&P Ex. 1, Vol. 1, p. 6-30*; *CL&P Ex. 18, p. 38*). Remarkably, DEEP, the Connecticut Audubon Society, and CL&P all agree that this conversion represents a net benefit for the environment, not a net adverse environmental impact. As DEEP says:

While both the upland forest and old field/early successional environments possess habitat value, the old field and shrubland habitat that will be created within the right-of-way will benefit many of the wildlife species that are declining most rapidly in our state and region, including shrubland bird species. In addition, the early successional vegetative regime also provides excellent butterfly habitat. Much of this habitat type has been lost or is being lost as former agricultural land is being developed or as it reverts to woodland. The old field habitat created in the ROW will be maintained indefinitely in that state, and thus represents early successional habitat that is frozen in time. It will therefore continue to provide habitat value for critical species as long as the corridor is maintained for utility purposes. Also, it should be noted that the additional early successional habitat is created without fragmenting any existing upland forest blocks since the cleared right-of-way is already in existence.

*(DEEP Comment Letter d. June 21, 2012, p. 3)*

DEEP then makes a number of recommendations for maximizing the value of adding this habitat, which CL&P has agreed to follow. (*Id.*; *CL&P Ex. 28b*)

The comment letter of The Connecticut Audubon Society is equally noteworthy. After expressing support for the Project and identifying several declining bird species that will benefit from the expansion of the ROW's scrub and shrub habitat, the letter

quotes from a published essay by Robert Askins, professor of biology at Connecticut

College:

*The most important source of habitat for shrubland specialists are the open corridors (rights-of-way) maintained along powerlines. Trees must be removed from these corridors to protect the lines and facilitate maintenance of the line. Thus, there is an economic incentive to maintain low vegetation and in most parts of New England, this is accomplished by selectively removing trees and tall shrubs to favor low shrubs. The low shrubs form a relatively stable shrubland that have a greater diversity of plants and animals compared to corridors maintained by broadcast herbicide spraying or mowing.*

*Recent studies in Connecticut, Massachusetts and New York, show that the strips of shrubland along power lines support a rich diversity of shrubland birds, including species that have suffered substantial population declines in the region, such as Brown Thrasher, Yellow-breasted Chat, Blue-winged Warbler, and Eastern Towhee. A study in Massachusetts showed that birds nesting along power lines produce enough young to sustain their populations, indicating that these corridors provide good nesting habitat. Density of some shrubland species was greater on wider corridors, suggesting that consolidation of utility rights-of-way may produce better shrubland habitat (while minimizing fragmentation of forests.) (Audubon Comment Letter, p. 2)*

After noting that the condition described in the preceding paragraph is “precisely what CL&P is proposing – building its new line next to an existing 345 kV line,” the Audubon letter concludes: “Our mission, in a phrase, is to protect Connecticut’s birds and their habitats. The new power line will help do exactly that.” (*Id.*, p. 2)

Further detail on the beneficial effects of the conversion of forest to shrub/scrub habitat is provided at CL&P 1, Vol. 1, pp. 6-29 to 6-32. However, it adds little to the informative statements of DEEP and the Audubon Society. To quote the Audubon Society one final time, since the Project is needed for reliability, and constructing the line will provide scarce wildlife habitat, “This seems to us like a win-win situation.” (*Id.*, p. 2)

As noted by Ms. Mango in her testimony, all of the environmental effects of the Project and cumulatively with other existing facilities do not conflict with the State of Connecticut's environmental policies or land-use plans. (*CL&P Ex. 18, p. 45*)

Accordingly, it should be clear that the adverse environmental effects of the Project will be, for the most part minor, localized and short-term. Moreover, the Project will have significant long-term beneficial environmental effects. Given the importance to society of maintaining reliable electric service, such adverse impacts as the Project may have provide no reason to deny a certificate.

### **III. OVERHEAD CONSTRUCTION OF ALL SEGMENTS OF THE 345-kV LINES FROM CARD STREET SUBSTATION TO LAKE ROAD SWITCHING STATION TO THE CONNECTICUT/RHODE ISLAND STATE LINE IS CONSISTENT WITH THE COUNCIL'S EMF BEST MANAGEMENT PRACTICES AND STATUTORY REQUIREMENTS**

#### **A. The Statutory and Regulatory Framework for Analyzing Overhead vs. Underground Construction of Electric Transmission Lines (Conn. Gen. Stats. § 16-50p(a)(3)(D)(i), (ii); § 16-50p(a)(3)(E); § 16-50p(i); § 16-50t(c); Best Management Practices)**

In December, 2007, pursuant to Conn. Gen. Stats. § 16-50t(c) the Council adopted revised EMF Best Management Practices ("BMP"), following a two-year proceeding in which it considered, among other things, a comprehensive review of the scientific consensus concerning the potential health effects of transmission line electric and magnetic fields. (*Council Petition No. 754, Electric and Magnetic Field Best Management Practices, Record; Council Admin. Notice Item 23, Electric and Magnetic Field Best Management Practices for the Construction of Electric Transmission Lines in Connecticut, December 14, 2007. Website Link: <http://www.ct.gov/csc/emf-bmp>*) The

revised BMP, like their predecessor, apply to all transmission lines that require a certificate from the Council. The Council applied the new BMP to a major transmission project for the first time in its Docket No. 370, the Greater Springfield Reliability Project.

It was also in Docket 370 that the Council first applied the amendment of Public Act 07-4 § 116 to Conn. Gen. Stats. § 16-50p(i). Section 16-50p(i) establishes a presumption that overhead construction of 345-kV lines “adjacent to” certain areas where children congregate is “inconsistent with the purposes of” PUESA. In Public Act 07-4 § 116, the legislature clarified that, in determining whether that presumption has been overcome, the Council must consider, among other things, “whether the cost of any contemplated technology or design configuration may result in an unreasonable economic burden on the ratepayers of the state.” The specified land uses - “residential areas, private or public schools, licensed child day care facilities, licensed youth camps [and] public playgrounds” are often collectively called, for convenience, “statutory facilities.”

