DOCKET No. 370 – Consolidated proceeding pursuant to the Connecticut Energy Advisory Board (CEAB) Request for Proposal (RFP) process under C.G.S. §16a-7c. **Original application:** The Connecticut Light & Power Company application for Certificates of Environmental Compatibility and Public Need for the Connecticut Valley Electric Transmission Reliability Projects which consist of (1) The Connecticut portion of the Greater Springfield Reliability Project that traverses the municipalities of Bloomfield, East Granby, and Suffield, or potentially including an alternate portion that traverses the municipalities of Suffield and Enfield, terminating at the North Bloomfield Substation; and (2) the Manchester Substation to Meekville Junction Circuit Separation Project in Manchester, Connecticut. **Competing application**: NRG Energy, Inc. application pursuant to C.G.S. §16-50*l*(a)(3) for consideration of a 530 MW combined cycle generating plant in Meriden, Connecticut.	}	Connecticut
	}	Siting
	}	Council
	}	March 16, 2010

Opinion Docket 370 – Greater Springfield Reliability Project

I. Introduction

On October 20, 2008, The Connecticut Light and Power Company (CL&P) applied to the Connecticut Siting Council (Council) for Certificates of Environmental Compatibility and Public Need for the Connecticut Valley Electric Transmission Reliability Projects, which consist of (1) The Connecticut portion of the Greater Springfield Reliability Project (GSRP) that traverses the municipalities of Bloomfield, East Granby, and Suffield, or potentially including an alternate portion that traverses the municipalities of Suffield and Enfield, terminating at the North Bloomfield Substation; and (2) the Manchester Substation to Meekville Junction Circuit Separation Project (MMP) in Manchester, Connecticut.

The proposed GSRP involves the siting of facilities in both Connecticut and Massachusetts, which requires a decision by both state siting authorities. The Western Massachusetts Electric Company (WMECO) proposed the Massachusetts component of the GSRP to the Massachusetts Energy Facilities Siting Board (EFSB). The Massachusetts EFSB has jurisdiction over siting the Massachusetts portion of the proposed project. CL&P and WMECO are wholly-owned subsidiary operating companies of Northeast Utilities (NU).

The Connecticut portion of the GSRP is proposed to consist of a new overhead 345-kV line constructed mostly in an existing right-of-way (ROW). The GSRP includes a Northern Route and a Southern Route Alternative, as well as several underground options and variations.

The Connecticut portion of the Northern Route would begin at the North Bloomfield Substation in Bloomfield, Connecticut and extend north-northeast to the Connecticut/Massachusetts border, a distance of approximately 12 miles. After passing into Massachusetts, the Northern Route would proceed a short distance to the Agawam Substation in Agawam, from there continue north, through West Springfield, and then curve east before terminating northeast of Springfield at Ludlow Substation in Ludlow, Massachusetts.

The Connecticut portion of the Southern Route Alternative would initially follow the same path as the Northern Route, beginning at the North Bloomfield Substation in Bloomfield, Connecticut, and extending approximately 12 miles to the Connecticut/Massachusetts border. Just after crossing into Massachusetts, however, at the South Agawam Switching Station, the Southern Route Alternative would turn southeast, travel back down over the Connecticut border, and then proceed east through Suffield and Enfield, Connecticut before heading north once more to Hampden Junction in Hampden, Massachusetts, and on to its terminus farther north at Ludlow Substation in Ludlow, Massachusetts. By circling Springfield to the south and east, instead of west and north, the Southern Route Alternative would travel a greater distance in Connecticut than the Northern Route—approximately 17.4 miles, as opposed to 12.

The proposed GSRP would include expansion of the North Bloomfield Substation within the 34-acre CL&P-owned parcel. The proposed GSRP (Northern Route or Southern Route Alternative) would require the construction of a new 345-kV switchyard to interconnect the existing 345-kV line that extends into the substation from the south with the proposed 345-kV line that would extend into the substation from the north. It would also require a 345/115-kV autotransformer; space for future 345-kV connections; and expansion of the existing relay and control enclosure.

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.

During the past 50 years, transmission planning and reliability standards have become more closely integrated on a regional basis. Due to events such as the Northeast blackout of 1965 and extensive electric industry restructuring during the 1990s, regulators and legislators created and strengthened a clear chain of authority for both planning and reliability from the federal down to the regional level. ISO-NE is a Regional Transmission Organization, with consolidated authority to operate and plan transmission systems and maintain system reliability.

In 2004, ISO-NE began a study on 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 NUSCO and National Grid USA (National Grid), SNETR was the genesis of the New England East-West Solution (NEEWS).

NEEWS consists of four separate but related projects that would alleviate deficiencies in the southern New England transmission system. These projects are:

a. The GSRP and MMP – the subject of Docket No. 370A
b. The Interstate Reliability project – a new 345-kV line from Millbury Switching Station in Massachusetts owned by National Grid to its West Farnum Substation in North Smithfield, Rhode Island, to CL&P's Lake Road Substation in Killingly, Connecticut and Card Street Substation in Lebanon, Connecticut.
c. The Central Connecticut Reliability Project – a new 345-kV line from CL&P's North Bloomfield Substation to its Frost Bridge Substation in Watertown, Connecticut.
d. The Rhode Island Reliability Project – A National Grid project entirely within the State of Rhode Island. This project would not come before the Council.

