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| **DOCKET NO. 424** - The Connecticut Light & 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&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&P's existing Card Street Substation, Lake Road Switching Station, and Killingly Substation. | } | Connecticut |
| | } | Siting |
| | } | Council |
| | } | December 27, 2012 |

## Opinion – Interstate Reliability Project

### I. Introduction

On December 23, 2011, The Connecticut Light and Power Company (CL&P) applied to the Connecticut Siting Council (Council) for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction, operation and maintenance of the Connecticut portion of Interstate Reliability Project (Interstate).

Interstate involves the construction of transmission facilities in northeastern Connecticut, northwestern Rhode Island, and south-central Massachusetts and requires decisions by the Council, the Rhode Island Energy Facility Siting Board, and the Massachusetts Energy Facilities Siting Board for the respective state's portion of the project.

Interstate would extend 75 miles within the three states, predominantly within the existing utility rights-of-way (ROW). It would connect CL&P's Card Street Substation in Lebanon, CT and Lake Road Switching Station in Killingly, CT, National Grid's West Farnum Substation in Smithfield, RI, and National Grid's Millbury Switching Station in Millbury, MA. The project would extend through but electrically bypass CL&P's Killingly Substation in Killingly, CT and Narragansett Electric's Sherman Road Switching Station in Burrillville, RI.

CL&P would own and operate the Connecticut portion of Interstate, although following commencement of commercial operation, CL&P expects to transfer some of the facilities to the United Illuminating Company.

Narragansett Electric Company would own and operate the Rhode Island portion of the facilities. New England Power Company would own and operate the Massachusetts facilities. Both companies are owned by National Grid USA. CL&P is a wholly-owned subsidiary operating company of Northeast Utilities.

The Connecticut portion of Interstate includes new overhead 345-kV electric transmission lines extending approximately 36.8 miles between CL&P's Card Street Substation in Lebanon and the Connecticut/Rhode Island border in Thompson; and associated substation modifications.

The proposed project would pass through federally-owned property within Mansfield Hollow State Park in Mansfield and Chaplin. The existing CL&P ROW on this property is too narrow to accommodate the proposed 345-kV transmission line alongside the existing transmission line. CL&P proposes a ROW expansion.

### II. Need

The electric power system in New England became regionalized during the 1960s, when the electric utility companies in New England, including CL&P, developed a plan for a 345-kV transmission grid that would integrate the dispatch of electricity from strategically located generating stations serving loads within and between the New England States and other regions.

In the 1960s and 1970s, when the initial 345-kV loop was completed throughout New England from New York to Maine, the peak load was approximately 14,000 MW. The peak load in 2012 was approximately 29,000 MW and is forecasted in the ISO-NE Capacity, Energy, Loads, and Transmission report to be approximately 34,000 MW in 2022. The Council finds that the peak load when the 345-kV system was first put into place is a fraction of what it currently is, therefore the need for expansion of the 345-kV system is obvious and expected.

ISO-NE is the operator of the New England bulk power grid and, since 2001, is the Regional Transmission Organization, with consolidated authority to operate and plan transmission systems and maintain system reliability. ISO-NE defines reliability in accordance with the definition established by the North American Electric Corporation (NERC), which encompasses two concepts: adequacy and security. Adequacy has to do with supply and demand: it is the "ability of the system to supply the aggregate electric power and energy requirements of the consumers at all times." Security has to do with operating the electrical system within safe thermal and voltage limits: it is "the ability of the system to withstand sudden disturbances." As demand for electricity increases in the region, ISO-NE directs upgrades in the transmission system that are designed and modeled to assure reliability under the type of condition called a "contingency", that is, a condition where a system component fails—for instance, a transmission line or generator goes out of service. Indeed, the transmission system must be designed to withstand multiple contingencies.

In 2004, ISO-NE began a study on reliability deficiencies and interrelated needs throughout the southern New England electric supply system, and in 2006 released a draft report later referred to as the "Southern New England Transmission Reliability Report (SNETR) – Needs Analysis, January 2008." Developed by the planning staffs of ISO-NE, NU and National Grid USA (National Grid), SNETR was the genesis of the New England East-West Solution (NEEWS). In its most general sense, NEEWS is a comprehensive, long-range regional plan for expansion that addresses electric transmission reliability concerns throughout New England.

More specifically, NEEWS consists of four separate but related projects that would alleviate reliability deficiencies in the southern New England transmission system. Each of the projects that compose NEEWS would address at least one identified system deficiency on its own, as well as working together with the remaining NEEWS projects to resolve region-wide issues. These projects are:

a. The Greater Springfield Reliability Project (GSRP) and Manchester to Meekville Junction Project (MMP), which was approved by the Council in Dockets No. 370 and Docket No. 370_MR.
b. The Rhode Island Reliability Project, which is not under this Council's jurisdiction.
c. The Central Connecticut Reliability Project, which may be brought to the Council in the future.
d. Interstate, which is the subject of this proceeding.

In 2008, 2011 and 2012, ISO-NE and the relevant transmission companies re-evaluated the need for Interstate, taking into account changes in system conditions. Each of these analyses found a need for Interstate to resolve reliability deficiencies under contingent conditions for the years studied.

While the Party Civie alleges that there is adequate Connecticut import capability as a result of adding up the capacity of all transmission lines in the interface, it is the Council's opinion that this is not a proper method for transmission planning. Planners must design a transmission system across an interface taking into consideration not only normal conditions, but also the occurrence of a contingency event and the potential for a second contingency event occurring within 30 minutes of the first. The power flowing on the system would then redistribute to the remaining lines in service. The Council finds that the transmission system must be considered as a whole network rather than the sum of its parts.

