# Decisions and Orders

## Massachusetts Energy Facilities Siting Board

## VOLUME 18

TABLE OF CONTENTS

COMMONWEALTH OF MASSACHUSETTS
**Energy Facilities Siting Board**

| | | |
|---|---|---|
| Proposed Rulemaking to Amend the Regulation Found at 980 CMR 1.01(4)(e) to Establish a Minimum Threshold Size for a "Facility" As Defined in that Regulation. | ) | EFSB 09-RM-1 |

**FINAL DECISION OPENING PROPOSED RULEMAKING**

Robert J. Shea
May 17, 2010

Facility means any "facility" described in M.G.L. c. 164, § 69G including:

. . . .

(e) a unit, including multiple tanks and associated buildings and structures, designed for, or capable of, the manufacture or storage of gas, except: 1) a unit with a total gas storage capacity of less than 25,000 gallons and also with a manufacturing capability of less than 2,000 MMBtu per day; 2) a unit whose primary purpose is research, development, or demonstration of technology and whose sale of gas, if any, is incidental to that primary purpose; or 3) a landfill or sewage treatment plant.

## I. INTRODUCTION

In 1975, the Energy Facilities Siting Council ("Siting Council"), the predecessor to the Energy Facilities Siting Board ("Siting Board"), initially promulgated 980 CMR § 1.00, "Rules for the Conduct of Adjudicatory Proceedings." On September 13, 2002, these regulations were amended in EFSB 02-RM-1 to reflect statutory changes that had occurred since 1975. These regulations were amended again, effective February 19, 2010, in EFSB 08-RM-1, to provide additional clarity and efficiency.

Presently, 980 CMR 1.01(4)(e) defines a "Facility" as including "(e) a unit, including associated buildings and structures, designed for, or capable of, the manufacture or storage of gas, **except such units below a minimum threshold size as established by regulation**" (emphasis supplied). The Siting Board believes that it would be appropriate to articulate such a minimum threshold and to exclude from Siting Board jurisdiction certain units whose storage or manufacture of gas is small or ancillary to the unit's primary purpose. Therefore, it proposes to revise 980 CMR 1.01(4)(e) to that effect. Accordingly, pursuant to G.L. c. 164, § 69H and G.L. c. 30A, the Siting Board hereby opens a rulemaking for the purpose of revising 980 CMR 1.01.

A copy of the proposed revised regulation is attached.

## II. STATUTORY BACKGROUND

Massachusetts General Laws Chapter 164, section 69H, provides the statutory authority for the Siting Board to adopt regulations and to later amend them.

> There is hereby established an energy facilities siting board . . . . The board shall have powers and duties as follows:
>
> (1) To adopt and publish rules and regulations consistent with the purposes of sections sixty-nine H to section sixty-nine Q, and to amend the same from time to time.
>
> G.L. c. 164, § 69H

Consequently, the Siting Board has express statutory authority to adopt a regulation and to later amend it, provided that the regulation and any amendments are consistent with the purpose of Chapter 164, sections sixty-nine H to sixty-nine Q.

In the present case, the regulation in question relates to the term "Facility" which is defined in G.L. c. 164, § 69G. Under this statute, a "Facility" is defined as, among other

things: "a unit, including associated buildings and structures, designed for or capable of the manufacture or storage of gas, ***except such units below a minimum threshold size as established by regulation.***" G.L. c. 169, § 69G, eighth paragraph, clause (5) (emphasis supplied). Consequently, section 69G expressly provides that a minimum threshold size for a gas storage facility may be established by regulation, and section 69H expressly provides that the Siting Board is empowered to issue such a regulation. These statutes together give the Siting Board the authority to amend 980 CMR 1.01(4)(e) to establish a minimum threshold size.

## III. PROPOSED REGULATION

As stated above, the definition of a "Facility" under 980 CMR 1.01(4)(e) includes "a unit, including associated buildings and structures, designed for, or capable of, the manufacture or storage of gas, except such units below a minimum threshold size as established by regulation." The proposed regulation deletes the words, "except such units below a minimum threshold size as established by regulation." In their place it adds three clauses, each of which exempts certain units that may manufacture or store gas.

The effect of the proposed revised regulation is to exempt from Siting Board jurisdiction small gas storage and manufacturing units, research facilities, and landfills and sewage treatment plants. While such units may make or store gas, it is either in small amounts or is ancillary to the unit's primary purpose. Exempting such units from Siting Board jurisdiction is consistent with the Siting Board's overall regulatory mandate and promotes administrative efficiency.

## IV. REQUEST FOR COMMENTS

The Siting Board seeks written comments addressing any or all provisions of the proposed regulation. Among other issues, the Board seeks comments regarding whether the exemption set forth in clause number 3 – *i.e.*, for landfill and sewage treatment plants, regardless of size – is necessary or advisable. Furthermore, with respect to clause number 3, the Board specifically seeks comments about or whether the exemption set forth in clause number 1 – which sets jurisdictional limits by storage size and manufacturing capability – is sufficient to encompass all landfill and sewage treatment plants that should be exempt from

Siting Board jurisdiction, thereby rendering clause number 3 superfluous. The comments should be received no later than 5:00 p.m. on July 1, 2010, and should be filed with Robert J. Shea, Energy Facilities Siting Board, One South Station, Boston, Massachusetts 02110. The Siting Board requests that all written comments also be submitted to the Siting Board in electronic format using one of the following methods: (1) by electronic mail ("e-mail") attachment to dpu.filing@state.ma.us (copy to robert.j.shea@state.ma.us); or (2) on a 3.5 inch floppy diskette, IBM-compatible format. The text of the e-mail or diskette label must specify: (1) an easily identifiable case caption; (2) the docket number; (3) the name of the person or company submitting the filing; and (4) a brief descriptive title of the document (e.g., comments on 980 CMR § 1.01). The electronic filing should also include the name, title and telephone number of a person to contact in the event of questions about the filing. Text responses should be written in Microsoft Word. Documents submitted in electronic format will be posted on the Siting Board's web page which can be accessed via the Department's website, http://state.ma.us/dpu.

To provide further opportunity for comment, and pursuant to G.L. c. 30A, §§ 2 and 4, the Siting Board will hold a public hearing at 10 am on July 1, 2010, at the Siting Board's offices, One South Station, Boston, Massachusetts. Interested persons may present facts, opinions, or arguments relating to the proposed regulations at the public hearing.

The effective date of the revised regulations shall be the date of their final publication in the Massachusetts Register.

Robert J. Shea

APPROVED by unanimous vote of the Energy Facilities Siting Board at its meeting of October 8, 2009, by the members and designees present and voting. **Voting for** approval of the Final Decision: Ann Berwick, Undersecretary for Energy (Acting EFSB Chair/Designee for Ian A. Bowles, Secretary, Executive Office of Energy & Environmental Affairs); Robert Sydney (Designee for Commissioner, DOER); James Colman (Designee for Commissioner, DEP); Robert Mitchell (Designee for Secretary, EOHED); Jolette Westbrook (Commissioner of the DPU); Timothy Woolf (Commissioner of the DPU); and Dan Kuhs, Kevin Galligan, and Penn Loh, Public Members.

Ann Berwick, Acting Chair
Energy Facilities Siting Board

COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD

| | |
|---|---|
| In the Matter of the Petition of Western Massachusetts Electric Company for approval to construct and operate new overhead 345 kV transmission facilities, rebuild/reconductor existing 115 kV overhead transmission lines and construct/rebuild various other ancillary facilities in the Towns of Agawam, Ludlow and West Springfield, and the Cities of Chicopee and Springfield extending to municipalities of East Longmeadow, Hampden, Longmeadow and Wilbraham for the alternative route, pursuant to G.L. c. 164, § 69J. | EFSB 08-2 |
| In the Matter of the Petition of Western Massachusetts Electric Company for approval to construct and operate transmission facilities, pursuant to G.L. c. 164, § 72. | D.P.U. 08-105 |
| In the Matter of the Petition of Western Massachusetts Electric Company for individual and comprehensive zoning exemptions, pursuant to G.L. c. 40A, § 3. | D.P.U. 08-106 |

FINAL DECISION

Stephen H. August
Presiding Officer
September 28, 2010

On the Decision:
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John C. Young

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FOR: Town of West Springfield Planning Department
Limited Participant

TABLE OF CONTENTS

ABBREVIATIONS

| | |
|---|---|
| BECo/Hopkinton | Boston Edison Company, 6 DOMSB 208 (1997) |
| Boston Gas/Danvers | Boston Gas Company, D.T.E. 00-24 (2001) |
| Cape Wind | Cape Wind Associates LLC, 15 DOMSB 1 (2005) |
| CELCo/Kendall | Cambridge Electric Light Company, 12 DOMSB 305 (2001) |
| Hydro-Quebec | Massachusetts Electric Company/New England Power Company, 13 DOMSC 119 (1985) |
| MECo/Westford | Massachusetts Electric Company, D.T.E. 01-77 (2002) |
| NSTAR/Stoughton | NSTAR Electric, 14 DOMSB 233 (2005) |
| NY Central RR | New York Central Railroad v. Department of Public Utilities, 347 Mass. 586 (1964) |
| Russell T-Line | Russell Biomass, EFSB 07-4/D.P.U. 07-35/07-36 (2009) |
| Save the Bay | Save the Bay v. Department of Public Utilities, 366 Mass. 667 (1975) |
| Tennessee/Agawam | Tennessee Gas Pipeline Company, D.T.E. 01-57 (2002) |
| WMECo/AWS | Western Massachusetts Electric Company, D.P.U. 09-24/09-25 (2010) |
| AAL | annual average load |
| APL | annual peak load |
| ACSS | steel-supported aluminum conductor |
| AICUZ | Air Installation Compatibility Use Zone |
| APZ-1 | Primary accident prevention zone |
| Breckwood Cables | Circuit #1322 and #1433 |
| CELT | Capacity, Energy, Loads, and Transmission (forecast) |
| CHP | combined heat and power |
| CL&P | Connecticut Light & Power |
| CMLP | Chicopee Municipal Lighting Plant |

| | |
|---|---|
| CMP | Conservation and Management Plan(s) |
| Company | Western Massachusetts Electric Company |
| CONVEX | Connecticut Valley Electric Exchange |
| CSC | Connecticut Siting Council |
| dBA | A-weighted decibels |
| DCR | Massachusetts Department of Conservation and Recreation |
| DCT | double circuit tower |
| DOC | diesel oxidation catalyst |
| DOMSB | Decisions and Orders of Massachusetts Energy Facilities Siting Board |
| DOMSC | Decisions and Orders of Massachusetts Energy Facilities Siting Council |
| DPF | diesel particulate filter |
| DSM | demand-side management |
| EFSB | Energy Facilities Siting Board |
| EMF | electric and magnetic fields (here, 60 hertz magnetic field) |
| FAA | Federal Aviation Administration |
| FTF | flow-through filter |
| G.L. c. | Massachusetts General Laws chapter |
| Greater Springfield | Here, west to Bladford, north to Amherst, east to Ludlow and south to the Massachusetts/Connecticut border |
| GSRP | Greater Springfield Reliability Project, *often including* the Manchester to Meekville Separation Project in Connecticut |
| ICF | ICF Resources LLC |
| ICNIRP | International Commission on Non-Ionizing Radiation Protection |
| ISO-NE | Independent System Operator of New England |

| | |
|---|---|
| kcmil | thousand circular mils |
| kV | kilovolts |
| LSP | Licensed Site Professional |
| MADEP | Massachusetts Department of Environmental Protection |
| MEPA | Massachusetts Environmental Protection Act |
| mG | milligauss |
| mG-house | milligauss-house |
| $/mG-house | dollars-per-milligauss-house |
| MHC | Massachusetts Historical Commission |
| MHG | Material Handling Guideline |
| MMP | Manchester to Meekville Circuit Separation Project |
| MMWEC | Massachusetts Municipal Wholesale Electric Company |
| MVA | megavolt-amperes |
| MVAR | megavolt-amperes, reactive |
| MW | megawatts |
| MWh | megawatt-hours |
| NAAQS | National Ambient Air Quality Standards |
| NAS | National Academy of Sciences |
| NEEWS | New England East – West Solution |
| NERC | North American Electric Reliability Corporation |
| NPCC | Northeast Power Coordinating Council |
| NPDES | National Pollutant Discharge Elimination System |
| NU | Northeast Utilities |
| OCC | Connecticut Office of Consumer Counsel |

| | |
|---|---|
| OHM | Oil or Hazardous Materials |
| PVEC | Pioneer Valley Energy Center |
| PM | particulate matter |
| $PM_{2.5}$ | fine particulate matter |
| PP-3 | ISO-NE Planning Procedure No. 3 |
| ppm | parts per million |
| PREP | Palmer Renewable Energy Project |
| RMR | reliability-must-run |
| ROW | right-of-way |
| RR | Record request |
| Siting Board | Energy Facilities Siting Board |
| $SF_6$ | sulfur hexafluoride |
| SPS | Special Protection System |
| SWPPP | Storm Water Pollution Prevention Plan |
| USEPA | United States Environmental Protection Agency |
| UMass | University of Massachusetts |
| URAM | Utility Related Abatement Measure |
| WARB | Westover Air Reserve Base |
| WHO | World Health Organization |
| WHO Report | Environmental Health Criteria v. 238 (2007) |
| WMECo | Western Massachusetts Electric Company |
| XS | numbered cross-section on the GSRP |
| 50:1 glide path rule | FAA requirement for clearance from end of runways |

Pursuant to G.L. c. 164, § 69J, the Massachusetts Energy Facilities Siting Board ("Siting Board") hereby approves, subject to the conditions set forth below, the petition of Western Massachusetts Electric Company ("WMECo" or the "Company") to construct a new 345 kV transmission line, reconfigure and replace existing 115 kV transmission lines, and build new and upgrade several existing substations and switching stations in the Greater Springfield area. Pursuant to G.L. c. 164, § 72, the Siting Board hereby approves, subject to the conditions set forth below, the petition of WMECo for a determination that the proposed 345 kV and 115 kV transmission lines are necessary, serve the public convenience and are consistent with the public interest. Pursuant to G.L. c. 40A, § 3, the Siting Board hereby approves, subject to the conditions set forth below, the petition of WMECo for individual and comprehensive exemptions from the zoning bylaws of the Towns of Agawam, Ludlow, and West Springfield, and the Cities of Chicopee and Springfield in connection with the proposed transmission facilities, as described herein.

## I. INTRODUCTION

### A. Summary of the Proposed Transmission Project

WMECo's proposed transmission project is known as the Greater Springfield Reliability Project ("GSRP"). The GSRP is one of four major transmission projects that together make up the New England East-West Solution ("NEEWS").[1] The GSRP consists of: (1) reconfiguring and replacing existing 115 kV transmission lines; (2) constructing new 345 kV transmission facilities; and (3) building and upgrading several existing substations and switching stations in Greater Springfield.[2]

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1 The other three NEEWS projects are: (1) the Interstate Reliability Project [41 miles of new 345 kilovolt ("kV") line between Millbury MA, West Farnum RI, and Card Street CT]; (2) the Rhode Island Reliability Project [21.4 miles of new 345 kV line between North Smithfield RI and Warwick RI]; and (3) the Central Connecticut Reliability Project [37 miles of new 345 kV between Bloomfield CT and Frost Bridge CT].

2 A separate, but related project is called the Manchester to Meekville Junction Circuit Separation Project ("MMP"), which involves the modification of approximately 2.7 miles of existing transmission lines in Manchester, Connecticut.

The Company proposes to construct an approximately 23-mile single-circuit 345 kV overhead transmission line in an existing right-of-way, from the Massachusetts border near Agawam, Massachusetts, to the Ludlow Substation via West Springfield, Chicopee, and Ludlow (the "Northern Corridor"). From Agawam, the 345 kV line would continue south into Connecticut where it would terminate in Bloomfield, Connecticut. WMECo also proposes to remove existing towers and 115 kV conductors, construct new towers and reconductor higher capacity 115 kV transmission circuits along the 23-mile Northern Corridor. In addition, the Company would rebuild 3.3 miles of 115 kV lines on three spurs that extend from this corridor to the Orchard Substation in Springfield, to a new Cadwell Switching Station in Springfield, and to a new Fairmont Switching Station in Chicopee.

WMECo would install modifications at the Ludlow, Agawam, Chicopee, Orchard, Breckwood and Piper Substations, and the Shawinigan and South Agawam Switching Stations. In addition, WMECo would rebuild its existing Fairmont Switching Station and would construct a new 115 kV switching station, to be called the Cadwell Switching Station.

The Company is required by G.L. c. 164, § 69J to present both a preferred route and an alternative route for its project. Here, the only difference between the two alternatives is the route of the 345 kV line. The 115 kV reconfiguration work in the Northern Corridor and substation work would be the same under either the Northern Alternative, which is preferred by the Company, or the Southern Alternative, as described below:

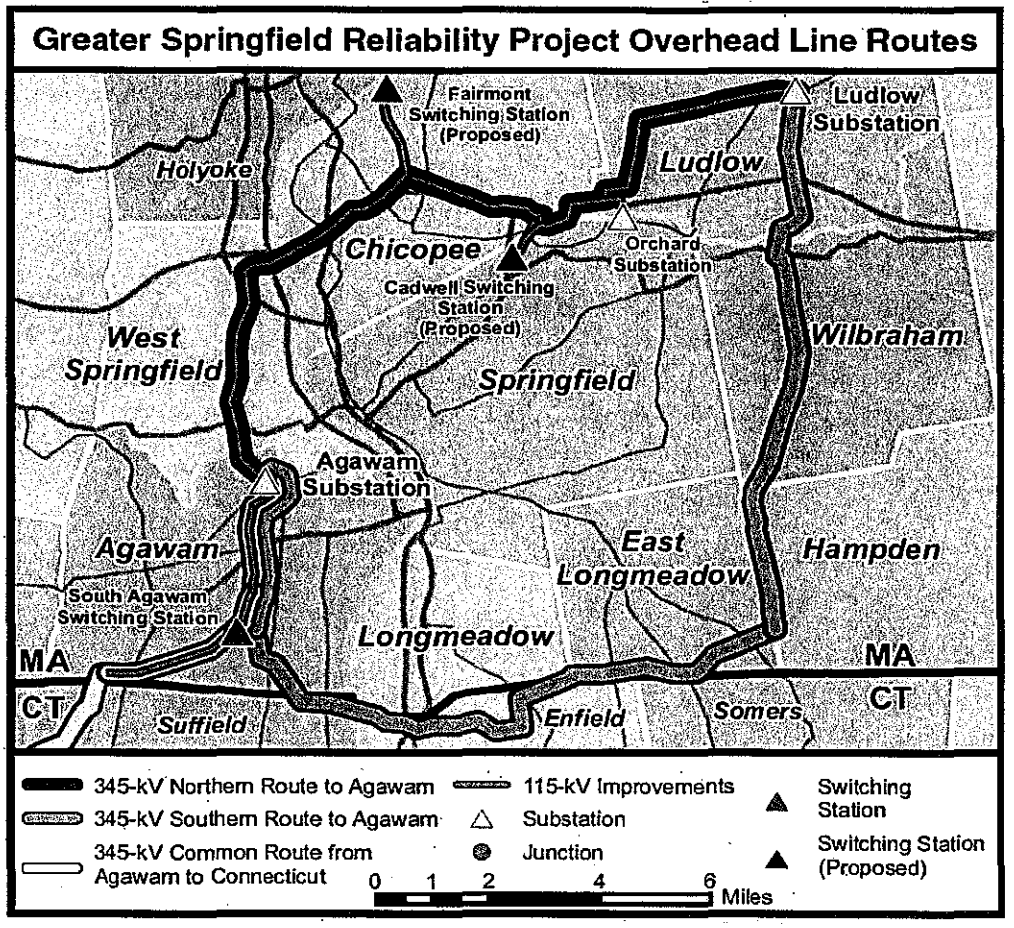
Northern Alternative: Under this alternative, the 115 kV and 345 kV transmission lines would be placed in the Northern Corridor, described above. The total project length (including spurs and the 12-mile portion in Connecticut) would be 39 miles.

Southern Alternative: Under this alternative, the 345 kV line would not be in the Northern Corridor with the 115 kV lines, but in a different existing right-of-way that runs between Agawam and Ludlow for 22.3 miles via Agawam, Longmeadow, East Longmeadow, Hampden, Wilbraham and Ludlow ("Southern Corridor"). The Southern Alternative includes an additional 5.4-miles in Connecticut between Longmeadow and East Longmeadow, where the 345 kV line would travel through the Connecticut towns of Suffield and Enfield and re-enter Massachusetts. Under this approach the

total project length (including spurs and the 12-mile portion in Connecticut) would be 61.3 miles.

Exh. WMECo-TBB-4, Att. 4, Table 4-8. Figure 1, below, provides a graphic representation of the proposed project.

**Figure 1. GSRP Northern and Southern Alternatives**




One part of the proposed 345 kV line, marked with a yellow line (in Connecticut) and a yellow line with a green filling (in Massachusetts), would extend from a substation in Bloomfield, Connecticut (not shown) to the Agawam Substation. This portion of the 345 kV line is the same whether the Northern Alternative or the Southern Alternative is selected. If the Northern Alternative is selected, the 345 kV line will follow the blue line beginning at Agawam Substation. If the Southern Alternative is selected, the 345 kV line will follow the orange line

beginning at Agawam Substation. In either case, the 115 kV improvements would occur on the thin green line (much of which fills in the blue line).

B. Procedural History

On October 27, 2008, WMECo filed three petitions with the Siting Board and the Massachusetts Department of Public Utilities ("Department") relating to the GSRP. In the first petition, the Company requests approval, pursuant to G.L. c. 164, § 69J ("Siting Board Petition"). A second petition, filed with the Department, seeks specific and comprehensive exemptions from the zoning bylaws or ordinances in the cities and towns along either the preferred or noticed alternative routes for the GSRP pursuant to G.L. c. 40A, § 3 ("Zoning Petition"). The third petition requests approval for the GSRP pursuant to G.L. c. 164, § 72 ("Section 72 Petition"; all three petitions together, the "Petitions").

The Siting Board Petition was docketed as EFSB 08-2, the Zoning Petition as D.P.U. 08-105 and the Section 72 Petition as D.P.U. 08-106. Pursuant to the Company's request, on March 25, 2009 the Chairman of the Department issued a Consolidation Order, referring the Section 72 and Zoning Petitions for review and approval or rejection to the Siting Board pursuant to G.L. c. 164, § 69H(2). The consolidated proceeding was docketed as EFSB 08-2/D.P.U. 08-105/08-106. Accordingly, the Siting Board conducted a single adjudicatory proceeding and developed a single evidentiary record for the consolidated Petitions.

Three public hearings were held for the purpose of taking public comment on the GSRP on May 6, 2009 in Agawam, May 7, 2009 in Chicopee, and on May 13, 2009 in Wilbraham. By Hearing Officer ruling dated June 10, 2009, intervenor status was granted to the Massachusetts Attorney General ("Attorney General"), Massachusetts Municipal Wholesale Electric Company ("MMWEC"), ISO-New England, Inc. ("ISO-NE"), Westover Air Reserve Base ("WARB"), Chicopee Municipal Lighting Plant ("CMLP"), and Ashley Jones, a resident of West Springfield. Petitions to participate as limited participants were granted for the Town of West Springfield, and for David Sterling, a resident of Agawam, who asked to represent certain identified residents of Prospect Street in Agawam. By ruling dated October 9, 2009, the Hearing Officer granted the late-filed petition to intervene of the Connecticut Office of Consumer Counsel ("OCC").

WMECo presented the testimony of the following seventeen witnesses in support of its petitions: William H. Bailey, Timothy B. Barton, David Cameron, Robert E. Carberry, John C. Case, Kenneth Collison, Donald D. Cooper, Julia Frayer, Jerry P. Fortier, George C. Loehr, Anthony Johnson, Timothy F. Laskowski, Scott E. Newland, Lane P. Puls, Allen W. Scarfone, Maria F. Scheller, and Roger C. Zaklukiewicz. ISO-NE presented three witnesses: Frank Mezzanotte, Stephen J. Rourke, and Richard V. Kowalski, concerning the function of ISO-NE, regional system transmission planning, and the need for transmission upgrades for system reliability. WARB presented the testimony of Lt. Colonel Heroux. MMWEC presented the testimony of Bruce McKinnon. OCC presented the testimony of Paul Chernick.

The Siting Board held 30 days of evidentiary hearings beginning on November 2, 2009 and ending on February 12, 2010. Two further evidentiary hearings were held before the Siting Board at its meetings on June 3 and June 25, 2010. A joint evidentiary hearing with the Connecticut Siting Council ("CSC") was held in Enfield, Connecticut, on September 22, 2009.[3] Prior to the start of evidentiary hearings, the Siting Board Staff issued five sets of information requests to the Company, two sets to ISO-NE, and one set to WARB. During the course of evidentiary hearings the Company responded to 125 Record Requests.

[3] The Connecticut Light and Power Company ("CL&P") filed a parallel request for CSC approval of: (1) the Connecticut portion of the GSRP; and (2) the MMP in Manchester, Connecticut. The Connecticut proceeding was docketed as CSC No. 370. The proposed MMP would separate two existing circuits (Circuits 1448 and 395) that occupy one line of structures along a 2.7-mile section of CL&P's existing ROW between Manchester Substation and Meekville Junction. On March 16, 2010, the CSC voted to issue a certificate of environmental compatibility and public need for the Connecticut GSRP facilities. On March 9, 2010, the CSC denied the MMP without prejudice. On July 20, 2010, the CSC reconsidered its denial without prejudice and granted a Certificate of Environmental Compatibility and Public Need for the Manchester Substation to Meekville Junction Circuit Separation Project Variation in Manchester, Connecticut.

## II. JURISDICTION AND STANDARD OF REVIEW UNDER G.L. c. 164, § 69J

The Company filed the Siting Board Petition pursuant to: (1) G.L. c. 164, § 69H, which requires the Siting Board to implement its statute so as to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost; and (2) G.L. c. 164, § 69J, which requires a project applicant to obtain Siting Board approval for the construction of a proposed energy "facility" before a construction permit may be issued by another state agency.

G.L. c. 164, § 69G defines a "facility" to include:

> a new electric transmission line having a design rating of 115 kilovolts or more which is 10 miles or more in length on an existing transmission corridor except reconductoring or rebuilding of transmission lines at the same voltage.

The proposed 345 kV transmission line is clearly a "facility" with respect to Section 69J. However, the Company raises a question whether the GSRP's 115 kV transmission line upgrades (and the associated substation construction work) are also subject to the Siting Board's jurisdiction under Section 69J (WMECo Initial Brief at 6-7).[4]

The Company confirms that all of the 115 kV transmission upgrades and related switching station and substation construction and/or modification will occur together with the new jurisdictional 345 kV transmission facilities (id.). Without conceding that the 115 kV upgrades meet the definition of a "facility," or that the proposed 115 kV upgrades constitute "ancillary facilities," WMECo presented and analyzed all aspects of the consolidated construction project, including the 115 kV upgrades and associated ancillary facilities, on an integrated and consolidated basis (WMECo Initial Brief at 7; Exh. WMECo-1, at 1-11).[5]

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[4] The Company does not challenge the Siting Board's jurisdiction over the GSRP, in its entirety, with respect to its request for approval pursuant to G.L. c. 164, § 72 and G.L. c. 40A, § 3.

[5] WMECo's Petition states: "[i]n preparing this Petition on an integrated and consolidated basis, addressing all related impacts, costs and other topics and requesting approvals which the Siting Board may view as applicable to the [p]roject, WMECo believes that a challenge to the Siting Board's jurisdiction [with respect to the 115 kV facilities] is unnecessary and counterproductive" (Exh. WMECo-1, at 1-11, n.3).

The Company observes that the legal issues of need, cost, reliability, alternative approaches, alternative routing, and mitigation, were each addressed on a consolidated basis with respect to both the 345 kV and 115 kV transmission lines (WMECo Initial Brief at 7).[6] Because the Company's case for approval under Section 69J relies on the presentation of an integrated, inter-related project, the Siting Board concludes, for purposes of our review in this case pursuant to G.L. c. 164, §§ 69H and 69J, that these facility issues can be reviewed only on a consolidated basis, as has been presented by the Company.

In accordance with G.L. c. 164, §§ 69H and 69J, before approving a petition to construct, the Siting Board requires an applicant to justify its proposal in four phases. First, the Siting Board requires the applicant to show that additional energy resources are needed (see Section III, below). Second, the Siting Board requires the applicant to establish that, on balance, its proposed project is superior to alternative approaches in terms of reliability, cost, and environmental impact, and in its ability to address the identified need (see Section IV, below). Third, the Siting Board requires the applicant to show that it has considered a reasonable range of practical siting alternatives and that the proposed site for the project is superior to a noticed alternative site in terms of cost, environmental impact, and reliability of supply (see Section V, below). Finally, the applicant must show that its plans for construction of its new facilities are consistent with the current health, environmental protection and resource use and development policies as developed by the Commonwealth (see Section VI, below).

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[6] Indeed, the Company explicitly relies on the inter-relationship between the new 345 kV line and the 115 kV transmission upgrades in making its case for approval of the new 345 kV line under Section 69J. For example, in comparing the environmental impacts of the Northern and Southern Alternatives, the Company argues that the Northern Alternative is superior because it will only disturb one transmission corridor while the Southern Alternative will disturb two. This is true, of course, only if one assumes that the 115 kV transmission upgrades will take place in the Northern Corridor.

## III. NEED FOR THE PROPOSED FACILITIES

### A. Standard of Review

G.L. c. 164, § 69J provides that the Siting Board should approve a petition to construct if the Board determines that the petition meets certain requirements, including that the plans for the construction of the applicant's facilities are consistent with the policies stated in G.L. c. 164, § 69H to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. To accomplish this, the Board must, among other matters, review the "need for" the facilities to meet reliability, economic efficiency, or environmental objectives. G.L. c. 164, § 69H. Consistent therewith, G.L. c. 164, § 69J requires applicants to include in their petitions an analysis of need for the facility. Here, the Company asserts that the GSRP is needed for reliability purposes (Exh. WMECo-1, at 2-1).[7]

To ensure reliability, each transmission and distribution company establishes planning criteria for construction, operation, and maintenance of its transmission and distribution system. Compliance with the applicable planning criteria can demonstrate a "reliable" system. See e.g., New England Power Company, 7 DOMSB 333, at 346-348 (1998); Boston Edison Company, 6 DOMSB 208, at 243-245 (1997) (BECo/Hopkinton).

To determine whether system improvements are needed, the Siting Board takes the following steps: (1) examines the reasonableness of the Company's system reliability planning criteria; (2) determines whether the Company uses reviewable and appropriate methods for assessing system reliability over time based on system modeling analyses or other valid reliability indicators; and (3) determines whether the relevant transmission and distribution

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[7] The Siting Board's review of proposed transmission facilities is conducted pursuant to G.L. c. 164, § 69J. This section states, in part, that "[n]o applicant shall commence construction of a facility at a site unless . . . in the case of an electric or gas company which is required to file a long-range forecast pursuant to section sixty-nine I, that facility is consistent with the most recently approved long-range forecast for that company." The Siting Board notes that, pursuant to the Department's Order in D.T.E. 98-84A, Massachusetts electric companies, including WMECo, are now exempt from the requirements of G.L. c. 164, § 69I. Thus, the Siting Board need not consider whether the proposed transmission facilities are consistent with a recently-approved long range forecast.

system meets these reliability criteria over time under normal conditions and under certain contingencies, given existing and projected loads.

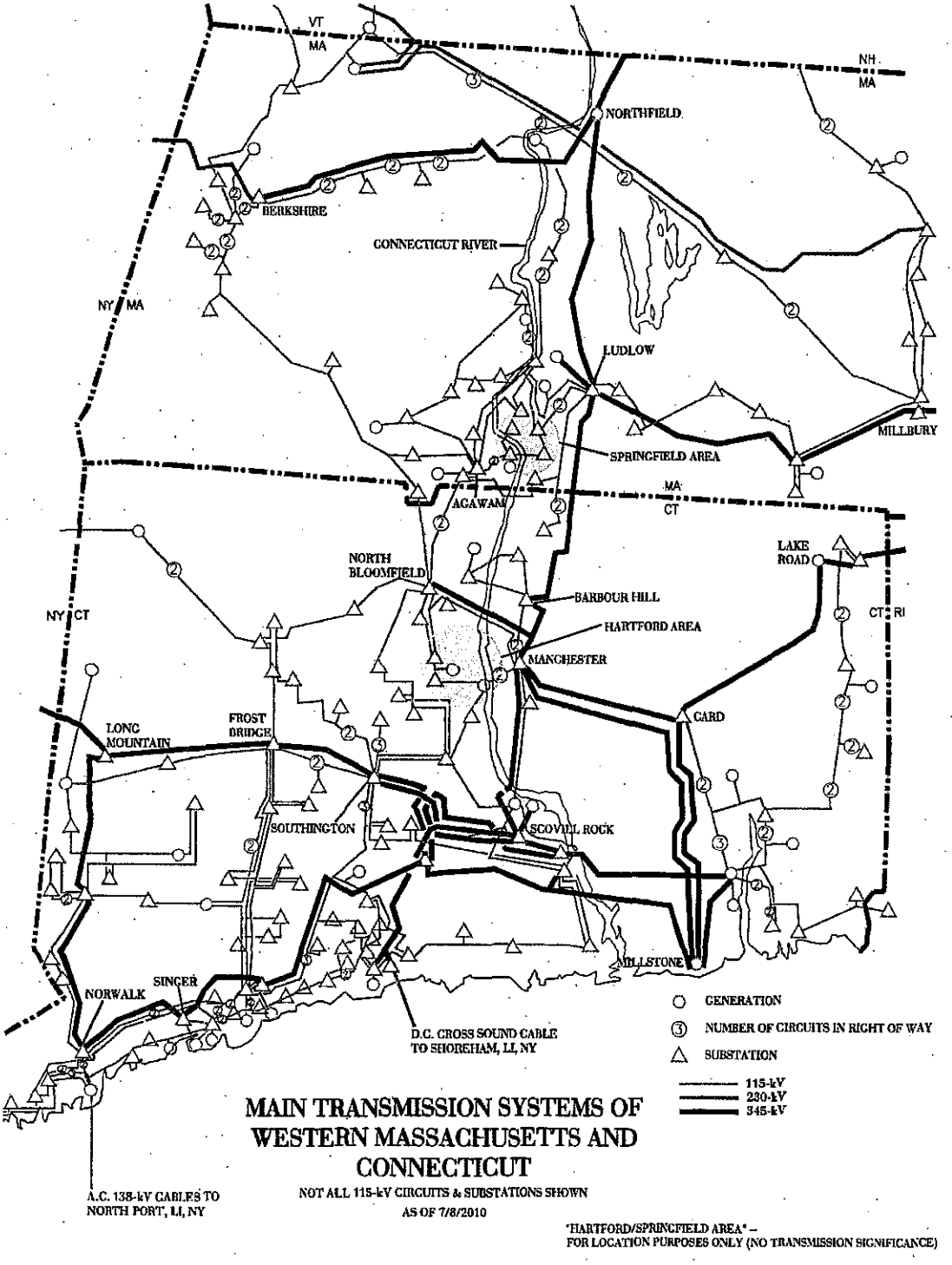
When a petitioner's assessment of system reliability and facility requirements are, in whole or in part, driven by load projections, the Siting Board reviews the underlying load forecast. The Siting Board requires that forecasts be based on substantially accurate historical information and reasonable statistical projection methods that include an adequate consideration of conservation and load management. G.L. c. 164, § 69J. To ensure that this standard has been met, the Siting Board requires that forecasts be reviewable, appropriate and reliable. NSTAR Electric, 14 DOMSB 233, at 252-253 (2005) (NSTAR/Stoughton); BECo/Hopkinton at 232 (1997). A forecast is reviewable if it contains enough information to allow a full understanding of the forecast method. A forecast is appropriate if the method used to produce the forecast is technically suitable to the size and nature of the company that produced it. A forecast is reliable if the method provides a measure of confidence that its data, assumptions and judgments produce a forecast of what is most likely to occur. NSTAR/Stoughton at 253.