Following its "Needs Analysis", the SNETR working group analyzed transmission solutions to satisfy the identified needs for every concentrated load area of southern New England. Their draft report, which discussed detailed solution options for each area, was published by ISO-NE on its website in April 2008 with the title "New England East-West Solutions (Formerly SNETR) Report 2, Options Analysis."

Planners design transmission systems to operate reliably in the event of contingency conditions. Contingency is the failure of a system component, such as a transmission line or generator out of service. The transmission system is designed to withstand multiple contingencies while operating reliably. The existing 115-kV lines that serve the Greater Springfield/north-central Connecticut load area were found to be out of compliance with national and regional reliability criteria. Deficiencies at the North Bloomfield Substation are of particular concern since the load served by the substation is growing at a higher-than-average rate.

The increased transfer capacity into Connecticut associated with the proposed GSRP may aid CL&P in meeting load growth and achieving environmental and statutory compliance with state renewable portfolio standards (RPS) by enabling access to renewable and/or low emission power-supply sources.

III. Reliability

CL&P is obliged by binding tariff provisions to design and propose transmission improvements that will assure the bulk power supply system complies with applicable reliability standards. Reliability is defined by ISO-NE in accordance with the North American Electric Corporation (NERC). NERC's definition of reliability encompasses two concepts: adequacy and security. Adequacy is the "ability of the system to supply the aggregate electric power and energy requirements of the consumers at all times." Security is "the ability of the system to withstand sudden disturbances."

The GSRP is proposed as a solution to a reliability problem in the Greater Springfield load area, which includes north-central Connecticut. The GSRP is a stand-alone project designed to meet identified reliability needs regardless of whether other components of NEEWS are undertaken. Although the project was designed as a solution to transmission reliability problems, it would also improve the power transfer capacity between Massachusetts and Connecticut.

The proposed GSRP would create a new 345-kV loop in the north-central Connecticut and western Massachusetts areas. The GSRP portion of the loop would connect the North Bloomfield Substation with the Agawam Substation and from there go on to the Ludlow Substation. The remainder of the loop consists of the existing 345-kV line from North Bloomfield Substation to the Barbour Hill Substation in South Windsor, Connecticut and then extending north to Ludlow Substation in Ludlow, Massachusetts.

The Council determines that there is a need for the reliability improvements associated with the GSRP. The GSRP is necessary to provide safe, reliable, and economic transmission service throughout the Greater Springfield and north-central Connecticut geographical areas. The proposed project would bring these portions of the transmission grid into compliance with federal and regional reliability standards. The proposed 345-kV line will allow the system to operate reliably following contingency events, such as the loss of generation and/or transmission facilities. The GSRP will also limit contingency events on the existing 115-kV lines in the greater Springfield/north-central Connecticut load area.

The GSRP would advance NEEWS, which is a comprehensive, long-range regional plan for expansion that addresses electric transmission concerns throughout New England. Consistent with the state's energy policy under Connecticut General Statute §16a-35k, the proposed GSRP will: provide an interconnected utility system serving interests of electric system economy and reliability; replace energy resources vulnerable to interruption; and help develop and utilize renewable energy resources.

IV. System Alternatives

The Council finds no non-transmission alternatives to the proposed GSRP. Planning scenarios demonstrate that the addition of demand-side management and/or large-scale generation in the area would not replace or defer the need for the proposed GSRP: even given such additions, transmission overloads are still shown to occur under modeled contingencies that keep the system from fully complying with reliability standards. Thus, a transmission solution is necessary.

In evaluating the transmission solution proposed in GSRP, the Council started with the premise that, given the transmission facilities in this area of Connecticut, the most efficient use of utility resources dictates expansion along the existing ROW. Creating an altogether new ROW to connect the relevant substations would be wasteful, both economically and environmentally. Building transmission lines overhead alongside roadways is impractical for many reasons, especially the impacts of moving homes or businesses, and putting transmission underground beneath roads has problems that will be discussed elsewhere. No established linear corridors for other infrastructure in the area, such as railroads or gas lines, are suitable to use. Finally, the existing ROW is sufficiently wide to accommodate new transmission.

Two transmission alternatives using overhead lines in the existing ROW were investigated by CL&P and ISO-NE planners in addition to the proposed GSRP. One was a 345-kV line between the North Bloomfield (Connecticut) and Ludlow (Massachusetts) Substations without a tie into the Agawam Substation; the other was a 345-kV line from Manchester Substation in Manchester, Connecticut directly north to the Ludlow Substation. CL&P rejected both of these because of disadvantages related to reliability, length, and cost. The Council concurs with this rejection.

In the Council's opinion, no high-voltage direct current (HVDC) alternative, either overhead or underground, would be as cost-effective in solving the reliability need as the overhead alternating current transmission lines proposed in the GSRP. HVDC is a technology typically used to connect asynchronous electric systems, systems that differ operationally, or systems that are separated by major obstacles in the terrain, such as large bodies of water. The Greater Springfield/north-central Connecticut load area meets none of these criteria. Furthermore, HVDC cables would require converter stations to convert the electricity from alternating current to direct current and back. More land would have to be developed and visual intrusions would occur at and around converter station locations. Each converter station would cost approximately $200 million. Three or four converter stations would be needed along the entire distance of the Northern Route, totaling $600 million to $800 million dollars in additional cost for converter stations alone.