The legislature and the Council have made clear that the BMP and the presumption against overhead 345-kV line construction modify one another, and should be considered together when determining if overhead line construction is appropriate. Conn. Gen. Stats. §16-50p(3)(D)(iii) (requiring finding that approved overhead line adjacent to statutory facilities will be (i) within protective buffer zone and (ii) consistent with BMP); BMP, Sec. III, p. 4 (BMP were developed “in conjunction with” Section 16-50p(i)). The Council has also recognized that established safety regulations provide ample protection from transmission line electric fields, so that the BMP concentrate on

the reduction of magnetic fields. (*Council Admin. Notice Item 23, p. 1*) With these amendments and revisions, the regulatory framework concerning magnetic fields from overhead power lines at 345 kV and above is as follows:

- (1) The Council must conclude that any overhead portions of a transmission line are “cost effective,” based on a life-cycle cost analysis of the facility and underground alternatives to it. (*§ 16-50p(a)(3)(D)(iii)*)
- (2) The Council must find that any overhead portions of the facility “are consistent with the purposes of this chapter.” (*§ 16-50p(a)(3)(D)(iii)*)
  - (i) Overhead construction of a line at 345kV or above, that is proposed to be “adjacent to” statutory facilities, is presumed not to meet this consistency test. (*§ 16-50p(i)*)
  - (ii) But this presumption may be overcome by a demonstration “that it will be technologically infeasible to bury the facility,” and in determining feasibility, the Council is to consider effects “of burying the facility on...reliability” and “whether the cost of any contemplated technology or design configuration may result in an unreasonable economic burden on the ratepayers of the state.” (*§ 16-50p(i), as amended by P. A. 07-4 § 116*)
  - (iii) Like any rebuttable presumption, this presumption should also be subject to being overcome by more general proof that the proposed construction *is* consistent with the purposes of PUESA. However, that point has never been ruled upon by the Council or a court.
- (3) The Council must find that any overhead section of a line is “consistent with” the Council’s own regulations and standards, particularly including its BMP. (*§ 16-50p(a)(3)(D)(iii)*)
- (4) The Council must find that overhead lines in general, and in particular those that are to be constructed “adjacent to” statutory facilities are contained within a suitable buffer zone (which may be the existing ROW) that will protect public health and safety. (*§ 16-50p(a)(3)(D)(iii)*)

Thus, the Council’s first inquiry when an overhead line is proposed is whether an underground line is more cost-effective on a life-cycle basis or otherwise more consistent

with the “purposes” of PUESA, which are stated in detail in §16-50g and summarized there as “To provide for the balancing of the need for adequate and reliable public utility services at the lowest reasonable cost to ratepayers with the need to protect the environment and ecology of the state.... This determination applies to the whole line, without regard to its voltage class or whether it is adjacent to statutory facilities.

Next, the Council considers whether any segments of a proposed overhead line will be “adjacent to” statutory facilities. As will be discussed later on, this determination can require a judgment by the Council as to whether a particular use is or is not one of the specified “statutory facility” uses; and, if it is, a determination whether the proposed line would be “adjacent to” that statutory facility. If the Council answers both of these questions affirmatively, it will consider whether the “adjacent” section of overhead line in question will be contained within a suitable buffer zone. In doing that, the Council will evaluate, among other things, the projected electric and magnetic fields associated with the line, both before and after the potential application of its BMP.

If the voltage class of the proposed overhead line is 345 kV or above, the Council must also consider whether the presumption against overhead construction “adjacent to” statutory facilities has been overcome by proof of infeasibility (including proof of an unreasonable burden on ratepayers) or by any other allowable proof. In determining whether the “burden” on ratepayers is or is not “unreasonable,” the Council should take into account not just the cost differential between overhead and underground line construction, but also the benefit, if any, that would be provided by the greater expense. Thus, the Council can consider the magnetic field levels that will be associated with the

proposed construction; any conclusion it has reached with respect to whether the ROW provides a suitable “buffer zone” for the proposed line; and how the magnetic field exposure levels that would be associated with the proposed construction compare to those that would exist if the proposed line were constructed elsewhere, or constructed underground.

Turning now to the judgments that must be made by the Council in administering the EMF BMP and the § 16-50p(i) presumption, a threshold determination will need to be made as to whether a specific land use constitutes a statutory facility. There will rarely be doubt as to whether a facility is a school or a licensed day care center or youth camp. As the Council saw in Docket No. 272, there can be some doubt as to what portion of a public recreation area constitutes a “playground.” However, the most vexing question is determining whether a place qualifies as a “residential area.”

The legislature has provided no definition of a “residential area.” Rather, as the co-chair of the Committee that reported the bill that introduced this concept into the Council’s governing legislation said, the legislature “left up to the Siting Council to try to define residential based upon hopefully what they can determine about electromagnetic fields.” (*Comments of Rep. Backer, 2004 House Proceedings, May 3, 2004, pp. 239, 263*) Exercising this discretion, the Council has previously construed the term “residential areas,” as used in Conn. Gen. Stats. § 16-50p(i) and the BMP as referring to developed “neighborhoods,” not residentially zoned land where people do not yet live. (*Council Admin. Notice Item 30, Docket No. 272 (Middletown to Norwalk 345-kV Line), Opinion, April 7, 2007, p. 15*) Accordingly, in that case, the Council ordered an overhead line-

route deviation that bisected a proposed 15-lot subdivision that had not yet been built (although it was approved during the proceeding.) (*Id.*) CL&P understands that by a “neighborhood” the Council meant to designate a rather densely settled and integral development or collection of homes - such as, for instance, the Royal Oak subdivision from which that deviation was ordered.

Another determination requiring an exercise of discretion by the Council is whether a statutory facility - such as a group of homes constituting a “residential area” would be “adjacent to” the proposed 345-kV line if it were built overhead. As the Council noted in Docket No. 272, there is no legislative definition of the term “adjacent,” and in common speech it is used to mean both “near to” and “abutting.” Indeed, both concepts are included in the primary dictionary definition of the term. For instance, the Oxford English Dictionary (1971 ed.) defines “adjacent” to mean “Lying near or close; adjoining; contiguous; bordering; not necessarily touching (though this is by no means precluded.)” The Council asked, in Docket No. 272, for briefing on which of these meanings should be used in applying the presumption.<sup>5</sup> However, the term will have to be construed in widely varying circumstances, and it seems prudent to apply it on a case-by-case basis, rather than to settle upon a single restrictive definition that will be applied in all cases. A fixed definition applied in all cases could result in over-serving or under-

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<sup>5</sup> “In interpreting C.G.S. § 16-50p(i), does the term “adjacent” mean that the proposed line goes through or borders the property (parcel) of the listed facility? Or does it mean that the proposed line has to be within a certain distance from a listed facility? If the protected facility is on a large parcel of land, does the underground requirement still pertain if the proposed line is adjacent to the property, but a substantial distance (such as 300 feet) from the actual facility? Conversely, does the underground requirement still pertain if the proposed line (or its ROW) does not actually border or go through the property of a protected facility, but the protected facility is relatively close (such as less than 100 feet) from the proposed line (or ROW)?” (*Docket No. 272, Council’s Request for Briefing, Feb. 17, 2005*)

serving the statutory objective of reducing magnetic fields in areas where children congregate. (*Council Admin. Notice Item 23, p. 4*) This is likely the conclusion that the Council came to in Docket No. 272, since it did not then adopt any fixed definition of the term in that Docket.