The Council acknowledges this extended expert review of the need for NEEWS and for Interstate as part of NEEWS. Our own evaluation also builds on our 2010 decision regarding the GSRP, the first NEEWS application presented to us. Regarding Interstate in particular, the Council determines that the project is needed to assure

reliable and economic transmission service throughout Connecticut, along with Massachusetts, Rhode Island, and New England as a whole. We highlight the following support for this determination.

First, Interstate increases the security of the electric system for Connecticut's neighbors and thus for Connecticut. Under contingencies, it eliminates thermal overloads on critical transmission lines in Massachusetts that provide power to Connecticut customers. Also, by providing two new 345-kV lines into the West Farnum Substation in Rhode Island, Interstate eliminates deficiencies otherwise likely, under contingencies, to cause a voltage collapse of Rhode Island's transmission system that could easily propagate into Connecticut.

Second, Interstate raises transfer limits on electricity flowing both east and west across New England at the New England East West Interface (NEEWI); at the same time, Interstate increases the transfer capability into Connecticut. Both aims are accomplished by providing a line into Card Street via the route from West Farnum and Lake Road. Although a net exporter of power during the mid-1980s and early 1990s, Connecticut is currently a net importer and has the least ability of all the New England states to import power as a supplement to its internal supply resources. The likelihood of significant retirement of generators here only exacerbates the need for greater transfer capability to assure system adequacy. Supplemental benefits involve: a) greater access to renewable generation, assisting the state to achieve its Renewable Portfolio Standards and other environmental goals more economically; b) a larger number of 345-kV connections across NEEWI and state boundaries, allowing the electric system in New England as a whole more flexibility as it expands.

Third, Interstate solves an unusual reliability problem involving the Lake Road Generating Station in Killingly, Connecticut. Ever since this plant was built in 2002, it has been considered to be electrically isolated because planning studies showed that a single contingency forces power from the plant to flow out of Connecticut into Rhode Island. Indeed, for that reason, the plant has been treated by ISO-NE as if it were not even part of Connecticut. Operation of Interstate would allow Lake Road Generating Station's power to flow into Connecticut as well as Rhode Island under a single contingency. No longer isolated, the plant's capacity would be counted toward Connecticut's Local Sourcing Requirement, lifting an economic penalty from our state regarding its contribution to regional resource adequacy.

In short, the current expansion of the 345-kV transmission system in Connecticut and southern New England is a logical outgrowth of area load growth, which has roughly doubled in the past 40 years.

Having discussed Interstate's assurance of the electric system's reliability in terms of both security and adequacy, the Council further notes that Interstate is consistent with Connecticut's energy policy under Connecticut General Statute §16a-35k .

Given that Interstate meets reliability needs, has economic and environmental benefits, and improves system integration both within Connecticut and the region as a whole, the Council will approve the Connecticut portion of Interstate generally over the route proposed, with details as specified in subsequent portions of this Opinion.

## III. Selected Route

The Council will order Interstate be constructed as proposed along the existing CL&P ROW using an overhead line configuration.

The base-design configuration for most of Interstate is new steel or wood-pole laminated H-frame structures with conductors overhead in a horizontal line configuration. Each structure would be typically 85 feet in height. The Interstate route was divided into 12 different line segments with an additional five subsections labeled "focus areas" (A-E).

The proposed 345-kV transmission lines would be installed adjacent to the existing 345-kV line from Card Street Substation to Lake Road Switching Station, then would follow another existing 345-kV line from Lake Road Switching Station to Killingly Substation. From Killingly Substation to the Connecticut/Rhode Island border, the proposed transmission line would follow a third existing 345-kV line. Additionally, the existing ROW contains the existing 69-kV lines between Card Street Substation and Babcock Junction in Coventry and with an existing 115-kV line between Day Street Junction and Killingly Substation.

The Council will require the construction of a single taller steel monopole structure on Highland Ridge Golf Range property in Mansfield, currently owned by Richard Cheney. This would allow the golf range greater use of its property while still supporting the proposed transmission line, and would not increase project cost.

The Council will order CL&P to submit a Development and Management (D&M) Plan for the Connecticut portion of Interstate prior to commencement of construction and that provides details regarding the construction of the project, including transmission structure locations, clearing and access roads.

While the Council recognizes that electric distribution line siting is not under its jurisdiction, the Council urges CL&P to place electric distribution lines underground at areas where the proposed transmission line would cross. Undergrounding short sections of electric distribution lines would reduce visual impact associated with the crossing at a similar cost.

## Substations

Three substations in Connecticut would be modified as part of Interstate. Card Street Substation would be modified by reconfiguring equipment and installation of new equipment to accommodate a new 345-kV transmission line terminal position. CL&P proposes the installation of new equipment to connect Lake Road Generating Station to Interstate. Killingly Substation would be modified to include two new 345-kV transmission line terminal structures

The Council finds that the proposed additions to each of the three substations, which are entirely within the fenced area, would be similar in height and appearance to the equipment already existing on the property, and would have only very limited environmental effect.

## Mansfield Hollow Configuration

The proposed transmission line would be aligned along the existing ROW across two segments of federally-owned property in the Mansfield Hollow portion of Mansfield and Chaplin. This includes 0.9 miles through Mansfield Hollow State Park in Mansfield (Segment 1) and 0.5 miles across Mansfield Hollow Wildlife Management Area (WMA) in Chaplin (Segment 2). These properties are owned by the United States Army Corps of Engineers (USACE) and managed by the Connecticut Department of Energy and Environmental Protection (DEEP).