The proposed GSRP, including the lines and substation upgrades across its entire route in Connecticut and Massachusetts, would cost approximately $714 million. A conventional HVDC system along the same route, including converter stations, would cost approximately $2.3 billion, while an HVDC "Lite" system for 1,000 MW of capacity would cost approximately $2.4 billion. Either type of HVDC technology would cost significantly more than the proposed GSRP overhead transmission lines. The Council finds that the system compatibility concerns as well as the significant additional cost related to either HVDC technology make the proposed alternating current transmission lines the preferred solution.

After determining the need for reliability improvements in the Greater Springfield/north-central Connecticut load area, and having examined both non-transmission and transmission alternatives, the Council finds that the proposed GSRP is the most appropriate project to achieve the necessary solution. There are no practical overhead line routing options other than using the existing ROW, and no established linear corridors or other infrastructure in the vicinity that could be used to create a new ROW.

V. Project Route

Northern Route and Southern Route Alternative

The Connecticut portion of the GSRP – Northern Route would be installed predominantly within an existing CL&P ROW for a distance of 12 miles from the North Bloomfield Substation to the Connecticut/Massachusetts border. The Connecticut portion of the Southern Route Alternative, in addition to traversing the Connecticut portion of the GSRP – Northern Route and extending from the Connecticut/Massachusetts border north to the Agawam Switching Station in Massachusetts, would then extend southeast, cross the Massachusetts border again into Connecticut at Suffield, traverse Suffield for approximately 1.1 miles, cross the Connecticut River back into Massachusetts for approximately 0.5 miles, and then cross back into Connecticut in Enfield, going east for approximately 4.3 miles before crossing for the last time into Massachusetts. On its way through Suffield and Enfield, the Southern Route Alternative would be adjacent to densely populated residential areas.

Since the Southern Route Alternative would not only duplicate all of the Northern Route in Connecticut but also extend an additional 5.4 miles through Connecticut, its impact to the environment and nearby neighborhoods in this state would be far greater than the impact of the Northern Route alone. Furthermore, the Southern Route Alternative would have the disadvantage of significantly increasing overall GSRP costs, because some upgrades would need to be done on existing 115-kV lines along the Massachusetts portion of the Northern Route even if the Southern Route Alternative were approved. The estimated increase to overall costs would be $52 million. Finally, the Northern Route offers a better opportunity for future system improvement and expansion. Considering these points, the Council determines the Southern Route Alternative is not in the best interest of the State of Connecticut.

Underground Cable Alternatives

Underground cable transmission systems consist of buried alternating current electric cables, splice vaults at specific intervals, and a transition station at each end. Splice vaults are located at approximately 1,600-foot intervals along the cable trench (roughly three per mile) to tie together separate reels of cable. They are large concrete structures, approximately 10 feet wide by 10 feet deep by 32 feet long. Transition stations contain switching equipment necessary to isolate the underground cables from the overhead line conductors. They typically require two to four acres of property.

Underground electric cables may be used in situations when overhead transmission lines are undesirable or impractical due to environmental, social, construction, or regulatory issues. CL&P investigated an all-underground cable alternative to the proposed overhead transmission lines and determined it to be technically feasible. An all-underground cable installation would be either in CL&P's ROW or within roads.

An all-underground in-ROW alternative would include burying cables and splice vaults entirely within the transmission line ROW adjacent to the existing 115-kV transmission line. The cables would traverse numerous wetlands and watercourses. Clear-cutting for a continuous trench would be necessary, as well as a permanent access road running the entire length of the underground cable, and more numerous access roads from other points. This alternative would have significant permanent adverse environmental impacts on the ecology of the ROW, including wildlife; it would particularly impact water resources.

The all-underground in-street cable installation would consist of burying cables and splice vaults within streets. The Connecticut Department of Transportation requires the installation of splice vaults outside of state road rights-of-way, to the extent possible, which would result in the installation of splice vaults on adjacent private property.

Whether located in-ROW or in-street, an underground system requires transition stations, and these have environmental drawbacks, since each one necessitates the use of extra land, accompanied by vegetative clearing and grading, and each has a visual impact on the surrounding area.

The initial capital cost of an all-overhead H-frame design transmission facility within Connecticut, not including substation improvements, as proposed in the GSRP, is approximately $41 million (2008 dollars) compared with $455 million (2008 dollars) for all underground in-ROW and $479 million (2008 dollars) for all underground in-street. The estimated life-cycle costs of the H-frame design facility, including the cost of transition stations but not substations, would be approximately $85 million (2008 dollars) compared with $648 million (2008 dollars) for all underground in-ROW and $682 million (2008 dollars) for all underground in-street.

Four specific underground route variations were investigated as alternatives to the GSRP Northern Route: the Newgate Road Underground Route Line Variation, the Route 168/187 Underground Line Route Variation, the 4.6-mile In-ROW Line Route Variation, and the 3.6-mile in-ROW Line Route Variation. Each of these variations was proposed to substitute for the proposed overhead line between a point where Country Club Lane comes closest to the ROW in East Granby and a point where Phelps Road intersects the ROW in Suffield, a section of the project that is discussed elsewhere. (See "VIII. Electric and Magnetic Fields.")