In Docket No. 370, the Council implicitly applied both the concepts of “residential area” and “adjacency” to the line when it considered EMF BMP configurations for a 3.2-mile section of ROW. The Council found that although there were homes “nearby” this 3.2-mile section, there was a distinction between a 1.1-mile portion of the segment where the homes were relatively closer to the line and the remaining 2.1 miles. Along the 1.1-mile segment, 25 homes were located within 100 feet of the ROW edge, and an additional 50 homes were located within 101 to 300 feet of the ROW edge. The Council concluded that EMF BMPs were warranted along this stretch of the ROW. (*Docket 370, Opinion, p. 13*)<sup>4</sup> On the other hand, the Council found that along the remaining 2.1 miles of the analyzed section, there were “few homes adjacent to the ROW compared to the 1.1 mile section.” The Council decided not to order an EMF BMP configuration for this part of the ROW.

Once the Council determines that the presumption applies, the presumption may be rebutted by showing that the costs of underground line construction would impose an unreasonable burden on ratepayers. As the following discussion shows, in this case, the cost of underground line variations adjacent to possible statutory facilities would be severe. Moreover, such an investment would be particularly unreasonable in light of the effectiveness of overhead line designs in lowering magnetic field levels along the edge of

the ROW in areas of most interest. The huge investment in underground construction would produce very little difference in magnetic field levels along the edges of the ROW. Moreover, the construction of the proposed overhead line would actually lower magnetic fields at some statutory facilities, including the Mount Hope Montessori School, and constructing the new line underground would achieve a very small incremental reduction. (CL&P Ex. 17, pp. 79-81 & Tables CCM-17 & CCM-18)

**B. As Applied to the Facts in this Docket, the Analytical Framework for Consideration of 345-kV Line Construction Clearly Favors Approval of All-Overhead Lines From the Card Street Substation to the Connecticut/ Rhode Island State Border**

***1. The Council May Consider Certain Sections of ROW Identified as Focus Areas Appropriate for the Application of EMF BMP Line Designs***

In Section I.C of this Brief, CL&P has established that overhead construction of the 345-kV lines included in the Project is more cost-effective on a life-cycle basis than underground line construction. CL&P has also demonstrated that overhead construction is more consistent with the statutory objective of providing reliable service at the lowest reasonable cost with the protection of the environment.

The Council must now evaluate its EMF BMP and determine if CL&P should implement any low-cost EMF mitigation measures. Once it has made that determination, the Council must analyze the presumption in Conn. Gen. Stats. § 16-50p(i) to determine whether it has been rebutted.

As the following discussion will show, consideration of implementing EMF BMP measures beyond the “no cost” measures already embedded in the baseline H-Frame

design is complex, because for this Project the overall magnetic field levels at the edges of and beyond the ROW that would be associated with construction of the new 345-kV lines are quite similar to the pre-Project field levels; when field levels on both edges of the ROW are considered, levels are not substantially reduced by alternate BMP designs.

Nevertheless, as required by the Council's EMF BMP, CL&P identified "Focus Areas" and considered low-cost engineering designs to reduce magnetic fields adjacent to statutory facilities and to areas that the Council might consider to be residential areas. The Council's EMF BMP establish a "benchmark" budget of 4% of project cost for such designs. CL&P has calculated the 4% guideline to be \$8.5 million for the Project.

#### **Focus Area A (Coventry and Mansfield)**

Focus Area A is an approximately 2.3-mile-long section of ROW in Coventry and Mansfield. Homes have been developed near each side of the ROW along crossing streets. Construction of the new line on H-frame structures would increase the estimated AAL magnetic field along the North/West ROW edge from 4.6 mG to 7.2 mG, and reduce it on the opposite edge from 28.0 mG to 18.4 mg. The alternate configuration that best complies with the Council's EMF BMP guideline is a steel-monopole support structure with the conductors in a delta configuration. The delta configuration would decrease the AAL magnetic field on the North/West edge to 5.2 mG but increase it on the opposite edge to 20.6 mG. The effects would be similar for magnetic fields at the homes nearest to the ROW: with respect to pre-Project levels, the delta configuration would produce a small decrease at homes along one side of the ROW and a small increase at homes on the other side, as compared to the baseline H-Frame configuration. (PFOF

¶ 356) The incremental cost of the delta configuration in all of Focus Area A is estimated as \$2.7 million, which would be localized. (PFOF ¶ 357)

Because the homes that would see a reduction in magnetic fields are those near the side of the ROW where the new line would be constructed, and that reduction amounts to more than 28% of the pre-Project AAL field, the delta design qualifies as a EMF BMP design that would yield a greater than 15% magnetic field reduction at adjacent homes. However, if both sides of the ROW are considered, there is no overall advantage for the delta design. The average of the estimated AAL magnetic fields at both ROW edges with the baseline H-frame design is 12.8 mG; and with the delta design they are 12.9 mG. (PFOF ¶ 357) The average of the AAL fields at the nearest houses on both sides of the ROW is 11.9 mG for the baseline H-frame and 11.6 mG for the delta design.

In applying its BMP, the Council considers the visual impact of different designs. (Council Admin. Notice Item 23, p. 8) The typical height of the delta structures would be 110 feet, as compared to the 85-foot height of typical H-frame structures. (PFOF ¶ 357)

Therefore, the Council must determine if the reduction in the magnetic fields on one side of the ROW is worth the increased visibility of the new structures and the required \$2.7 million incremental investment, when there is no overall improvement in the magnetic field environment along both sides of the ROW, and there are small numbers of homes on both sides. As DEEP noted in evaluating the magnetic fields associated with the H-Frame and Delta configurations: “These mixed results in combination with the greater visual impact of the taller steel poles and the increase in cost of the BMP design point to the need for the Council to carefully weigh these aspects

before making a decision on employing the BMP option in this area.” (*DEEP Comment Letter d. June 21, 2012, p. 6*)

CL&P has included the \$2.7 million incremental cost of the delta configuration in its estimated Project cost. However, it has recognized that the Council “may consider that the magnetic field reduction offered by the delta design is offset by the visual impact of the taller structures required for the delta configuration, and therefore select the base-case H-frame design for all or portions of this focus area.” (*CL&P Ex. 1, Vol. 1, Appendix 7B, p. 7B-26*)

**Focus Area B (Montessori School / Green Dragon Day Care)**

Focus Area B is a 0.9-mile-long segment of ROW in Mansfield. It passes by the Mount Hope Montessori School and the Green Dragon home-based day care facility. It was originally designed to pass by the now-discontinued Come Play With Me day care facility as well. In light of the discontinuance of that day care use, this Focus Area could be shortened to approximately 0.6 miles. The pre-Project and post-NEEWS edge-of-ROW levels of magnetic fields in Focus Area B are the same as those in Focus Area A (*PFOF ¶¶ 360-363*) However, in this case, the focus of concern is on the school / day care facilities. The baseline design lowers the pre-project AAL magnetic field at the Montessori School from an already low 1.7 mG to 1.2 mG. Similarly, it lowers the pre-project AAL field at the Green Dragon day care from 2.7 mG to 0.9 mG. Although the delta design would produce the same reduction along the north ROW edge as it would in Focus Area A, it would not reduce magnetic fields at either the Montessori School or the Green Dragon day care to the same extent as the baseline H-Frame configuration does.