The existing ROW through this federal property is 150 feet wide, which is inadequate for the installation of the proposed transmission line. CL&P is currently negotiating with USACE for expansion of its existing easement and offered USACE three options.

a. The "no ROW expansion" option would be used if the USACE does not grant a conveyance for additional easement rights. This option would include the installation of the existing and proposed transmission lines using vertical conductor configurations and taller monopole structures. The cost is $28.5 million.

b. The "Minimal ROW expansion" option limits the expansion of the additional easement to approximately 4.8 acres by using taller monopole structures to support the proposed transmission line within both Segment 1 and Segment 2. This option would require a 25-foot easement width expansion in Segment 1 and a 35-foot easement width expansion in Segment 2. The cost is $14.3 million.

c. The "11-acre Expansion" option would expand the easement by 55 feet (approximately 5.8 acres) in Segment 1 and 85 feet (approximately 5.2 acres) in Segment 2. In this case, CL&P would construct the new transmission line on structures that generally match the existing structures. The cost is $13.0 million.

The cost and environmental impact (including visual effect) of each of these options varies. For example, while the 11-acre expansion option would result in slightly more ROW clearing than the Minimal ROW expansion, it would also be less expensive and have less visual impact due to the use of matching structures. It would also have some environmental benefits by changing a small amount of mature forest to a scrub-shrub environment, which would benefit wildlife, including birds.

Without deference to Connecticut ratepayers, USACE indicated a preference for the 4.8-acre Minimal ROW expansion option. However, there is currently no official decision of USACE. Therefore, the Council will order that the 345-kV route be approved through the federally-owned property but that the final configuration of the structures and lines is determined in the D&M Plan phase of the docket.

## Hawthorne Lane Alternative Option

The Hawthorne Lane cul-de-sac in Mansfield crosses a 0.4-mile section of the ROW between structures 9078 and 9081 of the 330 Line. In 2008, the property owners on Hawthorne Lane in Mansfield initiated negotiations with CL&P to shift a section of the existing ROW to the south and construct existing and proposed lines in a vertical configuration, thereby moving the existing and proposed transmission lines farther from most of the homes in this development, preserving an existing tree screen between the homes and the transmission lines, and eliminating an angle in the existing ROW. The Hawthorne Lane Alternative would require new easements from each landowner to CL&P without purchase and the release of a conservation easement from the Town of Mansfield. The conductors would span the Hawthorne Lane roadway, and a forested wetland system that contains three vernal pools.

The approximately $1.8 million incremental cost of the Hawthorne Lane Alternative would include outages of the existing line and erection and use of temporary structures. Due to the existing line layout, the alternative could be accomplished with minor additional steps during the construction process, rather than a complex process with extended line outages.

At the close of the proceeding record, the Hawthorne Lane property owners were unable to obtain the necessary mortgage subordination commitments to enable the ROW shift to be made. The property owner's attorney reported to CL&P that application packages requesting the outstanding mortgage subordinations had been submitted, and were pending.

The Council finds that the Hawthorne Lane Alternative is a well thought out plan with minimal adverse impact. The Council will leave the final decision on this portion of Interstate to the D&M Plan.

## IV. System Alternatives

The route chosen by the Council has emerged from a series of alternative solutions explored and rejected for NEEWS during earlier phases of ISO-NE and utility planning studies, as well as a progressively detailed set of options investigated by CL&P for the Connecticut portions of NEEWS. At various points along the way, not only transmission system alternatives have been considered, but also non-transmission alternatives, or NTAs. For Interstate, the NTA of No Action was eliminated first, on account of pressing problems with reliability in Rhode Island. A CL&P consultant, ICF International, Inc. (ICF) modeled various other NTAs that might plausibly be available within southern New England during the planning period of 5 to 10 years. The scenarios included generation only, demand resources only, and a combination of generation and demand-side resources. Power-flow simulations were used to determine whether a given NTA would match the proposed Interstate's performance in eliminating thermal violations. ICF's final report concluded that none of the NTA scenarios performed as well as Interstate. The Council thus finds that NTAs are not an adequate solution for meeting the regional reliability need, and agrees with CL&P's decision to pursue further only transmission alternatives.

The need for Interstate discussed earlier in this Opinion establishes certain key facilities that any alternative route through Connecticut must connect, namely, the Card Street Substation, Lake Road Switching Station, and National Grid facilities at the Rhode Island border. CL&P eliminated certain all-new alternatives in this area of northeastern Connecticut, such as transmission lines running all overhead or all underground on new ROWs. The linear railroad, pipeline, and highway corridors that might hypothetically allow such use are not evident in this area. Besides, these corridors are typically are too narrow to be developed for transmission lines. Such problems could possibly be surmounted by buying raw land, but, given that existing transmission-line ROWs are available, the Council sees no justification for the expense or environmental impact of developing raw land for all-new alternatives, and concurs with CL&P's decision to exclude them.

After taking first and second cuts at a route by carving off the NTAs and the all-new transmission alternatives, CL&P presented its base design route to the Council. This included one large-scale alternative, the Combination Alternative, which would go underground along a combination of highway and transmission-line ROWs, with a short portion of overhead; or a variation of that alternative called the Route 44 Underground Variation. Further included were about ten other variations designed to solve certain potential or actual constraints and design problems for short segments of the route. The Council evaluated the large-scale Combination Alternative, its variation, and all the other variations in order to determine the final route.