The environmental impacts relevant to underground installations in general have already been mentioned. However, each of the four underground variations has specific environmental challenges. As to the Newgate Road Line Route Variation: two properties that are on the National Register of Historic places are within 10 feet of Newgate Road. These are Newgate Prison and Viet's Tavern. Newgate Prison features historic copper mining tunnels that extend beneath Newgate Road. The construction of an underground transmission line along Newgate Road may cause significant damage to both the tavern and the prison sites, especially the tunnels. The Route 168/187 Variation would be primarily aligned along state road rights-of-way, which results in problems with construction in traffic areas and locating splice vaults outside of the state roads. The 4.6-mile in-ROW Line Route Variation would cross many large wetlands. The 3.6-mile in-ROW Line Route Variation would require a transition station to be located within the Newgate Wildlife Management Area, which is owned by the State of Connecticut, and would interfere with the use of the land as a wildlife management area.

The Council rejects all-underground in-ROW alternative, the all-underground in-street alternative, and all four underground variations due to their extensive environmental impacts and excess cost.

The all-underground in-ROW would cause significant and permanent adverse impacts to natural resources. The all-underground in-street alternative would necessitate significant intrusions on private property. Either one of these two all-underground systems would cost more than ten times the cost of an all-overhead line. As to the four underground variations: any one of them would cost between $153 million and $322 million more than the proposed overhead GSRP. While the cost of the GSRP as proposed would likely be "regionalized" by ISO-NE, meaning that CL&P's Connecticut ratepayers would pay approximately 27 percent of the total cost of the project, 100 percent of the additional cost associated with any underground alternative to the proposed GSRP would be allocated to Connecticut alone. Therefore, the cost associated with installation of any underground alternative would impose an unreasonable economic burden on Connecticut ratepayers.

Based on a life-cycle cost analysis of the proposed GSRP and underground alternatives to such facility, the Council determines that the overhead facility is the most cost-effective and appropriate, 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.

VI. Project Design

The Council will order the GSRP to be constructed along the Northern Route using an overhead line configuration.

The baseline design for the Northern Route proposes new steel or wood-pole H-frame structures supporting the conductors overhead in a horizontal configuration. Each structure would be approximately 90 feet in height and spaced 570 feet apart, on average, although the spans would vary due to terrain.

The Northern Route consists of Segment 1 (North Bloomfield to Granby Junction) and Segment 2 (Granby Junction to the Connecticut/Massachusetts state border).

Segment 1 is 4.7 miles long and generally 385 feet wide. Transmission facilities existing on the ROW consist of: a) wood-pole H-frame structures, typically 60 feet in height, that support one 115-kV circuit; b) lattice-steel towers, typically 70 feet in height, that support two 115-kV circuits; and c) 40-foot wood poles that carry a 23-kV distribution line. (A distribution line operates below 69-kV and transports electricity from the transmission system [69-kV and above] to consumers.) The existing 115-kV lines would remain in service during construction of the proposed GSRP. Following completion of the project, CL&P would petition the Council to remove the 115-kV circuits from North Bloomfield Substation to Granby Junction if it determines the lines will not be needed in the immediate future.

For Segment 1, the Council will order that the existing 115-kV line on the lattice structure be taken out of service temporarily for short periods to allow for construction of the proposed 345-kV line up to 25 feet closer than proposed to the 115-kV line, thus reducing clearing by approximately 25 feet for 4.7 miles along the ROW, which equates to 14 acres. Retaining this vegetation would be important because it maintains screening and forest habitat and reduces clearing costs.

Segment 2 is 7.2 miles long and approximately 305 feet wide. The existing transmission facilities along the Segment 2 ROW consist of lattice-steel towers approximately 70 feet in height supporting two 115-kV circuits. The GSRP proposes that the existing lattice structures would remain in place, but be reconfigured as a split-phase line, part of a single circuit operating from Agawam Substation to the Southwick Substation in Massachusetts.

For Segment 2, the ROW would have to be expanded by approximately three acres to accommodate the new H-frame construction. This acreage, which would comprise 100 feet of width for a distance of approximately 1,000 linear feet between Phelps Road and Mountain Road and a distance of approximately 400 linear feet east of Ratley Road, would be acquired from private owners.

For one approximately 1.1-mile section of Segment 2, the Council will approve a change from the baseline H-frame design to a different type of support structure, with a different configuration of the conductors. See "VIII. Electric and Magnetic Fields" for further discussion.

VII. Environment

Wetlands and Watercourses

The Northern Route is not above or in the vicinity of public supply wells or aquifer protection areas. Many watercourses and wetlands, however, including vernal pools, are located along or adjacent to the Northern Route of the GSRP. A number of these resources could be either permanently impacted by the presence of the transmission facility or temporarily impacted by construction.

Permanent impacts would include an increase in the number of transmission structures installed in wetlands; the conversion of 26 acres of palustrine forested wetlands to shrub-scrub or emergent wetlands; possible adverse effects from vegetation clearing on wetlands functioning as vernal pools (18 vernal pools have been identified along the GSRP – Northern Route, four of which would be impacted by the proposed construction); approximately 0.78 acres of adverse effects within two previously-disturbed wetlands at the North Bloomfield Substation; and approximately 400 cubic yards of flood storage capacity lost along Griffin Brook in the vicinity of the North Bloomfield Substation.