B. Understanding the Existing Transmission System

1. Description of the Existing Transmission Infrastructure

WMECo's transmission system is part of the interconnected New England transmission system or "grid." The main transmission lines of Western Massachusetts and Connecticut are shown in Figure 2 below (Exh. WMECo-1, at 2-14 (Replacement Figure 2-1a)):

**Figure 2: Main Transmission System of Western MA and CT**



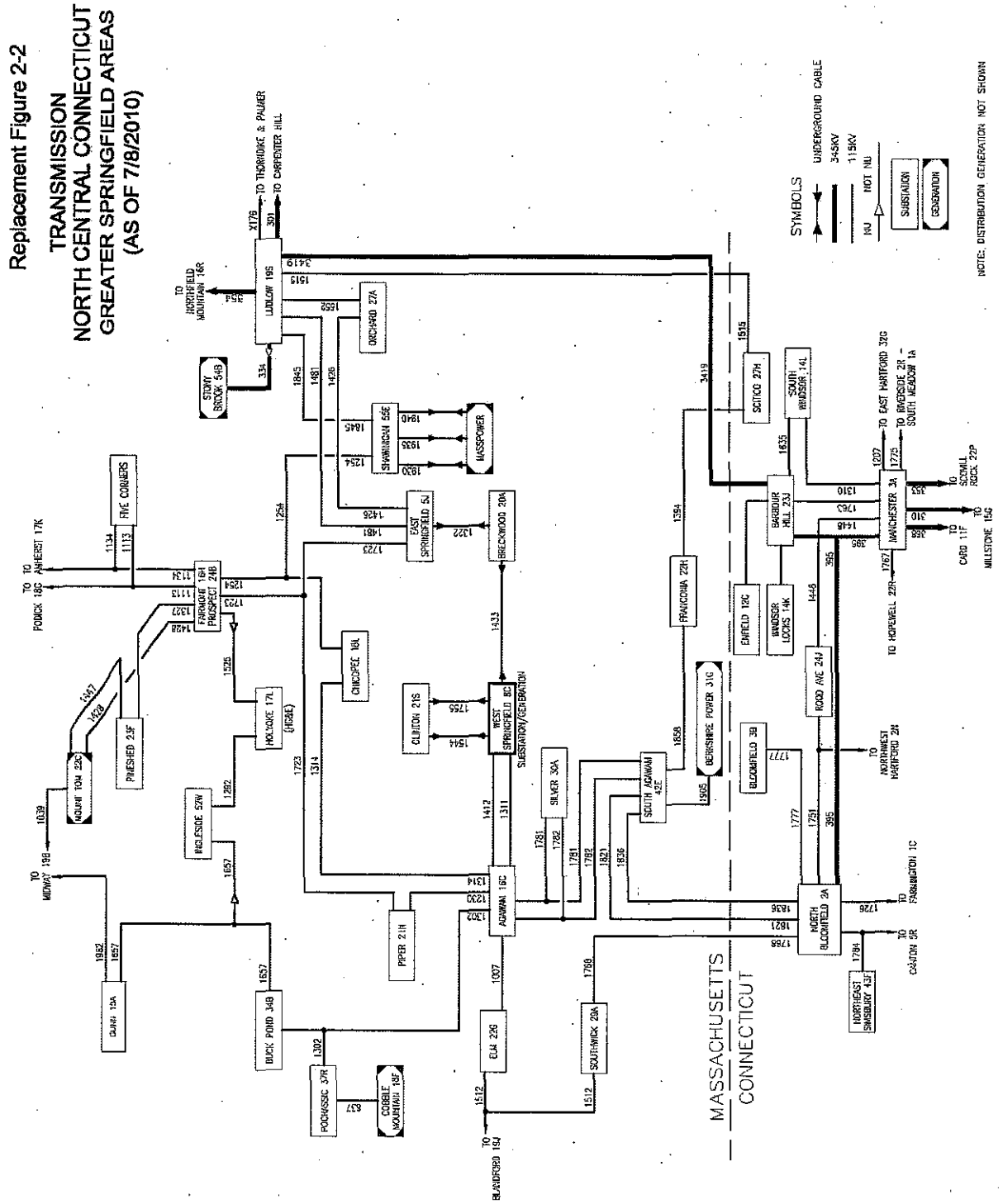
The 345 kV transmission grid, as shown in bold (blue) in Figure 2, is the backbone of the New England bulk power system, which transmits power from large central generating stations and power imported from neighboring regions throughout New England (Exh. WMECo-AWS-1, at 10). The 345 kV transmission system is somewhat analogous to the interstate highway system, which interconnects large regions with high volume access. Using large transformers located at substations throughout the region, power is delivered from the 345 kV transmission system to the 115 kV transmission system, and then ultimately delivered to local load centers, such as Greater Springfield. Figure 3 below is a "one line diagram" of the 345 kV and 115 kV transmission systems in and around Greater Springfield.

WMECo serves the major portion of the load in Greater Springfield and its sister utility, CL&P, serves load in the north-central Connecticut area (Exh. AWS-1, at 18).[8] In addition, Chicopee Electric Light Department serves the City of Chicopee and Holyoke Gas and Electric Company serves the City of Holyoke (id.). Greater Springfield includes the City of Springfield and extends west to Blandford, south to the Connecticut border, north to Amherst, and east to Ludlow. The north-central Connecticut area borders Greater Springfield to the south, and extends further south to the city of Hartford, Connecticut and its surrounding suburbs (id.).

The Ludlow Substation, located northeast of Springfield, is the only 345/115 kV power substation in Greater Springfield. At Ludlow Substation, the 345 kV and 115 kV transmission networks interconnect with two large autotransformers, allowing power to flow from the 345 kV system to the 115 kV system (Exhs. WMECo-1, at 2-15; AWS-1, at 18). From the Ludlow Substation, there are essentially three electrical pathways from the east side of Springfield to Agawam on the west side of Springfield. The first path travels around Springfield to the north on two 115 kV lines through East Springfield Substation, Fairmont Switching Station, and Piper Substation (see Circuits 1723 and 1314 on Figure 3).

[8] Both CL&P and WMECo are wholly-owned subsidiaries of Northeast Utilities, based in Berlin, CT.

**Figure 3. Springfield Area Existing Configuration (Exh. WMECo-1, at 2-17, Revised).**



The second 115 kV path travels directly through the downtown section of Springfield and under the Connecticut River to West Springfield Substation by means of underground cables (known as the "Breckwood Cables") (Circuits 1322 and 1433)). This underground 115 kV cable system was constructed in 1954 and is at this point in time significantly undersized for current and forecasted future load requirements (Exh. WMECo-1, at 2-19). The third 115 kV pathway travels south from Ludlow Substation (Circuit 1515), west via Scitico, Franconia and South Agawam and then north where it terminates at the Agawam Substation.

The Agawam Substation connects to all three of these 115 kV pathways from the east side of Springfield to the west side of Springfield (and also connects to additional circuits to the north, south, and west) (Exh. WMECo-1, at 2-17 (fig. 2-1)). The Agawam Substation depends exclusively on local generation and its 115 kV connections to Ludlow Substation for its power supply and is not currently connected to the 345 kV system (id.). The Ludlow Substation, in addition to serving Massachusetts load, serves as an important source of electricity supply to the Connecticut transmission system, through its 345 kV connection to the Barbour Hill Substation, located in South Windsor, Connecticut (Exh. AWS-1, at 19).

2. How Power Flows In Greater Springfield

Typically, during peak periods of demand, power flows west from Ludlow Substation to the Agawam Substation through the three 115 kV paths (Exh. WMECo-1, at 2-19). Interruption of transmission service on any one or more of these three paths causes more power to flow on the remaining paths (Exh. WMECo-1, at 2-19). Also, if a contingency interrupts the power flow on the 345 kV transmission line going south into Connecticut (Circuit 3419), approximately 30 percent of the power flow into Connecticut must find alternative paths, such as the 115 kV loops through and around Greater Springfield (id.). Thus, the same lines that serve customer load in and around Springfield also serve a second purpose -- to transmit power from Massachusetts into Connecticut (Exh. WMECo-AWS-1, at 23).[9] Any Greater Springfield reliability problems that may exist are therefore exacerbated when the existing 115 kV transmission system is called upon

[9] In recent years, at times of peak summer demand power flows have largely been in the direction from Massachusetts into Connecticut (see Exh. EFSB-ISO-3).

to do the double duty of serving local Springfield load and also transmitting power to Connecticut (id.).

3. Double Circuit Towers

The transmission infrastructure around Springfield is further complicated by the existence of many double circuit transmission tower structures ("DCTs"), which support two separate circuits on the same tower (Exh. WMECo-1, at 2-20). For example, circuits sharing the same tower structure include the following: (1) Circuits 1723 and 1314 between Chicopee and Piper Substations; (2) Circuits 1412 and 1311 between Agawam and West Springfield Substations (currently under construction pursuant to Western Massachusetts Electric Company, D.P.U. 09-24/09-25(2010) (WMECo/AWS); and (3) Circuits 1314 and 1230 between Piper and Agawam Substations (id.). Transmission reliability testing rules require that both circuits on a DCT be taken out-of-service at the same time when modeling the unexpected loss of DCT facilities (Exh. WMECo-AWS-1, at 25). Accordingly, the loss of a DCT in a transmission system reliability study increases the likelihood that the remaining transmission system will be overburdened.

4. Transmission Interfaces

Another important element of the transmission infrastructure in the context of this case is the transmission interface. Transmission interfaces are made up of one or more individual transmission lines that can be used to transfer power from one area to another and have a defined limit (Exh. WMECo-1, at 2-6, fn.5). The Connecticut Import Interface is a series of nine identifiable transmission lines coming into Connecticut from Massachusetts, Rhode Island, and upstate New York. Even though each separate transmission line has its own physical capacity to transfer power, it is not possible simply to sum these capacities to obtain the interface transfer limit because whenever any one of the nine lines reaches its thermal limit, the transfer limit of the entire interface, by definition, also reaches its limit (Exh. EFSB-ISO-32). For example, if most of the generation that is feeding power across an interface is located much closer to some of the lines than others, these generators may send a disproportionate share of their electrical output

towards these closer transmission lines. The result would be to overtax these closer transmission lines before more distant lines reach their capacities.

Rather than a single transfer limit over an interface, there is a range of transfer levels that depends on which generators are operating on either side of the interface (Exh. WMECo-1, at 2-34, at n. 36; Tr. 2, at 234). The Connecticut Import Interface has a transfer limit represented as a range between 1500 and 2500 megawatts ("MW"), although even this range cannot be reached for some dispatches (EFSB-RR-32). In fact, there are certain generators, the operation of which plays a particularly important role in facilitating the maximum delivery of imports into Connecticut, including Berkshire Power, West Springfield #3 and the Lake Road Units 1, 2 and 3 located in northeast Connecticut (EFSB-RR-26, Supplement 1).

C. Description of Modeling Used to Demonstrate Need

1. Contingency Analysis

The reliability of a transmission system may be measured by the frequency, duration, and magnitude of modeled adverse effects that would occur on the system following one or more modeled contingency events. A contingency is an unintentional event, usually involving the loss of one or more system elements, such as a transmission circuit, which affects the power system adversely (Exh. WMECo-1, at 2-27). The transmission system is tested for reliability using computer modeling software[10] that runs a series of "what if" type scenarios, involving one or more contingencies in which one or more elements of the transmission system are assumed to be unexpectedly out-of-service. The remaining system is studied under peak load conditions to determine whether it remains capable of serving load without violating any thermal or voltage standards.

A single contingency, known as an "N-1" contingency, includes the outage of any 115 kV or 345 kV transmission system element (e.g., circuit, underground cable, breaker-failure, or 345/115 kV transformer) (Exh. WMECo-1, at 2-28). A single contingency also includes the simultaneous outage of DCT facilities, i.e., two transmission circuits sharing a common

10 In this case, WMECo modeled its system using two programs: (1) the Siemens PTI PSS/E power-flow program; and (2) the Siemens PSS MUST Power System Simulator (Exhs. WMECo-1, at 2-27, at n. 20; EFSB-RR-28-SP1).

transmission line tower (id.). After the first contingency has occurred, if a second non-related transmission or generation outage follows, the second contingency is commonly known as an N-1-1 contingency condition (Exh. EFSB-N-19). The transmission modeling must first reflect certain actions that can be taken by the transmission operators within ten minutes before exposing the system to the second contingency (EFSB-RR-16). The reliability of the transmission system must also be tested and be capable of serving load without violating any thermal or voltage standards under both N-1 and N-1-1 contingencies (Exh. EFSB-N-19).[11]

Even when the transmission system is fully operational, transmission operators operate the system in anticipation of experiencing a first contingency (N-1). In that way, the transmission operators are prepared in advance to stabilize the system should a contingency actually occur. If a contingency does occur, the transmission operators reconfigure the system in anticipation of the next contingency that may occur (N-1-1).

To test the system under contingencies, transmission planners study the thermal performance of the local transmission facilities and voltage levels on the system to determine whether the loss of certain transmission elements would cause either the remaining elements to become loaded beyond their temperature-based capability ratings or system voltages to fall below acceptable limits (Exh. WMECo-1, at 2-27, 2-44).

2. Using Power Flows To Stress the System

Modeling the transmission system requires the inclusion of certain "base case" assumptions about which generators are operating and not operating within the region being studied for the relevant study year(s). For example, when modeling the system for the year 2014, the base case assumptions should include all existing transmission lines and those new lines that would be built between 2010 (the current year) and 2014, even if such lines have not yet been constructed (Exhs. EFSB-N-15; EFSB-N-17). The base case thus becomes the starting

[11] A transmission company is not required to plan its system to withstand an N-2 contingency, which is the outage of two non-related transmission elements or generating units occurring in a very short period of time (i.e., less than ten minutes), during which the power system operator does not have time to initiate system adjustments between the contingencies (Exhs. EFSB-N-19; EFSB-N-54).

platform against which the transmission system is tested by applying N-1 and N-1-1 contingencies for a given study year(s).

NPCC, NERC and ISO-NE reliability standards require that the model assumes certain power flow conditions that "stress" the system before beginning to test it with contingencies (Exh. WMECo-1, at Ex. 2.1, NPCC Document A-2, at 2.1). For example, ISO-NE Planning Procedure No. 3 ("PP-3"), Reliability Standards for the New England Area Bulk Power Supply System, states:

> With due allowance for generator maintenance and forced outages, design studies will assume power flow conditions with applicable transfers, load, and resource conditions that reasonably stress the system.

Id. at Ex. 2.3, at 4. Section 5.2 of ISO-NE Planning Procedure 5-3, Guidelines for Conducting and Evaluating Proposed Plan Application Analyses ("PP 5-3"), defines "Reasonably Stressed Conditions" as follows:

> Reasonably stressed conditions are those severe load and generation system conditions which have a reasonable probability of actually occurring. Generally both import and export conditions should be addressed. The purpose of testing these conditions is to identify potential weaknesses in the system and not to test the worst imaginable extreme.

Another assumption that is necessary to study transmission reliability for a given year(s) is the forecasted level of demand for electricity (the "load") that is likely to occur. WMECo relied upon the ISO-NE load forecast in modeling the transmission system and used forecasted seasonal summer peak load conditions reflecting extreme weather that would not occur with a frequency greater than once in ten years 90/10 weather (Exh. WMECo-1, at 2-29). The loads assumed were 2014 summer peak loads, as projected in the 2008 and 2009 Capacity, Energy, Loads and Transmission ("CELT") forecasts (Exh. WMECo-AWS-1, at 21).

3. Selecting Generation Dispatches

WMECo, in consultation with ISO-NE, selected three generation dispatches that would cause stressed conditions for Greater Springfield in order to test the robustness of the transmission system under seasonal peak load conditions (Exh. WMECo-1, at 2-34, 2-35). The three generation dispatch scenarios, Dispatches #1, #2 and #3, are shown below in Table 1.

**Table 1. Greater Springfield Generation Dispatch Scenarios (WMECo)**

| Generation | Dispatch #1 (MW) | Dispatch #2 (MW) | Dispatch #3 (MW) |
|---|---|---|---|
| Berkshire Power | 0 | 229 | 229 |
| West Springfield #1 | 0 | 37 | 37 |
| West Springfield #2 | 0 | 37 | 37 |
| West Springfield #3 | 0 | 94 | 94 |
| West Springfield Jet | 0 | 17 | 0 |
| Stony Brook | 425 | 425 | 0 |
| MASSPOWER 1 | 82 | 82 | 0 |
| MASSPOWER 2 | 82 | 82 | 0 |
| MASSPOWER 3 | 75 | 75 | 0 |
| Mount Tom | 0 | 229 | 229 |
| Cobble Mountain | 31 | 31 | 31 |
| Lake Road (Connecticut) | 0 | 0 | 840 |

Only Greater Springfield Generators and Lake Road are shown.
Exh. WMECo-AWS-1, at 22 (as amended, Tr. 1, at 13).

Dispatch #1 simulates the unavailability of all major generation on the west side of Springfield (West Springfield Units #1, 2, 3, the West Springfield Jet, Berkshire Power and Mount Tom). The ability of these generators to be operating is critical to preventing overloads on the underground Breckwood Cables and other regional 115 kV transmission lines under certain operating conditions (id.). Dispatch #1 is further stressed by the assumed operation of the three MASSPOWER units located on the east side of Springfield, which causes increased power to flow over the Breckwood Cables (WMECo-RR-97-RV01(1) at 6).

In Dispatch #2 all critical generating units in Greater Springfield are assumed on-line. Dispatch #3 simulates the unavailability of all major generation on the east side of Springfield (MASSPOWER Units #1, 2, 3, and Stonybrook). Notably, Dispatches #1 and #2 are further stressed by the decision to model the system with the Lake Road generating units off-line. The Lake Road generating units, located in northeast Connecticut, are critical to the transmission system's ability to import power into Connecticut from Rhode Island, and their assumed

unavailability worsens the stress on the remaining Springfield Area transmission system (Tr. 5, at 924). The Lake Road generating units, although physically located in Connecticut are considered to be electrically located outside of Connecticut when evaluating the Connecticut import capability (Tr. 1, at 102).

These three dispatches are evaluated by using additional assumptions about which generators are operating in Connecticut and the remaining New England states, their level of output, and the level of imports/exports that are taking place at the same time between New England and neighboring transmission control areas such as New York, Quebec, and New Brunswick (Exh. WMECo-1, at EX. 2.14).

4. Selecting Power Flows Over Transmission Interfaces

Numerous further assumptions are made in the model about the amount of power flowing across transmission interfaces within ISO-NE. For example, WMECo's modeling always assumed that there would be 2500 MW of power flowing over the Connecticut Import Interface (for its N-1 contingency evaluations). To accomplish this modeling assumption, the Company adjusted the generation in both Greater Springfield and in Connecticut by "turning off" a large amount of generation in Connecticut. This caused the model to import more power from Massachusetts into Connecticut in order to serve the Connecticut load. Thus, for each of its three principal dispatch scenarios, WMECo adjusted generation in Connecticut so that the model would reach the upper limit of the range specified for the Connecticut Import Interface transfer capability, identified by ISO-NE as 2500 MW (Exh. WMECo-AWS-1, at 23; Exh. WMECo-1, at 2-35). In particular, the amount of Connecticut generation that was modeled as not operating was 3419 MW for Dispatch #1; 3477 MW for Dispatch #2; and 3477 MW for Dispatch #3 (EFSB-RR-20).[12] These figures represent approximately 41 percent of Connecticut's total generating capacity in each of the three WMECo dispatches (id.).

[12] The total 2013 generating capacity in Connecticut is projected to be 8258 MW, not including the Lake Road Generating Station, which is considered to be electrically outside of Connecticut (EFSB-RR-20).

D. Need Analysis

1. The Company's Initial Petition

Generally, WMECo contends that the GSRP is needed for reliability purposes. The existing transmission system serving Greater Springfield is primarily made up of 115 kV lines originally constructed from the 1940s through the early 1970s (Exhs. WMECo-1, at 1-2; EFSB-G-7).[13] WMECo contends that the system does not meet current mandatory national and regional reliability performance standards (id.). According to WMECo, the system can become overloaded even with all transmission lines operating in-service (Exh. WMECo-1, at 1-2). Moreover, WMECo maintains that if certain generators become unavailable at times of forecasted system peak loads, the Company's modeling of the transmission system indicates that there may be circumstances when the loss of one or more transmission line(s) during such generation outages would result in one or more transmission line(s) exceeding their allowed long-term emergency thermal ratings (Exh. WMECo-2, at 2-39, 2-40 (Table 2-1); 2-49, 2-50 (Table 2-3); 2-51 (Table 2-4) and 2-52 (Table 2-5)). In some of the more extreme hypothetical scenarios that were modeled, the local Springfield transmission system might experience a system-wide failure to provide electric service (i.e., voltage collapse). According to WMECo, the construction of the GSRP would allow the local transmission system to continue to operate within normal allowed thermal and voltage ratings under N-1 and N-1-1 contingencies (Exh. WMECo-1, at 2-55).

As described above, power typically flows from Ludlow Substation towards Agawam Substation both around Springfield on the existing 115 kV transmission infrastructure and underground through the underground Breckwood Cables. When the major 345 kV transmission circuit between western Massachusetts and Connecticut (Circuit 395 from Ludlow Substation) is electrically "open"[14] because of either an unplanned or a planned outage, the flow of power

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[13] Many of the towers supporting the 115 kV transmission line between the Agawam Substation and the North Bloomfield Substation were constructed in the 1920s for a 69 kV line (Exh. WMECo-1, at 1-2, n.1).

[14] An electric circuit is said to be "open" if it lacks a complete path between the two ends of the circuit. A circuit can be "opened" by operating a switch to interrupt the path from one end of the circuit to the other end of the circuit. In contrast, a "closed circuit" is one where there is a complete path between the two ends of the circuit.

through the Springfield 115 kV transmission system into Connecticut increases resulting in numerous overloads occurring, particularly on the older, lower capacity underground Breckwood Cables (Exh. EFSB-N-3(1), at 2-4). As noted earlier, there are also numerous 115 kV DCT lines in Greater Springfield, in which two circuits are supported by a single transmission tower, thereby introducing a significant vulnerability to the local transmission system.

To demonstrate quantitatively the need for substantial new transmission in Greater Springfield, WMECo relied on specific power flow studies for the region using forecasted demand levels for 2014 (Exh. WMECo-AWS-1, at 26). Based on the results of these studies, WMECo maintains that there is a need for the GSRP because there were modeled thermal overloads on multiple transmission circuits in Greater Springfield including the 115 kV transmission lines between Agawam and the North Bloomfield Substation under both N-1 and N-1-1 contingencies (id.).

In addition, modeling for certain N-1 contingencies shows according to WMECo that unacceptable low voltages that might lead to a potential voltage collapse of Greater Springfield as a whole, and that could spread further into north-central Connecticut (id.). According to WMECo, the risk of a system collapse was even greater under N-1-1 contingencies (id.).

### 2. Analysis of Company's Initial Modeling Assumptions

#### a. Introduction

Our review raises concerns about the reasonableness of certain critical assumptions used by WMECo in modeling the transmission system. In particular, we are concerned with the Company's exclusive reliance on the assumption of a 2500 MW transfer level for the Connecticut Import Interface and the particularly aggressive generation dispatches, which assumed numerous generators would be out-of-service even before modeling the first transmission contingency. As described below, rather than demonstrating a need for additional energy resources in this case, the Company's choice of modeling assumptions effectively created an a priori conclusion that there is a need for additional resources. Two areas of further examination are discussed below: (1) the exclusive use of a 2500 MW transfer level for the Connecticut Import Interface; and (2) the base case generator outage assumptions.

b. Connecticut Import Interface Transfer Levels

For each of the three WMECo dispatch scenarios (Dispatch #1, Dispatch #2 and Dispatch #3), WMECo's modeling included a further assumption that 2500 MW would be flowing over the Connecticut Import Interface. As described above, 2500 MW is the upper limit of the interface's range from 1500 to 2500 MW (Exh. WMECo-AWS-1, at 23; EFSB-RR-32). However, given the location of the generating units that were assumed unavailable in each of the three dispatches, the Company acknowledged that, even before running the model to study the effects of transmission contingencies, the three dispatches would not be capable of supporting a 2500 MW transfer level into Connecticut without thermal overloads (EFSB-RR-26, SP1).[15] Running the model under each of the Company's three dispatch scenarios, while simultaneously assuming 2500 MW flowing over the Connecticut Import Interface would, of necessity, result in thermal overloads even before studying N-1 and N-1-1 contingencies (EFSB-RR-28-37-38-SP 2, Attachment 1, at 3). The analysis also shows that none of the Company's three dispatch scenarios would support any import over the interface into Connecticut (EFSB-RR-28-37-38-SP2, Attachment 1, at 3).[16]

By running the model with assumptions that were known not to be compatible (i.e., the assumed generation dispatches are unable to support the assumed Connecticut import values) the end result becomes inevitable – namely, that the model will show transmission system overloads occurring and the corresponding "need" for substantial new transmission. The Company

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15 In Dispatch #1, 1483 MW of Springfield area generation is unavailable (including 840 MW at Lake Road Units 1, 2 and 3) (Exh. WMECo-AWS-1, at 22 (as amended Tr. 1, at 13). In Dispatch #2, 840 MW at Lake Road are unavailable, and in Dispatch #3, 681 MW of Springfield area generation is unavailable (id.).

16 Dispatch #1 was not only unable to support 0 MW flowing into Connecticut without thermal violations, but thermal violations continued to occur in the modeling even after reversing the direction of the flow so that Connecticut was now *exporting* 2500 MW (EFSB-RR-28-37-38-SP2, Att. 1, at 27). In the case of Dispatch #2, a Connecticut *export* of 500 MW was required to eliminate thermal violations (id. at 34). In the case of Dispatch #3, a Connecticut *export* of 500 MW was still unable to eliminate all thermal overloads (id. at 41). The Company did not report the level of Connecticut exports under Dispatch # 3 that would be required to eliminate all thermal overloads (id.). Notwithstanding these results, the Company incorporated a modeling assumption of 2500 MW *import* into Connecticut for each of its three dispatch scenarios.

acknowledges this result: "[a]s the Staff's examination showed, it is also the case that simulating a transfer level with a dispatch that will not support it will surely show criteria violations" (WMECo Initial Brief at 33, citing Tr. 5, at 924-976).[17] The Company's use of the maximum Connecticut import of 2500 MW with generation dispatches that are unable to support this import level prevents a reasonable assessment of the actual need for new transmission in Greater Springfield.

WMECo argues, however, that if transmission planners had to simulate only those load, dispatch and interface transfers that would be consistent with each other, the results would never show violations (WMECo Initial Brief at 33). Although this argument is correct as far as it goes, it does not address the underlying methodological failure of the Company's approach. Selecting an interface transfer level that is not supported by the dispatch will always fail (i.e., it will always show reliability violations), and selecting an interface transfer level that can be supported by the dispatch will always succeed (i.e., it will always show the absence of reliability violations). Neither approach, by itself, is particularly instructive. Instead, a more comprehensive understanding of the transmission system can be gained by using a range of different interface transfer levels to determine how the system would operate under varying levels of stress.

The Company makes several arguments to justify using only the top of the range established for the Connecticut Import Interface (2500 MW), none of which we find to be persuasive. First, the Company argues that if less than 2500 MW were used, the regional interface transfer capabilities would be "degraded" (WMECo Initial Brief at 32). However, the Company failed to provide any evidence to support its conclusion that transferring less than 2500 MW over the Connecticut Interface for the purpose of modeling "need" would somehow degrade the Connecticut Import transfer limit.[18] Because the three dispatches adopted by

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17 Indeed, Dr. Loehr, a "need" witness for the Company, testified that it is not useful to assume a particular generation dispatch scenario when it is known in advance that it would not support a particular transfer limit (Tr. 2, at 354-355).

18 We also reject the Company argument that the Connecticut Import limit must use 2500 MW because the industry practice is to maintain existing transfer levels (WMECo Initial Brief at 33). Existing transfer levels for the Connecticut Import Interface reflect a range of values between 1500 and 2500 MW (or lower), depending on the dispatch. It is

WMECo were never capable of allowing 2500 MW to flow over the Connecticut Import Interface, WMECo's argument that the transfer level would be degraded were it to study any import value less than 2500 MW is without merit.

Next, the Company argues, in effect, that there may be times when resources in Connecticut are insufficient to supply Connecticut's load at the same time when generation resources in Greater Springfield are insufficient to serve Springfield's load (WMECo Initial Brief at 31-32). According to WMECo, a solution to this problem is assured only if the system can be planned to allow 2500 MW to flow over the Connecticut Interface, even when significant generation resources are not operating in Greater Springfield, and "notwithstanding the reality that [the existing] transmission system does not [provide for this]" (id. at 32). Although the Company's premise is correct – there may be times when resources in Connecticut are insufficient to supply Connecticut's load at the same time when generation resources in Greater Springfield are insufficient to serve Springfield's load – WMECo failed to explain why using the top end of the transfer range (2500 MW) would provide the appropriate test as to whether or not these identified concerns persist. For example, if 3500 MW of imports are required to supply Connecticut's load, using 2500 MW would be insufficient to provide a reasonable transmission test. WMECo's decision to use the top of the previously established range of transfer limits bears no established relationship to Connecticut's import requirements.

Nor are we reassured by the Company's assertion that the purpose of the exercise in these circumstances is not to determine if a criteria violation will result, but to determine only the full scope of the violations that appear when a plausible dispatch is run with an established transfer level that the system is "supposed to be able to support" (WMECo Initial Brief at 33). The Company performed its transmission planning study and offered it into evidence for the purpose of demonstrating the need for the GSRP. If the need for the GSRP is an *a priori* assumption (which we believe it should not be), then the Company has not demonstrated the need for it, but instead only assumed that it was needed. The Company's argument assumes its conclusion – namely, that the transmission system is "supposed to be able to support" the higher end of the

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not a single value, and the Company has not demonstrated why using the high end of the range is appropriate regardless of the dispatch(es) used in the modeling.

transfer range, even though the system was never able to support 2500 MW of load under numerous generation dispatch scenarios, including the three dispatch scenarios adopted by the Company's transmission planning study in this case. Indeed, even after the construction of the GSRP, the Connecticut Import Interface maximum transfer level will continue to be represented by a range rather than a single number, albeit a narrower range with the new "bottom" of the range at 2500 MW, and the new top of the range at approximately 2800 MW (Exh. EFSB-N-57).[19]

Accordingly, we are unable to conclude that there is a need for substantial new transmission in Greater Springfield based solely on the use of an assumption of 2500 MW flowing over the Connecticut Import Interface. Such an assumption, by itself, shows only that the dispatches selected for study do not support a transfer limit of 2500 MW, a fact that was well known before the transmission planning studies were performed. We believe it may be more appropriate to identify plausible generation outage scenarios that would stress the existing transmission system without requiring an assumption, a priori, that the resulting transfer level be at the top of the interface's stated range. By so indentifying plausible generation outage scenarios, transmission planners will not be "backing into" a priori transfer levels that may or may not bear any relationship to the underlying plausibility of generation outages.

The Staff explored an alternative approach to demonstrating need for additional energy resources in Greater Springfield by requesting the Company to conduct a transmission power flow analysis to determine the highest import level into Connecticut or the smallest export level from Connecticut for which the results would indicate no N-1 contingency reliability violations in Greater Springfield (EFSB-RR-28-37-38-SP2(1) at 1).

The results of this analysis demonstrate that when no power is being imported into Connecticut (a zero transfer level), Greater Springfield reliability violations continue to be present under N-1 and N-1-1 contingencies under all three of the Company's dispatch scenarios

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19 Once GSRP is constructed, the resulting transmission system would again immediately fail to support a transfer limit of 2800 MW when modeling a particular dispatch that was capable of transferring only 2500 MW over the Connecticut Interface (Tr. 5, at 966-967). This would suggest the need for new transmission immediately after the project is built because the new transmission system would not be able to accommodate the top end of the *new* range under identifiable dispatch scenarios.

using the specified 90/10 load forecast conditions in 2014 (id. at 2). For all three dispatches the reliability problems are exacerbated as Connecticut imports are raised in 500 MW increments above zero in the power flow modeling (id.). Of primary significance are the reliability violations that occur on the Breckwood Cables in the base case (before studying the effects of contingencies). When N-1 contingencies are modeled using each of the Company's three generation dispatches, numerous violations occur at a variety of critical circuits in Greater Springfield (id. at 25 (Table 8), 34 (Table 18), and 40 (Table 25)). As noted above, the violations only get more numerous and severe as import levels increase into Connecticut.