The Council began by categorizing the alternate and variations in terms of whether they were designed to go overhead or underground. Overhead lines and structures generally do less environmental damage than cables underground. Cables, being "invisible" to the public, appear to pose no environmental issues at all, an appearance that is misleading. Overhead systems leave relatively small footprints overall, can span environmentally sensitive areas, call for less clear-cutting, decrease the need for access roads, involve lower line-losses and fewer other inherent electrical problems. Cables can only be developed on a continuous corridor with an access road along its full length; they cannot easily accommodate significant grade changes in terrain; they demand numerous splice vaults that are bulkier than the cable ducts, as well as transition stations at either end where the cables connect to the overhead system; and cables' operating characteristics are considerably more complicated than those for overhead lines. These drawbacks for underground systems, and other problems, have costs. While estimates do differ, typical costs per mile for underground systems are at least five times the costs per mile for overhead. In this regard, the Council noted, based on past experience with ISO-NE cost allocations rules and procedures, that 100% of the incremental cost for underground systems would likely be charged to Connecticut ratepayers.

Taking into account these significant environmental and economic costs, the Council decided against any undergrounding. The decision eliminated the Combination Alternative; its variation, called the "Route 44 Variation"; the Mansfield Underground Variation; the Mount Hope Underground Variation; the Brooklyn Underground Variation; and the Willimantic South Underground Variation.

The Combination Alternative was designed to avoid the route across Mansfield Hollow Lake, Mansfield Hollow State Park and WMA, and decrease the length of Interstate compared to an all under-highway installation. It is a whole-route alternative, going mostly underground along a combination of highway ROWs (36 miles) and transmission-line ROWs (two miles). A final mile would extend overhead between a new transition station to be built in Thompson and the Connecticut/Rhode Island border. Land for the necessary transition facilities could be found on available CL&P property and at Card Street Substation and Lake Road Switching Station; however, the fence lines at those substations would have to be expanded, involving adverse environmental impacts. In addition, CL&P's easements in Putnam and Thompson do not include underground line rights: the Council understands those would have to be negotiated, increasing costs. Finally, the two-mile area where the Combination Alternative route would run along the transmission-line ROWs is environmentally highly sensitive.

The Route 44 Variation was designed to replace the overhead end of the Combination Alternative with an underground piece in order to accommodate the possibility that the Rhode Island portion of Interstate would be built underground. It would eliminate the overhead line in Thompson and the need for a transition station there. However, this variation would not generally relieve the adverse environmental effects of the Combination Alternative, of which it is only a small part; nor would the variation make any difference in the cost. Either the Combination Alternative or the Route 44 Variation would cost $1.1 billion, against the $193 million estimated cost of Interstate as proposed. The high cost alone was prohibitive, in the Council's view, but the adverse environmental impacts were also major drawbacks.

The Mansfield Underground Variation would have extended underground 0.7 miles along CL&P's transmission ROW. The variation would have resulted in environmental impacts and would have cost approximately $53.5 million more than the overhead transmission line that would be replaced. Due to environmental and economic effects of this variation, the Council did not approve this variation.

The Mount Hope Underground Variation would have extended underground 1.1 miles along CL&P's transmission ROW. The underground cables would have impacted several wetlands that would be spanned by the overhead lines, which would avoid impact. This variation would have cost $59.6 million more than the overhead configuration. Due to environmental and economic effects of this variation, the Council did not approve this variation.

A 0.3-mile extension of the Mount Hope Underground Variation was proposed by the Party Civie. This variation would have cost more than the Mount Hope Underground Variation and increased the adverse environmental effects. Since the environmental and economic effects of this modified variation are even greater than the original variation that was already rejected by the Council, the Council did not approve this variation.

The Brooklyn Underground Variation would have extended 1.4 miles along the proposed overhead transmission route. This variation would cross three perennial streams, and several wetland areas including two vernal pools and an amphibian breeding habitat area. The variation would cost approximately $73.8 million more than the overhead line configuration it would replace. On account of the adverse environmental effects of this variation, as well as the costs, the Council did not approve this variation.

The Willimantic South Underground Variation would have consisted of 10.7 miles underground cables mostly beneath or along roadways. The variation would cross several wetlands and watercourses (including seven vernal pools and one amphibian breeding habitat). The variation would have cost $266.1 million more than H-frame structures and a vertical line configuration on the federal property in the Mansfield Hollow area. On account of the adverse environmental effects of this variation, as well as the costs, the Council did not approve this variation.

The cost associated with installation of any underground alternative would impose an unreasonable economic burden on Connecticut ratepayers. In addition, none of the underground variations would result in a significant overall reduction of Electric and Magnetic Fields.

Once the Council ruled out undergrounding, the alternatives remaining for consideration were the Brooklyn and Willimantic South overhead variations, the three Mansfield Hollow Configurations, and the Hawthorne Lane alternative. The Council selected the Hawthorne Lane alternative provisionally and left the Mansfield Hollow Configurations to be decided later: all of these are discussed in the section of the Opinion that presents the final route.

As to the Brooklyn Overhead Variation, it was designed for a new "greenfield" corridor that would have extended 3.3 miles through forested land, lawn areas associated with residences, and agricultural fields. It also would have disturbed 4.4 acres of wetlands. On account of the environmental effects associated with greenfield development and its high cost, the Council did not approve this variation.