(PFOF ¶¶ 362, 363, 365) On the other hand, the delta design would be 25 feet taller than the H-Frame and would have an incremental Project cost of approximately \$1 million.

(PFOF ¶ 366)

DEEP's evaluation is:

Field review at [the Montessori School] showed that there is sufficient intervening distance between the new line location and the school to accommodate another building lot. The Green Dragon daycare center is fairly well removed from the proposed line, over 400' away at the closest point, and on the opposite side of the ROW from the new line. The benefits of using the taller steel poles in this area are also called into question if the EMF calculations on page 54 of Exhibit 17 are accurate in that they indicate lower magnetic field strength at these two facilities with the use of H-frame structures as compared to steel pole-supported delta configuration conductor. (DEEP Comment Letter d. June 21, 2012, p. 7)

CL&P has not included the incremental cost of using the delta configuration in Focus Area B in its Project cost estimate. This decision reflects CL&P's judgment that on balance the baseline H-frame configuration is preferable, even though the delta configuration qualifies for consideration as a "low cost" EMF BMP measure based only on edge-of-ROW magnetic field levels.

### **Focus Area C (Hawthorne Lane)**

Focus Area C abuts Focus Area B in Mansfield. It is the Hawthorne Lane area. (PFOF ¶ 369) A ROW shift has been proposed to CL&P by the owners of four homes along a cul-de-sac. These homes are served by driveways from Hawthorne Lane, which is crossed by CL&P's existing 300-foot-wide ROW. The shift would eliminate an angle in the existing ROW and in the existing and new lines, which would result in the ROW and lines being moved further away from the homes. The new and existing lines would

be placed in a vertical configuration, on steel monopoles. (CL&P Ex. 1, Vol. 1, Appendix 7B, pp. 7B-27, 7B-28)

The edge-of-ROW pre-Project and post-NEEWS magnetic fields levels, with the baseline H-frame construction, are the same for this Focus Area as for Focus Areas A and B. (PFOF ¶ 370) However, because the landowners' proposed EMF BMP configuration is different than those CL&P considered for Focus Areas A and B and involves moving the lines away from the homes, the reduction achieved with this EMF BMP configuration would be somewhat greater. This configuration would result in a reduction of the estimated AAL magnetic field level on the side of the ROW that is nearer to most of the Hawthorne Lane homes from 7.2 mG (baseline design) to 2.0 mG (BMP design). On the other side of the ROW the magnetic field level would be higher with the EMF BMP design than with the baseline H-frame design. (PFOF ¶ 371) In addition, the Hawthorne Lane ROW Shift would result in a small reduction of magnetic fields at all but one of the nearby homes, over and above the reduction achieved by the baseline design. (PFOF ¶ 372)

The landowners' EMF BMP structures would be 130 feet tall, 45 feet taller than the baseline H-frame structures. (PFOF ¶ 371) However, the use of the taller structures and a relocated ROW enables the preservation of all of an existing tree screen between the Hawthorne Lane homes and the ROW. This visual improvement was the chief motivation for the homeowner's request for the alternative BMP configuration.

The incremental cost of this alternative would be \$1,800,000, or approximately 0.8% of the estimated project baseline cost, **provided that** several key conditions,

including conveyances by the homeowners of the required new ROW without cost to CL&P, could be fulfilled. Without fulfillment of these conditions, this is not a practical alternative that CL&P can implement; and as of the close of the record, all of the required conditions had not been fulfilled. CL&P has not included the incremental cost of the Hawthorne Lane Shift in its estimated Project cost, but recognizes that the Council could have reason to order it, particularly if it does not exhaust the 4% EMF BMP “benchmark” budget in other Focus Areas.

As set out in more detail in Section III.B.4 of this brief, CL&P recommends that the Council either: a) defer a decision on the Hawthorne Lane Alternative to the D&M Plan stage, if it is interested in considering the Hawthorne Lane Shift; or b) order that the baseline H-Frame configuration be used in this section of the Project.

#### **Focus Area D (Brooklyn)**

Focus Area D is a one-mile long section of ROW in Brooklyn. The Application identifies two home-based day-care facilities to the north of the ROW. However, one of these (the Susan Kirkconnell Day Care is nearly 500 feet from the ROW) and the other (the Jacqueline Ben Day Care) ceased operations during the hearing. Accordingly, there are no now child day-care facilities “adjacent to” this section of the ROW. However, there are homes along both sides of the ROW. The comparison of pre-project and post-NEEWS fields for this Focus Area is the same as that for Focus Areas A-C. The average of estimated AAL fields along both sides of the ROW is 16.3 mG pre-Interstate and 12.8 mG after all of NEEWS is constructed. If the taller steel poles with the conductors in a delta configuration were used instead of the baseline H-frame construction, the average

of the estimated AAL fields on both sides of the ROW when NEEWS is complete would be 12.9 mG instead of 12.8 mG. However, as compared to the baseline design, the delta configuration would reduce fields on the north side of the ROW where there are more houses, from 7.2 mG to 5.2 mG (28%); and raise them on the south side of the ROW where there are fewer houses, from 18.4 mG to 20.6 mG (12%). The incremental Project cost of the delta configuration would be \$1,140,812 (0.7%). Finally, the greater height of the new structures could result in additional Notices of Presumed Hazard from the FAA, which could in turn lead to additional lighting requirements. (PFOF ¶¶ 373-377) DEEP reports that the owner of one of the homes closest to the ROW expressed a preference for the baseline configuration as opposed to the taller steel poles. (DEEP Comment Letter d. June 21, 2012, p. 8)

CL&P has included the incremental cost of the delta configuration for Focus Area D in its estimate of Project cost, because the delta design is the most effective low-cost choice for reducing magnetic fields along the ROW edges. However, CL&P recognizes that “given the modest changes in magnetic field levels resulting from the use of the base-case line design, the Council may consider that the benefit of the delta design in reducing magnetic field levels on one side of the ROW is offset by the additional visual impact of the taller structures, and therefore select the base-case H-frame line design for this focus area.” (CL&P Ex. 1, Vol. 1, Appendix 7B, p. 7B-31)