Thus, there are substantial reliability violations even when imports are low or nonexistent over the Connecticut Import Interface. This demonstrates that even without the exacerbating factor of importing 2500 MW to Connecticut, Greater Springfield by itself is facing significant transmission reliability concerns. As a result, the need for additional energy resources in Greater Springfield can reasonably be demonstrated without further stressing the Connecticut Import Interface.[20]

c. Base-Case Generator Outage Assumptions

WMECo stated that before 2000, the Company generally assumed that only a single generator would be unavailable within a given load pocket when conducting transmission modeling analyses (Exh. WMECo-AWS-1, at 15). Beginning in 2006, ISO-NE increased the number of generators to be assumed unavailable in an electrical area from one to two critical generators when stressing the system as part of transmission planning studies

[20] The Staff requested WMECo to identify two different fairly extreme but plausible generator outage scenarios in Connecticut that would stress the Greater Springfield transmission system (WMECo-RR-39, WMECo-RR-40). The Company presented two scenarios: (1) a significant amount of older Connecticut generation suffers unplanned outages resulting from an extended heat wave; and (2) Millstone Units #2 and 3 experience outages. In both cases, the ISO-NE System Operator would be required to redispatch generation so that the Connecticut Import Interface transfer limit is capable of transmitting approximately 2500 MW into Connecticut during peak-load periods (id.; EFSB-RR-39-SP1). To the extent these scenarios could reasonably occur, the results suggest the desirability of substantially narrowing the existing Connecticut Import Interface.

(Exh. EFSB-ISO-66). WMECo argues that since generators have been divested by traditional vertically integrated utilities, it is more difficult to predict future system conditions such as the location of new generation and the potential for existing generation to be retired in the future (Exh. WMECo-AWS-1, at 15). As a result, WMECo maintains that it is now necessary to assume the unavailability of multiple generating units (WMECo Initial Brief at 36-37).

In Dispatch #1, WMECo studied the reliability of the Greater Springfield transmission system by taking the three major generating units located on the west side of Springfield out of service for modeling purposes: (1) Berkshire Power (229 MW); (2) West Springfield #3 (94 MW); and (3) Mount Tom (144 MW) (Exh. WMECo-AWS-1, at 22 (as amended Tr. 1, at 13). As part of Dispatch #1, however, WMECo also assumed the following additional units out-of-service for modeling purposes: (1) West Springfield #1 (37 MW); (2) West Springfield #2 (37 MW); and (3) West Springfield Jet (17 MW); for a total of 558 MW in Greater Springfield out of service (id.). Moreover, in Dispatch #1, the Company's assumption that all three MASSPOWER units would be operating at the same time that Berkshire Power and West Springfield #3 are off, has the effect of further exacerbating the stress on the underground Breckwood Cables (EFSB-RR-26-SP1, at 1). In addition, WMECo further stressed the capability of the transmission system to import power into Connecticut by assuming that the Lake Road Generating Units #1, 2 and 3 (840 MW) were also unavailable (Tr. 5, at 924).

Dispatch #3 is also stressed, with Stony Brook (425 MW), Mount Tom (144 MW), MASSPOWER 1, 2, and 3 (combined 239 MW), and West Springfield Jet (17 MW) all modeled as simultaneously unavailable, for a total of 825 MW of unavailable Greater Springfield generation. In addition, Lake Road #1, 2 and 3 (840 MW), located in northeast Connecticut, were also modeled as unavailable.

Although neither NERC nor ISO-NE identify any specific number of generating units or megawatts of capacity that should be assumed to be unavailable to stress the system in a given transmission planning analysis, NERC guidance suggests that planners "formulate critical system conditions that may involve a range of critical generator unit outages as part of the possible generator dispatch scenarios" (Exh. WMECo-AWS-1, at 16). WMECo contends that it is important for the dispatches to be sufficiently severe to test the strength of the system, "but not so severe as to be unreasonable or incredible" (id. at 17).

In this case, MMWEC, which is on record as supporting the need for the GSRP, was less certain when questioned about the reasonableness of WMECo's dispatches. MMWEC's witness, Mr. McKinnon, testified that he "would tend to believe" that WMECo's dispatches were overstressed (Tr. 26, at 4329). ISO-NE's witness also testified that in retrospect it probably would have helped to include some other dispatches to show the need in less stressed system conditions (Tr. 23, at 3882).

On January 21, 2010, towards the end of the evidentiary proceedings, ISO-NE produced a previously unreleased internal study, dated October 22, 2009, that examined the need for the GSRP based on a series of less aggressive dispatches when compared to the Company's Dispatches #1, #2, and #3 ("Springfield Area Needs Supplement") (Exh. EFSB-ISO-22, 1st Supp). In the Springfield Area Needs Supplement ISO-NE relied on the following four dispatches to demonstrate the need for the GSRP:

**Table 2. Greater Springfield Generation Scenarios (ISO-NE)**

| Generator | Dispatch A | Dispatch B | Dispatch C, D[21] |
|---|---|---|---|
| Berkshire Power | 229 | 0 | 0 |
| MASSPOWER 1 | 82 | 82 | 82 |
| MASSPOWER 2 | 82 | 82 | 82 |
| MASSPOWER 3 | 75 | 75 | 75 |
| West Springfield #3 | 94 | 94 | 0 |
| West Springfield #1 | 37 | 37 | 37 |
| West Springfield #2 | 37 | 37 | 37 |
| West Springfield Jet | 17 | 17 | 17 |
| Stony Brook | 425 | 425 | 425 |
| Mount Tom | 144 | 144 | 144 |
| Cobble Mountain | 31 | 31 | 31 |
| Lake Road Units 1,2,3[22] | 0 | 0 | 0 |

Only Greater Springfield Generators and Lake Road Units are shown.

All four of the ISO-NE dispatches are less stressful than WMECo's Dispatches #1, #2, and #3 (Tr. 23, at 3841-3842). ISO-NE Dispatch C/D, although the most severe of the ISO-NE dispatches presented, is significantly less stressful than the comparable WMECo Dispatch #1. In addition to the units not operating in ISO-NE Dispatch C/D, WMECo Dispatch #1 turns off the following additional units: (1) West Springfield #1; (2) West Springfield #2; (3) West

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21 Dispatches C and D ("C/D") assumed the same generating units in Greater Springfield were off-line. For Dispatches A, B, and C, the Connecticut import level was incrementally increased by increasing generation in northern New England and decreasing generation in southwestern Connecticut. For scenario D, the Connecticut import level was incrementally increased by increasing generation in northern New England and by decreasing generation in Connecticut outside of southwest Connecticut as a sensitivity test to investigate how and if the Springfield area criteria violations would be affected by adjusting some generators that were electrically closer to the Springfield area (Exh. EFSB-ISO-22 (1st Supplement at 5)).

22 Exh. EFSB-ISO-22 (2nd Supplement).

Springfield Jet; and (4) Mount Tom. The ISO-NE results indicate that even with these less stressful dispatches, significant thermal and voltage violations would occur in Greater Springfield that would require substantial new transmission to remedy (Exh. EFSB-ISO-22, 1st Supp; Tr. 23, at 3855-3856).

Based on the results of the ISO-NE Springfield Area Needs Supplement – an analysis which demonstrates the need for additional energy resources in Greater Springfield using less stressful generation dispatch assumptions than WMECo's analysis – we need not reach the question whether WMECo's own analysis is based on appropriate methods (i.e., assumptions) for assessing system reliability.[23] Accordingly, the Siting Board concludes that there is a need for additional energy resources in Greater Springfield.[24]

3. Load Forecast

WMECo relied upon the ISO-NE load forecast for all of its transmission planning and analyses (Exh. WMECo-1, at 2-29). The power-flow analyses contained in the Company's Petition are based on the forecasted load for 2014 (Exh. WMECo-AWS-1, at 8). During the course of the proceeding the Company updated its power flow analysis using the most recent 2009 CELT projections (id.). The forecasted loads were somewhat lower based on the 2009 CELT Report compared to the 2008 CELT Report; however, the need for and the performance of the proposed GSRP remained the same (id. at 9). The ISO-NE load forecast, which was relied upon by WMECo, forecasted future loads based on an assumed 1.3 percent annual growth rate at

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23 We find that the Company's use of N-1 and N-1-1 planning criteria is reasonable. We also find that WMECo's transmission system does not meet these reliability criteria under certain contingencies, given existing and projected loads.

24 We note that ISO-NE's witnesses testified that ISO-NE will soon be developing a new draft Planning Procedure No. 2, which will address many of the underlying assumptions to be used in formulating a need determination for substantial new transmission within ISO-NE (Tr. 24, at 4212). ISO-NE stated that the draft will be made available for comment from ISO-NE participants and will undergo a public review process (Tr. 24, at 4212-4213). The Siting Board encourages all stakeholders to participate actively in this process and hopes that it will lead to a greater consensus regarding the numerous critical issues that make up the complex subject of transmission planning analysis.

Western Massachusetts load-serving substations, and a 0.9 percent growth rate at Connecticut load-serving substations (Tr. 1, at 111).

The ISO-NE load forecast used for transmission planning studies is a 90/10 forecast (Exh. WMECo-1, at 2-29). ISO-NE develops a 10-year econometric forecast for New England and for each of the six states (id. at 2-30). Econometric forecasting relies upon regression analyses, which seek to relate historical electricity use to historical demographic and economic measures such as average income per household, the total number of households, real income and real gross state product (id.). The forecast then uses individual forecasts of the same economic measures, and the established relationships between those measures and electricity use, to determine expected future electricity use (id.).

WMECo included 100 percent of the passive demand response and 75 percent of the active demand response in the Western Massachusetts area (Exh. EFSB-N-123). In general, active demand response systems are dispatchable in a manner similar to generation units, whereas passive systems are continuously in effect and require no special action to be activated (Exh. WMECo-AWS-1, at 9). Deratings for active demand response were provided and recommended by ISO-NE to reflect expected performance based on limited operating history of such systems (Exh. EFSB-N-123).

The Company has provided enough information to permit a general understanding of its forecasting method and has provided evidence that it uses appropriate historical data, independent variables, and quantitative methods. Therefore, the Siting Board finds that WMECo's load forecast is reviewable, appropriate and reliable.

E. Conclusions on Need Analysis

Based on the foregoing, the Siting Board finds that the existing electric transmission system is inadequate under certain contingencies to reliably serve both existing and projected loads in Greater Springfield. Accordingly, the Siting Board finds that additional energy resources are needed for reliability of supply in Greater Springfield.

## IV. ALTERNATIVE APPROACHES TO MEETING THE IDENTIFIED NEED

### A. Standard of Review

G.L. c. 164, § 69J requires a project proponent to present alternatives to the proposed facility which may include: (a) other methods of transmitting or storing energy; (b) other sources of electrical power; or (c) a reduction of requirements through load management.[25] In implementing its statutory mandate, the Siting Board requires a petitioner to establish that, on balance, its proposed project is superior to alternative approaches in terms of reliability, cost, and environmental impact, and in its ability to meet the identified need. Cape Wind Associates, LLC, 15 DOMSB 1, at 33 (2005) (Cape Wind); Cambridge Electric Light Company, 12 DOMSB 305, at 321 (2001) ("CELCo/Kendall").[26]

### B. Potential Project Approaches

WMECo considered a number of potential project approaches to meeting the set of needs identified in Section III, above.[27] The project alternatives analysis focuses primarily on meeting the need for improvements in Greater Springfield.

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25 G.L. c. 164, § 69J also requires an applicant to present "other site locations." This requirement is discussed in Section V.A, below.

26 The Company argues that once the Siting Board finds there is a "need" for additional energy resources, the applicant must have the legal authority and financial means of implementing the alternative "selected" by the Board to meet that need (WMECo Initial Brief at 88-89). According to the Company, non-transmission alternatives "must be within the control of the regulator and the regulated applicant in the proceeding at hand" (id. at 89). The Company misstates the Siting Board's role, which is not to select an alternative; but rather, to review an application for a specific jurisdictional facility to determine whether the proposed project, on balance, is superior to alternative approaches in terms of cost, environmental impact, and its ability to meet the identified need. By statute, the Siting Board must review alternative solutions including: (a) other methods of transmitting or storing energy; (b) other sources of electrical power; or (c) a reduction of requirements through load management, and may reject an applicant's project if it is not superior to the identified alternatives. See G.L. c. 164, § 69J.

27 WMECo evaluated the proposed project and a line separation project from Manchester to Meekville, Connecticut, with consideration of three additional NEEWS projects, identified in Section I.A: (1) the Interstate Reliability Project; (2) the Central Connecticut Reliability Project; and (3) the Rhode Island Reliability Project

1. Potential Non-Transmission Project Approaches

a. Large Scale Generation

Electrical generation placed close to load demand centers can help reduce load on the transmission system (Exh. WMECo-1, at 3-77). For instance, operation of existing generation in Agawam and West Springfield reduces power flow over the 115 kV overhead and underground transmission system components between Ludlow and Agawam Substations (Exh. EFSB-N-168). However, adding new generation in the Springfield area would require significant transmission upgrades (Exh. EFSB-ISO-68; EFSB-RR-35, at 4; EFSB-RR-77).

ICF Resources LLC ("ICF"), a consultant for WMECo, performed power-flow modeling of non-transmission project approaches, using conditions similar to those tested for transmission approaches (Exh. WMECo-1, at 3-76). ICF thereby evaluated the effectiveness of adding up to 400 MW of new generation at existing sites such as the Berkshire Power location in Agawam and the Mount Tom site in Holyoke (id. at 3-84; Exh. WMECo-MFS-1, at 10, 11). As modeled, single or combination additions of generation did not relieve Greater Springfield and north-central Connecticut transmission overloads (Exh. WMECo-1, at 3-89).[28] However, the conditions tested include the same severely stressed transfer limits used to identify a need for the project.[29] Therefore, additional evaluation is required here.

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(Exh. WMECo-1, at 3-5). The four NEEWS projects are designed to work together, yet each provides reliability improvements if constructed individually (id. at 3-4). While ISO-NE's evaluation of the four NEEWS projects considered both the GSRP independently and the combined operation of the NEEWS projects (Tr. 23, at 3934), the system modeling submitted by WMECo did not assume construction of the Interstate Reliability Project, the Central Connecticut Reliability Project, or the Rhode Island Reliability Project (Exh. EFSB-N-17; Tr. 8, at 1479; Tr. 24, at 4029).

28 WMECo also asserted that anticipated prices are not high enough to attract construction of new generation in Greater Springfield (Exh. WMECo-1, at 3-79, 3-81). This proposition is not evaluated here, as the analysis below shows that the large-scale generation project alternative would not meet area needs.

29 Additionally, ICF assumed that the West Springfield and Berkshire Power generating plants would retire; the retirements just offset the modeled new generation. Above-market income that had been received by these generators operating as reliability-must-run ("RMR") units was cited as justification for assuming their retirement (Exh. WMECo-MFS-1, at 8). However, the Company was unable to show that this past

According to WMECo, the Springfield area transmission system is weak and cannot readily support insertion of large generation units (Tr. 1, at 69). The potential 400 MW Pioneer Valley Energy Center ("PVEC") in Westfield (approved by the Siting Board in 2009, EFSB 08-2/DPU 08-105-106) serves as an example. PVEC would be located on the west side of Springfield, providing large-scale generation on the downstream side of the bottleneck in Springfield, along with West Springfield and Berkshire Power (id. at 65). Based on its electrical location, PVEC would reduce the power flow across the network from Ludlow to Agawam (id. at 64). This would tend to reduce the likelihood of straining transmission elements in the Springfield bottleneck. Similarly, PVEC would tend to reduce system dependence on the availability of West Springfield and Berkshire Power. However, as described by the Company, injection of power at Westfield would tend to have an adverse effect to the south, increasing the amount of power flowing south from the west side of Springfield into Connecticut on the existing 115 kV lines (id.). This problem applies particularly in anticipation of a potential contingency loss of the 345 kV Circuit 3419 from Ludlow Substation to Barbour Hill Substation in Connecticut (id.).

In summary, the existing 115 kV framework is not adequate to support the operation of major new generation sources in the area. New generation can reduce the strain on some parts of the 115 kV system, depending on loads and dispatch, but this reduction will be accompanied by an increase in the strain on other parts, if the Greater Springfield transmission system is not improved. Therefore, addition of large scale generation in Greater Springfield would not meet the identified need.

b. Combined Heat and Power Supply Options

WMECo's consultant identified a potential for the economic addition of 33 MW of combined heat and power ("CHP") in Western Massachusetts by considering projected market prices and surveys of market penetration in the area (Exh. WMECo-1, at 3-77). While

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income stream demonstrates that the units will likely retire (Tr. 4, at 696). In fact, after the RMR contracts expired in May 31, 2010, neither Berkshire Power nor West Springfield sought to delist from the Forward Capacity Market (Tr. 23, at 3935-3942).

potentially useful, this amount of localized power would be insufficient to meet the need for the project (id. at 3-83).

c. Large Scale Zonal Load Reduction

According to WMECo, economically feasible demand-side management ("DSM", including direct load reductions and distributed generation) would be insufficient to defer or displace needed transmission upgrades (Exhs. WMECo-1, at 3-77; WMECo-MFS-1). ICF identified a potential total of 527 MW of peak DSM in west-central Massachusetts in 2013, or about 13 percent of the total western Massachusetts load level (Exh. WMECo-1, at 3-78). ICF simulated power flows in the Springfield area with various scenarios including a combination of reducing Connecticut zone demand by 6 percent of 2013 peak load and reducing western Massachusetts demand by 25 percent of 2013 peak load (id. at 3-83, 3-84). The reduced load scenarios continued to show thermal overloads on the transmission system and so are insufficient to provide a reliable transmission system (Exh. WMECo-MFS-1, at 11).

d. Non-Transmission Approach Summary

Having examined approaches to meeting the identified need without building new transmission, the Siting Board finds that the non-transmission alternatives would not meet the need for additional energy resources for Greater Springfield. The next section considers project approaches that would address the identified need with new transmission.

2. Potential Transmission Project Approaches

All transmission upgrade combinations evaluated by the Company included separating double circuits on the 115 kV system between Ludlow and Agawam. The separation eliminates the obligation to model the loss of two parallel circuits as a single contingency (Exh. WMECo-1, Ex 2.3). At the same time, all transmission upgrade alternatives included replacing two 115 kV three-terminal circuits with four 115 kV two-terminal circuits, all four of which would route through East Springfield Junction in Chicopee and each of which would have a terminal at Fairmont Switching Station in Chicopee, eliminating the potential to lose service at three terminals as a result of a single outage. The transmission upgrade combinations share significant substation work at Fairmont Switching Station and at a new Cadwell Switching Station.

a. Transmission Upgrades without 345 kV vs with 345 kV

Higher voltage transmission circuits can serve more customers more efficiently than lower voltage circuits (Exh. WMECo-AWS-1, at 37). Matching the capacity of a 345 kV system extension around Springfield would therefore require a large number of 115 kV circuits. Existing corridors in the area are not wide enough to carry a large number of 115 kV overhead circuits (Exh. EFSB-A-29). Therefore, undergrounding of 115 kV lines was considered (Exh. EFSB-N-3, at 2-24, 3-16). Underground 115 kV lines typically have even less capacity than overhead lines, and underground construction is typically expensive. However, the Company did evaluate a number of all-115 kV alternatives, incorporating separation of double-circuit 115 kV lines and installation of additional underground circuits through Springfield (id.).

It would be possible to simply upgrade the capacity of the existing overhead 115 kV circuits in an arc from Ludlow via Orchard, Shawinigan, Chicopee, and Agawam to Bloomfield, by replacing poles and conductors with higher capacity components, and separating the circuits onto two lines of structures. However, the Breckwood Cables in Springfield would still be undersized for required loads.

The Company did present 2005 vintage analyses of a number of alternatives combining overhead line upgrade and separation with new underground cables in Springfield (Exh. EFSB-N-23(1)). In one such example, which met contingency test requirements if paired with additional projects outside Springfield, WMECo would have separated and upgraded overhead 115 kV lines, added transformer capacity at Ludlow Substation, and added or replaced five[30] underground cables in Springfield (id. at 108). Additional required components included reconductoring lines to Holyoke and to Berkshire County, installing series reactors for voltage control, and splitting a 115 kV bus in North Bloomfield, Connecticut, to reduce wheeling power through Springfield (id.). Rough cost estimates showed this approach would be more expensive than 345 kV alternatives, due to the extensive underground cable work; yet with this alternative,

30 The five circuits consist of two new circuits from East Springfield to Clinton Substation, an additional circuit from Clinton to West Springfield, replacement of the East Springfield to Breckwood cable and replacement of the Breckwood to West Springfield Switching Station (Exh. EFSB-N-23(1) at 108).

Ludlow Substation would still be the only major 345 kV source in the area (Exh. EFSB-N-52). Without a new 345 kV source, there is no strong backbone for future enhancements, so the approach is more costly for less benefit. However, since the analysis supporting development of this alternative included a 2500 MW import to Connecticut, which may or may not always be required, staff requested follow-up modeling by the Company of more modest and less costly 115 kV approaches.[31]

The follow-up modeling included combinations of separating and upgrading the 115 kV circuits on the arc from Ludlow through Agawam to North Bloomfield, with various strategies to reduce stress on the Springfield underground cables, using lower levels of Connecticut import than were modeled by the Company. In one study requested by Staff, the Company modeled a project combining: (1) separation and upgrading of 115 kV circuits along the arc from Ludlow to North Bloomfield; (2) upgrading Springfield underground circuits only through Breckwood Substation; and (3) a third transformer at Ludlow (EFSB-RR-97). Such a system was tested at Connecticut import levels ranging from 0 MW to 2500 MW (id.). Such a project would cost $103 million more than the GSRP, mainly due to the cost of underground cables (id.). With this all-115 kV alternative, system operators, who are required to be prepared for N-1 contingencies, would be unable to consistently maintain the same high level of Connecticut imports as the GSRP will provide, particularly if a large amount of generation west of the Springfield bottleneck, including Berkshire Power and all West Springfield units, are not running (id.). In addition, this project would not as effectively accommodate future load growth (id.).

In a second requested study, the Company modeled a project combining: (1) separation and upgrading of 115 kV circuits along the arc from Ludlow to North Bloomfield; and (2) installation of a Special Protection System ("SPS") to open a breaker when power flows would overload the underground Springfield cables, also tested at Connecticut import levels

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31 Similarly, the Connecticut Office of Consumer Counsel argues that WMECo should be required to develop a localized solution to system reliability problems in Greater Springfield (OCC Initial Brief at 14). While the original assumption of high flows across transmission interfaces lead to a more regionally-focused analysis, the all-115 kV project alternatives evaluated here are more locally-focused approaches.

ranging from 0 MW to 2500 MW (EFSB-RR-98). This project would cost $132 million less than the GSRP (id.). Failure of the SPS to operate as designed could result in faults on the underground cables, which would likely result in a prolonged outage (id.). With this alternative, system operators required to be prepared for N-1 contingencies would be unable to consistently maintain the roughly 2500 MW level of Connecticut imports the GSRP will provide, particularly if Berkshire Power and the West Springfield units are not running (id.). In addition, WMECo states that the SPS would operate frequently, even under normal conditions with all lines in, and that this alternative causes severe overdependence on the actuation of the SPS to relieve overloads (id.). System overseers allow for the use of an SPS only for infrequent contingencies or for temporary conditions (EFSB-RR-98). ISO-NE agreed that SPS operation would be frequent, and added that the frequent interruption of power would wear on the underground cables (Tr. 23, at 3865).

A third study modeled a project combining the 115 kV and SPS elements described above with an assumption that the Interstate Reliability Project is also constructed (EFSB-RR-99). At a Connecticut import of 1500 MW, several N-1-1 contingencies caused thermal overloads on 115 kV elements and voltage violations on 345 kV elements in the region (id.). This alternative suffers from the same SPS problems as the alternative described above. It is also unclear whether the Interstate Reliability Project will be built (id.; Tr. 22, at 3799). The cost, including the Interstate Reliability Project, was estimated at $1.042 billion (EFSB-RR-99).

Except for the alternative relying on an SPS, all the 115 kV alternatives cost more than the proposed project, and the SPS has been shown to be disadvantageous for reliability. As a greater reliability concern, the follow-up modeling supports the Company's original contention that upgrades at 115 kV alone would not provide the Springfield area with a robust transmission system. Regarding environmental impacts, use of only 115 kV lines would involve smaller structures and lower EMF levels. However, the 115 kV alternatives include a large amount of underground street construction in Springfield, which would have construction impacts, in addition to having impacts from the construction of two parallel lines of monopoles on the existing right-of-way from Ludlow to North Bloomfield for circuit separation. Relative to a 345 kV alternative, these plans do not have an overriding environmental advantage which would, on balance, equal or outweigh the cost and reliability drawbacks.

b. Locating Additional 345/115 kV Transformers

WMECo asserted that no large load center should rely on a single source of power or a single transmission element (Exh. WMECo-AWS-1, at 37). Located to the northeast of Springfield, Ludlow Substation is currently the only 345 kV level source of power for the Springfield area (Exh. WMECo-1, at fig 2.2R). Adding another 345 kV/115 kV substation on the east or north side of Springfield would leave the area largely dependent on the same group of 115 kV lines that currently bring power into the city from Ludlow Substation (Exh. EFSB-A-5).

A location for 345 kV to 115 kV transformation on the west side of Springfield would provide a source for power to downtown Springfield and for its western suburbs that would complement the Ludlow Substation (Exh. EFSB-N-167). On the west side, the Agawam Substation is the most tied-in location, with existing 115 kV circuits running: (1) to Piper Substation (and from there to Fairmont and the East Springfield substation); (2) to Chicopee Substation (and from there to Fairmont and Shawinigan switching stations); (3 & 4) to West Springfield Substation (two circuits); (5 & 6) to both Silver Substation and South Agawam Switching Station (two circuits); (7) to Elm Substation in Westfield; and (8) to Buck Pond and Pochassic Substations in Westfield (Exh. WMECo-1, at fig 2.2R). The large number of connections at Agawam Substation make it the best location for locating 345 kV to 115 kV transformers. Transformers at any other location would require multiple 115 kV connections between that other location and the terminals of existing 115 kV circuits at Agawam Substation.

No advantage was identified to moving the Agawam Substation infrastructure to another site west of Springfield (Exh. EFSB-A-17). Therefore, the project alternatives evaluated below all provide 345/115 kV transformation at Agawam Substation.

c. One Source vs Two Sources of 345 kV Power at Agawam

Transmission at 345 kV could be brought to Agawam from one direction only, e.g., with a single circuit from Ludlow Substation or alternatively a single circuit from North Bloomfield. Although building a single 345 kV line to a load-serving substation is more the exception than the rule in New England, the single circuit would provide a stronger source of power on the west side of Springfield than currently exists, and the existing 115 kV circuits could serve to back up and supplement the 345 kV line. Such a design would have the effect of leaving a gap in an

otherwise full 345 kV loop, where the open stretch is filled in with 115 kV transmission lines. As a result, if 345 kV transmission was only built from Ludlow to Agawam, a high amount of current available from 345/115 kV transformers at Agawam would cross on 115 kV lines to 115/345 kV transformers at North Bloomfield. If 345 kV transmission was only built from North Bloomfield to Agawam for 345 kV, a high amount of current available from 345/115 kV transformers at Ludlow would cross on 115 kV lines to 115/345 kV transformers at Agawam. In the event of the loss of Circuit 3419 from Ludlow to Barbour Hill, the new 345 kV circuit would tend to focus even more energy to overload the gap on the other side of the loop.

A looped system is more reliable than a radial circuit because a looped system tends to be able to withstand loss of one of the transmission circuits without an interruption of service (Exh. WMECo-AWS-1, at 36). Loops are also useful as they facilitate maintenance of transmission facilities (id. at 37). A design with two sources of 345 kV transmission to Agawam provides reliability benefits unavailable with less robust connections (Exh. EFSB-A-35).

d. Connecting 345 kV to Agawam Substation

Ludlow and North Bloomfield substations are the closest existing 345 kV hubs to Agawam (Exh. WMECo-1, at fig 2.1A R). Considerably longer transmission lines would be required to bring 345 kV transmission lines to Agawam from other points.

With a particular view to considering a southern route alternative for the 345 kV line, using an existing right-of-way extending east from South Agawam Switching Station that is described above in Section I.A, Staff requested that the Company evaluate ways to avoid having two parallel 345 kV circuits between South Agawam Switching Station and Agawam Substation. The approach of installing a 345 kV switch at South Agawam connected by a single 345 kV line to Agawam would provide lower reliability, given the potential for an N-1 contingency outage of the single line. In addition, a 345 kV switch would require a significant expansion at South Agawam, where wetland issues were a constraint in 1998 when South Agawam Switching Station was constructed (Exhs. EFSB-A-15; EFSB-A-37; EFSB-A-45). The approach of locating 345/115 kV transformation at South Agawam rather than at Agawam Substation would require a large number of 115 kV circuits running to Agawam Substation to carry the same

amount of power, and the existing right-of-way is not large enough to carry the number of circuits that would be required (Exh. EFSB-A-16).

With two sources of 345 kV power provided to Agawam, the Company proposes to open a circuit breaker at the Breckwood Substation in Springfield, eliminating the parallel path through the low capacity underground 115 kV cables in Springfield (Exh. WMECo-AWS-1, at 41; Tr. 8, at 1428). This is a less costly solution to potential residual overloads on these cables, compared to rebuilding the circuits with higher capacity lines (Exh. WMECo-AWS-1, at 41). With a 345 kV line connecting Agawam to North Bloomfield, the Company proposes to remove the existing 115 kV ties between Agawam and North Bloomfield, thereby eliminating a weak parallel path that now wheels power from Ludlow Substation to north-central Connecticut. (Exhs. WMECo-1, at 3-46; EFSB-G-29; EFSB-A-6). A portion of these existing 115 kV conductors would be re-used to connect a line from Southwick Substation to Agawam Substation, as well (Exh. WMECo-1, at 3-46).

3. Project Approach Conclusions

Large-scale generation, combined heat and power applications, and large-scale zonal load reductions (DSM including distributed generation) would not meet the identified need for electric power resources in the Springfield area. While each of these could complement the Company's proposed project, none would supplant it. Rather, improvements to the area bulk transmission system are needed. Among the transmission alternatives, transmission to new 345 kV to 115 kV transformation facilities at Agawam Substation, supplied by 345 kV transmission both from Ludlow Substation and from North Bloomfield Substation, in combination with baseline 115 kV upgrades, best provides a robust transmission system for the Springfield area, with or without considering additional stresses from high Connecticut import levels. The Siting Board finds that the GSRP would provide additional energy resources for Greater Springfield and that it would improve the reliability of electric service in Greater Springfield. The other transmission alternatives are relatively expensive, result in a less robust transmission system, and are unlikely to provide overriding environmental benefits, compared to the GSRP. Accordingly, the Siting Board finds that the GSRP is, on balance, superior to

alternative project approaches in terms of reliability, cost, environmental impact, and in its ability to meet the identified need.

## V. ROUTE ALTERNATIVES

### A. Route Selection

#### 1. Standard of Review

G. L. c. 164, § 69J requires a petition to construct to include a description of alternatives to the facility including "other site locations." Thus, the Siting Board requires an applicant to demonstrate that it has considered a reasonable range of practical siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts. To do so, an applicant must meet a two-pronged test. First, the applicant must establish that it developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner which ensures that it has not overlooked or eliminated any routes which, on balance, are clearly superior to the proposed route. Second, the applicant must establish that it identified at least two noticed sites or routes with some measure of geographic diversity.

#### 2. Overview

The primary purpose, and the starting point, of the Company's route selection process was determining the location for the 345 kV line. The study area for locating the 345 kV transmission line was selected based on the requirement to connect substations in Bloomfield, Connecticut and Ludlow, Massachusetts, with an intermediate substation connection at Agawam, Massachusetts (Exh. WMECo-1, at 4-6). In selecting the study area, the Company considered the shortest routes between the substation interconnections along with minimizing environmental and community disruption, and minimizing costs (id.). The primary intent of the route selection process was determining the location of the 345 kV line.

The 115 kV upgrades are replacements for existing 115 kV lines in the Northern Corridor. The choices for routes were constrained by the need to be located between the Agawam and Ludlow Substations, the connections at the existing 115 kV substations and switching stations along that route, and the upgrade itself to the existing 115 kV line (Exh. WMECo-1, at 6-2; Tr. 9, at 1596). Given the need for the upgrades to the 115 kV lines

and the locations of the existing substations and switching stations (Ludlow, Agawam, Orchard, Chicopee, and Piper Substations and South Agawam, Shawinigan and Fairmont Switching Stations), the Company considered a location for the 115 kV upgrades only within the existing right-of-way of the Northern Corridor (Exh. WMECo-1, at 4-2; 6-1).

The Company did provide further analysis, after the initial route selection process for the 345 kV line, considering underground alternatives to one of the two proposed single 115 kV lines along the Northern Alternative (Exh. WMECo-1, at Section 6). The underground alternatives consisted of in-right-of-way ("in-ROW") and in-road options (see below). Given that the in-road options were generally longer and in all cases were more costly, and had greater traffic impacts, compared to any of the in-ROW options, there was no advantage to reviewing the in-road alternatives in the Route Alternatives section, below (Section V.B) (Exhs. EFSB-U-27; WMECo-20).

3. The Company's Route Selection Process

The Company applied nine route-selection objectives in identifying potential routes (Exh. WMECo-1, at 4-8).[32] Given the large cost differential between overhead versus underground 345 kV lines, the Company focused only on the construction of an overhead 345 kV line (id.). The route selection for the 345 kV line focused on the potential alignments along or within existing right-of-ways, including existing transmission lines, pipeline corridors, railroads and limited access highways (id. at 4-11; Tr. 9, at 1495). Applying these route selection objectives to identified right-of-ways, all of the other non-transmission corridors except transmission line right-of-ways had some constraints to development of the proposed project (Exh. WMECo-1, at 4-12). Specifically: (1) pipeline routes in Agawam travel predominantly east to west rather than north to south; (2) railroad corridors are located in constrained urban

[32] The objectives were: compliance with statutory requirements, regulations and policies; maximize the use of existing linear corridors; minimize the need for eminent domain; minimize impacts on sensitive environmental resources; minimize impacts on significant cultural resources; minimize impacts on designated scenic resources; minimize conflicts with local, state, and federal land use plans and policies; maintain public health and safety; and achieve a reliable, operable, constructible, and cost effective solution (Exh. WMECo-1, at 4-8).

areas, with insufficient right-of-way width; and (3) limited access highways had the same restrictions as the railroad right-of-ways (id. at 4-11 to 4-12).