As to the Willimantic South Overhead Variation, it would have involved an 8.6-mile new corridor and a short length of 15-foot ROW expansion in width, both designs requiring easements from private landowners. It would have crossed 15 watercourses and 22 wetlands, two Connecticut State Parks, and property owned by the Fin, Fur and Feather Club, Inc. Its cost would have been approximately $9-$10 million more than the Mansfield Hollow configuration it would have replaced. On account of the adverse environmental effects of this variation, as well as the costs, the Council did not approve this variation.

Having carefully reviewed this wide range of alternatives and variations, the Council determined that the overhead facility as proposed is the most cost-effective and appropriate, in terms of both its capital and life-cycle costs, is consistent with the purposes of the Public Utilities Environmental Standards Act (PUESA), and is consistent with the regulations and standards adopted pursuant to Connecticut General Statutes § 16-50t.

## V. Environment

The northeast corner of Connecticut is mainly rural in character, with scattered, small neighborhoods, agricultural fields, woods, and abundant water resources, including associated wetlands. The existing overhead transmission lines have been a familiar part of this landscape for decades, and in several areas farmers are cultivating fields beneath them on the ROWs. The Council judges that the least environmental disturbance would come from developing Interstate generally alongside the existing lines, as proposed, instead of either diverging from the well-established route into new territory, or adding a new underground cable system—whether whole or in pieces—that would impact sensitive environmental resources the overhead facility currently spans. Nevertheless, the Council acknowledges that any new construction will have numerous temporary and some permanent environmental impacts, and will assure that these are minimized.

## Terrain and Soils

The Council will require the inclusion of grading and filling details in the D&M Plan for Interstate, with the aim of restoring as many areas as possible to pre-construction conditions following the installation of transmission structures and lines.

The Council will order CL&P to address in its D&M Plan the protection of valuable agricultural soils, whether by consulting with landowners who actively farm the ROW, or, elsewhere along the ROW, by working with state or regional agencies to identify valuable soils and manage their disposition appropriately during construction.

## Wetlands and Watercourses

The Interstate route and temporary and permanent access roads would cross several watercourses, which would require temporary and permanent culverts. The route would cross a portion of the Thompson Aquifer Protection Area. No new structures would be located within the Aquifer Protection Area, but three structures would be located adjacent to the eastern edge of the area. Many wetlands, including vernal pools and amphibian breeding habitat, are located along or adjacent to the Interstate route. A number of these resources could be either permanently impacted by the presence of the transmission facility or temporarily impacted by construction. CL&P has designed the transmission line to place new structures outside of wetlands where possible. However, 19 structures would be located in wetland areas, requiring permanent fill. Additionally, temporary or permanent access roads, crane pads and vegetative clearing may impact wetlands.

The Council will require that the D&M Plan for Interstate provide detailed plans showing all wetland impacts. On the basis of this detail, the Council may require further wetlands mitigation, which may include compensatory options, under the jurisdiction of DEEP.

The primary temporary impacts would be potential erosion and sedimentation into wetlands and watercourses during construction of transmission structures and access roads. Other temporary impacts include possible fuel spills into wetlands and watercourses from the operation of construction equipment, and possible adverse effects on wetlands and watercourses from temporary vegetative clearing related to construction. The Council will require that the D&M Plan include specific programs to minimize all such temporary impacts and to restore areas affected by such temporary impacts as much as possible to their pre-construction condition. Further with that aim, the Council will order that an environmental inspector be hired to monitor compliance with the D&M Plan during construction and to monitor restoration for a period afterward.

## Vegetation

Transmission-line construction and maintenance requirements are established by international, federal, and regional power authorities so as to assure reliability. In general, such requirements dictate the removal of all tall-growing tree species from the ROW, while low-growing tree species and taller shrub species may remain in the areas outside of the conductor zones, which is the area directly below the lines to 15 feet from the most outward conductors.

On the existing ROW along the proposed route, CL&P currently manages the vegetation on an average of 150 feet of the typical 300-foot ROW in areas with one existing line, and more than 150 feet where the ROW is wider and supports more than one line. Interstate would require the vegetative management of an additional 70 to 90 feet of the ROW. The vegetation clearing would amount to approximately 218 acres of upland forest and 50 acres of forested wetlands to scrub/shrub lands. Following construction, invasive plant species in wetland areas would be monitored and controlled on a four-year cycle and invasive plant species in upland areas would be controlled during routine vegetation management (also on a four-year cycle).

The Council recognizes that the proposed project would have a long-term effect on vegetation and associated wildlife habitats, but considers these effects would be incremental and localized. Conversion of the land on the ROW to old field and shrubland habitat would benefit wildlife species that are currently declining in the state and region. Much of the old field and shrubland habitat is gone because former agricultural land is being developed or allowed to revert to woodland. The Council will order an Invasive Species Control Plan for the project, developed in consultation with the USACE, DEEP and other agencies. This plan shall identify measures for controlling invasive plants listed on the Connecticut Invasive Plant List – October 2011. Also, through conditions to be applied in the D&M Plan, the Council will encourage the continuance of vegetative maintenance practices, including those related to herbicide application and to invasive species that protect native plants and wildlife.

## Wildlife

Construction of the proposed project may temporarily displace wildlife from the area due to disturbance from vegetation clearing and the operation of construction equipment. For instance, vegetation clearing and management will affect bird species. The nesting season for a majority of birds extends from May 1st through July 31st: construction during this period could potentially result in the loss of a breeding season for birds with established nests within the proposed work area.