### **Focus Area E (Elvira Heights)**

Elvira Heights is a residential area southeast of the ROW in Putnam. However, the homes in that neighborhood may not be considered to be “adjacent to” the new line, because they are separated from the ROW by a natural gas transmission pipeline and because the new line would be constructed on the far side of the existing 345-kV line. In this area, the cancellation effects achieved by best-phasing the existing and new lines are not as great as those in the other Focus Areas, so that base-case H frame line design produces higher magnetic fields on both edges of the ROW when compared to the 2015 pre-Interstate conditions; the average of the AAL fields along both sides of the ROW increases from 4.2 mG to 11.3 mG. (PFOF ¶ 378)

However, none of the six alternative line designs for the new line, including a split-phase configuration, would achieve a MF reduction on either ROW edge in the Elvira Heights segment of the ROW, as compared with the baseline H-frame design. Of the four additional alternatives involving rebuilding the existing line, one BMP alternative would involve reconstructing the existing line along its existing center line, and constructing the new line alongside it, both on steel-pole structures with delta-configured conductors. Although this alternative would achieve a reduction in MF levels on the side of the ROW where the houses are concentrated, and that reduction would be very small in absolute terms. (PFOF ¶ 379) At the home nearest to the ROW on the southeast, this alternative would reduce the post-Project AAL magnetic field level in 2020 from 3.6 mG to 2.8 mG (thus a 35% decrease, but only 0.8 mG). The additional cost to achieve this relatively small absolute reduction from an already low MF level is

\$4.3 million, or approximately half of the 4% guideline budget for magnetic field mitigation. In addition, the use of this alternative would have a greater impact on environmental resources. (*CL&P 1, Vol. 1, Appendix 7B, p. 7B-32*) DEEP's evaluation is: "The aesthetic impacts of the BMP option in this area appear to be more significant than the very limited reduction in EMF levels." (*DEEP Comment Letter d. June 21, 2012, p. 8; PFOF ¶ 380*)

Accordingly, CL&P has not included any incremental cost above that of the baseline H-frame configuration in this Focus Area, and has expressed strong reservations with respect to the use of any other configuration. (*CL&P Ex. 1, Vol. 1, p. 7B-32; CL&P Ex. 16, p. 59*) CL&P now recommends the base case H-frame line design for the Elvira Heights area.

### **Focus Area Summary**

The previous discussion of each of the Focus Areas may be summarized in tabular form as follows:

### BMP Focus Areas

Focus Area	Town(s)	Size	Location Between Existing Line Structures	Statutory Facilities	CL&P's EMF BMP Evaluation	Add'l Cost Included in Project Estimate	Project Cost Increase(%)
A	Coventry, Mansfield	2.3 miles	9028-9048 (330 Line)	Potential residential area	H-Frame acceptable; delta best option for additional reduction.	\$2.7 M	1.3%
B	Mansfield	0.9 miles	9070-9078 (330 Line)	a. Residential Day Care b. School/day care [Mount Hope]	H-frame preferable		
C	Mansfield	0.4 miles	9078-9081 (330 Line)	Potential residential area [Hawthorne Lane]	H-frame acceptable; Shift acceptable if conditions met; defer to D&M Plan		
D	Brooklyn	1 mile	9210-9219 (330 Line)	Homes	H-Frame acceptable; delta best option for additional reduction.	\$1.4 M	0.7%
E	Putnam	0.6 miles	9305-9310 (347 Line)	Potential residential area [Elvira Heights]	H-frame preferable; option for further reduction requires reconstruction of existing line; delta structures for both existing and new lines.		2.0%
						\$4.2 M (rounded)	4.0%

**2. *The Existing ROW Will Provide an Adequate Buffer Zone for the New Overhead 345-kV Lines (§ 16-50p(a)(e)(d)(iii))***

Whether or not any of the MF reduction strategies over and above the “no cost” strategies embedded in the base-line designs are adopted, the existing ROW will provide an adequate buffer zone for the new line. The ROW between the Card Street Substation and the state line is wide; it ranges from 250 feet to 400 feet (excluding the Mansfield

Hollow areas where the ROW width is 150 feet). The ROW edges will typically be approximately 170 feet or 130 feet from the centerline of the new line. Vegetation buffers on the north/west side of the ROW, will remain or be reestablished after the new line is built. The line will be constructed in full compliance with the National Electrical Safety Code, published by the Institute of Electrical and Electronic Engineers, which as the Council has recognized, provides standards for “the safe installation, operation, and maintenance of electrical utility lines, including clearance requirements from vegetation, buildings, and other natural and man-made objects that may arise in the ROW, ... the safety of power-line workers and the general public.” (*Council Admin. Notice Item 23, p.*

7) With respect to magnetic field levels, in evaluating whether an existing ROW provides an adequate buffer, the Council will consider, in addition to its own BMP, guidelines or benchmarks used by other states, such as the 85 mG Massachusetts benchmark for comparing different design alternatives, and the 150-250 mG range allowed for extra high voltage lines in Florida. The edge-of-ROW magnetic field levels, regardless of the line design chosen, and regardless whether they are estimated with average or peak loads, will be comfortably within these guidelines, even with assumptions of high average and peak levels of CT power imports. (*See e.g., CL&P Ex. 1, Vol. 1, Section 7, Appendix 7B*) The edge-of-ROW magnetic fields, estimated on an annual average load basis, will be toward the lower end of the range typically encountered in the vicinity of electric transmission lines, regardless of which line design is selected by the Council. They will also be lower than those commonly encountered by the U.S. population near many electric distribution lines, and in everyday settings.

Accordingly, the Council has a clear basis for a finding that the new lines will be contained within a “buffer zone that protects the public health and safety,” consisting of the existing ROW, which will provide an adequate buffer zone between any new or modified lines and any adjacent residential areas, public or private schools, licensed child day care facilities, licensed youth camps or public playgrounds. (*Conn. Gen. Stats. § 16-50p(a)(3)(D)(iii); Council Admin. Notice Item 23, p. 7*)

**3. *The Presumption of Section 16-50p(i) that new 345-kV lines will not be constructed “adjacent to” specific facilities has been overcome.***

As noted in the preceding discussion of the BMP, there are groups of homes in Focus Area A, C, D, and E that the Council could consider to be “residential areas” to which the new 345-kV line will be “adjacent;” and in Focus Area B, the Mount Hope Montessori School (which is both a day-care facility and a school) and/or a residential day-care facility, might be considered to be “adjacent to” the new line, notwithstanding that each is separated from the ROW by another property and the home-based day care will be separated from the new line by the existing line. However, if the presumption of 16-50p(i) is found to apply in any of these cases, it has been clearly overcome, because the expense of underground construction would impose an unreasonable economic burden on ratepayers.