Based on WMECo's route selection objectives and the existing transmission right-of-ways in the study area, the Company identified two routes for the 345 kV line – the Northern Alternative and the Southern Alternative -- each described above in Section I.A. (id. at 4-15). According to the Company, these two routes are the only locations where the 345 kV line could be constructed along an existing right-of-way which provided for a direct path between the Agawam and Ludlow Substations, thereby negating the need to acquire new green field right-of-way or use underground construction (Exh. EFSB-RS-1).

In the case of the 345 kV line, the Company's focus on routes that avoid underground construction was appropriate. However, for the 115 kV line, the Company's focus on using overhead alignment in existing right-of-way, precluded consideration of routes on local streets which would be possibilities using underground alignments. It is not necessarily appropriate to dismiss these alternatives before generating a group of routes that would be evaluated and scored using project-specific criteria. Therefore, as discussed below, subsequent to the Company's site selection analysis discussed here, the Company developed further analysis of routes with placement of one 115 kV line underground.

The two 345 kV routes were evaluated using project-specific criteria (Exh. WMECo-1, at 4-26).[33] In evaluating the two routes, the impacts associated with the 345 kV transmission line as well as the 115 kV re-build and re-conductoring ("upgrades") were included in the analysis. Therefore, because both the Northern and Southern Alternative options include siting 115 kV upgrades in the Northern Corridor, the Southern Alternative includes the impacts associated with both use of the Southern Corridor for the 345 kV line and use of the Northern Corridor for the 115 kV upgrades.

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[33] The criteria are: total route length; number of railroad crossings; number of stream crossings; length not paralleling existing linear facilities; length through private easement; length and area of right-of-way expansion; number of homes, businesses, and public facilities within the right-of-way and within certain distances from the edge of the right-of-way; length by land use; visibility; length through streams or wetlands or through environmentally sensitive areas; and potential impacts on cultural resources (Exh. WMECo-1, at 4-26)

Both routes were scored for identified criteria using an unweighted and weighted system, where for the weighted scores the criteria deemed to be more significant were assigned a higher weight, with a lower score being preferred (Exh. WMECo-1, at 4-30).[34] In addition, some criteria were given lower weights when the impact was common to both of the corridors, as well as when the impact was an incremental increase, such as with the visual criteria (id.). The evaluation of the routes incorporated both the Massachusetts and Connecticut segments, with the Northern Alternative scoring better under both the unweighted and weighted methodology (Exh. WMECo-TBB-4 (2) and (3)).[35]

In response to requests by staff, the Company also evaluated the routes by separating the 345 kV line and 115 kV upgrades (including spurs) and scoring them individually (Exh. WMECo-TBB-4, Atts. 15 and 16). For the 345 kV line alone, the Southern Alternative 345 kV only scored lower (better) than the Northern Alternative 345 kV only; however, there was less than a 10 percent differential between the scores (id. Att. 17). The Company argues that this analysis is not appropriate as the Southern Alternative will always include the impacts of the project as a whole, affecting both the Northern and Southern Corridor. Nonetheless, analyzing the routes based on separating out the 345 kV and 115 kV projects from the corridors is helpful for conceptualizing incremental impacts, further comparing route impacts, and developing targeted mitigation (see Sections V.B and C).

The Company asserted that the reliability of the two routes is comparable (Exh. WMECo-1, at 4-33). Specifically, even with the somewhat longer length of the Southern Alternative, each transmission system along either route would fully meet the requirements of the relevant reliability standards for comparable system reliability (id.).

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34 The two routes were scored on a segment basis when different segments of the route had different characteristics; where the criteria applied to a numeric score for the whole route, scoring was not conducted by segment (Exh. WMECo-1, at 4-24).

35 The Northern Alternative scores which uses the Northern Corridor for both the 345 kV line and the 115 kV upgrade are 14.03 unweighted and 41.63 weighted (Exh. WMECo-TBB-4, Atts. 2 and 3). The Southern Alternative scores which uses the Southern Corridor for the 345 kV line and the Northern Corridor for 115 kV upgrade, are 21.0 unweighted and 61.0 weighted (id.).

The costs of the routes were estimated based on past experience with transmission projects, vendor and construction contractor estimates, RSMeans published data, and the judgment of project consultants (Exh.WMECo-1, at 4-33). The cost estimates used for site selection reflected available analysis with less than 10 percent design completion, and amounted to $714 million for the Northern Alternative and $766 million for the Southern Alternative (id. at 4-33, and Table 3-13).[36] The Company selected the Northern Alternative as the proposed route because of the scoring, fewer impacts, combined with a lower cost, and comparable reliability.

In order to consider both new overhead and new underground route alternatives for the 115 kV upgrades, the Company identified alternative 115 kV routes between each of the substations and switching stations that will be served by the 115 kV upgrades, including along the four spurs (Exh. WMECo-1, at 6-4). The Company analyzed alternative routes on the existing Northern Corridor to determine whether to place the new 345 kV overhead line and both the 115 kV upgraded lines on the same corridor (id. at 6-4). For this analysis, the Company divided the 115 kV upgrades along the Northern Corridor and the spurs into nine segments. Each of the segments had one underground alternative along the existing right-of-way, and at least one underground in-road alternative (Exhs. WMECo-1, at 6-20 to 6-71; WMECo-20).[37] All of the underground alternatives were identified and assessed using the same methodology used for the 345 kV route selections (Exh. WMECo-1, at 6-13). Since the issue of the assessment of the overhead and underground 115 kV upgrades is associated with the preferred Northern Alternative, the environmental and cost comparison are discussed in Sections V.B through V.J.

In past decisions, the Siting Board has found various types of criteria to be appropriate for identifying and evaluating route options for transmission lines and related facilities. These types of criteria include natural resource issues, land use issues, community impact issues, cost

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36 The costs of the Southern Alternative were revised downward during the course of the proceedings (see Section V.C).

37 Segments 1 and 3 have one in-road alternative; Segments 4, 5, and 6 have two in-road alternatives, Segments 7 and 8 have three in-road alternatives, Segment 2 has four in-road alternatives; and Segment 9 has six in-road alternatives (Exh. WMECo-1, at 6-20 to 6-71).

and reliability. New England Power Company, 4 DOMSB 109, at 167 (1995). The Siting Board also has found the specific design of scoring and weighting methods for chosen criteria to be an important part of an appropriate site selection process and in some cases has identified the appropriate allocation of weights among the broad categories of environmental concerns, cost and reliability. Boston Edison Company, 19 DOMSC 1, at 38-42 (1989). Here, the Company developed numerous screening criteria, which it used to evaluate the routing options. These criteria generally encompass the types of criteria that the Siting Board previously has found to be acceptable. The Company also developed a quantitative system for ranking routes based on compilation of weighted scores across all criteria. This is a type of evaluation approach the Siting Board previously has found to be acceptable.

While the methods used by the Company regarding developing and applying appropriate criteria to the selected routes meets Siting Board standards, from the outset, the route selection analysis here encompassed a very small group of potential routes. Typically, the initial universe of potential routes, as well as the narrower group of route options that are then scored using detailed criteria, is not confined to what will be selected as the final two noticed routes. But here, given the necessity of locating the route between two designated endpoints -- the Agawam and Ludlow Substations, and the high cost of undergrounding the 345 kV line, the Siting Board accepts the small set of route options.[38] Further, the addition of the route analysis comparing overhead and underground options along the right-of-way and streets for locating the 115 kV upgrades contributed to expanding the original, narrower menu of routes presented by the Company.

The Siting Board finds that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner which ensures that it has not overlooked or eliminated any routes which are clearly superior to the proposed project.

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[38] The last four Siting Board transmission line cases analyzed from three to six candidate sites before selecting two as the preferred and alternative routes (see Russell Biomass, EFSB 07-4/DPU 07-35/07-36 at 23 (2009) (Russell T-Line); Cape Wind at 46; NSTAR/Stoughton at 280; CELCo/Kendall at 328). Russell T-Line analyzed three potential routes; Cape Wind analyzed six potential routes; NSTAR/Stoughton analyzed five potential routes out of 10 basic routes options; and CELCo/Kendall analyzed six routes.

4. Geographic Diversity

The two routes selected by the Company for the 345 kV line travel between the Agawam and Ludlow Substations via two distinct existing right-of-ways. The 23 mile-long Northern Corridor is located to the west and north of the City of Springfield, through the communities of Agawam, West Springfield, Chicopee and Ludlow; and the 28 mile-long Southern Corridor is located to the south and east of the City of Springfield through the communities of Agawam, Suffield, Longmeadow, Enfield, East Longmeadow, Hampden and Wilbraham. The only area common to both corridors is the approximately six mile segment from the Massachusetts/Connecticut border in Agawam to the Agawam Substation (Exh. WMECo-1, at 4-17). Proportionately, the length in common is short; in addition, the segment traverses an area which lacked practical alternatives for siting a 345 kV line. Therefore, the Siting Board finds that the Company has identified a range of practical transmission line routes with some measure of geographic diversity.

5. Conclusion on Route Selection

The Company has: (a) developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner which ensures that it has not overlooked or eliminated any routes which are clearly superior to the proposed project, and (b) identified a range of practical transmission line routes with some measure of geographic diversity. Therefore, the Siting Board finds that the Company has demonstrated that it examined a reasonable range of practical siting alternatives.

B. Environmental Impacts of Transmission Lines

1. Standard of Review

In implementing its statutory mandate under G.L. c. 164, § 69H, the Siting Board requires a petitioner to show that its proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply. To determine whether such a showing is made, the Siting Board requires a petitioner to demonstrate that the proposed route for the facility is superior to the alternative route on the basis of balancing cost, environmental impact, and reliability of supply. Russell T-Line, at 50; Cape Wind at 64.

Accordingly, in the sections below, the Siting Board examines the environmental impacts, reliability and cost of the proposed facilities along the Northern and Southern Alternatives to determine: (1) whether environmental impacts would be minimized; and (2) whether an appropriate balance would be achieved among conflicting environmental impacts as well as among environmental impacts, cost and reliability. In this examination, the Siting Board compares the Northern and Southern Alternatives to determine which is superior with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

2. Route and Corridor Description

This is the first case in Massachusetts in 25 years involving a proposed major 345 kV overhead transmission line.[39] The 345 kV line along the Northern Alternative travels through Agawam, West Springfield, Chicopee, Springfield, and Ludlow; the Southern Alternative travels through Agawam, Longmeadow, East Longmeadow, Hampden, Wilbraham, and Ludlow (and Suffield and Enfield in Connecticut).

The 345 kV line along the Northern Alternative includes approximately 6.9 miles in Agawam, approximately 4.3 miles in West Springfield, approximately 6.9 miles in Chicopee, and approximately 4.9 miles in Ludlow all along existing rights-of-way. The 345 kV line along the Southern Alternative includes approximately 7.9 miles in Agawam, approximately 0.5 miles in Longmeadow, approximately 3.9 miles in East Longmeadow, approximately 2.8 miles in Hampden, approximately 5.1 miles in Wilbraham, approximately 3.0 miles in Ludlow, and 5.4 miles through Suffield and Enfield, Connecticut, all along existing rights-of-way.

Elements of the proposed project in the City of Springfield that would be associated with either route are limited to two 115-kV spur lines, a new switching station, and modifications at an existing substation. The Cadwell Spur is 0.9 miles long and would cross the Chicopee River

39 In 1985, the Siting Council approved the Hydro-Québec project, which included a 345 kV line. More recently in 2005, the Siting Board approved a 17.5-mile NSTAR underground 345 kV line from Stoughton to Boston. The only overhead 345 kV line approved in the last 25 years is a 1.1-mile interconnection to the ANP Blackstone power plant, with a 275-foot-wide corridor, located 650 feet from the nearest residence (see ANP Blackstone, 8 DOMSB at 1 (1999)).

where Worcester Street (Route 141) crosses the Springfield/Chicopee border and travel southwest to the proposed Cadwell Switching Station, which would be located between Cadwell Drive and I-291. The Orchard Spur is 0.7 miles long and would cross the Chicopee River from Ludlow and terminate at the existing Orchard Substation, which is located just west of the Indian Orchard Mills in Springfield. A third spur, the Fairmont Spur, is located in Chicopee and runs north and northwest 1.7 miles from East Springfield Junction to the proposed Fairmont Switching Station site north of Prospect Street, near Frink Street.

**Table 3. Corridor Characteristics**

| | Northern Corridor | Southern Corridor |
|---|---|---|
| Density | Traverses urban, densely populated communities | Traverses less densely developed communities |
| Number of Residenceswithin 100 feet | Approximately 300 | Approximately 100 |
| Number of Residences within 25 feet | Approximately 95 | Approximately 35 |
| Undeveloped Land | 6.7 miles | 12.8 miles |
| Width of ROW | Narrower Corridor: Predominantly 150 feet wide but approximately 100 feet wide for 4.2 miles and at least 200 feet wide for 2.8 miles | Wider Corridor: Predominantly 250-300 feet wide but between 150-160 feet wide for 1.9 miles and 100 feet wide for 2.8 miles |
| School Properties within 300 feet of ROW | Agawam HS; West Springfield HS; West Springfield MS; John Ashley Elementary School | None |

These counts do not include the three spurs, where the same 115 kV upgrades would be constructed regardless of which route is selected for the 345 kV line.

3. Wetland and Water Resources

a. Northern Alternative

The construction and development of the proposed project will result in both temporary and permanent impacts to wetlands associated with the following activities: right-of-way expansion; access roads; structure installation; construction envelopes; public road crossings; and culvert replacement (Exh. WMECo-16, at 5-1). Effects on wetlands would occur from vegetation removal, the temporary placement of construction mats for movement of heavy machinery,

grading and filling of access roads, equipment staging pads, and installation of some transmission line structure foundations in wetlands (id. at 5-49).

The Northern Alternative would pass through 4.0 miles of streams or wetlands and have 107 wetland crossings (Exhs. WMECo-16, App. C at 13 to 15; WMECo-TBB-4, Att. 11). The majority of the wetlands are classified as Bordering Vegetated Wetlands (Exh. WMECo-1, at Table 5-14). Estimated temporary wetland impacts from the installation of crane pads, new pole structures, access roads and swamp mat crossings is 11.4 acres (Exhs. WMECo-DJC-3; WMECo-16, at 5-1). Estimated permanent wetland impacts of less than 0.7 acre would occur in the Riverfront Area from the same activities; with secondary impacts from tree removal in forested wetlands accounting for 5.9 acres (Exhs. WMECo-DJC-3; WMECo-16, at 5-4). There are one certified vernal pool, and three potential vernal pools along the Northern Alternative with no proposed impacts (Exhs. WMECo-1, at 5-45; WMECo-16, at 5-4; Tr. 13, at 2294-2299).

WMECo will comply with applicable wetland regulatory permit requirements (Exh. WMECo-1, at 5-54). The Company proposal for a wetlands Off-Site Compensatory Mitigation Plan is to convert 5.2 acres of the former 110-acre Boglisch Tree Farm in Agawam to wetland (Exh. WMECo-16, at 4-14 to 4-15, App. C). Specifically, portions of the property will be converted to forested wetlands or scrub/shrub/emergent marsh to replicate wetlands altered by the proposed project along the existing right-of-ways (id.). In addition to the Off-Site Compensatory Mitigation Plan the Company will minimize wetland impacts by: (1) installing temporary swamp mats, geotextile, or stone pads for access roads across wetlands where necessary; (2) placing new structures outside of wetlands where feasible; and (3) restoring wetlands to pre-construction contours to the extent feasible (Exhs. WMECo-1, at 5-54, 5-55). Further, WMECo indicated it would generally remove access road materials in wetlands (Tr. 11, at 2012). The Company has submitted Notices of Intent to the Conservation Commissions of Agawam, West Springfield, Chicopee, Springfield and Ludlow. [40]

[40] As of the close of hearings, the Company had received its Order of Conditions from the Ludlow and Agawam Conservation Commissions (Exh. WMECo-27). Additional town specific wetland mitigation has been coordinated with the individual towns (Exh. WMECo-16, at 6-2 to 6-5).

The proposed project is located across three watersheds, the Connecticut River Basin; the Chicopee River Basin, and the Westfield River Basin (Exh. WMECo-1, at 5-62). The Northern Corridor crosses the Westfield River, the Connecticut River, 14 additional named streams, and a number of smaller waterways (id. at 5-64). WMECo stated it would avoid construction work in watercourses to the extent feasible and culverts may be installed or replaced where access roads cross watercourses (id. at 5-67 to 5-68). No work is expected to occur within the Westfield River or Connecticut River (id. at 5-68). Surface water resources will in general be spanned, therefore significant impacts are not anticipated (id. at 5-67).

b. Southern Alternative

In Massachusetts, the Southern Alternative would pass through 11.0 miles of streams and wetlands with 182 wetland crossings (7 miles and 75 additional crossings on the Southern Corridor, plus the 4.0 miles and 107 crossings on the Northern Corridor) (Exh. WMECo-TBB-4, Att. 12; WMECo Initial Brief at 169).[41] The majority of the wetlands are classified as Bordering Vegetated Wetlands (Exh. WMECo-1, at Table 5-15).

According to the Company, wetlands along the Southern Corridor generally function better and provide a higher value than those along the Northern Corridor (Exh. WMECo-1, at 5-50). Also, according to the Company, the wetlands located along the Southern Corridor are potentially better able to reduce surface contaminants, attenuate floodwaters, provide significant aquatic species habitat, entrap sediments, and remove and transform nutrients (id.). Further, these wetlands are larger and extend for greater distances along and across the right-of-way. Therefore, the Company explained that there is less flexibility along the Southern Corridor to avoid wetland impacts by moving equipment around on the right-of-way (Tr. 13, at 2320). Finally, a significant wetland feature is a great blue heron breeding colony in Hampden near the right-of-way (Exh. WMECo-1, at 5-48).

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[41] The 5.4 mile portion through Suffield and Enfield, Connecticut has 27 wetlands, two vernal pools, and crosses five watercourses (CL&P Petition, Volume 1, at N-72; CL&P Petition, Volume 4, Ex. 2 at 3). It is likely that some structures would be situated in wetlands (id.).

The largest water crossings are the Connecticut River and the Chicopee River (id. at 5-66). Surface water impacts are similar for both routes since in-stream activity would be limited; both routes cross the same number of large rivers, and, regardless, watercourses will be spanned for either route.

c. Conclusion on Wetland and Water Resource Impacts

Based on the above, the Northern Alternative impacts less wetlands and water resources than the Southern Alternative, and the wetlands and water resources along the Southern Alternative are more pristine. Further, the Northern Alternative traverses wetlands and water resources only along the Northern Corridor, while the Southern Alternative entails those same impacts and also traverses wetlands and water resources along the Southern Corridor. The Siting Board finds that the Northern Alternative would be preferable to the Southern Alternative with respect to wetlands and water resource impacts.

Impacts to surface water would typically occur from erosion and sedimentation as a result of soil disturbance, vegetation removal, and installation of access roads and transmission line structures (Exh. WMECo-1, at 5-64). WMECo proposes to implement a Soil Erosion/Sediment Control Plan for the construction of the proposed project (Exh.WMECo-16, at 6-11). Further, prior to construction, a Storm Water Pollution Prevention Plan ("SWPPP") will be submitted to the USEPA (id.). WMECo stated it would avoid construction work in watercourses to the extent feasible (Exh. WMECo-1, at 5-67). Finally, it will construct a replacement wetland at the Boglisch Tree Farm.

The Siting Board finds that with mitigation proposed by the Company including construction of a replacement wetland, and with the implementation of the SWPPP, impacts to wetlands and water resources along the Northern Alternative will be minimized.

4. Land Resources and Historic Resources

a. Northern Alternative

WMECo characterized the Northern Corridor as traversing a variety of uses and developments, including residential, commercial/industrial, open space, agricultural, recreation, and transportation lands (Exh. WMECo-1, at 5-10). Vegetative communities include mature

mixed upland forest (maples, oaks, hickories, conifers); old field habitat (including persistent shrublands and early successional forest); and cultural grasslands (parks, golf courses, lawns, pastures, hay fields, etc.). Schools and recreation areas in the vicinity include Agawam High School, Robinson State Park, Cook Playground, West Springfield High School, West Springfield Middle School, John Ashley School, Bellamy Middle School along the Fairmont Spur, and Facing Rock Wildlife Management Area (Exhs. WMECo-1, at 5-11; EFSB-NO-1).

There are several residential structures that extend into the WMECo right-of-way, four of which were determined to require removal. These include houses at 45 Bill Street and 16 Truro Street in the Willimansett neighborhood of Chicopee, and two mobile homes at the Blue Bird Trailer Park (Exh. EFSB-LU-27). Relocation is generally required if any portion of the structure is within 35 feet, horizontally, of a 345 kV conductor or within 25 feet of a 115 kV conductor. No other residences were identified for removal (id.).

In Agawam, the proposed project will pass through Robinson State Park for 0.2 miles on WMECo's existing right-of-way (Exh. WMECo-16, at 5-8). In addition, a temporary access road to be used for construction will be needed through Robinson State Park (Exhs. EFSB-LU-8; WMECo-16, at 5-8). The temporary access road will use an existing road in the Park to get to one of the structure foundations, but does require the removal of several trees, for the purpose of avoiding a ravine in the actual right-of-way; along with some additional improvements including land alteration requirements (Exhs. EFSB-LU-8; EFSB-25; Tr. 12, at 2164, 2168, 2171). The Massachusetts Department of Conservation and Recreation ("DCR") has informed the Company that the road will not require Article 97 approval; only a temporary construction permit, a draft of which has been provided to DCR by the Company (Exh. WMECo-16, at 4-13). The Company is still in discussions with DCR regarding the permitting and the improvements, including to what extent trees will be removed, as the final plans for the road are not yet in place (Exhs. EFSB-LU-25; WMECo-16, at 4-8; 6-23).

The proposed project will also pass through the western edge of the Cook Playground in West Springfield (Exh. WMECo-1, at Ex. 5.2, Mapsheet 5; Tr. 15, at 2581-2583). Currently, construction in that area entails clearing the entire right-of-way, which includes the trees that are now located in the right-of-way along the ballfield (Tr. 15, at 2583). In discussions with the

Town of West Springfield concerning mitigation, the Company could ether save some of the lower shrubs, or replace the trees in another area (id., at 2581).

Approximately four acres of forest, including both forested wetland and upland forest, would be cleared of trees to accommodate new lines (Exh. WMECo-1, at 5-94). Under its continuing vegetation management program, WMECo would promote the establishment of desirable low-growing plant species by selective applications of herbicides to control tree saplings and undesirable invasive species such as multiflora rose, autumn olive, black locust, buckthorn, tree-of-heaven, and bush honeysuckle (Exh. WMECo-1, at 5-96). Therefore, the Siting Board directs the Company that under its continuing vegetative management program, that any application of herbicides must be consistent with utility right-of-way Integrated Vegetation Management Practices and applicable rules and regulations of the Commonwealth.

The Northern Alternative would pass through 3.7 miles of priority habitat which contains 13 protected animal species, of which eight are aquatic species (Exhs. WMECo-1, at 5-56; WMECo-16, at 4-2 to 4-3).[42] The eight aquatic species are associated with the Connecticut and Westfield Rivers, and therefore would most likely not be affected, as the transmission lines will span these areas and no in-river construction is planned (Exh. WMECo-1, at 5-56). Tree removal will affect approximately 7.2 acres of Riverfront Area, which includes both tree removal within the existing right-of-way and to widen the right-of-way (Exh. WMECo-16, at 6-9). There would not be any protected plant species affected by the proposed project (Exh. WMECo-16, at 4-9).

The NHESP preliminarily determined that a "take" may occur for both the eastern worm snake and the eastern box turtle (Exh. WMECo-16, at 4-5 to 4-7).[43] The Company has developed a Conservation and Management Plan ("CMP") for these two protected species along

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42 The aquatic species are shortnose sturgeon, bald eagle, three dragonflies, and three mussel species; and the remaining species include two salamanders and two reptiles (worm snake and box turtle) (Exh. WMECo-1, at 56).

43 If a "take" of an endangered species cannot be avoided, then a project can only proceed by meeting the performance standard for issuance of a Massachusetts Endangered Species Act Conservation and Management Permit, which mitigation includes a Conservation and Management Plan (Exh. WMECo-1, at 1-6).

the Northern Corridor (id.). Given that transmission line construction would occur on this corridor regardless, the CMPs apply to whichever route alternative is selected. For protection of wood turtles that may be at Sawmill Road in Ludlow, the Company agreed to confine tree-clearing to the period from late fall to early spring (Tr. 16, at 2732-2733).

Priority habitats may be affected by the conversion of forested habitat to scrub-shrub or other habitats due to tree clearing for corridor widening. Of the 46 properties on the Northern Corridor where additional right-of-way would be acquired, 17 would be expanded by 10 feet, 16 would be expanded by 25 feet and 8 properties would be expanded by 35 feet (5 are easement swaps) (Exh. EFSB-LU-5).

The Company's consultant, University of Massachusetts (UMass) Archeological Services, conducted predictive models studies for the GSRP in order to classify all potential work areas according to low, moderate, or high archeological sensitivity (Exh. WMECo-1, at 5-96 to 5-98). The study found that approximately 60 percent of the Northern Alternative possesses high sensitivity for Native American and or/historical archeological resources, with 20 percent each of moderate and low sensitivity (id. at 5-98). The Northern Alternative has one historically significant area within approximately 500 feet of the right-of-way, which is located in Ludlow Center (id. at 5-100). During required extensive cultural resource testing (Phase 2), surveys will be conducted to determine the eligibility of sites to be included in the National Register of Historic Places (Exh. WMECo-16, at 4-11). The Company stated that areas designated as such will be avoided if possible (Exhs. WMECo-1, at 5-100; WMECo-16, at 5-8). If the sites cannot be avoided, then data recovery programs for these sites are required, and will be developed for review and approval by the State Historic Preservation Officer (id. at 6-23). For significant archeological and historical sites that can be avoided, as requested by the Massachusetts Historical Commission ("MHC"), the Company will develop and implement an Archeological Site Avoidance and Protection Plan, in consultation with MHC and the US Army Corps of Engineers (id. at 7-10).

b. Southern Alternative

WMECo characterized the Southern Corridor as traversing a variety of uses and developments, including residential, agricultural, recreational, commercial and industrial, along with undeveloped forest land (Exh. WMECo-1, at 5-13).[44] Typical vegetative communities are similar to those along the Northern Alternative (id.).[45] Schools and recreation areas in the vicinity include Agawam High School, Soule Road School, Wolf Swamp Park and Recreation Area, Wilbraham Game Farm, Fanny Stebbins Wildlife Refuge, the Elmcrest, Wilbraham and Ludlow Country Clubs, and Facing Rock Wildlife Management Area (Exhs. WMECo-1, at 5-11; EFSB-NO-2).

The Southern Alternative would pass through 16.4 miles of priority habitat that contain 32 protected species (12.7 miles and 19 species for the Southern Corridor, and 3.7 miles and 13 species for the Northern Corridor) (Exhs. WMECo-1, at 5-59; WMECo-TBB-4, Att. 12). Of the 19 protected species identified along the Southern Corridor, four are protected plant species (Exh. WMECo-1, at 5-59). The majority of the 19 protected species found along the Southern Corridor are associated with wetlands or terrestrial habitat, rather than aquatic (Exh. WMECo-1, at 5-21).[46] Therefore, there are a large number of terrestrial and wetland species that will be directly impacted by the Southern Alternative.

For acquiring added right-of-way, 67 properties are impacted with the Southern Alternative (21 properties along the Southern Corridor and 46 properties along the Northern

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44 The 5.4 mile portion in Suffield and Enfield, Connecticut consists of 1.1 mile in Suffield and 4.3 miles in Enfield (CL&P Petition, Volume 1, at H-56). The more densely developed residential areas are located in a 3.7 mile area in Enfield (id. at H-55). There is no additional land acquisition (id. at N-74).

45 In general, the western part of the 5.4 mile portion in Suffield and Enfield would be aligned through agricultural areas, where limited vegetation removal would be required and no long-term effects on vegetative communities would occur (CL&P Petition, Volume 1, at N-73). The eastern portion of the route traverses more forested areas, where trees would have to be cleared from the ROW, resulting in a long-term conversion to shrub-scrub or open field type habitats (id.).

46 The 5.4 mile portion in Suffield and Enfield, Connecticut has four aquatic species associated with the Connecticut River, the shortnose sturgeon, bald eagle, riverine clubtail dragonfly, and arrow clubtail dragonfly (CL&P Petition, Volume 1, at N-73).

Corridor) (Exh. EFSB-LU-6). For the Southern Corridor an all 21 properties the right-of-ways would be expanded by 15 feet (id.).

The study conducted by UMass for the Southern Corridor determined that the route traverses areas with low, moderate, or high potential archeological sensitivity (Exh. WMECo-1, at 5-98). The Southern Corridor does not have any historically significant area in proximity to the right-of way (id. at 5-100). The Company did not conduct Phase 2 testing along the Southern Alternative to determine the eligibility of site to be included in the National Register of Historic Places (Tr. 13, at 2269).

c. Conclusion on Land Resources and Historic Resources

Based on the above, the Southern Alternative impacts more priority habitat than the Northern Alternative, and the Southern Alternative contains more terrestrial and wetland habitat. Further, the Northern Alternative traverses priority habitat areas only along the Northern Corridor, while the Southern Alternative entails those same impacts and also traverses priority habitat areas along the Southern Corridor. The Northern Corridor crosses through more residential areas, and passes by more schools and recreational areas than the Southern Corridor. However, the Southern Alternative also includes the Northern Corridor, and its attendant land resource impacts. With regard to historic resources, both the Northern and Southern Corridors cross through areas with high sensitivity for Native American and or/historical archeological resources; although the Northern Corridor has one historically significant area near the right-of-way and the Southern Corridor has none. As with land resource impacts, the Southern Alternative also includes the Northern Corridor, and therefore both corridors would be disturbed, with the potential for greater historic resource impacts. Accordingly, the Siting Board finds that the Northern Alternative would be preferable to the Southern Alternative with respect to land resources and historic resources impacts.

To mitigate impacts, the Company has developed CMPs for the eastern wood turtle and the eastern worm snake. In addition, the Siting Board directs the Company to confine construction-related tree-clearing at Sawmill Road in Ludlow to the period from late fall to early spring for the protection of wood turtles (see Tr. 16, at 2733).

The Northern Corridor passes through the playing fields for the West Springfield High School. The Company has discussed the possibility of avoiding construction on the West Springfield High School property when school is in session (Tr. 12, at 2050). Due to the level of construction and the noise, traffic and possible safety impacts associated with constructing both the 345/115 kV line and the 115 kV line in proximity to the high school playing fields, the Siting Board directs the Company to submit a Plan to the Board at the time construction at the West Springfield High School commences, detailing the terms of a Company agreement with the Town and school officials with regard to acceptable construction hours and safety measures, to avoid or minimize construction conflicts with activities during school hours, scheduled games, and practices.

The Northern Corridor also passes through the edge of the Cook Playground in West Springfield, and entails clearing the entire right-of-way, which includes the trees that that are now located in the right-of-way along the ballfield. The Company has had limited discussions with the Town of West Springfield concerning potential mitigation, which could consist of either saving some of the lower shrubs, or replace the trees in another area (Tr. 15, at 2581). Saving some of the lower shrubs should be a given, since any landscaping that could be maintained should be maintained. However, the removal of the existing trees in the playground will have a deleterious effect on shade in the park as well as a visual impact. Therefore, along with maintaining existing landscaping, the Siting Board directs the Company, in consultation with the Town of West Springfield, to submit a preliminary landscaping plan for Cook Playground prior to commencement of construction. The Board further directs the Company to submit a final landscaping plan for Cook Playground for approval to the Board within three months following construction that includes provisions to: (1) place additional trees in and around the Cook Playground to minimize views to the extent possible of the proposed GSRP; and (2) establish additional shaded areas through the use of tall trees or other shade structures. Additionally, the Siting Board directs the Company in consultation with the Town of West Springfield to submit a construction plan for Cook Playground for approval to the Siting Board prior to the commencement of construction at that site, that includes provisions to refrain from construction through the playground when the ballfield is in use for games or practice.

The Siting Board finds that with the implementation of the above conditions concerning construction limitations at the West Springfield High School and the Cook Playground, and seasonal work restrictions at Sawmill Road in Ludlow, impacts to land resources and historic resources along the Northern Alternative would be minimized.

5. Noise Impacts

a. Northern Alternative

Impacts during construction can perhaps best be understood in terms of the different crews that will be working in sequence at a particular monopole installation location along the right-of-way. At a typical structure location along the right-of-way, the following activity would take place: (1) clearing crew of three to five would clear vegetation, as needed; (2) a crew of three or four would prepare any required access road and crane pads over the course of one to three days; (3) a foundation crew of four or five would install line structure foundations over the course of two to four days; (4) a series of crews would deliver and install the supporting structures, with a total of up to four days work; (5) conductor installation would take one to two days per structure; (6) and a ground restoration crew of two or three would remove temporary access facilities (Exh. EFSB-G-12). Iterative visits for conductor installation will be required at most locations because existing structures need to be removed before new structures are installed, yet new conductors need to be connected before existing conductors are removed – requiring attention to sequencing.

Construction noise levels were estimated based on the installation and removal of monopoles and H-frames and clearing of the right-of-way, as well as associated activities occurring at temporary work spaces (Exh. EFSB-NO-3). The specific construction phases that generate noise consist of: establishing erosion and sediment controls; constructing new or improvement of existing access roads; preparing staging and lay down areas; preparing work areas; constructing new line structures; removing existing structures; and restoration (id.). Essentially the same equipment will be used whether constructing a 115 kV monopole or the composite 345/115 kV monopole (Tr. 12, at 2059, 2068). The Company asserted that

construction noise will have a temporary impact on residences adjacent to the equipment and that noise would only last up to a week for each activity in most instances (id.).[47]

Construction noise along either corridor has been estimated at a maximum of 85 to 95 dBA at 50 feet from the construction activity (an average of 75-85 dBA at 50 feet from substations and switching stations) (Exhs. EFSB-NO-3; EFSB-NO-4). The Company estimated that at distances greater than 50 feet, (on average over the day) construction noise would be expected to be at the 65 to 75 dBA level, although in rare instances maximum levels could approach the 85-95 dBA level (Exhs. EFSB-NO-3; EFSB-NO-11, SP1). As mitigation to minimize noise levels, the Company will require contractors to properly muffle and maintain engine-powered construction equipment and restrict idling in areas with noise-sensitive receptors (Exh. EFSB-NO-6). Nonetheless, the Company acknowledged that, in general, the most effective type of mitigation for construction noise is to adjust the time frame when work would occur (Tr. 12, at 2052).