DEEP recommended field surveys to identify the presence or absence of state-listed bird, butterfly, and moth species. CL&P performed field the recommended field surveys in 2008. Species discovered during the surveys as well as previously identified species in the area result in 29 state-listed endangered, threatened or special concern species within the vicinity of Interstate, including five butterfly species, 12 moth species, seven bird species, one turtle species, two snake species, one aquatic snail and one aquatic dragonfly.

Mitigation to minimize impact to Lepidoptera involves maintaining its habitat. Lepidoptera host plant communities were found along the ROW. CL&P would install exclusion fencing to protect plant communities. If exclusion fencing is not feasible, mitigation would include avoiding permanent impact to important vegetative areas to the extent practicable; limiting construction to existing dirt access roads; creating a Vegetation Management Plan to reduce potential colonization by invasive species and promote the growth of native host plant species; and performing additional rare species surveys along certain areas of the ROWs.

The wood turtle is a state-listed species identified as potentially occurring near the proposed route. The Council will order that CL&P comply with DEEP recommendations, to the extent feasible, for wood turtles, including: minimizing the removal of low-growth vegetation in areas adjacent to rivers/streams documented to support wood turtles; using erosion and sedimentation controls to minimize the deposition of sediment into wetland areas and to preclude wood turtles from accessing active construction areas; and ensuring construction contractors are able to identify wood turtles and know proper handling and care procedures if one is encountered. Also, a DEEP-approved turtle monitor would be present during construction in wood turtle habitats. If found, wood turtles would be removed from the active area and placed in the direction they were moving.

The eastern hognose snake and eastern ribbon snake are state-listed species identified as potentially occurring near portions of the proposed route. Both snake species are typically dormant from November 1 through April 1. The Council will order that CL&P comply with DEEP recommendations, to the extent feasible, for the eastern hognose snake and eastern ribbon snake, including: training construction contractors to identify the snakes properly handle and care for the snakes if encountered; and maintaining the presence of a DEEP-approved snake monitor during construction. Any snakes that are encountered would be removed from the active workspace.

An aquatic snail and the moustached clubtail dragonfly, also aquatic, were identified as potentially occurring near the proposed route. For the aquatic snail, negative effects would be minimized by maintaining as much vegetation as possible along the ROWs in riparian zones and installing the appropriate erosion and sedimentation controls. For the moustached clubtail dragonfly, mitigation may include avoiding or minimizing construction within the species' habitat, maintaining vegetation as feasible within riparian zones, and use of soil erosion and sedimentation controls.

## Noise and Air Quality

Operation of the Interstate lines will not be a significant source of audible noise. Any noise from heavy machinery during construction of Interstate would be short-term. The Council will condition the D&M Plan, however, to schedule construction periods during reasonable day-time hours.

Operation of the transmission lines would not impact air quality. Air quality effects from constructing Interstate would be temporary. The Council will condition the D&M Plan so that such effects would be mitigated by properly maintaining vehicles and equipment to limit emissions, watering access roads to suppress fugitive dust, and using crushed stone aprons at access road entrances from public roads to minimize tracking of soil onto pavement.

## Visibility on Reserved/Protected Land, Recreational Property

Clearing previously unmaintained portions of the ROW and adding a new line of H-frame structures for Interstate would have some visual impact for people who live in the vicinity of the route or travel along affected roads. However, visual impacts along the most of the route would be minimized by making the new structures match the existing ones as closely as possible in placement and in structure type.

There are a number of trails, open space and scenic vistas in the area surrounding the CL&P ROW associated with the Interstate route including, but not limited to Airline State Park Trail, Hop River State Park Trail, Nipmuck Trail, trails associated with Mansfield Hollow State Park and WMA, Joshua's Tract Conservation and Historic Trust, Inc. property, and Quaddick State Park. Since the proposed transmission lines would be installed adjacent to existing transmission lines, the Council considers that views of the proposed lines will not be significantly different from existing views.

## Historic and Cultural Resources

The proposed route would not be adjacent to any resources listed on or eligible for the National Register of Historic Places (NRHP) or the State Register of Historic Places (SRHP).

Five known Native American archaeological sites are within one mile of the proposed route. One site, located in Pomfret, was determined as not eligible for the NRHP. The remaining four archaeological sites are in Mansfield and each have insufficient reported data to make a determination of eligibility for the NRHP. There are 21 significant above-ground historic architectural resources within approximately 0.25 miles of the proposed route, some of which are within historic districts. Given the distance of all these archaeological sites from the proposed route the Council expects that the project will have no adverse impact on them.

The proposed project is not expected to have an adverse visual impact on the 21 historic architectural resources near the project routes.

The Council notes that CL&P would conduct additional archaeological reconnaissance investigations during the project planning stage and coordinate with the Connecticut SHPO, Native American tribes, the USACE and the Quinebaug-Shetucket Rivers Valley National Heritage Corridor, Inc.

**Substations/Switching Station**

Since the proposed modifications to the substations do not go outside the existing fence lines, the Council expects no adverse environmental impacts.

Three wetlands exist on the Card Street Substation property, 100 feet outside the existing fence line; however, effects to those wetlands would be minimized by the installation of erosion and sedimentation controls.

Two state-listed moth species were known to occur near Lake Road Switching Station; however, at a distance that prevents any adverse impacts.