The Council will require that a Development and Management (D&M) Plan be prepared to detail all such permanent impacts, including those so far not entirely defined. On the basis of this detail, the Council will further require wetlands mitigation. Such mitigation may include compensatory options including wetlands restoration and/or enhancement along the project ROW, mitigation banking, wetlands creation, wetlands preservation, and conservation restrictions. Mitigation would be coordinated with the Connecticut Department of Environmental Protection (DEP) and the United States Army Corps of Engineers.

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.

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.

There are seven state-listed endangered, threatened and special concern species within the vicinity of the GSRP Northern Route, including:

1. eastern box turtle (*Terrapene carolina*) – State Special Concern;
2. Jefferson salamander (*Ambystoma jeffersonianum*) – State Special Concern;
3. arrow clubtail dragonfly (*Stylurus spiniceps*) – State Special Concern;
4. eastern pearlshell mussel (*Margaritifera margaritifera*) – State Special Concern;
5. dwarf wedge mussel (*Alasmidonta heterodon*) – Federal Endangered and State Endangered;
6. eastern pond mussel (*Ligurnia nasuta*) – State Special Concern; and
7. Bush's sedge (*Carex bushii)* – State Special Concern.

Two additional state-listed special concern species are the eastern hognose snake (*Heterodon platirhinos*); and wood turtle (*Clemmys insculpta)*.

The Council notes not only the presence of suitable habitat for these protected species along the GSRP – Northern Route, but evidence for their active residence there. For instance, during field surveys for the GSRP, an eastern box turtle and a wood turtle were observed in the vicinity of the North Bloomfield Substation.

The Council will order that CL&P comply with DEP recommendations for: daily presence of a DEP-approved turtle ecologist during the eastern box turtle active period (June through October) whenever construction activities take place in mapped eastern box turtle habitats, so that any eastern box turtles encountered shall be removed from the work area; contractor awareness training for identification and handling of eastern box turtles; parking all construction vehicles and equipment on roadways and not in eastern box turtle habitat to the extent possible; installing turtle exclusion fencing around work areas prior to construction; minimizing the removal of low growth vegetation in all mapped eastern box turtle habitats during ROW clearing; and implementing an effective erosion and sedimentation control plan to limit the deposition of sediment into wetland habitats.

The Council will order that CL&P comply with DEP recommendations for construction within the vicinity of the Jefferson salamander, including: seasonal restrictions on tree clearing work, which would be performed in September and October in the affected areas of the ROW; avoiding the installation of new structures within amphibian breeding pools; using temporary timber mats rather than constructing new gravel access roads in the vicinity of amphibian breeding habitat; limiting the removal of low-growth vegetation surrounding breeding pools; making the protection and maintenance of low-growth vegetation within and around breeding pools part of CL&P's vegetation maintenance program for the ROW; using effective erosion and sedimentation controls to minimize deposition of sediment into breeding areas; and placing wood-chip ramps on either side of sediment and erosion controls and/or openings in the erosion control barriers to allow amphibian access to and from vernal pool habitat. Additionally, all silt fencing should be removed from the area following soil stabilization so movement of the species between uplands and wetlands is not restricted.

The Council will also order that CL&P comply with DEP recommendations to mitigate impacts to the arrow clubtail dragonfly, dwarf wedge mussel and eastern pond mussel, which are found near the proposed crossing of the Farmington River, including: performing a rare mussel survey and relocating any rare mussels found to a suitable habitat; performing tree removal activities on the banks of the Farmington River and on an associated island using crews on foot rather than mechanized equipment; minimizing the removal of low-growth vegetation adjacent to the river during clearing; and installing erosion and sedimentation controls to minimize the deposition of sediment into riverine habitats.

The Council will also order that CL&P comply with DEP-recommended mitigation measures to protect the eastern pearl shell mussel by minimizing removal of low-growth vegetation in wetland areas that are tributary to Muddy Brook during initial vegetative clearing; and applying effective erosion and sedimentation controls to minimize the deposition of sediments into wetland areas.

The Council will order mitigation measures for the eastern hognose snake, including a DEP-approved snake ecologist/monitor to be present on the ROW between Tunxis Avenue and Hatchett Hill Road during the active period of the species whenever construction takes place; removal of the snakes encountered from the active work area; and contractor awareness training to ensure proper identification of the snakes and proper handling and care procedures for the snakes.

The Council will order mitigation measures for the wood turtles, including: the daily presence of a DEP approved turtle ecologist during the wood turtle active period whenever construction activities take place in mapped wood turtle habitats so that any wood turtles encountered shall be removed from the work area; contractor awareness training for identification and handling of wood turtles; minimizing the removal of low growth vegetation in all mapped wood turtle habitats during ROW clearing; and implementing an effective erosion and sedimentation control plan to limit the deposition of sediment into wetland habitats.

The Council will order a pre-construction sweep of the project area to identify any Bush's Sedge plant locations and mark them for avoidance during construction. If the plants cannot be avoided, they should be transplanted to a location outside of the construction area.