The Company initially proposed construction between the hours of 7:00 a.m. to 9:00 p.m., Monday through Saturday, no Sundays or holidays, and typically for 10 hours of the 14-hour work day (Exhs. EFSB-NO-13; EFSB-NO-20; Tr. 12, at 2027 to 2031). Based on Memorandum of Understandings ("MOU") with the five communities, four of the MOUs now specify construction to occur between 7:00 a.m. to 7:00 p.m., and all allow construction on weekends and holidays (Exhs. EFSB-Z-1-SP01; EFSB-Z-2-SP01; EFSB-Z-3-SP01; EFSB-Z-4-SP01; EFSB-Z-5-SP010). Most right-of-way construction activities are expected to occur during the daytime. There will be only minimal nighttime work if a circuit must be taken out of service (Exh. EFSB-NO-3). WMECo stated that, where feasible, construction work near commercial and industrial areas would be scheduled at night, and construction work near residential areas would typically be during the day (Exh. WMECo-1, at 5-25). Further, the Company asserted that work conducted during the nighttime would consist of equipment that would generate lower sound levels and that sound abatement would be used (id.). In addition, the Town of West

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47 The Company does not expect that blasting would be necessary along either route, and that any rock could be removed by mechanical means. If blasting is necessary, a blasting plan will be developed and implemented by a licensed blasting contractor (Exh. EFSB-G-10).

Springfield had a concern with construction impacts at the high school ballfield and the Company indicated it may try to limit work in that area to months where school is not in session (Tr. 12, at 2050).

Ambient noise along the Northern Corridor is influenced by noise from I-91 and its spurs, the Mass Turnpike, commercial and industrial areas, as well as other roads and residential area sounds (Exh. WMECo-1, at 5-24). The ambient sound levels were measured at six points along the route, selected by the Company as representative of the majority of the route locations given similarities to existing and proposed structures, and proximity to highways and other non-WMECo producing entities (Exh. EFSB-NO-3).[48] The lowest daytime ambient noise levels ranged from 36.7 dBA at Lancaster Road in Agawam to 50.1 dBA at Bill Street in Chicopee, with two locations measuring in the mid 30s, three locations measuring in the low to mid 40s, and one location at 50 dBA (id.).

For the Northern Corridor (without spurs) there are 15 homes within the right-of-way; 95 homes within 25 feet of the right-of-way; 157 homes within 50 feet of the right-of-way; 303 homes within 100 feet of the right-of-way; and 702 homes within 101 to 300 feet of the right-of-way (Exhs. WMECo-TBB-4; EFSB-LU-1-RV-1; WMECo-26). In addition, the property line of the West Springfield High School, John Ashley School, Cook Playground and Robinson State Park abut the right-of-way, and the West Springfield Middle School and Agawam Middle School property lines are 60 feet and 275 feet, respectively, from the right-of-way (Exh. EFSB-NO-1).[49]

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48 The six locations are: Lancaster Drive in Agawam; Larchwood Street in West Springfield; southwest of Piper Road in West Springfield; Frederick Street in West Springfield; Bill Street in Chicopee; and Stanley Street in Ludlow (Exh. EFSB-NO-3(1)).

49 The construction along the 115 kV spurs will occur regardless of which route is selected. The Fairmont Spur has 8 homes within 25 feet of the right-of-way; 24 homes within 50 feet of the right-of-way; 44 homes within 100 feet of the right-of-way; 93 homes within 101 to 300 feet of the right-of-way, and the Bellamy Middle School property line abuts the right-of-way (Exhs. WMECo-26; WMECo-1, Ex. 5.2, Mapsheet 20). The Orchard Spur has 4 homes within 25 feet of the right-of-way; 8 homes within 50 feet of the right-of-way; 24 homes within 100 feet of the right-of-way; and 35 homes within 101 to 300 feet of the right-of-way (Exh. WMECo-26).

b. Southern Alternative

Construction activities and phases, as well as construction work hours, are the same for the Southern and Northern Alternatives.

The Southern Corridor has fewer sensitive receptors in close proximity to the edge of the right-of-way than the Northern Corridor. For the Southern Corridor there are 6 homes within the right-of-way; 35 homes within 25 feet of the right-of-way; 53 homes within 50 feet of the right-of-way; 104 homes within 100 feet of the right-of-way; and 305 homes within 101 to 300 feet of the right-of-way (Exhs. EFSB-LU-2-SP1; WMECo-TBB-4, Att. 10).[50] In addition, the property lines of two nursing homes and a game farm abut the right-of-way, and the Agawam Middle School property line is 275 feet from the right-of-way (Exh. EFSB-NO-2). Construction work, and the associated construction noise at the substations and the switching stations is the same for the Southern Alternative.

The ambient sound levels were measured at five points along the route, selected by the Company as representative of the majority of the route locations, given similarities to existing and proposed structures, and proximity to highways and other non-WMECo producing entities (Exh. EFSB-NO-3).[51] The lowest daytime ambient noise levels ranged from 33 dBA at northwest of Greenleaf Drive in Hampden to 37 dBA at Meadowlark Circle in Ludlow, with all of the five locations measuring in the mid 30 dBA range (id.).

c. Conclusion on Noise Impacts

With regard to route comparison, regardless of which route is selected, construction noise will have significant impacts on sensitive receptors. The Northern Corridor has higher existing ambient noise levels, but more sensitive receptors are in close proximity to the edge of the right-of-way. The Southern Corridor has a lower ambient noise level due to the more rural nature of

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50 The right-of-way width for the 5.4-mile portion in Suffield and Enfield is 280-300 feet (CL&P Petition, Volume 1, at N-75). There could be construction noise impacts in the eastern part of this portion, located near subdivisions in Enfield (id.).

51 The five locations are: Samble Lane in East Longmeadow; northwest of Greenleaf Drive in Hampden; Manchonis Road in Wilbraham; Americo Street in Ludlow; and Meadowlark Circle in Ludlow (Exh. EFSB-NO-3, Att. 2).

the location of the right-of-way, with less sensitive receptors in close proximity to the edge of the right-of-way. However, the Southern Alternative also includes the 115 kV upgrades to the Northern Corridor, and the associated construction noise impacts. Therefore, construction noise would occur along both corridors if the project is constructed using the Southern Alternative. In addition, the Southern Alternative includes 3.3 miles of construction for two separate sets of 345 kV monopoles between the South Agawam Switching Station and the Agawam Substation. At the same time, sensitive receptors along the Northern Corridor could experience twice the duration of construction noise due to the construction of the 345/115 kV composite structure at one time, and the 115 kV upgrades at a subsequent point in time. Given the mixed levels of construction noise along both routes and the significant noise impacts that will be generated regardless of which route is selected, the Siting Board finds that the two route alternatives are comparable with respect to noise impacts.

The Company is proposing to provide some mitigation that is basic to a project of this nature, such as mufflers, properly maintaining engines, and restrictions on idling. However, the construction noise would result in substantial increases above ambient noise levels, even with construction equipment noise mitigation. As noted, the Company and the Towns have agreed to daily construction work hours in the MOUs, but these hours include evenings, weekends, and holidays.

In WMECo/AWS, the Department ordered WMECo, absent unusual circumstances, to limit construction to the hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, excluding holidays in densely developed residential areas.[52] In other project areas the hours were limited, absent unusual circumstances to 7:00 a.m. to 7:00 p.m., Monday through Saturday, excluding holidays. Id. at 23, 39. The Company argues that such limitations on the GSRP would increase the cost and total duration of construction of the project, and that scheduling would be complicated as crews adapt to different work hours for residential versus industrial construction segments (WMECo Initial Brief at 145-146). The Company reiterates that full use of the flexible work hours provided for in the MOUs will not typically occur, and that work will be conducted

52 In WMECo/AWS a majority of the residences within ¼ mile of the right-of-way and all of the 16 residences were located within 100 feet of the right-of-way in Agawam. Id. at 23.

for 10 hours within the 7:00 a.m. to 7:00 p.m. work window, Monday through Saturday (id. at 146). The Company offered to adjust its initial proposal to be 7:00 a.m. to 6:00 p.m. Monday through Friday, and 7:00 a.m. to 5:00 p.m. on Saturday for three residential neighborhoods (id.).

The projected significant noise impacts from the proposed project resulting from the number of residences in close proximity to the edge of right-of-way, construction time frame, and combined construction activities, would affect more sensitive receptors than that of the Agawam-West Springfield transmission project. Here, the Company has not addressed substantive limitations on construction for days outside weekday periods or on holidays. Further, as proposed, the WMECo construction schedule would encroach into the evening hours. The Company itself acknowledged that the most effective method to mitigate noise is to adjust work hours. The Siting Board concurs. The offer presented by the Company does not contain an adequate level of mitigation given the projected noise impacts. Given the substantial noise levels associated with construction of the facility, the Siting Board finds that the following mitigation measures are warranted.

With respect to construction hours, the Siting Board first directs the Company to conduct no construction work on Sundays and holidays, absent unusual circumstances. Second, because the Northern Alternative is located in residential areas in close proximity to the edge of the right-of-way, absent unusual circumstances, WMECo shall limit construction activities along the entire route and at all substations and switching stations (with the exception of XS-3, XS-14, XS-19 and at the Cadwell Substation) to the hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, excluding holidays (for purposes of this sentence, circuit or equipment outages required for project construction and approved by CONVEX shall constitute "unusual circumstances" relieving all outage-dependent work activities from otherwise applicable hour and Saturday restrictions set forth in this sentence). Third, absent unusual circumstances, in XS-3, XS-14, XS-19 and at the Cadwell Substation, WMECo shall limit construction activities to the hours of 7:00 a.m. to 7:00 p.m., Monday through Saturday, excluding holidays.

In addition, the Siting Board directs the Company, in consultation with the Towns of Agawam, West Springfield, and Ludlow and the Cities of Chicopee and Springfield, to develop a community outreach plan for project construction. This outreach plan should, at a minimum, set forth procedures for providing prior notification to affected residents of: (a) the scheduled start,

duration, and hours of construction; (b) any construction the Company intends to conduct that, due to unusual circumstances, must take place outside of the hours detailed above; and (c) complaint and response procedures including contact information, the availability of web-based project information, a dedicated project hotline for complaints, and protocols for notifying schools of upcoming construction.

The Siting Board finds that, with the implementation of the conditions limiting construction hours and the development of a community outreach plan; as well as the use of mufflers, maintaining equipment, and implementing idling restrictions, noise impacts resulting from the construction of the proposed project along the Northern Alternative will be minimized.

6. Visual Impacts

a. Northern Alternative

Presently, the Northern Corridor typically consists of: (1) one set of 115 kV lattice structures that range from 60 to 80 feet tall between the Massachusetts/Connecticut border and the Agawam Substation and between Chicopee Substation and East Springfield Junction; (2) two sets of lattice structures that range from 65 to 100 feet tall between the Agawam and Chicopee Substations; (3) one set of 115 kV monopoles that range from 85 to 90 feet tall between East Springfield Junction and Shawinigan Switching Station; and (4) one set of 50-foot tall wood H-frames and one set of 90-foot tall monopoles between Shawinigan to Ludlow Substations (Exh. WMECo-1, at Table 5-12, and Ex. 5.1; EFSB-V-5).[53] If the Northern Alternative is selected, most of the structures will be removed and replaced with two new sets of structures up to the Shawinigan Switching Station: (1) 130-foot-tall (on average) "composite" monopoles carrying a 345 kV line on one side and a 115 kV line on the other side; and (2) 100-foot-tall (on average) monopoles carrying a 115 kV line; from Shawinigan to Ludlow Substations there

[53] From the Massachusetts/Connecticut border, for 0.2 miles, the existing structures are single 65 to 75-foot tall H-frames (Exh. WMECo-1, at Table 5-12).

will be the new composite monopoles and the existing 90-foot 115 kV monopole will be re-conductored (Exh. WMECo-1, at Table 5-12, and Ex. 5.1; WMECo-JCC-1; WMECo-JCC-3).[54]

Regardless of which route is selected, there will be 115 kV upgrades along the three spurs. The 1.7 mile-long Fairmont Spur consists of one 70-foot tall lattice structure that supports two 115 kV lines (horizontal configuration) which will be replaced by three 115-foot tall monopoles. The 0.9 mile-long Cadwell Spur consists of two lattice structures, one 75-foot tall and one 95-foot tall which will be replaced by two 115-foot tall monopoles. The 0.7-mile long Orchard Spur consists of two 65- foot tall H-frame structures with two lines which will only be reconductored (Exh. WMECo-1, at Ex. 5.1 and Table 6-1).

The Company provided an evaluation of the potential visual impacts of the proposed project from residences and schools along the right-of-way.[55] For each location, there is a photograph of existing views looking toward the right-of-way, and a photo simulation of the same view with a rendering of the proposed project. In addition, for each location there is a photo simulation with a rendering depicting one 115 kV line placed underground. The photographs show that for a majority of the route, there are prominent views of the proposed project from residences, streets, and schools (Exhs. EFSB-V-1; V-2; V-4).

Given the length and urban setting of the proposed project and the height of the monopole structures (the average height of the 345 kV monopole is 130 feet, and the average height of the 115 kV monopole is 100 feet), the visual impacts will be significant for a widespread area, not really dependent on the specific land use mix or relative absence of vegetative buffer.[56] Our evaluation of the visual impact, however, is based on an analysis of

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54 From the beginning of the proposed project at the Massachusetts/Connecticut border, for 0.2 miles, the new structures will be single 345 kV, 85 to 100-foot tall H-frames (Exh. WMECo-1, at Table 5-12).

55 The Company initially provided simulations for 17 cross sections. The Siting Board requested additional simulations of 18 residential locations and two school locations with both the proposed project and one 115 kV line placed underground (Exhs. WMECo-1, at Ex. 5-1; EFSB-V-1; EFSB-V-2; EFSB-V-4; EFSB-V-6; EFSB-V-7).

56 The 345 kV monopoles range from 105 feet to 160 feet and 115 kV monopoles range from 75 feet to 150 feet.

the number of sensitive receptors that fall within the view shed of the proposed project and the degree to which those receptors have an unobstructed view of the facilities. As discussed above, the Northern Corridor has a substantial number of residential properties in close proximity to the edge of right-of-way, of which most either cross or abut the edge of the right-of-way lines (see Section V.B.4, above). The full width of the right-of-way will be cleared for the majority of the route because of the number and size of the structures to be placed in the 150-foot wide right-of-way (Tr. 10, at 1774-1775). Therefore, all existing vegetative buffer that has served as screening for the existing 115 kV lines will be removed. The Northern Alternative therefore has many homes in direct proximity to new taller 345 kV structures without the benefit of vegetative buffering.

In general, the location of a transmission corridor for a project of this size through a densely developed community is unprecedented among transmission lines of any voltage proposed to the Siting Board in at least 25 years. The selection of the Northern Alternative would result in a significant increase in visual impacts to the communities along the Northern Corridor. At 150 feet wide for the majority of the route, the right-of-way is narrow, especially given the number and the dimensions of the structures to be located within the right-of-way. The heights of the new structures range from approximately 30 percent to 60 percent taller than the existing structures. The composite structures are on average, 130 feet tall, with 7.5-foot-wide foundations and 5.5-foot-diameter poles, and the 115 kV monopoles are on average, 100 feet tall (Exhs. EFSB-V-22; EFSB-V-30).

b. Southern Alternative

Presently, the Southern Corridor (in Massachusetts) from the South Agawam Switching Station typically consists of: (1) one set of 80-foot tall lattice structures between the Agawam Substation and the South Agawam Switching Station; (2) one set of 80-foot tall wood H-frames between the South Agawam Switching Station and the Massachusetts/Connecticut border; (3) one set of 90-foot tall monopole structures between Franconia Junction and Hampden Junction; and (4) one 95-foot tall 345 kV wooden H-frame and one 100-foot tall 115 kV monopole between Hampden Junction and the Ludlow Substation (Exhs. WMECo-1, at Table 5-12, and Ex. 5.1; EFSB-V-5). These structures are on a right-of-way with an existing maintained

width of 90 to 185 feet, and in some areas trees have been allowed to grow under and near the existing lines (Exh. EFSB-V-52). If the Southern Alternative is selected the existing structures will remain except between the Agawam Substation and the South Agawam Switching Station where the lattice structures would be removed and: (1) two new sets of 130-foot-tall monopoles carrying 345 kV lines will be located between the Agawam Substation and the South Agawam Switching Station; (2) one set of 90-foot tall wood H-frames between the South Agawam Switching Station and the Massachusetts/Connecticut border; (3) one new set of 90-foot tall H-frames carrying 345 KV lines will be located between Franconia Junction and Hampden Junction; and (4) one new set of 130-foot-tall monopoles carrying 345 kV lines will be located between Hampden Junction and the Ludlow Substation (Exhs. WMECo-1, at Table 5-12, and Ex. 5.1; EFSB-V-5).

If the Southern Alternative is selected, the Northern Corridor will have one new 115 kV monopole and one existing 115 kV lattice structure in the right-of-way from the Agawam Substation to the Chicopee Substation, and two new 115 kV monopoles from the Chicopee Substation to the Ludlow Substation. The entire width of the right-of-way would still be cleared (Exh. WMECo-1, at Ex. 5.1; WMECo-JCC-7, at 10).

As with the Northern Alternative, the Company provided an evaluation of the potential visual impacts of the proposed project from residences and schools along the right-of-way. For each location, there is a photograph of existing views looking toward the right-of-way, and a photo simulation of the same view with a rendering of the proposed project (Exhs. EFSB-V-1; EFSB-V-3).[57] These photographs show visibility from a few select areas, but less prominent views than the Northern Corridor especially where using H-frames. But they show there will be some increase in visibility in places from the significant clearing on the Southern Corridor.

The Southern Corridor is approximately 250 to 350 feet wide for the majority of the route, and given the more suburban and rural nature of the communities along the route there are substantially less residential properties in close proximity to the edge of right-of-way (see

[57] The Company initially provided photo simulations for seven cross sections of the Southern Corridor with the 345 kV line, and the Siting Board requested additional photo simulations of nine residential locations (Exhs. WMECo-1, at Ex. 5-1; EFSB-V-1; EFSB-V-3).

Section V.B.4, above). The new 345 kV monopole structures are 130 feet tall, with poles that are approximately four feet-wide at their base (Exh. EFSB-V-30).

c. Conclusion on Visual Impacts

The comparison of the visual impacts along the two route alternatives is mixed, because regardless of which route is selected for the 345 kV line, along the Northern Corridor only limited wooded areas will remain as clearing of the entire width of the right-of-way is required for the 115 kV upgrades. If the Southern Alternative is selected, the Northern Corridor will have one line of new 115 kV monopoles and one line of existing 115 kV lattice structures in the right-of-way between the Agawam Substation and the Chicopee Substation, and two lines of 115 kV monopoles from the Chicopee Substation to the Ludlow Substation. While incremental impacts on the Northern Corridor would be less if the Southern Alternative were selected, visual impacts with use of either route alternative will still be at a significant level for those in proximity to the Northern Corridor. Further, with the Southern Alternative, homes between the Agawam Substation and the South Agawam Switching would have views of two sets of tall towers because the Southern Alternative includes two separate 345 kV lines on the same segment. The Siting Board finds that the two route alternatives are comparable with respect to visual impacts.

However the information above is insufficient to determine whether the visual impacts would be minimized. A more extensive evaluation, including a number of additional potential visual mitigation options, is provided in Section V.G, below.

7. EMF Impacts

a. Northern Alternative

WMECo is proposing a vertical arrangement of each new or reconfigured circuit, with some exceptions in the more rural locations where adequate right-of-way width is available. A vertical arrangement takes up less of the width of the horizontal right-of-way than other arrangements such as H-frame, triangular, or delta, and so the vertical arrangement is proposed where the right-of-way is narrow. Where allowed by reliability modeling, two circuits are proposed to be suspended off one of the lines of monopoles.

To calculate the magnetic field levels for the proposed project, the currents that will flow along the existing and proposed lines must be determined. The factors included in this determination include system load level, generation dispatch, and the Connecticut import level and east-west power transfer levels (Exh. WMECo-1, at 5-87). In calculating the magnetic field levels, the Company provided two cases, the annual average load ("AAL") and the annual peak load ("APL") (id.). The magnetic levels used throughout the analysis are based on the AAL, where the AAL was calculated by the Company using 61 percent of peak loads (Exh. WMECo-REC-6 at 4). The Company provided estimated pre-NEEWS (2012) and post-NEEWS (2017) calculations. The pre-NEEWS calculations include all projects that have an in-service date before 2012, and the post-NEEWS calculations include all of the four NEEWS projects (Exh. WMECo-1, at 5-87).[58] The magnetic field measurements were calculated for 18 line sections, which included 15 sections along the Northern Corridor for the 345/115 kV line and the three spurs (Exh. WMECo-REC-7).[59]

Table 4, below, provides edge of right-of-way EMF levels for the most densely populated cross sections along both the Northern and Southern Alternatives. Specifically, these cross sections have 15 or more homes within 100 feet of the edge of the right-of-way. The data details the EMF levels for: (1) the Northern Corridor if the Northern Alternative is selected (one 345/115 kV monopole and one 115 kV monopole); (2) the Northern Corridor if the Southern Alternative is selected (one 115 kV monopole and one 115 kV lattice structure); and (3) the Southern Corridor if the Southern Alternative is selected (one 345 kV monopole).

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58 The post NEEWS EMF projections account for not only the GRSP and other NEEWS projects, but also for five years of load growth (Exh. WMECo-1, at 5-87).

59 In general along the Northern Corridor, the magnetic field levels will increase along both edges of the right-of-way for nine cross sections (XS-3 to XS-11) and one spur; and increase on one edge and decrease on the other edge for six cross sections (XS-12 to XS-17) and two spurs (Exhs. WMECo-REC-7; WMECo-1, at 5-88).

**Table 4. Edge of ROW EMF Levels - Northern Alternative vs. Southern Alternative**

| NUMBER of HOMES W/IN 100 FT. OF ROW | | CASE | WEST EDGE OF ROW (mG) | | EAST EDGE OF ROW (mG) | |
|---|---|---|---|---|---|---|
| | | | (1) Northern Alternative | (2) Southern Alternative | (1) Northern Alternative | (2) Southern Alternative |
| EMF Levels on Northern Corridor if (1) Northern Alternative is Selected or (2) Southern Alternative is Selected | Lakeview Cir. to Agawam S.S. XS-9/XS-S01 16 Homes | Pre-NEEWS | 4.6 | 4.4 | 0.7 | 0.7 |
| | | Post-NEEWS | 16.3 | 57.0 | 53.2 | 15.1 |
| | | Change in mG | 11.7 | 52.6 | 52.5 | 14.4 |
| | Agawam to Piper XS-10/XS-S17 95 Homes | Pre-NEEWS | 14.6 | 14.6 | 22.2 | 22.2 |
| | | Post-NEEWS | 42.7 | 14.3 | 66.6 | 1.5 |
| | | Change in mG | 32.1 | -0.3 | 44.4 | -20.7 |
| | Piper to Chicopee XS-11/XS-S16 87 Homes | Pre-NEEWS | 7.6 | 7.6 | 3.6 | 3.6 |
| | | Post-NEEWS | 25.3 | 4.4 | 65.6 | 9.0 |
| | | Change in mG | 17.7 | - 3.2 | 62 | 5.4 |
| | Shawinigan to Orchard XS-16/XS-S11 31 Homes | Pre-NEEWS | 6.8 | 6.8 | 47.4 | 47.4 |
| | | Post-NEEWS | 24.1 | 17.5 | 12.5 | 9.1 |
| | | Change in mG | 17.3 | 10.7 | -34.9 | -38.3 |
| | Orchard to Ludlow XS-17/XS-S10 28 Homes | Pre-NEEWS | 17.3 | 17.3 | 52.6 | 52.6 |
| | | Post-NEEWS | 51.5 | 17.1 | 18 | 19.3 |
| | | Change in mG | 34.2 | -0.2 | -34.6 | -33.3 |
| | Fairmont Spur XS-18 38 Homes | Pre-NEEWS | 8.9 | same | 24.3 | same |
| | | Post-NEEWS | 9.4 | same | 53.6 | same |
| | | Change in mG | .5 | same | 29.3 | same |
| EMF Levels on Southern Corridor | South Agawam Jct. To Longmeadow 27 Homes XS-S04 | Pre-NEEWS | | 7.0 | | 0.3 |
| | | Post-NEEWS | | 14.7 | | 10.4 |
| | | Change in mG | | 7.7 | | 10.1 |
| | Hampden Junction to Ludlow XS-S09 45 Homes | Pre-NEEWS | | 46.6 | | 22.7 |
| | | Post-NEEWS | | 38.2 | | 30.2 |
| | | Change in mG | | -12.4 | | 7.5 |

The Company asserted that their calculations of magnetic fields yield conservatively high values given their choice of load levels, import levels and generation dispatch (Exh. WMECo-1, at 5-88). However, the methodology used is consistent with methodologies used by the Company in past instances. Further, there is no indication that the Company's methodology will not be applicable for determining future EMF levels, or that the Company's methodology is inconsistent with analyses presented to the Siting Board in past cases. In fact, in this, and in most environmental analyses presented to the Board, it is appropriate to rely on conservative estimates. Therefore, the Siting Board accepts the use of this analysis as appropriate to determine EMF impacts.

b. Southern Alternative

The Company conducted the same analysis for both the Northern and Southern Alternatives. Table 4, above, summarizes EMF impacts of the Southern Alternative, in comparison to the Northern Alternative. The Southern Corridor is wider and there are fewer residences in close proximity to the edge of the right-of-way (see Section V.B.4, above).

c. Conclusion on EMF

The projected EMF levels are predominantly associated with current that flows along the 345 kV line. The projected EMF levels along the edge of the Northern Corridor are higher than for the Southern Corridor when the Northern Alternative is selected. Further, the projected levels along the Northern Corridor decrease in most areas when the Southern Alternative is selected because the 345 kV lines on the Southern Corridor would relieve 115 kV electrical flows on the Northern Corridor, since the Northern Corridor would only contain the upgraded 115 kV lines, and no 345 kV lines.

The 345 kV line is in close proximity to far more residences with the Northern Alternative than with the Southern Alternative (see Section V.B.4, above). The Southern Corridor is wider, providing a larger buffer between the transmission lines and the edge of the right-of-way, and there are fewer homes within 100 feet of the right-of-way. Further, on the Northern Alternative the John Ashley Elementary School playing fields are within 25 to 55 feet of the right-of-way,[60] the West Springfield High School property abuts the transmission line and the West Springfield Middle School property is 60 feet from the right-of-way, with future expansion of the High School fields to be directly under the 345/115 kV transmission lines (Exhs. EFSB-G-41; EFSB-NO-1; EFSB-RR-127). There are no schools abutting the Southern Corridor (Exhs. EFSB-NO-1; EFSB-NO-2; WMECo-1, Sec. 5, Mapsheets). The modeled EMF

[60] The John Ashley Elementary School is located in West Springfield, south of the right-of-way for cross section 11. The field area behind the school ranges between 25 and 55 feet (the location of the basketball court) from the edge of the right-of-way, with EMF levels of 40.2 milligauss ("mG") and 24.4 mG respectively. The nearest playground facilities are approximately 75 feet away and the EMF level is 18.3 mG. The nearest school building wall is approximately 180 feet way, and the EMF level is 6.1 mG (EFSB-RR-127).

levels are significantly greater for the Northern Alternative due to the placement of the 345 kV line. The Siting Board finds that the Southern Alternative would be preferable to the Northern Alternative with respect to EMF impacts.

However, the information above is insufficient to determine whether the EMF impacts would be minimized. A more extensive evaluation, including a number of additional potential EMF mitigation options, is provided in Section V.F, below.

8. Traffic

The Company asserts that installation (and operation) of the overhead transmission lines will not affect the normal use of area roads (Exh. WMECo-1, at 5-9). The Company will post construction zone flags and/or use flag persons, as appropriate, and local police, as needed, to direct traffic near transmission line crossings (id. at 5-9, 5-10). The overhead transmission lines will span all roads and railroads; therefore, there will be minimal direct traffic impacts during construction and no permanent impacts for either alternative.

Temporary traffic impacts will be associated with the movement of construction equipment, vehicles and materials both along the right-of-way and from staging areas, storage areas and laydown areas ("Support Sites") (Exh. WMECo-1, at 5-8).[61] Several support sites will be established for the project which will contain construction equipment, material storage, temporary office trailers, and employee parking (Exhs. EFSB-Z-1-SP01; EFSB-Z-2-SP01; EFSB-Z-3-SP01; EFSB-Z-4-SP01; EFSB-Z-5-SP01). The Company has not identified the number or locations of the necessary sites, and has indicated that it will allow the contractors to select the final locations (Tr. 12, at 2117, 2118). Workers will most likely park at a storage yard (or show up area) and carpool by pickup over to the work site (Tr. 12, at 2119). For construction at substations, the workers would typically park within the fenced area of the substation (id. at 2129).

The Company explained that it would try to locate the support sites in commercial or industrial areas, however due to a range of factors, it is not guaranteed that they would not be placed in residential areas (Tr. 12, at 2120). The MOUs between the Company and the towns

[61] The MOUs between the Company and the towns refer to the combination of storage areas, staging areas and laydown areas collectively as "Support Sites".

note that where possible the Company will use its own sites or those owned by its affiliates; or town-owned sites (Exhs. EFSB-Z-1-SP01; EFSB-Z-2-SP01; EFSB-Z-3-SP01; EFSB-Z-4-SP01; EFSB-Z-5-SP01). Northeast Utilities owns numerous parcels along the proposed routes in various types of locations, including residential areas (Tr. 12, at 2122). The language in the MOUs as to placement of the support sites is general and similar for all five towns. The Company indicated that it will prepare project-specific access and traffic control plans which will include signage; flagman, police details; and gravel anti-tracking pads along with street sweeping (Exhs. WMECo-1, at 5-9 to 5-10; Tr. 12, at 2123).

With respect to route comparison, traffic impacts are predominately associated with the use of support sites for the movement and storage of equipment and construction workers traveling to a "show-up area" at the beginning and end of the work day. For the Northern Alternative, support sites would be located along the Northern Corridor; where for the Southern Alternative the support sites would be located along both the Northern Corridor and the Southern Corridor. However, activity at the support sites on the Northern Corridor associated with the Northern Alternative would extend for a longer period of time due to the construction of the 345 kV line and the 115 kV upgrades. The Company has not finalized its plans for the number and location of support sites, so specific details for the two routes are not known. The Siting Board finds that the two route alternatives are comparable with respect to traffic impacts.

As discussed above, the location and number of support sites, which could consist of staging areas, storage areas, laydown areas, and show-up areas, has not been identified by the Company for transmission line or for substation and switching station construction. The Company will not know the details of the number and location of the support sites until a contractor is selected and has provided input into finalizing the location of the sites. Given the length of this project through densely populated residential areas, there is the possibility that some sites may be located in proximity to residential areas, exacerbating traffic and noise impacts. Further, guidelines for construction worker parking have not been developed, for example, prohibitions on arriving too early or parking on residential streets. Therefore, the Siting Board directs the Company to submit for Siting Board approval a draft Support Site and Substation/Switching Station Plan, prior to the commencement of project construction, to be developed with input from the communities where the support sites will be located. The plan

should include both a written description and map of the specific location of each support site including the boundaries of each support site, and a description of all of the activities that will occur at each site. The plan should describe: (a) the hours that activities will occur; (b) an estimate of the timeline for use of each support site; (c) the duration and location of police details and/or flagmen if proposed; (d) maintenance of the support site to avoid impacts to the surrounding properties; (e) use restrictions; (f) additional mitigation as appropriate; (g) plans to return the site to its original use and condition; and (h) a description of how community input was obtained. In addition, although traffic impacts associated with the project will be temporary in nature, the Company provided specifics for traffic control. Therefore, the Siting Board directs the Company, in consultation with municipalities and Company contractors, to develop and implement a Traffic Management Plan to minimize traffic disruption, which includes, but is not limited to, the following measures: (1) signs erected to identify construction work zones; (2) police details and/or flagmen to direct traffic near public road crossings; (3) police details and/or flagmen to direct traffic at construction work sites along roads; and (4) anti-tracking pads to be installed at right-of-ways and substation access roads at intersections with public roads (Exh. WMECo-1, at 5-8 to 5-10; Tr. 16, at 2742-2744).

The Siting Board finds that, with the development and approval of a Support Site and Substation/Switching Station Plan for construction support areas, and a Traffic Management Plan, the traffic impacts resulting from the construction of the project along the Northern Alternative will be minimized.

9. Air Impacts

As a transmission facility, operation of the GSRP generally would not contribute to air impacts. Emissions from construction vehicles are a concern, however.

a. Background

Diesel engines produce significant amounts of particulate matter ("PM"), which are small solid and liquid particles composed primarily of carbon which can be easily inhaled and which pose a significant health risk to humans (MADEP Report at 1).[62] Reducing PM pollution from all sources, including construction equipment, is important for the health of workers and communities (id.). Because construction equipment emits such a significant portion (27 percent) of the state's total diesel $PM_{2.5}$ emissions, the MADEP established the Massachusetts Diesel Retrofit Program ("MDRP") (id. at 4). The program involves using contract specifications to require contractors working on state-funded projects to install retrofit pollution controls on their construction equipment engines to reduce PM, volatile organic compounds ("VOCs"), and carbon monoxide ("CO") (id. at 1, 4).[63] The three most common diesel PM retrofit technologies, in order of increasing effectiveness, are: diesel oxidation catalysts ("DOC"), flow-though filters ("FTFs"), and active or passive diesel particulate filters ("DPF") (id. at 8). The following MADEP chart compares the retrofit technologies:

62 MADEP issued a document in January 2008, Diesel Engine Retrofits in the Construction Industry – A How to Guide. During the course of this proceeding, the Hearing Officer incorporated this document in its entirety by reference from the record in WMECo/AWS, D.P.U. 09-24/09-25 ("MADEP Guide").