Killingly Substation is located in an area that may contain state-listed invertebrate species of moths and butterflies, and CL&P consultants observed these species during field surveys of the ROWs; however, the substation itself would not be suitable habitat for these species. Killingly Substation is also in the vicinity of the Tracy Road Trail, which is a one-mile paved walking/biking trail; however, intervening vegetation and topography screen the substation from the trail.

Considering that no new substations are being constructed and that construction activities at all the substations will go on inside the fence line, the Council judges that the substations will have minimal environmental effect.

## VI. Electric and Magnetic Fields

The Council's *"Electric and Magnetic Field Best Management Practices for the Construction of Electric Transmission Lines in Connecticut"* (EMF BMPs) were revised in December 2007 to address concerns regarding potential health risks from exposure to EMF from transmission lines. The Council's EMF BMPs support the use of effective no-cost and low-cost technologies and management techniques to reduce magnetic fields (MF) exposure to the public while allowing for the development of electric transmission line projects.

International health and safety agencies, including the World Health Organization (WHO), the International Agency for Research on Cancer (IARC), and the International Commission on Non-Ionizing Radiation Protection (ICNIRP), have studied the scientific evidence regarding possible health effects from MF produced by non-ionizing, low-frequency (60-Hertz (Hz)) alternating currents in transmission lines. Two of these agencies have attempted to advise on quantitative guidelines for mG limits protective of health, but have been able to do so only by extrapolation from research not directly related to health: by this method, the maximum exposure advised by the International Committee on Electromagnetic Safety (part of IARC) is 9,040 mG, and the maximum exposure advised by the ICNIRP is 2,000 mG. Otherwise, no quantitative exposure standards based on demonstrated health effects have been set world-wide for 60-Hz MF, nor are there any such state or federal standards in the U.S.

Consistent with the Council's EMF BMPs, CL&P began with a "base" design of the proposed project that includes "no-cost" magnetic field management features. CL&P then added in potential designs that are "low-cost" magnetic field management features at five locations along the project route. The five locations with potential low-cost magnetic field management designs are sections of the route that are near public or private schools, licensed child day care facilities, licensed youth camps, public playgrounds or near statutory facilities or near an area that the Council may determine to be a residential area.

Locating a new transmission line on an existing ROW, adjacent to an existing transmission line, allows for phasing the conductors of the new line resulting in partial cancellation of magnetic fields from each of the two lines. CL&P designed the proposed project for best phasing of line currents in the same direction to reduce magnetic fields at no cost. For the section of the line between Card Street Substation and Lake Road Switching Station the proposed lines are very similar to the existing lines, which allows for the best reduction in MF. There are several sections of Interstate where the base design H-frame line configuration would result in lower MF levels at one or both ROW edges than the existing pre-Interstate lines.

CL&P modeled the proposed transmission line using an H-frame base design configuration, except along four segments of the route. The four segments include one segment within Mansfield Hollow, where the existing transmission line consists of a delta configuration and the proposed configuration is vertical; and three of the five focus areas (Focus Areas A, D and E) where CL&P proposes other 345-kV line configuration to comply with the Council's EMF BMPs. In two of the identified focus areas (Focus Areas B and C) CL&P proposes the base design H-frame configuration of the proposed conductors.

**Focus Area A**

Focus Area A is a 2.3 mile section of the ROW in Coventry and Mansfield where there are homes near each side of the ROW. There are three homes immediately adjacent to the north ROW edge and three homes immediately adjacent to the south ROW edge. In this Focus Area, CL&P identified a delta line configuration as an EMF BMP alternative.

While a delta configuration of the proposed lines would reduce MF levels on the northern ROW edge when compared to the H-frame base design, the cost is also approximately $3 million greater. Additionally, the construction of the proposed lines in the base design horizontal configuration would result in MF levels that are lower along the southern ROW edge when compared with the delta configuration or the pre-Interstate levels.

Therefore, the Council finds that the delta line configuration in Focus Area A would add cost to the project and particularly to Connecticut ratepayers without a significant reduction in MF. The Council will order the transmission lines to be constructed on H-frame structures in Focus Area A.

**Focus Area B**

Focus Area B is a 0.9 mile section of the ROW in Mansfield between structures 9070 and 9078 of the existing 330 Line. In this section, the ROW is near the Green Dragon Day Care and the Mount Hope Montessori School--both statutory facilities. In Focus Area B, CL&P recommended the horizontal line configuration on H-frame structures.

While other line configurations would reduce MF levels compared to the H-frame configuration, each option would increase the project cost. Additionally, the MF levels associated with the transmission lines decreases rapidly with distance from the ROW edge. At the nearest corners of Mount Hope Montessori School and Green Dragon Day Care, the H-frame line would actually yield a lower MF than the existing pre-Interstate transmission lines on the ROW or the Interstate lines in a delta configuration. The Council will order the base design H-frame line configuration in Focus Area B.

Discussion during the proceedings for this docket brought up an option of CL&P providing vegetative screening on the Mount Hope Montessori School property. The Council encourages planting of this screening and will order that vegetative screening at the school be discussed in the D&M Plan for this docket.

**Focus Area C**

Focus Area C is the Hawthorne Lane Alternative, as described above.

**Focus Area D**

Focus Area D is a one-mile section of the ROW in Brooklyn between structures 9210 and 9219 of the existing 330 Line. In this focus area, there is one home-based child day care facility and a number of homes along Darby Road and Meadowbrook Drive. In this focus area, CL&P has recommended an EMF BMP delta line configuration that would reduce MF levels on the northern ROW edge (where more homes are located) by more than 15 percent compared to the base design H-frame line configuration and cost less than the vertical or split-phase configurations.