As discussed in Section III.B.1 of this brief, the new 345-kV line will not increase magnetic field levels substantially at any of these facilities, and will actually reduce them in many cases. On the other hand, construction of any of the route variations considered to avoid constructing the new line “adjacent to” statutory facilities would not

substantially reduce magnetic field levels along the ROW, as compared to the proposed overhead construction, and would indeed increase magnetic fields in many locations, as shown on the following summary table:

**Magnetic Field Levels (AAL) for Overhead Lines and the Underground Variations (mG)**

	<b>Pre-Interstate (2015)</b>	<b>Post-NEEWS (2020)</b>		
<b>ROW Edge</b>	<b>Existing Configuration</b>	<b>Base Line H-Frame Design</b>	<b>Underground Variation</b>	<b>BMP Configuration (if not H-frames)</b>
<b>Mansfield Underground Variation</b>				
North	4.6	7.2	2.8	5.2
South	28.0	18.4	24.6	20.6
Average Both Sides	16.3	12.8	13.7	12.9
<b>Mount Hope Underground Variation</b>				
North	4.6	7.2	2.8	N/A
South	28.0	18.4	24.6	N/A
Average Both Sides	16.3	12.8	13.7	N/A
<b>Brooklyn Underground Variation</b>				
West/North, XS-6	4.6	7.2	2.8	5.2
East/South, XS-6	28.0	18.4	24.6	20.6
Average Both Sides	16.3	12.8	13.7	12.9
West, XS-7	6.4	20.0	4.5	N/A
East, XS-7	16.6	<u>18.7</u>	<u>19.8</u>	<u>N/A</u>
Average Both Sides	<u>11.6</u>	<u>19.4</u>	<u>12.2</u>	<u>N/A</u>
<b>Elvira Heights Underground Variation</b>				
North	1.2	2.2	2.6	1.8
South	7.2	20.4	21.2	13.3

(See, PFOF ¶ 345)

Similarly, the underground variations would not substantially reduce magnetic field levels at statutory facilities, as demonstrated by the following example for the Mount Hope Underground Variation:

**Magnetic Field Levels at Statutory Facilities Near the Mount Hope Underground Variation Route**

Facility	Distance to Nearest Edge of ROW (ft)	Magnetic Fields for Annual Average Load Case (mG), 2020		
		Pre-Interstate	Post-NEEWS	
			Overhead H-Frame Line Configuration	Underground Variation
Mount Hope Montessori School	137	1.7	1.2	0.8
Green Dragon Day Care	196	2.7	0.9	2.9

*(PFOF ¶ 365; CL&P Ex. 1, Vol. 1A, p. 15-58; CL&P Ex. 16, p. 81)*

Moreover, underground construction would cause greater environmental impacts than the proposed overhead construction. *(See PFOF ¶¶ 175-191, 195-198, 201-204, 226-227, 236-239, 248, 263-266)* Under these circumstances, where underground construction provides no benefit of reducing magnetic field levels, and is detrimental to the environment, no significant expenditure on underground construction can be considered “reasonable” in the context of §16-50p(i). However, the incremental cost of any of the underground variations, particularly when the impact of “localization” of those costs is considered, is exorbitant, as illustrated by the following table:

**Estimated Initial Capital Costs of Underground Variations  
Compared to Those for Section of Overhead Line Each Variation Would Replace,  
Assuming Localization of BMP Overhead Costs and Underground Costs  
Exceeding Baseline H-Frame Costs  
(All Costs in \$ Million)**

UG Variation	Cost to CT Consumers of UG Variation	Cost to CT Consumers of OH Segment Replaced (incl. localized EMF BMP costs)	Multiple	Application Reference
Mansfield	\$58.2	\$4.7	12.4	15-37, 15-38
Mount Hope	\$65.0	\$5.4	12	15-61, 15-62
Brooklyn	\$82	\$8.2	10	15-103, 15-104

*(PFOF ¶¶ 228, 240, 267; CL&P Ex. 16, p. 77)*

The estimated costs to Connecticut ratepayers for the Connecticut portion of Interstate would be approximately 24 cents per month, based on the incremental retail rate for a 700 kilowatt hour rate 1 residential customer. In contrast, the incremental cost for only the Mount Hope Underground Variation, in lieu of the overhead section it would replace, would be an additional 25 cents, thereby doubling the cost to Connecticut ratepayers for the Project. *(PFOF ¶ 241; Tr. 8/2/12, pp. 7-9, Taupier)* A doubling of consumer cost for construction that does not reduce magnetic field exposure must be considered an unreasonable burden on ratepayers under section 16-50p(i).

Of course, the Civies' proposed extension of the Mount Hope Underground Variation through and past their own property suffers from all of the same defects as the Mount Hope Underground Variation and more. It would be more costly, and it would have significantly more environmental impacts. *(PFOF ¶ 248)* Moreover, of course, the fact that the Civies have an unrecorded "concept plan" for a subdivision does not make their property a "residential area," any more than the 15-lot subdivision plan made the

property to which the Council moved the proposed line in Docket 272 a “residential area.”

The comparison of the Brooklyn Overhead Variation to the section of the proposed line that it would replace is not as drastic as that of the underground variations. The estimated incremental cost of the overhead variation would be \$10.5 million, which would be localized. But nothing would be gained for that investment. The AAL fields along the existing ROW would be little different without the new line than they would be with it; and creating a separate ROW for the new line would create a second source of magnetic fields. (PFOF ¶¶ 257, 383, 384) Of course, building on a “greenfield” ROW rather than on an existing ROW would entail greater environmental effects. (PFOF ¶ 258) Accordingly, there is no way that the incremental cost of the Brooklyn Overhead variation could be considered a “reasonable” cost.

***4. The Council Should Defer Its Routing Decisions With Respect to the Mansfield Hollow Federal Lands Until the D&M Plan Stage, and May Consider Deferring Its Decision With Respect to the Hawthorne Lane Shift to the D&M Plan Stage.***

Although the Council normally makes its routing determinations during the contested phase of a proceeding on an application for a certificate, there is no need to make a final determination then with respect to alternate locations or alternate configurations where the choice will not affect different sets of landowners. In this case, there are two routing choices to be made for which complete information was not available during the hearings. Each of these choices affects only a single landowner or the same set of landowners; no third party rights or interests would be affected.

Accordingly, there is no reason not to defer the choice to the D&M stage, should the Council find that convenient.

a. Mansfield Hollow Areas in Mansfield and Chaplin

There are two non-contiguous segments of CL&P's existing ROW that traverse federal public lands that are managed by the United States Army Corps of Engineers ("USACE") and leased to DEEP. The first segment includes an approximately 0.9-mile segment, across a portion of Mansfield Hollow State Park, an approximately 600-foot span of Mansfield Hollow Lake, and a portion of the Mansfield Hollow Wildlife Management Area ("WMA") on the eastern side of the lake, in Mansfield ("Segment 1"). The second segment includes an approximately 0.5-mile segment, across another portion of the WMA and in the vicinity of the Natchaug River, in Chaplin ("Segment 2"). In these segments, CL&P's existing ROW is 150 feet wide. A new 345-kV line cannot be built alongside the existing line within the existing ROW, due to conductor separations required for safety and reliability. Because CL&P's eminent domain powers do not extend to federal land, any widening can only occur through a voluntary grant by the USACE. (*CL&P Ex. 17, p. 25*) The USACE's decision whether to grant additional rights, and if so, what width to grant, will depend on its determination of the "least environmentally damaging practical alternative."