Habitat and 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. Vegetation within the conductor zone must be eight feet or less. Outside the conductor zone the height of vegetation may be up to 30 feet.

As a result of these established practices, the maintained portion of the GSRP – Northern Route in Connecticut (approximately 131 acres) is open field/shrub land. The unmaintained portion of the ROW consists of upland and upland forest (approximately 211 acres), intermixed with agricultural areas and maintained lawns and wetlands. Installation of the proposed GSRP – Northern Route would require clearing an average of an additional 100 feet along the existing ROW for the new 345-kV line: this would lead to the removal of approximately 103 acres of upland deciduous and coniferous forest.

Approximately two acres of mostly deciduous upland forest would have to be removed for the expansion of the North Bloomfield Substation.

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 that application of herbicide and mechanical clearing of vegetation shall be conducted outside of nesting season for potential resident species. 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.

Visual Resources

Clearing previously unmaintained portions of the ROW and adding a new line of 90-foot H-frame structures for the proposed GSRP would have a visual impact for people who live in the vicinity of the route or travel along affected roads. In addition, views of the ROW from certain key recreational resources would be affected.

The Metacomet Trail is part of the Metacomet-Monadnock-Mattabesett Trail System, which was designated as the New England National Scenic Trail in March of 2009. The existing ROW is parallel to the Metacomet Trail for approximately 9.2 miles through East Granby and Suffield, and at certain points even crosses the trail. The 90-foot H-frame structures for the proposed 345-kV line would be more visible from the Metacomet Trail than the existing 70-foot 115-kV line H-Frame structures, and the structures associated with any EMF BMPs (see “VIII. Electric and Magnetic Fields”), which could be either 110 or 130 feet, would be more visible still. Also, the GSRP – Northern Route will cross the Farmington River, certain portions of which are classified as “Wild and Scenic.” Although the proposed crossing would not go through any of those currently classified portions, it would go through a portion currently being studied by the National Park Service for such designation.

The Council recognizes that views of the ROW from residences and roads in the area will change, as will views from the Metacomet Trail and the Farmington River. The Council finds this change is mitigated, however, by several considerations. First, views of the 70-foot towers for the 115-kV line have existed along the ROW in this area for 50 years. An increase of 20 feet in the height of the structures is not significant, especially considering that the new structures will be supported on H-frames, whose poles can be made of a material that blends in with the forested vegetation surrounding the ROW. Second, the topography in the area is highly variable, limiting views of the ROW from several scenic points. For instance, from Talcott Mountain State Park in Bloomfield, only 0.3 miles west of the ROW, the proposed GSRP facilities are not expected to be visible. Views from various points on the Metacomet Trail are similarly limited. Also, the ROW generally runs through a valley at a lower height than the Metacomet Trail, so that, seen from the trail, the transmission lines appear against a forested backdrop, which minimizes their visual impact. While the taller steel structures associated with any EMF BMPs would not be as camouflaged, they would only be used for a relatively short distance of 1.1 miles. Finally, as has been stated earlier, the Council will take steps to preserve natural screening all along the route of the proposed GSRP to the greatest extent possible.

Visual impact associated with the expansion of the North Bloomfield Substation is minor because the substation occupies a large parcel that already provides considerable screening, and because the proposed equipment would be similar in height to existing equipment at the substation.

Noise and Air Quality

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

The only permanent sources of noise associated with the proposed GSRP would be at the North Bloomfield Substation. Noise will be emitted from the transformers, the transformer cooling fans, and the control house air conditioning units; however, all three pieces of equipment would not be expected to operate simultaneously because such operation would represent an overload condition on the system. Measures will be incorporated to minimize noise into the design of the modified substation. The Council will condition the D&M Plan so as to assure that noise emission levels from the substation equipment would continue to comply with State of Connecticut noise control regulations for residential areas.

Operation of the transmission lines would not impact air quality. Air quality effects from constructing the proposed GSRP 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.

Open Space

Parks and open space in the vicinity of the GSRP include Marion Wilcox Park in Bloomfield; Newgate Wildlife Management Area, the Farmington Valley Greenway and Fox Run at Copper Hill Golf Course in East Granby; and Spencer Woods Wildlife Preserve in Suffield. The route would cross only one of the five properties: the Newgate Wildlife Management Area, which would require new clearing of vegetation in a strip approximately 100 feet wide by 8,300 feet long. This strip would be maintained similarly to the existing ROW after construction. The Council considers this clearing minimal and notes that, as vegetation grows back, it would provide valuable forage for wildlife. As to the other four properties, they are somewhat removed from the proposed transmission line: the farthest is 1,200 feet away; the closest is 280 feet away. All of them currently are well-screened from the ROW. The Council will condition the D&M Plan so that vegetation clearing associated with the proposed construction near any of these properties would allow a buffer of trees to remain.

Historic and Cultural Resources

Historic sites near the GSRP Route include three historic cemeteries within 0.25 miles: St. Andrew's Cemetery in Bloomfield; a smallpox cemetery and Newgate Prisoner's Cemetery in East Granby. The proposed project would not have a visual impact on these cemeteries.

The structures associated with the GSRP would not be distinctly visible from Old Newgate Prison, which is listed on the National Register of Historic Places.