63 Other strategies include (1) reducing idling; (2) replacing/repowering/rebuilding older engines; and (3) using cleaner diesel fuels (MADEP Guide at 4).

**Table 5. Retrofit Technologies**

| | DOC | FTF | DPF (Passive) | DPF (active) |
|---|---|---|---|---|
| PM Reduction | 25% | 50% | 85% | 85% |
| CO, VOC Reduction | 20-75% | 50-89% | 60-90% | Variable* |
| Cost (<250 hp)[64] | $800 - $3500 | $3500-$5000 | $8500 - $10,000 | $14,000 - $20,000 |
| On-going Maintenance & Costs | None | None | Annual filter cleaning. Increased fuel use of 1-3%. | Annual filter cleaning. Increased fuel use of up to 7% if regenerating electrically requires electric infrastructure. |
| Limitations | None | Minimum exhaust temp required. | Minimum exhaust temp and < 50 ppm sulfur fuel required. | None |

* If the filter is catalyzed reductions will be similar to a passive DPF. With an uncatalyzed filter, reductions will be lower. Source: MADEP Guide.

Several agencies or programs that fund public construction projects in Massachusetts now include retrofit requirements in their contracts (MADEP Guide at 5). These agencies or programs include MADEP's State Revolving Fund ("SRF") program, MassHighway Department ("MHD"),[65] MBTA, MassPort and Massachusetts Division of Capital Asset Management ("DCAM") (id.).

In response to a general request by the Siting Board, Staff issued a report to the Board, "Siting Board Staff Report – Diesel Retrofits for Non-Road Construction Vehicles and

64 For a typical construction engine less than 250 horsepower, cost depends on the size and power of the engine being retrofitted. For all retrofit devices, larger engines require physically larger devices to handle the exhaust flow volume and more precious metals which increase cost (MADEP Guide at 17).

65 In November of 2009, the Patrick Administration merged several of the state's transportation agencies, including MassHighway, into a single agency, the Massachusetts Department of Transportation ("MassDOT"). MassPort and the MBTA continue to act as separate agencies but the MBTA is subject to oversight by the same five-person board as MassDOT. The MassHighway retrofit program is now being administered by the Highway Division of MassDOT.

Equipment" ("Staff Retrofit Report") on March 18, 2010, regarding (1) the Commonwealth's existing diesel retrofit programs for construction vehicles; and (2) the Siting Board's options for imposing similar retrofit requirements. The Staff Retrofit Report was distributed to the Company on March 19, 2010.

b. Discussion

The Staff Retrofit Report proposes a requirement that all diesel powered non-road construction equipment over 50 horsepower and used for over 30 days have USEPA-verified or equivalent emission control devices installed. The Company has provided a breakdown of the number of crews and types of vehicles per crew for the eight major construction tasks, as well as the estimated days needed for each task (EFSB-RR-82). The construction schedule for the proposed project calls for approximately 39 months, and the estimated number of non-road construction vehicles and equipment ranges from 35 to 45 (id.; Exh. EFSB-G-8). The Company has done some preliminary outreach to potential contractors as to implementing this type of requirement in their contracts (Tr. 16, at 2764). WMECo acknowledged that this type of requirement could be incorporated into a contract, but that generally it would be costly to implement (id.).

The Company estimated that the retrofit costs would be approximately $4000 per non-road construction vehicle and equipment (WMECo Initial Brief at 131). The MADEP Guide states that the costs for diesel oxidation catalyst technology range from $800 to $3500 per vehicle (MADEP Guide at 16). The Company indicates that unless ordered to do so, it does not intend to require its contractors to install emission control devices (WMECo Initial Brief at 131).

The Company will require its contractors to use low sulfur diesel fuel for all off-road equipment (Exh. EFSB-LU-9). The Company also requires that all construction vehicles limit vehicle idling and be equipped with appropriate mufflers (Exh. WMECo-16, at 9-3). The Company indicated that it would try to find a way to encourage contractors invited to bid to consider engine retrofits, and to incorporate some advantage into the overall contractor selection process for contractors that use equipment with diesel retrofits (Tr. 30 at 4788).

The Siting Board is concerned with the diesel air emissions caused by construction equipment especially in a densely developed residential environment. The GSRP along the Northern Alternative is approximately 23 miles long and will be constructed over a period of 39 months, consisting of linear construction and construction at 10 substations and switching stations, and construction along the Southern Alternative is of a similar magnitude (Exh. EFSB-G-8). Therefore, the potential impact of diesel air emissions from construction equipment on sensitive receptors is significant along either route. The Siting Board finds that the two route alternatives are comparable with respect to air impacts.

Thus, the Siting Board directs that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of project construction have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine. Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition and a list of retrofitted equipment, including type of equipment, make/model, model year, engine horsepower, and the type of emission control technology installed. The Siting Board finds that with the Company's proposed mitigation, in conjunction with the implementation of the preceding diesel retrofit condition, the environmental impacts related to air emissions from construction equipment along the Northern Alternative would be minimized.

10. Other Impacts

a. Hazardous Waste

Based on database research, 76 sites of potential environmental concern were identified in the vicinity of the Northern Corridor, of which seven are located either along or directly abutting the right-of-way (Exh. WMECo-1, at 5-75). Of the seven sites located along or abutting the right-of-way, four are considered Chapter 21E sites, two of which are in Agawam and two are in Chicopee (Exh. EFSB-RR-64).

Based on database research, nine sites of potential environmental concern were identified from the South Agawam Switching Station to the Ludlow Substation, in the vicinity of the

Southern Corridor, none of which are located either along or directly abutting the right-of-way (Exh. WMECo-1, at 5-75).[66]

The Northern Corridor has a significantly higher number of sites of potential environmental concern than the Southern Corridor, which is consistent with the developed nature of the communities along the Northern Corridor (Tr. 13, at 2273). However, any difference in impacts regarding sites of potential environmental concern will be minor because both alternatives include construction along the Northern Corridor. Consequently, the Siting Board finds that the two route alternatives are comparable with respect to hazardous waste impacts.

The Company will prepare a project specific Material Handling Guideline ("MHG") which will include specifications for the management and disposition of contaminated material generated by or encountered during construction of the proposed project (Exh. WMECo-1, at 5-73). A Licensed Site Professional ("LSP") has helped the Company develop the plans and will review the results from pre-construction and construction activities (EFSB-RR -84). The MHG will also identify where areas containing oil or hazardous materials ("OHM") are located, and where applicable a Utility Related Abatement Measure ("URAM") will be required pursuant to the Massachusetts Contingency Plan (Exh. WMECo-16, at 4-13 to 4-14). The URAMs will be supervised by the LSP and reported to MADEP (RR-WMECo-84).

The Company has set forth the measures it would take to identify contaminated sites before construction and if contamination is present, the GSRP must be constructed in conformance with a URAM plan submitted to MADEP and such procedures would be performed under the supervision of an LSP. These factors provide assurance that contaminated soils or groundwater encountered along either route would be handled appropriately, regardless of the number of instances of contamination. Thus, the Siting Board finds that with the above mitigation measures, impacts pertaining to hazardous materials associated with construction along the Northern Alternative would be minimized.

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66 As the 345 kV line for the Southern Alternative overlaps the Northern Corridor for the portion from the South Agawam Switching Station to the Agawam Substation, 28 of the 76 sites identified above also fall along the Southern Alternative (EFSB-RR-64).

b. Solid Waste

The Company will be demolishing approximately 400 of the existing 115 kV towers (Exhs. WMECo-16, at 2-13, 9-4; WMECo-JCC-1; WMECo-RCC/JCC-12, at 2). The new monopole line is to be constructed before the existing line is to be demolished, so that the existing 115 kV circuit conductors can be transferred to the new double-circuit monopoles (Exh. WMECo-16, at 3-4). In addition, a small number of distribution line structures in Agawam and Chicopee will be removed (id. at 9-4).

The record does not contain specifics as to how the dismantled transmission structures will be disposed of, nor the plans for disposing of other construction waste. The Siting Board seeks to be informed regarding the plans and effectiveness of recycling efforts associated with the construction of the project. Therefore, in order to minimize solid waste impacts, the Siting Board directs the Company, prior to the commencement of construction, to provide to the Siting Board a construction recycling plan, and at the end of construction to report on the Company's recycling rate. The Siting Board finds that, with implementation of this condition, the solid waste impacts of the proposed facility along the Northern Alternative would be minimized.

C. Cost

The total project cost using the Northern Alternative is an estimated $714,224,000, with the Massachusetts portion costs estimated at $580,854,000 (Exhs. WMECo-JCC-14; EFSB-RS-6). The 345 kV portion of the entire project is estimated to be $487,772,000 and the 115 kV project cost is estimated to be $226,452,000 (Exhs. WMECo-JCC-14; EFSB-RS-6). The costs of the substations are estimated to be $326,580,000, for either alternative route.[67] The cost of the Northern Alternative includes the cost of easements where new acquisition of land is required; however, neither route includes the cost for upgrading easement agreements with property owners (Tr. 9, at 1560-1561).[68]

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[67] The cost of the five major substations and switching stations is the same for either route; however, under the category of miscellaneous substations work, the Southern Alternative is estimated to be $1.1 million less (Exh. WMECo-JCC-14).

[68] The Company needs to negotiate two kinds of easements: (1) new easements to physically expand the right-of-way; and (2) broadening or upgrading of the existing easement in order to obtain the rights to put in more equipment. The broadening of the

The total project cost of the Southern Alternative is estimated to be $746,260,000, with the Massachusetts portion costs estimated at $591,527,000 (Exhs. WMECo-JCC-14; EFSB-RS-6). The 345 kV portion of the entire project is estimated to be $457,042,000 and the 115 kV project cost is estimated to be $283,218,000 (Exhs. WMECo-JCC-14; EFSB-RS-6).

The difference between the costs of the two alternatives is approximately $32 million (Exh. WMECo-JCC-14). The contingency applied to the estimate of the costs of both route alternatives is 15 percent (Tr. 13, at 2198). This is an extensive project, where the costs are based on preliminary estimates (see Section V.A, above). As a result, the estimates will most likely change as the project progresses. However, there is no clear indication that the cost differential between the two routes would change or, if so, by what amount. In addition, the cost comparison does not yet include any additional mitigation that may be ordered by the Siting Board, regardless of which route is selected. Nonetheless, the Northern Alternative cost is approximately 4.5 percent lower than the cost the Southern Alternative. Accordingly, the Siting Board finds that the Northern Alternative is preferable to the Southern Alternative with respect to cost.

D. Reliability

The reliability of the operation of the 345 kV lines is similar along either corridor (Exh. WMECo-1, at 5-111). Since the 345 kV lines move power at a different geographic scale in comparison to the 115 kV circuits with which it would share structures on the Northern Corridor, no reliability disadvantage for double-circuit towers with the combination of a 115 kV circuit and a 345 kV circuit was identified. Instead, the Northern Alternative may have an advantage of preserving the option to expand the Southern Corridor in the future. Also, having a 345 kV power line in close proximity to numerous lower voltage lines at locations such as Shawinigan Switching Station and Fairmont Switching Station could turn out to be beneficial in

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existing easement costs are the predominate use of the easements for the GSRP, and WMECo has obtained a majority of the easements on the Northern Alternative (Tr. 15, at 2572). WMECo has not entered into any easement agreements on the Southern Corridor.

the event that stronger sources of power are needed for these areas in the future (Tr. 9, at 1553; Tr. 24, at 4150).[69] Overall, the Siting Board finds that the Northern Alternative is preferable to the Southern Alternative with respect to reliability.

E. Conclusion of 345 kV Route Alternatives

The Siting Board finds, above: (1) that the Northern Alternative is preferable to the Southern Alternative with respect to wetlands and water resource impacts, and land and historic resource impacts; (2) that the Southern Alternative is preferable to the Northern Alternative with respect to electric and magnetic field impacts; and (3) that the impacts are comparable for both routes with respect to noise, visual, traffic, air and hazardous waste impacts. The majority of the impacts that occur on the Northern Alternative will also occur along the Southern Alternative, since the Southern Alternative will consist of construction along both the Southern and Northern Corridors. Given the above comparison and the ability to confine impacts to one versus two corridors, the Siting Board finds that the Northern Alternative is preferable to the Southern Alternative route with respect to environmental impacts. Finally, the Siting Board finds that the Northern Alternative is preferable to the Southern Alternative route with respect to costs and reliability.

The Siting Board finds that the Northern Alternative is preferable to the Southern Alternative with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

F. Consideration of Additional EMF Mitigation

Section V.B.7 describes EMF impacts of the GSRP for the Northern Alternative. In that section, the Siting Board determined that further evaluation of potential EMF impacts was warranted prior to making a determination of whether EMF impacts along the Northern Alternative would be minimized.

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[69] The Southern Alternative would take longer to construct -- the Company asserts 18 months or more -- as engineering and permitting are not as advanced for the Southern Alternative (Tr. 16, at 2812).

1. Potential for Adverse Effects from Project EMF

In 1997, the National Academy of Sciences ("NAS") issued an evaluation of the effects of EMF on health (Exh. EFSB-E-1(1)). In 2007, the World Health Organization ("WHO") reviewed the existing scientific literature in the "Environmental Health Criteria" monographs, Volume 238 ("WHO Report") (Exh. EFSB-E-5 (1)). According to the WHO Report, there is no conclusion that EMF causes disease (id.). The NAS and WHO Report further indicate that no consistent statistical association between magnetic fields and disease has been established, other than for childhood leukemia (id.).

Among EMF issues, the relationship between EMF exposure and childhood leukemia has received much attention in the general scientific literature to date. According to the WHO Report, "[c]onsistent epidemiological evidence suggests that chronic low-intensity magnetic field [EMF] exposure is associated with an increased risk of childhood leukemia" (Exh. EFSB-E-5(1) at 355). WMECo's expert witness on EMF in this case stated that studies published after the WHO Report continue to report an association between childhood leukemia and magnetic field levels greater than approximately 4 mG (Exhibit WMECo-1(5-3), at 33). The NAS and WHO reported that magnetic fields in residences are typically in the range of 0.1 to 3.0 mG (Exhs. EFSB-E-1, at 21; EFSB-2). WMECo's expert witness on EMF testified that higher exposures are rare (Tr. 18, at 3075).

Childhood leukemia is a comparatively rare disease with a total annual number of new cases estimated to be 49,000 worldwide in 2000 (Exh. EFSB-E-2(1) at 2). According to the WHO Report, if the association between magnetic fields and childhood leukemia is causal, the number of cases worldwide that might be attributable to magnetic field exposure would be 100 to 2400 cases per year, based on values for the year 2000, representing 0.2 to 4.95 percent of the total incidence for that year (Exh. EFSB-E-5(1) at 12). The WHO Report states that "exposure limits based upon epidemiological evidence are not recommended, but some precautionary measures are warranted" (id. at 356).

2. The Company's Proposed EMF Mitigation

The Company's original proposal would mitigate EMF by reverse-phasing for expected power flows on the 115 kV circuits relative to the expected power flow on the 345 kV circuit

(Tr. 18, at 3164-3165). Where there are multi-circuit rights-of-way, WMECo will optimize phasing to minimize EMF at the edge of the right-of-way (id.). This mitigation is warranted. Nevertheless, EMF levels would increase substantially along the Northern Corridor, as shown in Section V.B.7, above. Projected EMF levels at the edge of right-of-way in three densely settled areas are detailed in Table 6, below.

**Table 6. Projected EMF in Densely Settled Areas Under WMECo's Original Proposal**

| | **Agawam to Piper Substation (XS-10)** | **Piper to Chicopee Substation (XS-11)** | **Fairmont Spur (XS-18)** |
|---|---|---|---|
| Number of residences | 110 homes within 100 feet of the edge-of-ROW, 64 of which are 50 feet or less. | 87 homes within 100 feet of the edge of the ROW, 42 of which are 50 feet or less. | 44 homes within 100 feet of the edge of the ROW, 24 of which are 50 feet or less. |
| Projected EMF levels: Edge of ROW | West Edge 42.7 mG<br>East Edge 66.6 mG | West Edge 25.3 mG<br>East Edge 65.6 mG | West Edge 9.4 mG<br>East Edge 53.6 mG |
| Change from existing levels: Edge of ROW | West Edge +32.1 mG<br>East Edge +44.4 mG | West Edge +17.7 mG<br>East Edge +62.0 mG | West Edge +0.5 mG<br>East Edge +29.3 mG |

Note: The Company provided the estimated pre-NEEWS (2012) and post-NEEWS (2017) annual average load EMF calculations. The pre-NEEWS calculations include all projects that have an in-service date before 2011, and the post-NEEWS calculations include all of the four NEEWS projects. The Company made some conservative assumptions about future power flow when calculating the annual average EMF levels (EFSB Board Meeting, June 3, 2010, at 45, 47). The table is for construction of the GSRP with the 345 kV line on the Northern Corridor.

Subsequent to filing the Petition, WMECo indicated that additional EMF mitigation could be obtained by increasing the heights of the 345 kV monopoles and, from Agawam Substation to Chicopee Substation, by placing the 345 kV circuit between the two 115 kV circuits (Tr. 18, at 3090-3191). In its Brief, WMECo indicated that it does not oppose a combination of putting the 345 kV circuit in the middle of the right-of-way and using 20-foot higher monopoles for designated lengths totaling two miles (WMECo Initial Brief at 215). This combination of options is among those evaluated further below.

The Company argues that no further mitigation is warranted because: (1) evidence of a causal relationship between EMF and health risks has been lacking (WMECo Initial Brief

at 200); (2) any levels below 85 mG are by precedent "acceptable" to the Siting Board (id. at 206); and (3) when benefits are unknown, the Siting Board cannot find that impacts are minimized consistent with minimizing cost, other than for low-cost mitigation measures (id.).

Contrary to WMECo's suggestion, the Siting Board has not found that by presenting an edge of right-of-way magnetic field of 85 mG or lower an applicant is presumed to have mitigated environmental impacts and that no further mitigation would ever be required regardless of circumstances. See, e.g, Brockton Power Company, 10 DOMSB 157, at 242 (2000) (previously accepted EMF levels are not a standard limiting acceptable impacts, and do not provide the sole or principal basis for our evaluation of EMF impacts in current reviews). Rather, in prior EFSB decisions, the Board has recognized public concern about EMF and has encouraged the use of practical and cost-effective design to minimize magnetic fields along transmission ROW. CELCO/Kendall at 349; Nickel Hill Energy, LLC, 11 DOMSB 88, at 211 (2000); IDC Bellingham, 9 DOMSB 225, at 333 (1999). The Siting Board requires EMF mitigation which in its judgment is consistent with minimizing cost.[70]

Here, the Siting Board finds that consideration of mitigation measures beyond the Company's original proposal is warranted because:

- The resulting levels of EMF (as well as the incremental increases from existing levels) are high compared to past transmission cases. For example, the estimated annual average EMF levels at the edge of the right-of-way with the proposed project range from 42.7 mG to 66.6 mG in the most densely populated right-of-way section, with increases ranging from 32.1 mG to 44.4 mG (See Table 6, above). In comparison, four past EFSB overhead transmission cases since 1994 have had projected maximum edge of-right-of-way EMF of 12.4 mG in Uxbridge (New England Power, 4 DOMSB 109, at 209 (1995)); 3.5 mG in Belchertown at a residence (New England Power/Massachusetts Electric Company. 5 DOMSB 1, at 83 (1996)); and 31 mG (ANP Blackstone Energy Company; 8 DOMSB 1, at 236 (1999); and 16.4 mG (Russell T-Line at 36).

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70 The Siting Board has been guided by the specific facts and circumstances and the number of households or schools potentially affected when deciding what appropriate mitigation, if any, would minimize the environmental impacts of a proposed project consistent with minimizing cost. In one example, the Siting Board directed Cambridge Electric Light Company to consult with local officials about the feasibility of lowering student exposures at a school from the expected level of 24 mG to 10 mG, the level proposed by the City of Cambridge. CELCO/Kendall at 349 (2001).

- The transmission corridor passes through thickly settled communities. There is a large number of homes located in close proximity to the transmission line. For example, for the section that runs from Agawam Substation to the Piper Substation there are 110 homes within 100 feet of the edge of the right-of-way, of which 64 homes are within 50 feet; for the section from Piper to Chicopee Substation there are 87 homes within 100 feet of the edge of the right-of-way, of which 42 homes are within 50 feet (Exh. WMECo-26A); and

- Selection of the Northern Alternative results in a measurable increase in EMF to the communities along the Northern Corridor; and

- According to the WHO Report, average magnetic field exposures in homes exceeding 3 mG are rare (Exh. EFSB-E-2). Yet, for a home built up to the edge of the right-of-way in the Northern Corridor, this level would be substantially exceeded.

3. Other EMF Mitigation Options

In the case of the GSRP, where the right-of-way is narrow, a vertical configuration of lines is preferred due to space limitations. With residences on both sides of the right-of-way, opportunities for mitigation are limited. The most applicable design mitigation techniques to reduce EMF are: (1) undergrounding the 345 kV line; (2) sufficient undergrounding of 115 kV lines to use a split-phase arrangement of the 345 kV line; (3) raising the height of conductors; and (4) use of electrical shielding.

Table 7, below, presents an overview of these general EMF mitigation choices. Table 8, which follows, provides more detail on the specific EMF reduction of each option, as well as the costs and visual impacts associated therewith.

**Table 7. Overview of EMF Mitigation Design Options**

| Design Change | EMF Mitigation | Visual Impact | Cost/Feasibility/Other |
|---|---|---|---|
| Underground 345 kV | Large Improvement | Improved | Very high cost, construction noise and traffic, less tree clearing* |
| Underground one 115 kV | Little Improvement | Improved | High cost, construction noise, less tree clearing* |
| Underground two 115 kVs and split-phase 345 kV | Large Improvement | Improved | High cost, construction noise, less tree clearing* |
| Increase line height | Improvement | Worsened | Moderate cost |
| Local shielding | Large improvement | Worsened | Cost proportionate to length; some potential safety hazard from induced currents |

* Higher traffic impacts would occur if an in-road alternative is selected for underground cable. Also, wetland impacts would occur in some areas for an in-ROW alternative.

**Table 8. EMF and Visual Mitigation Option Details**

| Configuration | | EMF | Visual | Cost |
|---|---|---|---|---|
| As proposed by WMECo | | Historically high EMF at edge of ROW (see Section V.B) | One line of monopoles ~100 feet and one line of bulkier monopoles ~130 feet | Baseline cost of project is $714 million (includes substations) |
| Overhead Configurations | Place 345 kV Circuit in the Middle of the ROW | Reduces EMF by ~12 mG on east ROW edge, compared to WMECo proposal, but small increase on west ROW edge. Company agrees to this option where applicable. | Comparable to WMECo proposal | May cost on the order of $1 million, depending on number of endpoints |
| | Use H-frames instead of Monopoles | Significantly higher EMF in ROW and at ROW edges | Reduces height of towers by ~40 feet; less intrusive in rural areas | Would be less expensive than monopoles, but must be combined with some undergrounding of other lines due to ROW space limits |
| | Increase Pole Heights by 20 feet | Reduces EMF by 4 to 7 mG on west ROW edge, and by ~20 mG on east ROW edge (down to 18 to 46 mG). Company acknowledges this as an option in densely populated areas. | Pole heights would increase from ~130 feet to ~150 feet, visible at a greater distance; foundations and base of poles would be wider, worsening visual impact | Incremental cost ~$0.9 million per mile (EFSB-RR-94(S1)) |
| Shielding: Passive Loop | | Reduces EMF at edge of ROW by 36 to 48 mG (down to 7 to 19 mG) | Pole heights would increase to ~150 feet and base of poles are wider; thick shield wires would be visible above & below the other wires; possible safety hazard at uncontrolled locations | Incremental cost ~$1.6 to $2.6 million for a single span. May be cost effective if targeted to small areas. |
| Undergrounding Configurations | Underground the 345 kV line | Reduces EMF by 17 to 27 mG (west) and ~63mG (east) at ROW edge (down to 3 to 16 mG) | Doesn't reduce the number of poles, but tall bulky ~130-foot poles would be replaced by a second set of ~100-foot poles, reducing visual impact | Incremental cost ~$34 million per mile, plus $32 million for two transition stations per segment undergrounded |
| | Underground one 115 kV line | Minor EMF benefit if a single 115 kV line is undergrounded | Eliminates one of the two lines of overhead structures, for significant visual benefit | Incremental $10 million per mile and up, depending on segment (from EFSB-U-27) |
| | Underground two 115 kV lines, and split the 345 kV | By split phasing the 345 kV line, reduces EMF by 11 to 14mG (west) and 44 to 55 mG (east) at ROW edge (down to 12 to 28 mG) | Eliminates one of the two lines of overhead structures, for significant visual benefit | Incremental cost for undergrounding to allow split phasing: $18 million per mile and up, depending on segment (EFSB-RR-94R1) |
| | Underground 115 kV in densely populated areas only | Minor benefit if a single 115 kV line is undergrounded. Significant reductions are possible if two 115 kV lines are undergrounded. | Eliminates one of the two lines of overhead structures, for significant visual benefit in targeted areas | $4.7 million to $42 million, depending on location, segment length, and number of lines undergrounded |

4. Siting Board Consideration of the Options

As shown above, the Siting Board considered a variety of methods for achieving EMF reductions. However, because of the lack of dose-response information, it is difficult for the Board to determine which sorts of exposure reductions should have the highest priority. For example, it is not clear whether reducing exposure of ten people from 20 mG to 10 mG is more or less beneficial than reducing exposure of ten people from 50 mG to 40 mG. Similarly, it is not clear whether reducing exposures of ten people from 20 mG to 10 mG is more or less beneficial than reducing exposure of 100 people from 20 mG to 19 mG.

To assist in the Siting Board's evaluation of potential EMF reduction alternatives, the Company identified sections of the right-of-way with the highest density residential development, which it termed "focus areas." Approximately 85 percent of homes within 100 feet, and 77 percent of the homes within 300 feet of the right-of-way are in a focus area (Exh. WMECo-REC/JCC-1, at 4). Then, to provide information on the cost-effectiveness of its EMF reduction alternatives, WMECo developed a conceptual unit called a milligauss-house ("mG-house"), which represents the benefit of modeled EMF reduction from a particular EMF alternative, summed/integrated over all the affected homes out to 300 feet from the right-of-way for a particular section. The calculation is self-weighting to account more heavily for homes for which benefits are greater, such as those near the right-of-way. WMECo also developed a conceptual unit called dollars-per-milligauss-house ("$/mG-house") which represents the cost per unit of beneficial modeled EMF reduction. The numbers are approximate because houses were categorized by distance intervals and the EMF was calculated by interval rather than for individual houses (Exh. WMECo-REC/JCC-1, at 6).

For the options that were applicable to a given section, and feasible to construct, WMECo then rank-ordered combinations of focus area and EMF reduction alternative with respect to cost-effectiveness (i.e., lowest to highest $/mG-house). The results are shown in Table 9. The numbers in the table only represent houses, and not other potentially sensitive receptor locations such as schools. The table also does not incorporate any considerations of visual changes or construction impacts.

**Table 9. Cost-Effectiveness of EMF Options** ("und." = underground 115 kV(s))

| Focus Area | Mitigation Alternative | Cost-Effectiveness ($/mG-house) |
|---|---|---|
| I-90 | 20' higher (345) | 0 |
| Willimansett | 345 in middle + 20' higher | 1,938 |
| West Springfield (N of Rte 20) | 345 in middle + 20' higher | 2,444 |
| South Fairmont | 20' higher (circuit 1601) | 3,178 |
| Bluebird | 20' higher (345) | 3,683 |
| Labelle St | 345 in middle + 20' higher | 3,973 |
| Granby Road | 345 in middle + 20' higher | 4,054 |
| Westfield River to Rt 20 | 345 in middle + 20' higher | 4,098 |
| Clayton Drive | 345 in middle + 20' higher | 4,543 |
| Oakridge | 20' higher (345) | 4,646 |
| Agawam Substation Area | 345 in middle + 20' higher | 5,347 |
| North Fairmont | 20' higher (circuit 1601) | 6,429 |
| Cook Playground / WSHS | 345 in middle + 20' higher | 8,010 |
| Schoolhouse Rd | 345 in middle + 20' higher | 8,338 |
| Cook Playground / WSHS | 30' higher | 10,014 |
| Route 57 | 20' higher (345) | 10,549 |
| Schoolhouse Rd | lateral shift | 10,595 |
| Piper Substation Area | 345 in middle + 20' higher | 11,818 |
| West Springfield (N of Rte 20) | split phase 345 w/ und. | 12,432 |
| Willimansett | split phase 345 w/ und. | 13,854 |
| Agawam Substation Area | split phase 345 w/ und. | 20,536 |
| Ludlow | 20' higher (345) | 25,693 |
| Piper Substation Area | split phase 345 w/ und. | 26,695 |
| South Fairmont | split phase 345 w/ und. | 33,884 |
| John Ashley School | passive shielding loop | 36,088 |
| South Fairmont | circuit 1601 und. | 38,741 |
| Cook Playground / WSHS | split phase 345 w/ und. | 48,577 |
| Labelle St | split phase 345 w/ und. | 50,307 |
| Granby Road | split phase 345 w/ und. | 53,422 |
| Bluebird | split phase 345 w/ und. | 54,664 |
| W.S. Middle School | 30' higher | 56,429 |
| Clayton Drive | split phase 345 w/ und. | 62,719 |
| North Fairmont | split phase 345 w/ und. | 69,262 |
| Holyoke Street | 20' higher (345) | 84,516 |
| North Fairmont | circuit 1601 und. | 86,776 |
| Schoolhouse Rd | split phase 345 w/ und. | 181,509 |
| Ludlow | split phase 345 w/ und. | 219,939 |
| Holyoke Street | split phase 345 w/ und. | 384,348 |
| Bellamy School | passive shielding loop | 1,002,632 |

Table 9 shows that undergrounding 115 kV circuits to allow for split-phasing of the 345 kV line costs $12,000 to $70,000 or more per unit reduction of one mG at one house, for most focus areas. The cost for such split phase/undergrounding at the two most cost-effective focus areas would be $27.1 million, with an EMF "benefit" of 2085 mG-houses (Exhs. WMECo-REC/JCC-4; WMECO-REC/JCC-6). The total cost for such split phase/undergrounding at all 14 of the potentially applicable focus areas would be $158 million, with a benefit of 4425 mG-houses (Exhs. WMECo-REC/JCC-4; WMECo-REC/JCC-6). Thus, undergrounding 115 kV or 345 kV circuits comes with significant cost and does not achieve definitive health benefits because no dose-response relationship between EMF exposure and health outcomes has been established. The Siting Board views the cost of both 115 kV and 345 kV undergrounding as excessive for the uncertain and thus precautionary potential benefit of reducing EMF.[71] Also, most of the undergrounding alternatives provide only fractional improvements to the visibility of transmission lines. Therefore, the Siting Board does not require undergrounding of either 115 kV or 345 kV transmission lines for the GSRP.

While local passive shielding showed some promise for reducing EMF exposures at selected locations, the current induced in these lines could pose a safety hazard in the event that the passive shielding loop dropped toward the ground, and land under the shielding loop cannot practicably be controlled by the Company at the particular locations of interest (EFSB Board Meeting, June 3, 2010, at 108). Therefore, the Siting Board does not require any passive shielding loops for the GSRP.

Another option would be to take the composite 115/345 kV monopole, which is currently designed to carry the 345 kV circuit on the side of the monopole closest to the edge of the right-of-way, and reverse it so that the 345 kV circuit is now in the middle of the right-of-way and the 115 kV circuit is closest to the edge of the right-of-way. By placing the 345 kV line in the middle of the right-of-way between two 115 kV circuits (one of which would be on its own separate monopole), the distance from the 345 kV line to the edge of-the-right-of-way is increased. Of course, it also decreases the distance between the 345 kV line and the other edge

71 The cost-effectiveness of undergrounding any 345 kV lines is not shown in the cost-effectiveness table. The incremental cost of undergrounding all of the 345 kV would be $695 million (Exh. WMECo-1, at 3-38).

of the right-of-way. However, the Company's calculations show that the reduction in EMF on the close side is substantially more than the increase on the far side (e.g., a reduction of ~12 mG on one edge and an increase of ~5 mG on the other edge in XS-11) (Exh. WMECo-REC/JCC-3(2)).

WMECo reported that it would be feasible to put the 345 kV circuit in the middle of the right-of-way from Agawam Substation to Chicopee Substation (XS-10 and 11), encompassing the highest-density residential areas (EFSB Board Meeting, June 3, 2010, at 45, 47).[72] The change would not increase costs (id. at 47). Therefore, in order to reduce EMF impacts, the Siting Board directs the Company to configure lines and structures such that the 345 kV circuit is placed between two 115 kV circuits between Agawam Substation and Chicopee Substation.

Raising the height of lines so that the minimum height of the 345 kV conductors is 20 feet higher than heights originally modeled by the Company will provide additional EMF mitigation, albeit with a visual disadvantage and some increased cost. Use of higher structures reduces EMF on both sides of the right-of-way (e.g., by ~15 mG at the southeast edge and by ~12 mG at the northwest edge in XS-11, comparing 20-foot higher 345 kV in the middle of the right-of-way to standard height 345 kV in the middle of the right-of-way) (Exh. WMECo-REC/JCC-3(2)). WMECo is amenable to this mitigation (EFSB Board Meeting, June 3, 2010, at 175). Table 9 shows that, for this project, EMF reductions in high-density areas generally cost $2,000 to $12,000 per unit reduction of one mG of EMF (on an average annual exposure basis) per house, when using 20-foot taller poles and moving the 345 kV line to the middle to reduce EMF. These approaches together are more cost-effective than undergrounding, in $/mG-house terms.