CL&P developed a preferred configuration and two configuration options and presented them to the USACE for the Mansfield Hollow areas:

- (a) An “11-Acre ROW Expansion Option” (called the “Proposed Configuration” in the Application and referred to as the “Matching Structure Option” during the hearings) would construct the new line on structures of the same type and height as the existing line structures and would have the lowest cost. CL&P would need an additional 55 feet of easement width in Segment 1 and an additional 85 feet in Segment 2, for a total of 11 acres. CL&P initially preferred this configuration. However, based on the preference of the USACE expressed during CL&P’s negotiations with its real estate division, this alternative was withdrawn from the Application (*CL&P Ex. 17, pp. 25, 27; CL&P Ex. 15, Q 38*)
- (b) A “Minimal ROW Expansion Option” (also called the “4.8-Acre (or 5-Acre) Minimal ROW Expansion Option”), would reduce the amount of new ROW required by using steel monopoles with vertically arranged conductors to support the new line. Here, new ROW could be limited to 25 feet in Segment 1 and 35 feet in Segment 2, for a total of approximately 4.8 - 5 acres. This option would cost approximately \$1.3 million more than the 11-Acre ROW Expansion Option.
- (c) A “No ROW Expansion Option” would require no new ROW by removing the existing line and constructing steel monopoles with vertically arranged conductors for both the existing line and the new line in both segments. This approach would require complex construction sequencing and line outages, the installation of the tallest structures, and additional vegetation clearing to both ROW edges. It would increase project cost by approximately \$16 million.

*(CL&P Ex. 1, Vol. 1, § 10; CL&P Ex. 17, p. 25)*

CL&P predicts that USACE will determine that the Minimal ROW Expansion Option is the least environmentally damaging practical alternative, and therefore will grant the additional ROW width required to construct it. However, CL&P cannot be sure that this is the case. In order to avoid the possibility of delay, should the USACE require it to construct the No Additional ROW option, CL&P requests that the Council, in approving CL&P’s application, not specify a configuration for the construction over the federal lands. Instead, the Council could order that CL&P present a final proposed

configuration for these sections of line in its D&M Plan. By the time the D&M Plan is submitted, the USACE will have made its decision. (Otherwise stated, CL&P will not be able to submit a D&M Plan until the USACE makes its decision.)

If, however, the Council is not willing to approve the route across the federal lands without specifying the line configuration in its Decision and Order, CL&P requests that the Council specify the Minimal ROW Expansion Option. Should the Council do so, and should the USACE then surprise CL&P by declining to grant any additional rights, thus necessitating the No ROW Expansion Option, CL&P would have to move the Council to reconsider this aspect of the its order or apply for an amendment to the certificate. Either procedure would entail several months of delay. (*CL&P Ex. 17, p. 29 & Attachment CCM-7; Tr. 6/5/12, p. 157, Mango*)

b. Hawthorne Lane in Mansfield

The Hawthorne Lane Shift relates to the ROW in the Town of Mansfield, between existing 330 line structures 9078 and 9081. A ROW shift has been proposed to CL&P by the owners of four homes along a cul-de-sac. These homes are served by driveways from Hawthorne Lane, which is crossed by CL&P's existing 300-foot-wide ROW. The shift would straighten a large angle in the existing ROW and in the existing and new lines, which would result in the ROW and lines being moved further away from the homes. The new and existing lines would be placed in a delta configuration, on steel monopoles. This route variation would preserve all of an existing tree screen between the four homes and the lines, and would also reduce already low magnetic fields at the Hawthorne Lane homes. CL&P evaluated the Hawthorne Lane ROW Shift alternative in its EMF Field

Management Design Plan, in which Hawthorne Lane is designated “Focus Area C” and this alternative is #7. (*CL&P Ex. 17, pp. 33, 54-56; CL&P Ex. 1, Vol. 1, App. 7B, pp. 7B-6 -20, 27-30*)

CL&P is not proposing the adoption of the Hawthorne Lane ROW Shift alternative. However, it has worked extensively with the Hawthorne Lane landowners in order to develop the information necessary to present the shift to the Council for its consideration; and CL&P identified several conditions that would be required for it to consider the Hawthorne Lane Shift to be a feasible and practical route variation that it would accept. (*CL&P Ex. 17, pp. 30-33*)

These necessary conditions include the landowners’ performance of their proposal to convey to CL&P an easement for the relocated ROW for no consideration other than a release of the existing easement that would be replaced by the new one. In order to make such a conveyance, the landowners must obtain from the Town of Mansfield a release of a conservation restriction on land to which the ROW is to be relocated, in exchange for the grant of a replacement conservation easement on land now burdened by the existing easement. In order to convey the required rights to each of CL&P and the Town, the landowners must obtain the subordination of certain existing mortgages to the new CL&P easement and to the new conservation restriction. (*CL&P Ex. 17, pp. 31-33*) The Town has agreed to the relocation of its conservation easement, provided that the required subordinations are provided. (*CL&P Ex. 17, p. 32, Tr. 8/30/12, p. 134, Carberry*)

The incremental Project cost of adopting the Hawthorne Lane ROW Shift alternative would be approximately \$1,800,000, or approximately 0.8% of the Project’s

estimated baseline cost. (*CL&P Ex. 1, Vol. 1, App. 7B-19, Table 8; CL&P Ex. 17, p. 30; Tr. 8/30/12, p. 132, Carberry*) There would be room for this expenditure in a 4% EMF BMP “budget” if one or more of the other potential BMP configurations were not implemented, which seems likely to be the case. However, if all of CL&P’s preferred EMF BMP Alternatives were to be adopted, plus the Hawthorne Lane Shift, the 4% budget would be exceeded.

As of the close of testimony in this Docket, the Hawthorne Lane landowners had not been able to obtain all of the mortgage subordination commitments necessary to enable the required ROW shift to be made. Their attorney had reported to CL&P that application packages requesting the outstanding subordinations had been submitted, and those applications were pending. (*Tr. 8/30/12, pp. 135, 136, Carberry*)

If the Council is interested in considering approval of the Hawthorne Lane Shift, it could approve the proposed new line, while deferring to the D&M Plan a decision on its specific configuration across the Hawthorne Lane properties (in the area of existing 330 line structures 9070 and 9078.) The Council’s Decision and Order would further direct CL&P to propose the Hawthorne Lane Shift in its D&M Plan, if all of the conditions (other than Council approval) necessary for the Shift to be made were satisfied prior to the submission of the relevant D&M Plan segment.