Five Native American archaeological sites are within one mile of the GSRP – Northern Route, with no documented sites directly adjacent to the route. Approximately 6.7 miles of the Northern Route appear sensitive for undocumented Native American archaeological resources. CL&P will avoid any sites eligible for the National Register of Historic Places, to the extent possible. The Council will require that, if avoidance is not possible, CL&P will develop a mitigation strategy for review and approval by the State Historic Preservation Office.

VIII. 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-Hz) alternating currents in transmission lines. Two of these agencies attempted to advise on quantitative guidelines for mG limits protective of health, but were 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) was 9,040 mG, and the maximum exposure advised by the ICNIRP was 833 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. The magnetic fields along the edge of the ROW for the GSRP are approximately one-third of one percent of the IARC guideline and approximately three percent of the ICNIRP exposure guideline.

There is no new evidence that might alter the scientific consensus articulated in the Council's 2007 EMF BMP document.

The baseline H-frame design for the GSRP - Northern Route, modeled at Average Annual Load for 2017, would produce maximum magnetic fields within the ROW of approximately 270 mG, which is significantly higher than pre-construction conditions. Since MF declines with distance, this maximum MF would become 10.2 mG and 13.4 mG, respectively, at the western and eastern edges of the ROW for Segment 1 (North Bloomfield Substation to Granby Junction); and 23.6 mG and 12.6 mG, respectively, at the western and eastern edges of the ROW for Segment 2 (Granby Junction to the Connecticut/Massachusetts State Border).

In Segment 1, due to the future removal of an existing 115-kV transmission line, the modeled level of MF at the western edge of the ROW would ultimately decrease below 13.4 mG after the completion of GSRP. The land abutting the ROW in Segment 1 is primarily forested and agricultural, with few residences and no established public or private schools, licensed child day-care facilities, licensed youth camps, or public playgrounds (Statutory Facilities). Based on these facts, the Council concludes that no EMF BMPs are warranted.

Segment 2 of the ROW also has a rural character, but, unlike Segment 1, it passes through a 3.2-mile section where homes are nearby. This section extends from a point where the ROW comes closest to Country Club Lane in East Granby to a point where the ROW crosses Phelps Road in Suffield. Over this distance, 25 homes are located within 100 feet of the ROW edge, and an additional 50 homes are located within 101 to 300 feet of the ROW edge. Due to the presence of these homes in an otherwise rural area, the Council concludes that EMF BMPs are warranted.

In this section, the pre-construction MF levels at the edges of the ROW are predicted to be 8.7 mG along the western edge and 0.1 mG along the eastern edge. Post-construction, if the baseline design were used, MF would increase to 23.5 mG at the western edge of the ROW, and 12.6 mG at the east, as stated above. Seeking to reduce this increase, the Council studied the design and cost of the seven options put forward by CL&P in accordance with the EMF BMPs, noting that CL&P recommends the delta configuration, which would reduce MF by 24 percent (to 17.9 mG) at the western edge of the ROW, and 22 percent (to 9.8 mG) at the eastern edge.

Although the delta configuration is consistent with the Council's EMF BMPs, which suggest a guideline for cost as 4 percent or less above the baseline design, and a guideline for MF reduction as 15 percent or more below the baseline design at the edges of the ROW, it is important to note that the four percent guideline is not an absolute cap or threshold. The Council's policy allows, under unique circumstances, for consideration of costlier designs, provided that the additional cost above four percent is justified by reductions in MF comparably above 15 percent, with the cost remaining relatively low. The split-phase configuration would reduce MF by 90 percent (to 2.3 mG) and 85 percent (to 1.9 mG), respectively, at the western and eastern edges of the ROW. Indeed, the split-phase configuration would result in MF levels lower than those calculated under current pre-construction conditions for the western edge, and, in certain respects, accomplishes even more reduction than undergrounding would. The Connecticut Department of Public Health recommends installing the lines in a split-phase configuration in this section.

The Council finds that approximately 2.1 miles of the 3.2 mile section of Segment 2 has few homes adjacent to the ROW compared to the 1.1-mile section of the ROW between proposed structure number 3191 to structure number 3201, which have more homes adjacent to the ROW. The baseline cost of the 3.2 mile segment is approximately $11.3 million. Constructing the line in a delta configuration along the same 3.2 mile section would cost an additional $2.2 million. Further, constructing the line in a split-phase configuration over the 3.2 mile section would cost an additional $13.5 million. While the split-phase configuration would dramatically reduce MF levels at the edges of the ROW, the increase to cost is also significant. The Council considered approving the lines in a split-phase configuration along the 1.1 mile portion of the ROW where homes are nearby to provide some MF mitigation while keeping costs low. The installation of a split-phase configuration along 1.1 miles of the ROW would cost an additional approximately $4.64 million (previously $6.5 million)[*] above the baseline H-frame configuration. Therefore, the Council will order that the line configuration over this 1.1 mile section of ROW be constructed using split-phase from proposed structure number 3191 to proposed structure number 3201 in East Granby as shown in Figure 1 of this document.

IX. Conclusions

The facility approved by this Council in the Opinion, Decision and Order will be reliable.

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. Included in the review of the probable environmental impact was a review of electromagnetic fields. The Council has examined the policies of the state concerning the natural environment, ecological balance, public health and safety, air and water purity,

[*] At a Council meeting on May 18, 2010, the Council voted to make a correction to the clerical error in the cost of the additional 1.1 miles of split-phase configuration. The change is from $6.5 million to "approximately $4.64 million."