Considering the uncertainty of the potential harm from the EMF, as a precautionary measure the Siting Board considers it warranted to raise the height of the 345 kV circuit in the focus areas, where a significant number of homes and other sensitive receptors are located close

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72 In other areas of the GSRP, placing the 345 kV line in the middle of the right-of-way is not feasible or not beneficial because (a) there are only two lines, so there is no middle; (b) there are no residential areas or schools on the side originally proposed for the 345 kV; or (c) there are significantly fewer residences on the original 345 kV side than on the far side (Tr. 6/3/10 EFSB Board Meeting at 84-86).

to the right-of-way. The total cost estimate for all of the listed focus areas is $5.9 million (Exh. WMECo-REC/JCC-7). The Siting Board excepts the "Holyoke Street" focus area from the increases in structure height because the area is associated with Runway 33 at WARB and because household EMF reductions would be small (Exh. WMECo-REC/JCC-1). At an additional cost of approximately $1.1 million, the conductors can be raised another 10 feet (30 feet altogether) from Cook Playground to the West Springfield Middle School, including the West Springfield High School ballfields; at the John Ashley School; and at the Bellamy Middle School (EFSB Board Meeting, June 3, 2010, at 177-181). The higher poles are selected at these schools and playground because EMF is of greater concern, relative to visual impacts, at schools and playgrounds as compared to residences, and because there are playing fields directly under the lines between the West Springfield Middle School and West Springfield High School. The total listed EMF "benefit" for raising lines in focus areas – and putting the 345 kV in the middle where applicable – is 1463 mG-houses. In order to reduce EMF impacts, the Siting Board directs the Company to: (1) raise the 345/115 kV composite lines minimum conductor heights 20 feet above the minimum level modeled[73] in the following focus areas:

- I-90 (Chicopee Substation east to Mass Pike)
- Willimansett (Granger Street to Chicopee Street, Chicopee)
- West Springfield (Rte 20 to Morton Street)
- Bluebird (Old Fuller Rd Ext to Quail Drive, Chicopee)
- Labelle Street (end of Clayton Drive focus area to Route 5)
- Granby Road (Chicopee Substation west to Mass Pike)
- Westfield River to Rte 20 (in West Springfield)

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[73] Costs were calculated on a cost per-mile basis without reference to the specific costs that might be incurred at each location (EFSB Board Meeting, June 3, 2010, at 82). Similarly, EMF benefits were calculated on a miligauss-house basis without reference to the specific EMF reductions that might be achieved at each location (id.). In some locations, the originally planned transmission lines were already somewhat higher than they would typically be because of local design considerations, such as higher lines at road crossings (id. at 10, 11). As the Company is directed to raise the lines 20 and 30 feet above the generic level, the increases both in costs and EMF benefits may be less than described in the generic analysis.

- Clayton Drive (in West Springfield)
- Oakridge (Marla Place, Oakridge Drive, Barry Street, Agawam)
- Agawam Substation Area (Agawam Substation to Robinson State Park)
- Route 57 (Cooper Street, Wrenwood Lane, Lancaster Drive, Agawam)
- Piper Substation Area (including Canterbury Way and Piper Road, West Springfield)
- Ludlow (Booth Street, Robin Drive, Lyon Street, Ludlow)

(2) raise the 345/115 kV composite lines minimum conductor heights 30 feet above the minimum level modeled at:

- Cook Playground and the area of West Springfield High School and West Springfield Middle School (Morton St to WS Middle School);
- John Ashley School
- Bellamy Middle School

and (3) raise the easterly 115 kV lines minimum conductor heights 20 feet above the minimum level modeled in the following focus areas:

- South Fairmont (115 kV circuit 1601, East Springfield Jct to St Stanislaus Cemetery)
- North Fairmont (115 kV circuit 1601, Pendleton Ave to Fairmont Switching Station)

Since using taller structures is moderately costly, estimated as $0.903 million per mile (EFSB-RR-94(S)), and the cost-benefit ratio expressed in $/mG-house would be higher in less densely populated areas, raising the lines is not warranted outside of the focus areas.

5. Conclusion

With the implementation of conditions requiring the 345 kV circuit to be placed in the middle of three circuits from Agawam Substation to Chicopee Substation and 20 or 30 feet higher in focus areas, as described in Section V.F.4, above, the Siting Board finds that EMF impacts of the project will be minimized.

G. Consideration of Additional Visual Mitigation for Transmission Lines

In Section V.B.6, above, the Siting Board determined that further evaluation of potential visual impacts was warranted. Accordingly, mitigation of transmission line visual impacts is considered at greater length here.

Here, visual impacts might be mitigated by the following: (1) undergrounding the 345 kV line; (2) undergrounding one or more 115 kV lines; (3) individual structure location adjustments; (4) attention to small design elements to minimize visual intrusiveness; and (5) installation of visual barriers. These mitigation techniques are evaluated below.

Table 10, below, presents an overview of general visual mitigation choices, also showing EMF and construction impacts, cost, and feasibility of the potential visual mitigation. Table 8, in Section V.F.3, above, provides more detail on options, including both options to reduce EMF and options to mitigate visual impacts.

**Table 10. Overview of Visual Mitigation Design Options**

| Design Change | Visual Mitigation | EMF Mitigation | Cost/Feasibility/Other |
|---|---|---|---|
| Underground 345 kV | Improved | Large Improvement | Very high cost, construction noise and traffic, less tree clearing* |
| Underground one 115 kV | Improved | Little Improvement | High cost, construction noise, less tree clearing* |
| Underground two 115 kV and use H-frame for 345 kV | Improved | Worsened | High cost, construction noise* |
| Local pole adjustments | Small improvements | Minor | Varies |
| Simplify structural pieces | Small improvement | None | Minimal cost difference |
| Visual buffering | Varies | None | Varies |

* Higher traffic impacts would occur if an in-road alternative is selected for underground cable. Wetland impacts would occur in some areas for an in-ROW alternative.

1. Undergrounding for Visual Mitigation

The Company presented information on undergrounding either the 345 kV line, or one or two 115 kV lines, which would affect EMF and visual impacts. While undergrounding any of these lines would lessen the number of overhead structures and/or overhead conductors, there would still be monopoles and overhead conductors on the Northern Corridor under any of these options. In other words, the visual benefit of undergrounding would be moderate. The high cost to underground 345 kV or 115 kV components of the GSRP are described above in the context of EMF mitigation. As with EMF mitigation, the Siting Board concludes, on balance, that the potential benefits of undergrounding do not outweigh cost and other considerations.

2. Local Pole Adjustments

The Siting Board considered opportunities to adjust pole locations at a small number of specific locations, and also as a generic procedure for the Company to follow.[74]

a. Larchwood Street

Relative to its original proposal, WMECo stated that it could move both the 345/115 kV composite monopole and the single 115 kV monopole approximately 30 to 40 feet to the north at pole 48018 in West Springfield (Tr. 15, at 2569; EFSB-RR-72). This would move the poles away from the front yards of the closest houses, so that the poles would not be visible from the front windows, and also move the poles a bit further from Larchwood Street where it crosses the right-of-way. To reduce visual impacts, the Siting Board directs the Company to move the two poles at Larchwood Street in West Springfield approximately 30 to 40 feet to the north of the original proposed locations.

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74 In addition to these potential mitigation measures, WMECo reported on mitigation in the Schoolhouse Road neighborhood in Chicopee. Residents there had requested that the transmission lines be moved further from their houses and closer to the Mass Turnpike (Exh. EFSB-RV-3). This lateral shift puts the transmission lines further from the homes, but requires additional clearing of vegetation. WMECo indicated that this plan is feasible, is amenable to the change, and is working with the Mass Turnpike Authority to acquire easements (Exhs. WMECo-JCC-7, at 7, 8; EFSB-RV-3).

b. Paderewski and Granger Streets

In its original proposal, the project included four poles across near Paderewski Street in Chicopee because of small diversions from straight line construction over the Mass Turnpike at Granger Street, following the existing alignments; separate structures are typically required to support the additional strain at angles. Further analysis revealed that WMECo has adequate right-of-way, and pole placement opportunities exist on both sides of the Mass Turnpike, to allow the new transmission lines to be constructed straight across Granger Street and the Mass Turnpike, reducing four poles to the usual two for this cross-section (Tr. 17, at 2858; EFSB-RR-86). To reduce visual impacts, the Siting Board directs the Company to use tangent composite poles on a direct line at the Mass Turnpike crossing in Willimansett.

c. Pole Placement Plan

Visual impacts can potentially be reduced by moving pole locations away from houses and other visual receptors. In response to a request from the Siting Board, the Company prepared the June 2010 WMECO Plan for Minimizing the Visual Impacts of Final Pole Placement ("Pole Placement Plan") (Exh. WMECo-REC/JCC-12, at 6). The Pole Placement Plan outlines steps the Company could take: (1) to identify poles within 125 feet of houses that can potentially be beneficially relocated without offsetting adverse effects; (2) to inform owners of homes within 125 feet of potentially beneficial pole location adjustments; (3) to consult with the affected homeowners about potential pole relocation; (4) to make final determinations on pole placement if homeowners do not reach consensus; and (5) to file a compliance report after pole construction (Exhs. WMECo-REC/JCC-11, at 2; WMECo-REC/JCC-12, at 6). In discussing the Pole Placement Plan, the Company cautioned that its effect would likely be restricted to "fine tuning" due to various constraints on pole placement (Exh. WMECo-REC/JCC-11, at 2; WMECo-REC/JCC-12, at 1, 3). Where there are two circuits in the same right-of-way, the Company should place the pole for one circuit directly across from the pole for the second circuit rather than staggering them. Accordingly, the optimal solution for a given location may include moving a pair of structures the same distance in the same direction.

In discussing its Pole Placement Plan, the Company suggested limitations such that: (1) WMECo would not be required to consider any lateral movements requiring right-of-way

adjustments; (2) WMECo would be required to incur no or low additional cost (compared to screening costs for the same affected homeowners); and (3) WMECo's construction schedule would not be disrupted by timing requirements in any pole placement condition (Exh. WMECo-REC/JCC-12, at 2, 4, 5). With regard to the first suggested limitation, WMECo should consider all reasonably practical and beneficial pole location adjustments regardless of whether they require right-of-way adjustments. With regard to the second suggested limitation, WMECo should incur all reasonably practicable costs to implement the Pole Placement Plan. We agree with WMECo's third suggestion that Company should contact owners early enough to be able to implement the Pole Placement Plan without disrupting the construction schedule.

The Siting Board directs the Company to implement the WMECo Plan for Minimizing the Visual Impacts of Final Pole Placement, to consult with, and attempt to resolve the visual concerns of, the individual owners of homes within 125 feet of proposed poles that have the potential for beneficial pole location adjustments. Upon consensus with these homeowners, the Company shall relocate the structure or pair of structures to a nearby location and/or otherwise modify the structure(s). Upon completion of construction, the Company shall file a compliance report with the Siting Board describing its procedural compliance, all pole relocations that were proposed to homeowners, and the pole relocations and other modifications that were adopted as a result of implementing the Pole Placement Plan.

### 3. Simplify Structure Elements (Structure Matchings, Crossbar Design, Surface Treatment)

WMECo provided a 1974 internal document reviewing appropriate structure designs for various circumstances, "Overhead Transmission Policies and Practices – Northeast Utilities System" (Exh. EFSB-V-24(1)). The Company stated that monopoles have a modern appearance and occupy less ground space than most other structure types (Tr. 17, at 2894). The 1974 document further suggests that monopoles may be visually most appropriate for modern developed areas (Exh. EFSB-V-24(1)). Similarly, consistency of style is normally preferred, as feasible. Where there are two circuits in the same right-of-way, placing the pole for one circuit directly across from the pole for the second circuit provides a less cluttered appearance. Consequently, WMECo has proposed this approach, and to use a single style for the new

transmission structures. Absent necessary engineering or environmental constraints, and except as may be required to achieve consensus under the Company's Pole Placement Plan, in order to reduce visual impacts, the Siting Board directs the Company to place the pole of one line as nearly as practical directly across from the pole of the second line rather than staggering them.

We note that one of the lines of existing structures, with minor adaptations, is structurally adequate to carry one of the 115 kV circuits on the eastern end of the Northern Corridor, from Shawinigan Switching Station to Ludlow Substation (Exh. WMECo-JCC-3). In this area, new 345/115 kV composite monopoles will run parallel to older monopoles that will be used to carry the other 115 kV circuit (id.). The Siting Board considers this style combination to be acceptable.

The Company plans to use tapered steel monopoles for the project. For a tangent structure 130 feet high (i.e., not at an angle along the route), the base of the monopole would be just over four feet in diameter, with thicker poles required for angles (Exh. EFSB-V-30). The Company indicated that it is not practical to specify significantly less bulky poles for the project, due to the anticipated loads and available materials, and the limited ability to stay the towers with guy wires on such a narrow right-of-way (Exhs. EFSB-V-31; EFSB-V-34).

Along a considerable length of the Northern Corridor, one of the lines of structures will carry a 345 kV circuit on one side and a 115 kV circuit on the other side. Cross-bars, insulator strings, the number of conductors per phase (two versus one), and the diameter of the conductors all would normally be smaller on the 115 kV side than the 345 kV side. Lengthening the 115 kV cross-bar would increase the amount of right-of-way required for the 115 kV circuit, which would be disadvantageous on these narrow rights-of-way (Exh. EFSB-V-37; Tr. 17, at 2971). Without cross-bars of even length, using symmetric insulators and other components is not likely to be worthwhile.

As originally proposed, each side of the composite structure would have curved side-arms. The different curves that would result would emphasize the asymmetry. Using straight, horizontal side-arms on both sides of the composite monopoles would tend to appear as a single cross-bar from some angles or distances (Tr. 17, at 2967, 2973), lessening the visual clutter compared to having two differently curved separate side-arms. The Company indicated that the straight, horizontal tapered side-arm design would not increase costs (Exh. EFSB-V-38; Tr. 17,

at 2978, 2979). Horizontal side-arms can also be used on the non-composite structures for the project to provide visual consistency. Therefore, to minimize visual impacts, the Siting Board directs the Company to use straight, horizontal arms throughout the GSRP. In addition, the Siting Board directs the Company to install straight arms with the top edges horizontal, such that the top edge of the arms on both sides of the pole form a straight line (provided that they can be readily manufactured).

As with structure style, WMECo indicated that using consistent surface treatment helps give a less cluttered look for a project (Exh. EFSB-V-46). However, the Company also indicated that there is a consensus that a bright metal look fits in better both in developed and open areas, while a brown, weathered look fits in better in wooded areas; the Company suggested using the latter only south of Agawam or South Agawam (Exh. EFSB-V-24; Tr. 17, at 2984, 2997). Paint typically peels, leaving a mottled appearance or requiring costly maintenance (Exhs. EFSB-V-33; EFSB-V-46). As a result, WMECo proposes to use a galvanized finish on its monopoles from South Agawam Junction to Ludlow Substation and on the spurs, and a controlled weathering steel finish from the Connecticut border to South Agawam (Exh. EFSB-V-24). The Siting Board concurs with this approach. A galvanized finish may not be available for the widest diameter pole sections, due to a lack of manufacturing capability. However, the Company should make every effort to match finishes for even the largest oversize tower components.

4. Off-ROW Visual Buffers

In the past, the Siting Board has required companies to offer off-site visual mitigation such as vegetative buffers, fences, and/or window awnings to mitigate visual impacts from generating facility, transmission line and pipeline projects.[75] In a recent transmission line case, the Siting Board directed the Petitioners to offer to provide vegetative plantings in edge of right-of-way or off-ROW locations to residential properties near where the right-of-way crosses a

[75] In Massachusetts Municipal Wholesale Electric Company, 12 DOMSB 18, at 142 (2001), the Siting Board required MMWEC to implement measures to preserve trees, wooded areas and other features, and, to provide replacement plantings or other restoration for each piece of property over which MMWEC intended to acquire either a permanent or temporary easement.

road. Russell T-Line at 46.[76] In a Department transmission case issued two months ago, where WMECO was the petitioner, the Department required off-site mitigation to residences that directly abut or are located within the right-of-way. WMECo/AWS at 23. Here, the GSRP presents visual impacts beyond a typical transmission line for the following reasons:

- The routing of the transmission corridor for a project of this size through densely developed communities is unprecedented among transmission lines proposed to the EFSB in at least 25 years. There are a large number of homes located in close proximity to the transmission line.
- Selection of the Northern Alternative results in a significant increase in visual impacts to the communities along the Northern Corridor.
- The corridor is narrow, especially for the number and the bulk of the structures to be located within the right-of-way. The heights of the new structures range from approximately 30 percent to 60 percent taller than the existing structures.
- The composite structures are 130 feet tall, with 7.5-foot wide foundations and 5.5-foot diameter poles.
- The entire width of the right-of-way will be cleared; any vegetation that historically has served as a buffer for the existing 115 kV lines will be removed.

As discussed above, the Northern Corridor has a significant number of residential properties in close proximity to the right-of-way, of which most either cross or abut the edge of the right-of-way. Due to the extent of the proposed project, the right-of-way will be cleared of any existing buffer (Tr. 10, at 1774-1775). The loss of existing buffer coupled with the increased heights of the transmission structures and lines will create greater visual impacts on abutting residential properties (Exhs. EFSB-V-2-SP-1; EFSB-V-4-SP-1). Given the restrictions on planting new vegetation near the transmission lines (Exh. EFSB-V-21), a feasible alternative would be to increase landscaping and buffer using taller plantings on the residential properties abutting the right-of-way, referred to as off-site landscaping.[77]

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[76] In addition, the Siting Board required off-site landscaping near a switching station in NSTAR/Stoughton at 413.

[77] Visual mitigation for substations and switching stations is discussed in Section V.I, below.

a. Company Position

The Company asserts in its Brief that the mitigation plan ordered in WMECO/AWS is neither appropriate nor warranted for the proposed project (WMECO Initial Brief at 154). All of the Company's arguments, although phrased differently, concern the cost of the mitigation (id. at 154 to 156). Specifically, the Company points out that the length of the GSRP is long, with many properties along both potential route alternatives; therefore, the mitigation would be costly – for example, approximately $152 to $850 for each tree (id.). Although the Company disagrees with the general premise of off-site landscaping, it offered a smaller scale approach designed to be less costly, by providing some limited opportunities for off-site landscaping requests (id. at 156-158). This approach would: (1) not require notice to all landowners; (2) limit mitigation to those within a certain distance of a structure, rather than the distance to the edge of the right-of-way; (3) require abutting landowner to have a new adverse visual impact; (4) provide no further mitigation to those landowners compensated through easement agreements; (5) place a cap on the amount of mitigation for each individual landowner and for the whole project; and (6) provide funds directly to a landowner with the landowner responsible for purchasing the plantings, obtaining warranties for plant survivability and maintaining the landscaping (WMECO Initial Brief at 157). The Company offered to modify this approach during additional evidentiary hearings in June 2010.

b. Conclusion on Off-Site Visual Buffers

Because of the significant visual impact on a large number of homes along the narrow Northern Alternative right-of-way, the Siting Board finds that mitigation of the visual impacts of the GSRP requires an off-site mitigation plan. The Siting Board understands the Company's argument that implementation of such a plan could be costly due to the length of the project and the number of homes along the route. However, this is the exact reason that an off-site mitigation plan is necessary here, given the significant visual impacts along the entire route. Visual impacts of the GSRP would not be minimized if the Siting Board limited the number of impacted homes or other sensitive receptors receiving this mitigation, or placed burdensome constraints on the ability of property owners to benefit from visual mitigation.

Therefore, in order to minimize visual impacts, the Siting Board directs the Company to implement an off-site screening program to include the following requirements:

(a) upon completion of construction the Company will notify in writing by first class mail all owners of property located on or abutting the right-of-way and substations and switching stations of the option to request that the Company provide off-site screening. The Company will follow up with a phone call to non-responding property owners for whom a phone number is accessible. The off-site screening may include, but is not limited to, shrubs, trees, window awnings and fences, provided that the Company's operating and maintenance requirements for its right-of-way facilities are met;

(b) provide property owners with a selection of renderings of possible mitigation approaches. Such renderings shall be for guidance purposes only, and shall not limit a property owner's ability to request different mitigation;

(c) meet with each property owner who requests mitigation to determine the type of mitigation/screening package the Company will provide, provided that the Company has received a response from the property owner within three months of receipt of the Company's written notification;

(d) honor all property owners' requests for reasonable and feasible mitigation/screening that are submitted within six months of a meeting with the Company and/or its consultants;

(e) provide a warranty to property owners to ensure that all plantings are established and replaced if needed at the end of one year from the date of planting;

(f) submit to the Siting Board for its approval, at least three months before the conclusion of construction, a draft of the notification letter to property owners prior to mailing; and

(g) submit a compliance filing within 18 months of completion of construction detailing: (i) a list of all properties that were notified of the available off-site landscaping; (ii) the number of property owners that responded to the offer for off-site mitigation; (iii) a list of any property owners whose requests were not

honored, and the rationale therefore; (iv) a general description of the types of off-site landscaping provided; and (v) the average cost of landscaping per property, broken down by installation, material, and design costs.

5. Conclusion on Visual Impacts

With the implementation of conditions requiring WMECo to adjust pole locations as described in Section V.G.2, above; to laterally match structure locations, to use a single style for new transmission structures, and to use straight, tapered arms of which the top surface is horizontal (providing a straight line at the top of the arms) as described in Section V.G.3, above; and to offer off-ROW visual buffering as described in Section V.G.4, above; the Siting Board finds that, with respect to the transmission lines, visual impacts of the project along the Northern Alternative will be minimized.

H. Mitigation for Aircraft Operations

WARB intervened in the proceeding due to potential incompatibility between the proposed transmission lines and air traffic. Very large C-5 cargo planes operate out of WARB to support the U.S. military overseas (Tr. 21, at 3518). In the area of Cooley Brook, alongside the Mass Turnpike in Chicopee, there are presently two 115 kV circuits on a line of shared monopoles. These existing monopoles are typically 100 feet high (EFSB-RR-116(2)). The Company's proposal is to replace this line of monopoles with a line of typically 130-foot 115/345 kV composite monopoles, plus a parallel line of 100-foot monopoles for a single 115 kV circuit. The positions of the parties are summarized below, followed by options considered by the Siting Board and the Siting Board's conclusion.

1. WARB Concerns

WARB argues that the project, as proposed, conflicts with the Air Installation Compatibility Use Zone ("AICUZ") program of the U.S. Department of Defense, and would pose "a serious safety risk" (WARB Brief at 1). The U.S. Air Force AICUZ program objectives include: (1) assisting state and local officials in protecting public health, safety, and welfare by promoting compatible development around air installations; and (2) protecting Air Force operational capacity from incompatible land uses (WARB Brief at 6, citing Exh. WARB-DMN-2). WARB cited Air Force policy recommending that surrounding authorities prohibit certain types of new development within specified areas around runways including an area designated as a primary accident prevention zone ("APZ-1") (Exhs. WARB-DMH-2, Att 4; EFSB-RR-114).

There are two runways at WARB: Runway 5, which is longer, is oriented north-south; and Runway 33, which is relatively short and has an east-west orientation. The proposed project extends through designated APZ-1 zones off both runways at WARB, but WARB indicated it was more concerned about Runway 5, for which the APZ-1 zone includes the Cooley Brook area near the Mass Turnpike (EFSB-RR-111). WARB does not dispute that, currently, there are two 115 kV transmission lines on shared 100-foot monopoles in the APZ-1. WARB states, however, that it only makes land use recommendations about new lines, not existing lines (WARB Reply Brief at 4, 5). Thus, the Air Force makes no recommendation that operation of the existing 100-foot structures in the APZ-1 zone be removed.

The AICUZ recommends against new development in an APZ-1 for certain identified land uses, such as residential use, retail use, and a variety of other developments including "major above-ground transmission lines" (EFSB-RR-105). As a result, WARB requests "that the Siting Board site the transmission lines outside of the APZ I or require that the transmission lines transecting APZ I be placed underground" (WARB Brief at 12). WARB was unclear whether its recommendation referred to Runway 5 only (the primary runway at Westover) or also to Runway 33.

2. WMECo Position

WMECo correctly notes that all parties agree that the proposed project will comply with the Federal Aviation Administration ("FAA") requirement that no structures extend above a plane defined by a 50:1 glide slope and takeoff angle from the end of a runway ("50:1 glide path rule") (WMECo Initial Brief at 252). WMECo implicitly argues that the 50:1 glide path rule is the appropriate standard for considering possible hazards, not the voluntary AICUZ handbook.

WMECo points out that its proposed configuration complies with the AICUZ Handbook to the extent that, like the FAA, the AICUZ Handbook states that no obstructions should rise into the 50:1 glide slope/takeoff angle (id.). Furthermore, WMECo argues that the AICUZ program is voluntary and has accomplished its purpose by providing information to the Siting Board, which has the statutory responsibility to balance interests (id. at 253).

3. Options Considered by the Siting Board

The Siting Board considered the Company's proposal, full undergrounding, re-routing around the APZ-1, and lowering pole heights by widening the existing right-of-way. Three of these options are presented in Table 11, below, for the Runway 5 area.

**Table 11. Options for the Runway 5 Area**

| Options for APZ-1 Zone of Runway 5, in Chicopee: | Original WMECo proposal (Composite 345/115 pole plus separate 115 kV pole) | Use existing poles for one circuit; re-route 345 kV and one 115 kV circuit around APZ-1 zone. | Widen existing ROW and spread all three circuits onto H-frames for 1.5 miles across APZ-1 zone. |
|---|---|---|---|
| Obstruction under Westover flight path: | Maximum elevation of 130-foot poles, (265' asl) is higher than other structures in APZ-1 (Top of USPS building is 241' asl). RR-126 However, all are under 50:1 glide path. RR-116 | Existing line of 100-foot monopoles would remain in APZ-1. In addition, a line of composite poles (typical height 130'), twice as long, would course just outside the APZ-1 boundary. See RR-58 | Highest H-frames 40 feet shorter than original WMECo proposal, and 10 feet shorter than existing monopoles on same ROW to be removed. RR-116 |
| Visual impact: | Two lines of poles with a total of three sets of conductors visible from MassPike. | One set of poles along MassPike; another set of poles in mixed use area; double crossing of Chicopee River; double crossing of MassPike. | Three lines of poles with a total of three sets of conductors visible from MassPike. |
| ROW expansion: | ROW widens 25 feet in this area (FEIR mapsheet 54; RR-116) | New ROW includes developed and undeveloped areas. Residential, recreational, and undeveloped land would be affected and one house would need to be relocated. RR-122 | Additional 12 acres lateral expansion of ROW (typically 125 feet wider) in undeveloped, mostly wetland area. RR-116(2); RR-123 |
| Noise and traffic impacts: | Area is not close to residences. | ROW clearing and line installation in mixed use area. | Additional tree clearing, but none near residences. |
| Habitat impact: | Existing ROW is mostly cleared. Habitat and wetland impacts limited in this area. | Greatest adverse habitat and vegetation impacts of these alternatives. Impact to sensitive area along Chicopee River near rare species. RR-122 | Significantly more vegetation clearing, increased wetland impacts during construction, and increased area changed to shrub wetlands, compared to baseline proposal. |
| EMF impact: | EMF impacts located in undeveloped wetland that has no easy public access. | EMF impacts at ball field, and near residential development (EMF not quantified). | EMF impacts located in undeveloped wet area that has no easy public access. |
| Reliability impact: | Three circuits cross APZ-1 together, subject to disruption from a single plane crash. | Only one circuit would be disrupted in an APZ-1 crash. Wetland permitting difficulties are anticipated (including with the Army Corps) (RR-122). New ROW was not noticed; local residents may object, also delaying project timetable. | Three circuits cross APZ-1 slightly spread out, still subject to plane crash. Also, there could be some difficulty with wetland permitting. |
| Differential cost: | Baseline cost ($714 M for entire project) | Incremental cost $16.3 M over baseline. RR-122 | Incremental cost $0.7 M over baseline. RR-123 |

Exhs. WMECo-1; EFSB-RR-116; EFSB-RR-122; EFSB-RR-123; EFSB-RR-126; Tr. 11, at 1938, 1942.

a. WMECo's Original Proposal

The Company's original proposal has the lowest cost among the identified options, has the least wetland impact, and conforms to the FAA 50:1 glide path rule. However, it includes construction of new transmission lines within the APZ-1, which is contrary to zoning recommendations of the Air Force. Although it increases structure heights compared to the existing transmission line in the same location, the Company's original proposal is below the 50:1 glide path (Tr. 11, at 1941-1942).

b. Full Underground for Runway 5

Undergrounding all lines within the right-of-way would remove aerial transmission obstructions from the APZ-1. Assuming the Northern Alternative is selected for the 345 kV line, transition stations would be required on either end of the underground segment (Tr. 11, at 1949). Placing all lines underground would cost an estimated $96 million (EFSB-RR-56).[78] This alternative would impact wetlands in the area of Cooley Brook, and, according to the Company, undergrounding tends to reduce reliability (Exh. EFSB-U-22; Tr. 11, at 1935).

c. Re-Routing Around the APZ-1

The Company indicated that, were it required to conform to the Air Force recommendation, it would prefer to leave the existing structures in the APZ-1 in place for one 115 kV circuit and then run the 345 kV circuit and the other 115 kV circuit on shared poles around the edge of the APZ-1. While this option may well conform to the letter of AICUZ guidance, it is unclear that the presence of the existing transmission line combined with new 130-foot monopoles around the periphery of the APZ-1 would improve air safety. The new composite pole route would affect wetlands, residences, and recreational areas (Tr. 11, at 1956). There are also rare species near the area. The alternative would cost an incremental $16.3 million (EFSB-RR-122). Re-routing all three transmission lines around the APZ-1 would require two sets of poles around the periphery, affecting more receptors and costing more.

[78] If the Southern Alternative is selected for the 345 kV line, only the two 115 kV lines would need to be undergrounded and placing the two 115 kV lines underground would cost an estimated $39 million (EFSB-RR-56).

d. Widen Right-of-Way and Lower Structures

If the existing right-of-way were to be widened, typically by 125 feet, there would be room to construct each of the three transmission lines on its own set of H-frame structures, minimizing heights (EFSB-RR-116(2)). This option would put the transmission lines lower than the existing lines by approximately 10 feet (id.). WMECo stated, however, that under this option, wetland permitting applications pending with Chicopee, MADEP, and the U.S. Army Corps of Engineers would have to be revised (Tr. 29, at 4660). While this option requires conversion of red maple forested wetland to scrub-shrub or perhaps *Phragmites* wetland (id.; EFSB-RR-123), H-frames do not require the same massive foundations as monopoles. Options fully complying with the AICUZ all appear to have more severe wetland impacts than this alternative. The estimated incremental cost for this option is $0.7 million (EFSB-RR-123). Neither WMECo nor WARB believes this approach addresses their concerns.

4. Conclusion

The Company's proposal meets the FAA 50:1 glide path rule. No party has stated that the existing transmission lines would need to be moved in the absence of the GSRP.[79] The record contains no evidence that there would be a measurable benefit from avoiding a height increase, when that height increase remains within the 50:1 glide path rule.

Full undergrounding of the 345 kV line and two 115 kV lines through the APZ-1 for Runway 5 would be very expensive, would require transition stations, and would have impacts on the Cooley Brook wetlands. Re-routing around the APZ-1 would also be expensive and would have considerable environmental impacts, including impacting wetlands, rare species, residences, and recreational areas. Widening the right-of-way and lowering structures would be less expensive and have more limited environmental impacts than full undergrounding or re-routing, but WARB and the Company said that approach did not alleviate their concerns. Without any evidence that the lower height would provide a measurable safety benefit (which is the only reason that could make the H-frame plan better than the Company's proposal), the

79 WARB is not aware of ever having raised an issue of aircraft safety (or transmission reliability) impairment from the existing transmission lines (Tr. 21, at 3531).

Siting Board does not believe it warrants the additional costs and environmental impacts. Therefore, the Siting Board accepts the Company's original proposal.

I. Substations and Switching Stations

The GSRP consists of construction of two new switching stations, Fairmont and Cadwell; and modifications to the Agawam, Piper, Chicopee, Orchard, Breckwood and Ludlow Substations and the South Agawam and Shawinigan Switching Stations, to accommodate the new 115 kV improvements (Exh. WMECo-1, at 7-158). While, the Fairmont and Cadwell Switching Stations will entail new construction, the Agawam Substation and to a lesser extent, the Ludlow Substation, entail significant upgrades. The Agawam Substation and Fairmont Switching Station are located closest to residences. The Ludlow Substation is somewhat further from residences, while the Cadwell Switching Station will be located in an industrial area. Distances from the closest residence for each facility are as follows: (1) Fairmont Switching Station is 135 feet; (2) Agawam Substation is 25 feet; (3) Ludlow Substation is 320 feet; and (4) Cadwell Switching Station is over 850 feet (Exh. EFSB-NO-17).[80]

The modifications to the other six facilities - - the South Agawam and Shawinigan Switching Stations, and the Piper, Orchard, Chicopee, and Breckwood Substations -- will occur entirely within the existing fence lines and are relatively minor (Exh. WMECo-1, at 7-185 to 7-207; Tr. 14, at 2445). Impacts that will be associated with the construction of these facilities will be mostly confined to construction noise, which has been addressed through limitations on hours of construction, as described above (see Section V.B.5). However, while impacts to the above six substations and switching stations will be minor, and modifications will only occur inside the fence line, certain facilities presently do not have adequate landscaping in place to screen the existing equipment. Also, current landscaping around many of the substations has not been actively maintained (Exh. WMECo-V-12). Therefore, while additional equipment may not change the current view, this is an integrated project and all components are subject to Siting Board approval. Further, the Company is requesting exemptions from all the landscaping

80 The remaining substations and switching stations will have minimal construction work. Chicopee, East Springfield, Piper, Breckwood and Orchard Substations have residences located within 300 feet of their fence lines (EFSB-RR-68).

requirements contained in the Zoning Ordinances and Bylaws of the affected communities (see NSTAR/Stoughton at 368).

Specifically, the Chicopee Substation is bounded by Granby, Gratten and Columbia Streets in a residential area with homes to the east and south along Columbia Street and Gratten Street. The existing landscaping consists of some substantial buffer of arborvitae, hemlocks, and pine as well as minimal or spotty landscaping in some locations (Tr. 14, at 2447-2448; Exhs. WMECo-1, at Fig. 7-10; EFSB-V-18). The South Agawam Switching Station, Piper Substation and Shawinigan Switching Station are located in undeveloped or industrial areas; and the Breckwood Substation, located adjacent to the Western New England College, has tall white pine screening along all sides of its perimeter (Exh. EFSB-V-18; EFSB-WMECo-1, at Figs. 7-6, 7-7; EFSB-RR-69). Therefore, to ensure that the visual impacts of the GSRP are minimized at the Chicopee Substation, the Siting Board directs the Company to submit a preliminary landscaping plan for the Chicopee Substation to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Chicopee Substation for approval to the Board within three months following construction. The landscaping plan shall be developed in conjunction with the City of Chicopee, Chicopee Electric Light Department, and surrounding landowners and shall contain provisions for new, as well as supplementing existing, vegetative buffers of mature plantings along the perimeters of the Chicopee Substation to screen residential and pedestrian views into the substation.