However, CL&P urges the Council not to order the Hawthorne Lane Shift unconditionally. Such an order could result in requiring construction that CL&P would not be able to implement, or would not be able to implement without excessive cost and risk. If the Council is not interested in deferring a final decision on the Hawthorne Lane

Shift to the D&M Plan stage, it should order that the new line be constructed in this area within the existing ROW. As suggested by DEEP, the Council could provide for preservation of more of the existing tree screen by ordering that the new line be constructed in a Delta configuration, on steel poles, rather than on H-Frame structures.

*(DEEP Comment Letter d. June 21, 2012, p. 7)*

### **CONCLUSION**

In the words of the Connecticut Audubon Society, the Project is a “win / win” situation for electric system reliability and the environment. CL&P respectfully requests that the Council issue a certificate of environmental compatibility and public need for the Connecticut portion of the Interstate line construction, which should be all overhead. CL&P further asks that the Council defer its decision with respect to the specific configuration of the sections of the new line to be constructed over the Mansfield Hollow federal lands and in the Hawthorne Lane area to the D&M Plan Phase.

Finally, CL&P asks the Council to include in its Opinion and the statutory findings that the Council is directed to make in order to support the issuance of the certificate. By way of reminder, these conclusory findings are listed in Appendix A to this brief.

Respectfully submitted,

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## NOTICE OF SERVICE

I hereby affirm that a copy of this Post-Hearing Brief was sent to each Party and Intervenor on the service list dated August 13, 2012, with method of service to each party and intervenor listed via e-mail and U.S. mail on October 1, 2012.

Dated: October 1, 2012



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## APPENDIX A

### Statutory Findings

There is a public need for the Connecticut portion of Interstate facilities. (See CL&P's Proposed Findings of Fact [PFOF] ¶¶ 24-94, and provisions of the Record cited by those Findings.) CGS § 16-50p(a)(3)(A)

The nature of the probable environmental impact, including EMF, of the facility alone and cumulatively with other existing facilities has been reviewed by this Council in approving this facility. (See PFOF ¶¶ 269-323, and provisions of the Record cited by those Findings.) (See PFOF ¶¶ 324-345, and provisions of the Record cited by those Findings) CGS § 16-50p(a)(3)(B)

The Council has examined the policies of the State concerning the natural environment, ecological balance, public health and safety, air and water purity, and fish, aquaculture and wildlife, together with all other environmental concerns, and balanced the interests in accordance with CGS § 16-50p(a)(3)(B) and CGS § 16-50p(a)(3)(C). (See PFOF ¶¶ 269-345, and provisions of the Record cited by those Findings.)

The environmental effects that are the subject of CGS § 16-50p(a)(3)(B) can be sufficiently mitigated and do not overcome the public need for the facility approved by the Council in the Opinion, Decision and Order. (See PFOF ¶¶ 269-320, and provisions of the Record cited by those Findings; also see PFOF ¶¶ 324-386, and provisions of the Record cited by those Findings.)

CGS § 16-50p(a)(3)(D)(i) requires that the Council specify what part, if any, of the facility approved shall be located overhead. That is designated in the Opinion, Decision and Order.

The facility approved by the Council in the Opinion, Decision and Order conforms to a long-range plan for expansion of the electric power grid of the electric systems serving the State of Connecticut and its people and interconnected utility systems and will serve the interests of electric system economy and reliability. (See PFOF ¶¶ 55, 56, and provisions of the Record cited by those Findings.) CGS § 16-50p(a)(3)(D)(ii)

The overhead portions of the facility approved by this Council in its Opinion, Decision and Order are cost effective and the most appropriate based on a life-cycle cost analysis of the facility and underground alternatives to the facility and comply with the provisions of CGS § 16-50p. (See PFOF ¶¶ 144, 194, 205-207, 209-216, 228, 240-242, 248, 257, 267, and provisions of the Record cited by those Findings; see also Opinion, Decision and Order.) CGS § 16-50p(a)(3)(D)(iii)

The overhead portions of the facility approved by this Council in its Opinion, Decision and Order are consistent with the purposes of Chapter 227a of the General Statutes of Connecticut, and with Council regulations and standards adopted pursuant to CGS § 16-

50t, including the Council’s BMPs and with the Federal Energy Regulatory Commission “Guidelines for the Protection of Natural Historic Scenic and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities” or any successor guidelines and any other applicable federal guidelines. (See PFOF ¶ 301, and provisions of the Record cited by those Findings; see also Opinion, Decision and Order.) CGS § 16-50p(a)(3)(D)(iii)

The overhead portions of the facility approved by this Council in its Opinion, Decision and Order are contained within the buffer zone, no less in area than the existing right-of-way that provides a buffer zone that protects the public health and safety. In establishing this buffer zone, the Council took into consideration, among other things, residential areas, private or public schools, licensed child day care facilities, licensed youth camps or public playgrounds adjacent to the proposed overhead route of the overhead portions and the level of voltage of the overhead portions and any existing overhead transmission lines on the approved routes. (See PFOF ¶¶ 385-386 and provisions of the Record cited by those Findings; see also Opinion, Decision and Order.) CGS § 16-50p(a)(3)(D)(iii)

CL&P has designed the Project in compliance with the Council’s BMPs. (See PFOF ¶¶ 385-386, and provisions of the Record cited by those Findings.) (CL&P Ex. 1, Vol. 1, Section 7) CGS § 16-50p(a)(3)(D)(iii)

In compliance with the BMPs, CL&P furnished a Field Management Design Plan for the Project. (PFOF ¶ 349; Council Admin. Notice Item 23, pp. 4-5, CL&P Ex. 1, Vol. 1, Appendix 7B)

The presumption of Conn. Gen. Stats. § 16-50p(i) could apply because overhead sections of the lines in the “BMP Focus Areas” may be considered by the Council to be adjacent to one or more public or private schools, licensed day care centers, or potentially “residential areas.” (See PFOF ¶¶ 350, 351, 353, 354 and provisions of the Record cited by those Findings.)

If the presumption of Conn. Gen. Stats. § 16-50p(i) applies, it has been rebutted because 1) the cost of constructing underground imposes an unreasonable burden on Connecticut ratepayers; 2) such an investment is particularly unreasonable because underground construction would produce very little difference in magnetic field levels along the edges of the ROW; and 3) construction of any segments underground would be less consistent with the purposes of PUESA than overhead construction. (See PFOF ¶¶ 381, 382, 345, and provisions of the Record cited by those Findings.) (CL&P Ex. 17)

The location of the facility approved by this Council in its Opinion, Decision and Order will not pose an undue hazard to persons or property along the area traversed by those lines. (See PFOF ¶¶ 314-318, and provisions of the Record cited by those Findings; see also Opinion, Decision and Order.) CGS § 16-50p(a)(3)(E)