The Council finds that while the delta line configuration would reduce MF levels compared to a horizontal configuration along the northern ROW edge, it is a small reduction that decreases with distance from the ROW edge. Also, the MF levels at the nearby home day care facility property would be lower if the lines were configured on H-frame structures rather than delta structures. Therefore, the Council finds that spending an additional $1.4 million on a delta line configuration would be unjustified and orders the line be constructed on H-frame structures in Focus Area D.

**Focus Area E**

Focus Area E is a 0.6 mile section of the ROW in Putnam between structures 9305 and 9310 of the existing 347 Line. This section of the ROW crosses the rear portion of residential properties on Elvira Heights. There are 15 homes within 400 feet of the ROW, the nearest of which is about 115 feet from the southeast ROW edge. In this line section CL&P brought forward an EMF BMP configuration constructing the existing and proposed lines on delta structures.

CL&P brought forward this configuration option to comply with the Council's EMF BMP Guidelines in an area with nearby homes; however CL&P does not recommend this option. In analyzing configuration options for MF level reduction along the ROW edges compared to the base design configuration, the only options that resulted in this reduction required changing the existing structures as well as the proposed structures. However, MF level reduction at the ROW edges for the two delta line configuration compared to the base design configuration is minimal. The base-design would yield MF levels of 20.4 mG at the southern ROW edge (where homes are located) compared to 13.3 mG if the existing and proposed lines were installed in a delta line configuration.

Constructing both the existing and proposed lines on delta structures would have increased environmental effects, including an increase in vegetation disturbance and an increase in temporary and permanent effects to wetlands and watercourses. Also, the Focus Area E option would cost approximately $4.3 million, which would be expected to be charged 100 percent to Connecticut ratepayers. Therefore, the Council will order construction of the base design construction of the proposed line on H-frame structures in Focus Area E, with no change to existing structures.

## VII. Conclusions

The facility approved by this Council in the Opinion, Decision and Order is necessary for the reliability of the electric power supply of the state and therefore, a public need exists for this facility.

The Council's ultimate decision reflects the balance required by Connecticut law to protect the environment, protect the public health and safety of our citizens, and to secure Connecticut's energy future for generations to come.

The nature of the probable environmental impact alone and cumulatively with other existing facilities, including EMF of the facility, has been reviewed by this Council in approving this facility. 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 Conn. Gen. Stat. § 16-50p(a)(3)(B) and Conn. Gen. Stat. § 16-50p(a)(3)(C).

The environmental effects that are the subject of Conn. Gen. Stat. § 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.

Conn. Gen. Stat. § 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 this Opinion, Decision and Order.

The facility approved by this 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 interconnected utility systems and will serve the interests of electric system economy and reliability.

The overhead route of the facility approved by this Council in its Opinion, Decision and Order are cost effective and the most appropriate alternative based on a life-cycle cost analysis of the facility and underground alternatives to the facility and complies with the provisions of Conn. Gen. Stat. § 16-50p. The overhead route of the facility approved by this Council in its Opinion, Decision and Order, are consistent with the purposes of Chapter 277a of the General Statutes of Connecticut, and with Council regulations and standards adopted pursuant to Conn. Gen. Stat. § 16-50t, including the Council's best management practices for electric and magnetic fields for electric lines and with the Federal Energy Regulatory Commission's "Guidelines for the Protection of Natural Historic Scenic and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities" and other applicable federal guidelines.

The overhead route of the facility approved by this Council in its Opinion, Decision and Order are contained within a buffer zone, no less in area than the existing right-of-way that protects the public health and safety. In considering this buffer zone, the Council took into consideration, among other things, residential areas, private and public schools, licensed child daycare facilities, licensed youth camps and 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 route. The location of the line will not pose an undue hazard to persons or property along the area traversed by the line.

In order to verify compliance with the Council's Decision and Order, the Council will require the Certificate Holder to hire an independent inspector(s), subject to Council approval, to document compliance with environmental requirements, prepare status reports, and act as a liaison between the Council, and the Certificate holder's environmental inspector and contractors. This independent inspector will provide bi-weekly progress reports in writing to the Council and to the chief elected official, or their representative, of each municipality traversed by the proposed project describing all significant construction activities and all associated environmental effects. This independent inspector shall have formal training and experience in civil and environmental engineering and have sufficient oversight and authority to stop construction practices that are inconsistent with the Council's Decision and Order; the approved D&M Plan; or that may cause significant damage or disruption to the environment.

To ensure that the proposed project is properly developed, the Council will require the Certificate Holder to submit a D&M Plan which will include, among others, detailed site plans identifying structure locations; an erosion and sediment control plan consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control; a Spill Prevention, Control, and Countermeasures Plan; provisions for revegetation and maintenance of the proposed ROW; provisions for inspection and monitoring of the proposed ROW; pre-construction and post-construction measurements of electric and magnetic fields.

There is a public need for the facility, which will be approved by this Council in the Opinion, Decision and Order.

With the conditions listed above, and having found a public need for the proposed facility, the Council will issue a Certificate of Environmental Compatibility and Public Need for the construction of an overhead 345-kV electric transmission line along the Interstate Route between CL&P's Card Street Substation in Lebanon, Lake Road Switching station in Killingly and the Connecticut/Rhode Island border with associated additions to CL&P's Card Street Substation, Lake Road Switching Station, and Killingly Substation.