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 its people and interconnected utility systems and will serve the interests of electric system economy and reliability.

The overhead portions 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 portions of the facility are 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 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" or any successor guidelines and any other applicable federal guidelines.

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 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 daycare 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 route.

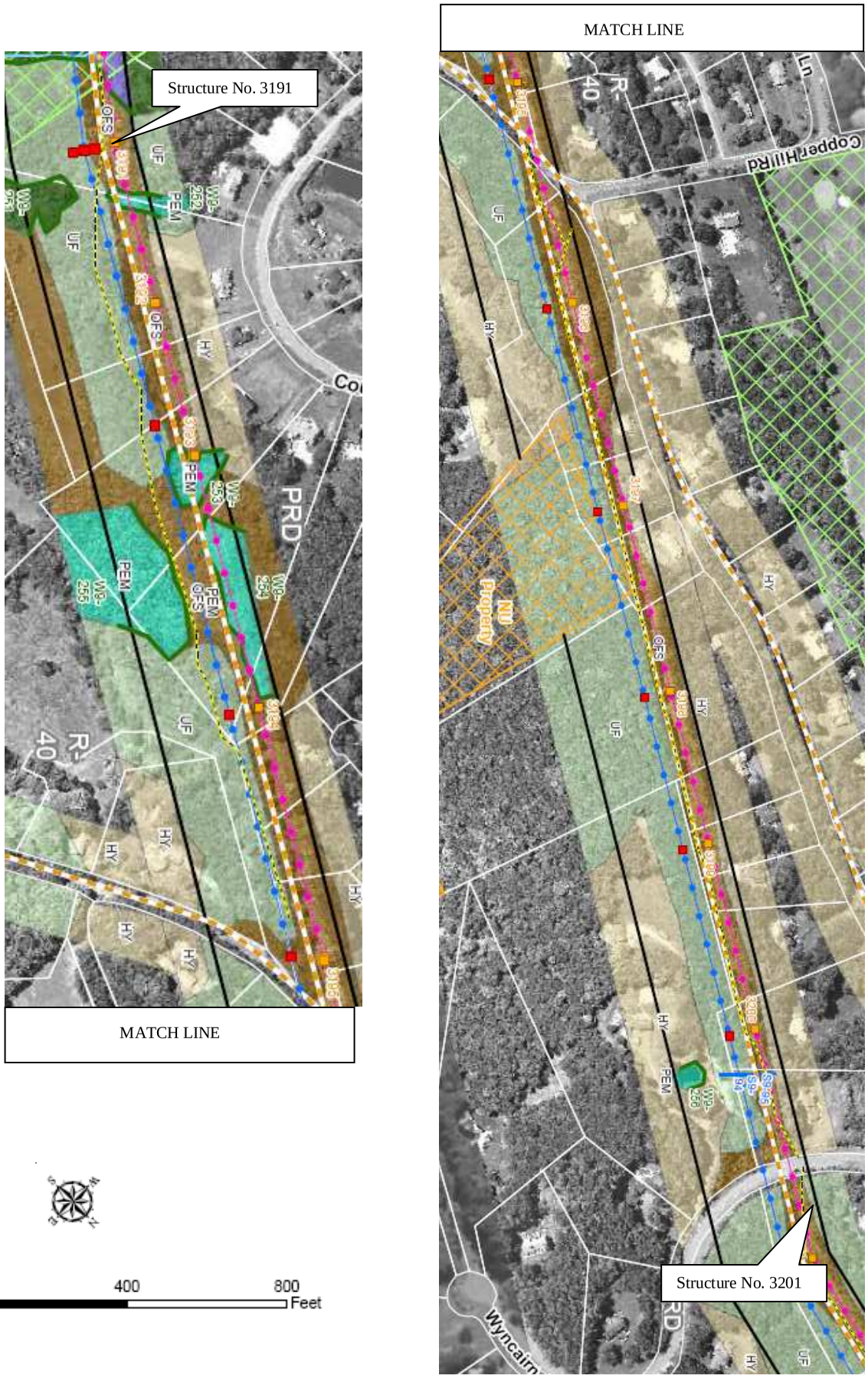
This proceeding was held under a consolidated hearing process with other applications that were common to a request for proposal. The facility proposed in the subject application represents the most appropriate alternative among such applications based on the findings and determinations pursuant to Conn. Gen. Stat. § 16-50p(a)(3). The Council's ultimate decision reflects the balance required by Connecticut law to protect the environment, protect the public health and safety of our children, and to secure Connecticut's energy future for generations to come.

In order to verify consistency 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 affected 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 applicant to submit a D&M Plan which will include, among others, provisions for public comment and review; 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 approved by this Council in the Opinion, Decision and Order.

With the conditions listed above, 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 Northern Route of the GSRP and related construction at the North Bloomfield Substation in Bloomfield and through the Towns of East Granby, and Suffield, Connecticut.



D370 OPINION-Figure 1. Line configuration over the 1.1 mile section of ROW using split phase from proposed structure no. 3191 to 3201 in East Granby. (CL&P 1, Vol. 9, EMF BMP Mapsheets 01and 02)