In addition, the project requires the long-term use of sulfur hexafluoride ("$SF_6$") for circuit breakers for the new substation and switching station layouts, where new breakers will be gas-insulated. Presently, only the Ludlow Substation uses $SF_6$ breakers (Tr. 14, at 2463). $SF_6$ is a greenhouse gas, and the Company noted its policy is to reduce $SF_6$ emissions, and further that their equipment leak rate for $SF_6$ is low (id. at 2463-2464). The Company entered into a Memorandum of Understanding with the USEPA in 1999 to join the $SF_6$ Emission Reduction Partnership for Electric Power Systems (EFSB-RR-70). In conjunction with this agreement, the Company reports its $SF_6$ emissions annually to the USEPA; in addition Northeast Utilities has developed an $SF_6$ management program for all of its subsidiaries (id.).

A large number of heavy vehicles will be necessary to truck fill to and from substation locations, especially Fairmont Switching Station and Agawam Substation, in order to achieve a flat surface for substation components. The estimated numbers of trucks carrying 15 cubic yards of cut and fill are 6286 truck trips at Fairmont Switching Station, 2967 truck trips at Agawam Substation, and fewer at Cadwell Switching Station and Ludlow Substation (EFSB-RR-85(1)). In Section V.B.8, above, the Siting Board directed the Company to prepare a Traffic Management Plan, which will include addressing this issue of construction truck traffic.

Construction of the new Fairmont and Cadwell Switching Stations and modifications to the Agawam and Ludlow Substations, which will involve site grading and more use of heavy construction equipment, are discussed below.

1. Fairmont Switching Station

The current Fairmont Switching Station is located in Chicopee and is located on a 3.5-acre site on the corner of Prospect and Ingham Streets in a residential neighborhood (Exhs. WMECo-1, at 7-158; EFSB-V-12). As presently configured, the Fairmont Switching Station is not adequate to accommodate the planned system modifications associated with the GSRP, and significant upgrades would be needed (Exh. WMECo-1, at 159). The upgrades consist of eight new 115 kV circuit breakers and the replacement of six existing 115 kV circuit breakers (id.).[81]

The Company determined that re-building the existing Fairmont Switching Station rather than building a new switching station would be more expensive, costing approximately $16 million more, and could cause operating problems during construction (Exh. WMECo-1, at 7-163). The Company selected a 6.6-acre site, owned by Holyoke Gas and Electric, located directly across Prospect Street to the northeast of the existing site (id.).[82] There are anticipated

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[81] The new Fairmont Switching Station will be 125,000 square feet consisting of a 5-bay, breaker-and-a-half with 11 connection positions for the 115 kV lines (Exh. EFSB-V-11).

[82] The Company evaluated another site, also located along the existing 115 kV right-of-way but approximately 1.6 miles south of the existing Fairmont Substation, near East Springfield Junction (Exh. WMECo-16, at 3-6). It was determined that use of a site further away from the existing Fairmont Substation would necessitate rebuilding components of the existing substation in addition to building at this site (id. at 3-7).

impacts to approximately 0.7 acres of wetlands (Exh. WMECo-16, at 2-6; Tr. 14, at 2435). The site does not have any streams, vernal pools, or any priority habitat (Exh. WMECo-1, at 7-166). However, approximately 15,000 square feet of upland forest, consisting primarily of oaks, will be cleared along the western edge of the site (id.).

The new site is in the same residential neighborhood as the existing switching station. The closest residences are: (1) to the east of the site at the corner of Ingham and Frink Streets, approximately 130 feet from the nearest facility structure; (2) to the north of the site on Prospect Street, approximately 100 feet from the proposed fence line; and (3) to the south of the site on the west side of Prospect Street, approximately 400 feet from the proposed fence line (Exh. EFSB-V-12).

The new switching station will not contain any noise producing equipment, such as power transformers (Exh. EFSB-NO-8). However, the Company indicated that it may study adding autotransformers at the Fairmont Switching Station, which would produce noise (Exh. EFSB-NO-16). The Siting Board notes that if this were to occur, any additions to the Fairmont Switching Station would need to be reported to the Siting Board (see Section IX, below).

The Company has not yet developed a landscaping plan. However, the Company intends to include one with the work scope of the contractor, who has not yet been selected (Exh. EFSB-V-55; Tr. 29, at 4568). WMECo described the general approach it will use, which will consist of various size trees on the switching station property along Prospect Street and along the east property line (Exh. EFSB-V-16). The proposed plantings would range from 5 to 8-feet tall and consist of eastern white pine, Norway spruce, Canadian hemlock, eastern red cedar and American arborvitae (id.). The Company noted that it will provide the landscaping plan to the Siting Board when it is available (Exh. EFSB-V-55).

The new Fairmont Switching Station site is located in at the edge of a residential neighborhood in close proximity to houses on three sides. The existing Fairmont Switching Station is not landscaped and the facilities were tightly constrained on a smaller lot (Exh. EFSB-V-12). Here, the site is almost twice as large, albeit with more equipment, and landscaping along the perimeter of the fence will help to mitigate visual impacts for the surrounding neighborhood. The Company owns property outside of the fence line (Exh. WMECo-16, at 2-5 to 2-7).

Therefore, where feasible, landscaping should also be located a distance from the fence line in the event that following the fence line would interfere with proposed transmission lines and limit the amount of planting in those areas. Again, while the Company has given some preliminary thought to site landscaping, it has not provided a landscaping plan. The general approach described by the Company will naturally be expanded in a completed landscaping plan.

The Siting Board directs the Company to submit a preliminary landscaping plan for the Fairmont Switching Station to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Fairmont Switching Station for approval to the Board within three months following construction. The landscaping plan shall be developed in conjunction with the City of Chicopee, and surrounding landowners and shall contain provisions for: (1) the location, type, number and size of the trees and plantings; (2) landscaped buffers placed to the north, east, and south of the fence line, including deciduous trees of 10-12 feet or taller; and (3) landscaped areas outside of the direct perimeter of the fence line on-site if necessary to maintain clearance with transmission lines. Further, the Siting Board directs the Company to extend the offer of off-site visual mitigation, described in Section V.G.4.b, above, to those home owners along Prospect, Ingham, and Frink Streets, that have either a front, side or rear view of the switching station.

The construction of the new Fairmont Switching Station will require a significant number of workers (Tr. 14, at 2460). The Company has not yet determined where the lay down area will be or where workers will park, but it anticipates it may be either on the site itself, at the old Fairmont Switching Station site or a WMECo-owned site near the Prospect Street Substation (Tr. 14, at 2460-2461). In Section V.B.8, above, the Company, is directed to provide a project-wide Support Site and Substation/Switching Station Plan for Siting Board approval. The Siting Board requires that this issue be fully addressed in the Support Site and Substation/Switching Station Plan. Further, given the location of the existing Fairmont Switching Station in the middle of a residential neighborhood, the Siting Board directs the Company, upon completion of the new Fairmont Switching Station, to decommission and dismantle the existing switching station.

Although, the Company is planning to locate the new switchyard on the Holyoke Gas and Electric property, and there is a signed purchase and sale agreement for the property, at the time

of the proceedings the Company had not yet closed on the property (Exh.WMECo-JCC-7; Tr. 17, at 3016). The Company has posited that if site negotiations fail, WMECo would rebuild the switching station at the existing Fairmont site (Exh. WMECo-JCC-7, at 7; Tr. 14, at 2428-2430). The Company has therefore requested that the Siting Board consider both locations for the Fairmont Switching Station facility improvements. In the event that it becomes necessary to re-build on the existing site, the Company stated it will make a supplemental filing with all information needed to obtain approval of the existing site in lieu of the proposed site (id.).

As presented here, any approval for the GSRP project is based on the new Fairmont Switching Station being located at the Holyoke Gas and Electric property on Prospect Street. There is currently not enough information in the record to consider the existing Fairmont Switching Station as a viable site. In fact, any information concerning the existing site identifies the site as constrained and costly. If the Company is not able to acquire the Holyoke Gas and Electric site, the Company is required to submit a Project Change filing with the Siting Board.

2. Cadwell Switching Station

The new Cadwell Switching Station is necessary since the GSRP upgrades will increase the current-carrying ability of the 115 kV switchyard equipment at the East Springfield Substation. According to the Company, the transformation and distribution functions currently performed at the East Springfield Substation could be separated, and a new switching station was proposed as the solution (Exh. WMECo-1, at 7-167). The Company initially proposed to use its Springfield Work Center Site ("Work Center site"), located one-half mile northeast of the East Springfield Substation.[83] During the course of the Siting Board proceedings, the Company proposed a different location for the Cadwell Switching Station approximately 300 feet to the southwest, still along the 115 kV transmission right-of-way ("ROW site") (Exhs. WMECo-JCC-7; WMECo-16, at 2-9). The new location is proposed because of plans for the future interconnection of the Cadwell Switching Station with the proposed Palmer Renewable

[83] Six alternative sites located in the vicinity of the East Springfield Substation were initially identified by the Company. The Work Station site was deemed preferable due to the location along the right-of-way, negating costly interconnections, and the fact that the Work Station site was owned by the Company (Exh.WMECo-16, at 3-8 to 3-9).

Energy Project ("PREP") located at Palmer Paving (Exh. WMECo-JCC-7). Relocating the site closer to Palmer Paving would negate the need for a separate switching station for the PREP at the Palmer Paving site, and would alleviate the need to dismantle and relocate the Springfield Work Center facilities to make room for the Cadwell Switching Station (id.). The ROW site is located on WMECo property and partially on property owned by Palmer Paving, which will require that an additional 60-foot wide parcel to be acquired from Palmer Paving (id.).

Both sites are located in an industrial area, with the nearest residence for the ROW site 580 feet away and the nearest residence to the Work Center site 850 feet away (Exhs. EFSB-N-4(2); EFSB-NO-17; EFSB-NO-17-SP1). Neither the ROW site nor the Work Center site has any wetlands, streams, vernal pools, or any priority habitat, and the use of the ROW site will require less tree clearing (Exh. WMECo-JCC-7).

The new switching station will not contain any noise producing equipment, such as power transformers (Exh. EFSB-NO-8). However, the Cadwell Switching Station design at the Work Station site would be capable of accepting future additions of power transformers and distribution switchgear. Any transformers would still be located at the Work Center site, regardless of which site is ultimately used for the switching station (Exhs. EFSB-NO-16; EFSB-NO-16-SP1; Tr. 14, at 2424). The Siting Board notes that if in the future this new equipment were to be added to either site, these additions to the Cadwell Switching Station would need to be reported to the Siting Board (see Section IX, below).

Regardless of whether the PREP goes forward, the Company still proposes the ROW site as its first choice. While the Company is planning to locate the new switchyard on the Palmer Paving property, there is no signed purchase and sale agreement for the property. The Company has posited that if site negotiations fail, WMECo would rebuild the switching station at the Work Center site (Exh. WMECo-JCC-7, at 5). The Company has therefore requested that the Siting Board approve both locations for the Cadwell Switching Station.

Here, the two sites are located approximately 300 feet apart in an industrial area. Both sites have similar, minimal, environmental impacts, and the Company has provided sufficient information on both sites for the Siting Board to make a decision about the viability of using either site. Therefore, subject to the conditions on construction noise above, the Siting Board

finds that either the ROW site or the Work Center site is approved for the location of the new Cadwell Switching Station.

3. Agawam Substation

The Agawam Substation is located off of Maple Street in Agawam (Exh. WMECo-JCC-4). The new layout will move the northern fence line approximately five feet to the north at the west corner and 40 feet to the north at the east corner and move the eastern fence line approximately 15 feet to the east at the north east corner for a total 0.28 acres expansion (Exhs. WMECo-G-34; WMECo-JCC-4). Further, the 115 kV capacitor bank will be relocated outside the southern fence line at the south east corner, near Springfield Street, for an expansion area of 0.31 acres (id.).[84] In the vicinity of the proposed location of these new capacitor banks is a residence that WMECo will need to acquire (Tr. 14, at 2383-2384, 2386).

The Agawam Substation is in a residential neighborhood.[85] The closest residences are: (1) to the south of the site, approximately 25 feet from the nearest fence line (this home is scheduled to be acquired by WMECo); (2) to the west of the site is the Sutton Place Apartments, approximately 70 feet from the nearest fence line; and (3) to the north of the site on Prospect Street, approximately 160 feet from the proposed fence line (Exh. EFSB-NO-17).

There will also be work in the Agawam Substation area in conjunction with the Agawam-West Springfield Project for the relocation of the 115 kV lines associated with that project. The relocation of these 115 kV lines will result in an approximately one-half acre (40 feet wide by 500 feet long) decrease in wooded buffer between Prospect Street and the Agawam Substation. This planned tree clearing would leave a wooded buffer between the closest residence on Prospect Street and the substation of approximately 50 feet in depth. WMECo/AWS, D.P.U. 09-24/09-25, at 18. This 50-foot buffer near Prospect Street will remain,

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84 The new equipment will include a 345 kV switchyard with two 345/115 kV autotransformer banks, and two 345 kV breaker-and-a-half bays with four terminal positions for the two transmission lines and two transformer connections (Exh. EFSB-G-34).

85 Anticipated sound levels at the property line of the Agawam Substation increase by not more than 0.1 decibels, as modeled noise levels from transformers are lower than ambient sound levels (Exh. WMECo-1(5.6) at 8, 15).

as the clearing to the north for GSRP is predominantly located to the northeast, away from Prospect Street which is northwest of the substation (Exhs. WMECo-JCC-4; EFSB-G-35). In addition, there will be construction of an underground 115 kV line along a portion of the western edge of the site (Exh. WMECo-JCC-4).

The Company provided a landscaping plan that incorporated the existing wooded buffer between the substation and Prospect Street (Exh. EFSB-V-17-SP1). Bordering the western fence line of the Agawam Substation is the Sutton Place Apartments (Exhs. WMECo-JCC-4; EFSB-LU-21; EFSB-NO-17). Presently there is vegetative screening between the fence and the Sutton Place property line, and there is also screening on the Sutton Place property, with some gaps in this buffer (Exhs. WMECo-JCC-4; EFSB-V-17-SP1; Tr. 14, at 2396-2397). The Company proposed to plant ten 6 to 7-foot high arborvitae, three 3 to 4-foot verbena, and three 3 to 4-foot high bayberry in this area, on the WMECo property where there are currently gaps in the vegetative buffer (Exh. EFSB-V-17-SP1; Tr. 14, at 2396). In addition, three white pine and seven arborvitae will be placed along the southern portion of the site.

While the Company has submitted a landscaping plan for the Agawam Substation site, and buffer will be maintained and supplemented to screen the residential areas to the north and east, there is still the potential for additional screening, especially to the east and south of the facility. Therefore, to ensure that the visual impacts of the GSRP are minimized, the Siting Board directs the Company to submit a preliminary landscaping plan for the Agawam Substation to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Agawam Substation for approval to the Board within three months following construction. The landscaping plan shall be developed in conjunction with the Town of Agawam, and surrounding landowners and shall contain provisions for: (1) new, as well as supplementing existing, vegetative buffers of mature plantings along the western perimeter of the Agawam Substation to screen residential and pedestrian views from the Sutton Place Apartments, the access road to the facility, and Maple Street, including deciduous trees of 10-12 feet or taller (greater than 6-7 feet described in the original landscaping plan); and (2) for additional landscaping to the southern portion of the site near Springfield Street where the capacitors will be constructed. Further, the Siting Board directs the Company to extend the offer of off-site visual mitigation, described in

Section V.G.4.b, above, to those owners of homes along the facility access road and Maple Street which have either a front, side or rear view of the Agawam Substation.

With regard to the staging and lay down area in the vicinity of the Agawam Substation, the Company had originally identified the area to the southeast of the substation along Springfield Street, in the area where the new capacitors will be constructed (EFSB-RR-67; Tr. 14, at 2398-2399). The Company explained that its intent was to stage all of the employees in that area, away from the residents both at the Sutton Place apartments and the Prospect Street area, with the attendant noise from workers confined to that commercial area to the southeast (Tr. 14, at 2398-2400). Later, however, the Company determined that the area along Springfield Street is not acceptable for a staging and lay down area because there is a 17-foot grade difference between the southern portion of the Agawam Substation property and Springfield Street (EFSB-RR-67). Instead, the Company proposed the area along the substation access road from Maple Street, which is a residential area (id.; Exhs. EFSB-V-9; EFSB-LU-21; WMECo-1(5.1) at Mapsheet 3). The Siting Board is concerned with the proposal to locate this area along the access road, directly abutting residential areas. In Section V.B.8, above, the Company, is directed to provide a project-wide Support Site and Substation/Switching Station Plan for Siting Board approval. The Siting Board requires that this issue be fully addressed in the Support Site and Substation/Switching Station Plan.

The Agawam Substation borders a residential area, with the Sutton Place Apartments abutting the site to the west, the Prospect Street neighborhood to the northwest, and homes along the access road leading to the site and along Maple Street, approximately 300 feet from the substation. While there will be construction noise impacts, this will be somewhat addressed through limitations on hours of construction, above (see Section V.B.5). In addition, given that: (1) the Sutton Place Apartments and the Prospect Street neighborhoods are directly abutting the Agawam Substation: (2) substation construction and site clearing, while not continuous, will occur from late 2010 through early 2013: (3) and the Company has been in contact with representatives of both neighborhood groups (Exhs. EFSB-G-8; EFSB-G-37; EFSB-V-9-SP1); the Siting Board directs the Company to meet on a quarterly basis during construction, and/or as requested by management of the Sutton Place Apartments and representatives of the Prospect

Street neighborhood to provide updates, gather comments, and address complaints. Further, the Company is directed to notify these representatives of this directive.

4. Ludlow Substation

There will be both 345 kV and 115 kV modifications at the Ludlow Substation, consisting of the removal and replacement of autotransformers, new circuit breakers and the replacement of existing circuit breakers (Exhs. WMECo-1, at 5-101, 7-209; WMECo-JCC-11). The capacitors would be located in an area used primarily as a contractor laydown area that is outside the existing fence (Exh. WMECo-JCC-7). The placement of the new capacitors in the northeast of the site will require some clearing of this area. However, the residences to the east of the facility are not in this area, but are south of Center Street, approximately 550 feet away (Tr. 14, at 2451).

There are no wetlands, water sources, vernal pools, or any priority habitat in the immediate vicinity of the proposed work (Exh. WMECo-1, at 5-101). The new 354 kV line terminal structures will be 90 feet high, which is similar in height to the existing on-site structures (id.).

The nearest residence is located southwest of the facility, approximately 320 feet away (Exh. EFSB-NO-17). The area to the southwest will have some additional clearing due to new lines that need to have sufficient clearance (Tr. 14, at 2455). There are two homes to the southwest of the site along Center Street with back yards that abut the substation site (id.; Exhs. WMECo-JCC-7; WMECo-JCC-11). Currently, the Ludlow Substation does have varying degrees of planted, maintained landscaping along the south side of the facility that fronts Center Street.[86] Therefore, to ensure that the visual impacts of the GSRP are minimized, the Siting Board directs the Company to submit a preliminary landscaping plan for the Ludlow Substation to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Ludlow Substation for approval to the Board within three months following construction. The landscaping plan shall be developed in

[86] Saw Mill Road and Pine Glen Drive run perpendicular to Center Street, across from the Ludlow Substation (Exh. WMECo-16, App. D, Mapsheet 81A).

conjunction with the Town of Ludlow, and surrounding landowners and shall contain provisions for: (1) new, as well as supplementing existing, vegetative buffers of mature plantings along the southern perimeter of the Ludlow Substation to screen residential and pedestrian views from Center Street, Saw Mill Road and Pine Glen Drive into the substation; and (2) additional landscaping to the southwest where the new clearing for the 115 kV lines will occur. Further, the Siting Board directs the Company to extend the offer of off-site visual mitigation, described in Section V.G.4.b, above, to those home owners along Center Street which have either a front, side or rear view of the switching station.

The Ludlow Substation modifications consist of the replacement of noise producing equipment (Exh. EFSB-NO-8). A noise analysis estimated that the new transformer equipment will have a minimal increase on existing noise levels (approximately 0.1 dBA) (Exh. WMECo-1 (5.6) at 16). However, the Ludlow Substation is being designed for potential future installation of a third 345/115 kV autotransformer (Exh. EFSB-NO-16). The Siting Board notes that if in the future this new equipment were to be added, these additions to the Ludlow Substation would need to be reported to the Siting Board (see Section IX, below).

5. Conclusion on Substations

All of the landscaping plans described above will comport with the requirements mandated in Section V.G.4.b, to ensure that landscaping is established and maintained. In addition, any properties abutting any substation or switching station site will be provided with off-site visual mitigation as described in Section V.G.4.b, above. With the Company's proposed mitigation for substations and switching stations, and following compliance with conditions: (1) to screen the Agawam Substation, Fairmont Switching Station, Chicopee Substation, and Ludlow Substation; (2) to prepare a Support Site and Substation/Switching Station Plan; (3) to prepare a Traffic Mitigation Plan; and (4) to limit construction noise, the Siting Board finds that project impacts would be minimized with respect to substations and switching stations.

J. Conclusion

The Siting Board finds that the information provided by the Company regarding the project's environmental impacts is substantially accurate and complete. Based on the

information presented in Section V, above, the Siting Board finds that with the implementation of the specified mitigation and conditions, and compliance with all local, state and federal requirements, the environmental impacts of the proposed project along the Northern Alternative would be minimized.

Based on its review of the record, the Siting Board finds that the Company provided sufficient information regarding cost, reliability, and environmental impacts to allow the Siting Board to determine whether the project has achieved a proper balance among cost, reliability, and environmental impacts. The Siting Board finds that the proposed project along the Northern Alternative would achieve an appropriate balance among conflicting environmental concerns as well as between environmental impacts, reliability, and cost.

## VI. CONSISTENCY WITH POLICIES OF THE COMMONWEALTH

### A. Standard of Review

G.L. c. 164, § 69J requires the Siting Board to determine whether plans for construction of the applicant's new facilities are consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth.

### B. Analysis

#### 1. Health Policies

In Section 1 of the Electric Utility Restructuring Act of 1997, the Legislature declared that "electricity service is essential to the health and well-being of all residents of the Commonwealth . . . ." and that "reliable electric service is of utmost importance to the safety, health, and welfare of the Commonwealth's citizens . . . ." See c. 164 of the Acts of 1997, Section 1(a) and (h). In Section IV.B.3, above, the Siting Board found that the GSRP will improve the reliability of electric service in Greater Springfield. In addition, in Section V.B.9, the Siting Board requires the Company to use only retrofitted off-road construction vehicles to limit emissions of particulate matter during project construction. This condition is consistent with MADEP's Diesel Retrofit Program designed to address health concerns related to diesel emissions. In Section V, the Siting Board finds that the proposed project's EMF, traffic, air and hazardous material impacts have been minimized. Accordingly, subject to the specified mitigation and the Siting Board's conditions set forth below, the Siting Board finds that the

Company's plans for construction of the GSRP are consistent with the current health policies of the Commonwealth.

2. Environmental Protection Policies

In Sections V.B through V.J above, the Siting Board reviews how the GSRP will meet various state environmental protection requirements. The Siting Board also: (1) considers the project's environmental impacts, including those related to water, endangered species, land use, historical resources, air emissions, noise and visual impacts; and (2) concludes that subject to the specified mitigation and conditions set forth below, the project's environmental impacts have been minimized.

Subject to the specified mitigation and conditions set forth in this Decision, the Siting Board finds that the Company's plans for construction of the GSRP are consistent with the current environmental policies of the Commonwealth.

3. Resource Use and Development Polices

In 2007, pursuant to the Commonwealth's Smart Growth/Smart Energy policy produced by the Executive Office of Energy and Environmental Affairs, Governor Patrick established Sustainable Development Principles. Among the principles are (1) supporting the revitalization of city centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources and integrates uses; (2) encouraging reuse of existing sites, structures and infrastructure; and (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes. In Section V, the Siting Board reviews the process by which the Company sited the project. The Siting Board notes that the GSRP is designed to improve the reliability of the Greater Springfield electric system. The GSRP is located almost wholly within or adjacent to existing overhead utility rights-of-way. Finally, the GSRP is unlikely to impact water or historic resources.

Subject to the specific mitigation and the conditions set forth in this Decision, the Siting Board finds that the Company's plans for construction of the GSRP are consistent with the current resource use and development policies of the Commonwealth.

## VII. ZONING EXEMPTION AND SECTION 72

Pursuant to G.L. c. 40A, § 3, WMECo has requested individual and comprehensive zoning exemptions from the Town of Agawam, Town of West Springfield, City of Chicopee and City of Springfield Zoning Ordinances, and the Town of Ludlow Zoning Bylaws.

In accordance with G.L. c. 164, § 72, WMECo is seeking a determination that the proposed transmission facilities in the Towns of Agawam, West Springfield, and Ludlow and the Cities of Chicopee and Springfield are necessary and will serve the public convenience and be consistent with the public interest.

### A. Individual Zoning Exemptions

#### 1. Standard of Review

G.L. c. 40A, § 3 provides, in relevant part, that:

> Land or structures used, or to be used by a public service corporation may be exempted in particular respects from the operation of a zoning ordinance or by-law if, upon petition of the corporation, the [Department] shall, after notice given pursuant to section eleven and public hearing in the town or city, determine the exemptions required and find that the present or proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public . . .

G.L. c. 164, § 69H. Thus, a petitioner seeking exemption from a local zoning by-law under G.L. c. 40A, § 3 must meet three criteria.[87] First, the petitioner must qualify as a public service corporation. Save the Bay, Inc. v. Department of Public Utilities, 366 Mass. 667 (1975) ("Save the Bay"). Second, the petitioner must establish that it requires exemption from the zoning ordinance or by-law. Boston Gas Company, D.T.E. 00-24, at 3 (2001) ("Boston Gas/Danvers"). Finally, the petitioner must demonstrate that its present or proposed use of the land or structure is reasonably necessary for the public convenience or welfare. Massachusetts

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[87] G.L. c. 40A, § 3 is a Department statute. The Department refers zoning exemption cases to the Siting Board for hearing and decision pursuant to G.L. c. 25, § 4. When deciding cases under a Department statute, the Siting Board has the power and the duty "to accept for review and approval or rejection any application, petition or matter related to the need for, construction of, or siting of facilities referred by the chairman of the department . . . provided, however, that in reviewing such application, petition or matter, the board shall apply department and board standards in a consistent manner."

Electric Company, D.T.E. 01-77, at 4 (2002) ("MECo/Westford"); Tennessee Gas Pipeline Company, D.T.E. 01-57, at 3-4 (2002) ("Tennessee/Agawam").

2. Public Service Corporation

a. Standard of Review

In determining whether a petitioner qualifies as a "public service corporation" ("PSC") for the purposes of G.L. c. 40A, § 3, the Massachusetts Supreme Judicial Court has stated:

> among the pertinent considerations are whether the corporation is organized pursuant to an appropriate franchise from the State to provide for a necessity or convenience to the general public which could not be furnished through the ordinary channels of private business; whether the corporation is subject to the requisite degree of governmental control and regulation; and the nature of the public benefit to be derived from the service provided.

Save the Bay at 680. See also, Boston Gas/Danvers at 3-4; Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997).

b. Analysis and Conclusion

The Company is an electric company as defined by G.L. c. 164, § 1 and, as such, qualifies as a public service corporation (Exh. WMECo-4, at 3). New England Power Company, D.P.U. 09-27/09-28, at 7-8 (2010); WMECo/AWS at 7. Accordingly, the Siting Board finds that the Company is a public service corporation for the purposes of G.L. c. 40A, § 3.

3. Public Convenience or Welfare

a. Standard of Review

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. Save the Bay at 680; Town of Truro v. Department of Public Utilities, 365 Mass 407 (1979). Specifically, the Department is empowered and required to undertake "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964)

("NY Central RR"). When reviewing a petition for a zoning exemption under G.L. c. 40A, § 3, the Department is empowered and required to consider the public effects of the requested exemption in the State as a whole and upon the territory served by the applicant. Save the Bay at 685; NY Central RR at 592.

Therefore, when making a determination as to whether a petitioner's present or proposed use is reasonably necessary for the public convenience or welfare, the Department examines: (1) the need for, or public benefits of, the present or proposed use; (2) the present or proposed use and any alternatives or alternative sites identified;[88] and (3) the environmental impacts or any other impacts of the present or proposed use. The Department then balances the interests of the general public against the local interest and determines whether the present or proposed use of the land or structures is reasonably necessary for the convenience or welfare of the public. Boston Gas/Danvers at 2-6; MECo/Westford at 5-6; Tennessee/Agawam at 5-6; Tennessee Gas Pipeline Company, D.T.E. 98-33, at 4-5 (1998).

b. Analysis

With respect to need for, or public benefits of the GSRP, in Section III, the Siting Board finds that additional energy resources are needed for reliability of supply in Greater Springfield.

Regarding project alternatives, in Section IV, the Siting Board analyzes a number of project approaches other than the GSRP that the Company might use to meet the reliability need and found that the proposed approach is preferable to other approaches. The Siting Board also reviewed the Company's route selection process in Section V.A and found that the Company applied a reasonable set of criteria for identifying and evaluating routes to ensure that no clearly superior route was missed. The Siting Board also compared the benefits of the Northern and

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88 With respect to the particular site chosen by a petitioner, G.L. c. 40A, § 3 does not require the petitioner to demonstrate that its primary site is the best possible alternative, nor does the statute require the Department to consider and reject every possible alternative site presented. Rather, the availability of alternative sites, the efforts necessary to secure them, and the relative advantages and disadvantages of those sites are matters of fact bearing solely upon the main issue of whether the primary site is reasonably necessary for the convenience or welfare of the public. Martarano v. Department of Public Utilities, 401 Mass. 257, 265 (1987); NY Central RR at 591.

Southern Alternatives and concluded that the Northern Alternative is preferable to the Southern Alternative with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Finally, regarding GSRP impacts, in Sections V.B and Sections V.F, the Siting Board reviews the environmental impacts of the proposed project and finds, while the GSRP may result in local adverse impacts, generally, with the implementation of certain mitigation and conditions; the impacts of the proposed project would be minimized. The Siting Board also finds that area residents will benefit from the GSRP as it will improve the reliability of electricity delivery.

Based on the foregoing, the Siting Board finds that the general public interest in constructing the proposed project outweighs any adverse local impacts. Accordingly, the Siting Board finds that the proposed project is reasonably necessary for the convenience or welfare of the public.

4. Individual Exemptions Required

a. Standard of Review

In determining whether exemption from a particular provision of a zoning by-law is "required" for purposes of G.L. c. 40A, § 3, the Department looks to whether the exemption is necessary to allow construction or operation of the petitioner's project. See MECo/Westford at 4-5; Tennessee/Agawam D.T.E. 01-57, at 5; Western Massachusetts Electric Company, D.P.U/D.T.E. 99-35, at 4, 6-8 (1999); Tennessee Gas Company, D.P.U. 92-261, at 20-21 (1993).[89]

b. List of Exemptions Sought

The Company seeks exemption from the following provisions of the Agawam, West

[89] It is the petitioner's burden to identify the individual zoning provisions applicable to the proposed Project and then to establish on the record that exemption from each of those provisions is required: The Company is both in a better position to identify its needs, and has the responsibility to fully plead its own case . . . The Department fully expects that, henceforth, all public service corporations seeking exemptions under c. 40A, § 3 will identify fully and in a timely manner all exemptions that are necessary for the corporation to proceed with its proposed activities, so that the Department is provided ample opportunity to investigate the need for the required exemptions. New York Cellular Geographic Service Area, Inc., D.P.U. 94-44, at 18 (1995).

Springfield, Chicopee and Springfield Zoning Ordinances and Ludlow Zoning Bylaw in order to construct and operate the proposed project.

**Table 12: Agawam Individual Exemptions Sought**

| | **Zoning Exemption Requested** |
|---|---|
| **Use** | Article II, § 180-17;Article III, § 180-23<br>Article VI, §180-31;Article VII, §180-37<br>Article VIII, § 180-44;Article IX, §180-48<br>Article X, § 180-55;Article XI, §180-61 |
| **Height Regulations** | Article II, § 180-17;Article III, § 180-23<br>Article VI, §180-31;Article VII, §180-37<br>Article VIII, § 180-44;Article IX, §180-48<br>Article X, § 180-55;Article XI, §180-61<br>Article VIII, § 180-45; Article IX, § 180-49 |
| **Removal of Topsoil (Suppl. Regs)** | Article I, § 180-8G |
| **Site Plan Approval** | Article I, § 180-13 |
| **Vehicle Parking** | Article VIII, § 180-46<br>Article IX, § 180-50 |
| **Landscaping Requirements** | Article IX, § 180-53; Article X, § 180-60<br>Article XI, § 180-66 |
| **Lot Coverage** | Article VIII, § 180-47<br>Article IX, § 180-51 |
| **Fences (Suppl. Regs)** | Article I, § 180-8B |

**Table 13: West Springfield Individual Exemptions Sought**

| | Zoning Exemption Requested |
|---|---|
| **Uses** | Section V, 5.31, Table 5-1<br>Section V, 5.32, Table 5-2<br>Section V, 5.34, Table 5-3<br>Section V, 5.35, Table 5-4 |
| **Height Regulations** | Section VI, Table 6-2 |
| **Site Plan Review** | Section XIII, 13.21 |
| **River Protection District** | Section VII, 7.0 |
| **Flood Hazard Overlay District** | Section VII, 7.3 |
| **Off-Street Parking** | Section IX, 9.028, 9.029 |
| **Front, Side and Rear Yards** | Section VI, Tables 6-1A through 6-1J |
| **Landscaping – Mobile Home Districts** | Section IX, 9.71 |
| **Development Standards – Mobile Home** | Section IX, 9.8 |
| **Fences** | Section IX, 9.4 |

**Table 14: Chicopee Individual Exemptions Sought**

| | Zoning Exemption Requested |
|---|---|
| **Uses** | Article IV, § 275-58; Article IV, § 275-59<br>Article IV, §275-60; Article IV, § 275-61<br>Article IV, §275-62; Article IV, § 275-65 |
| **Height Regulations** | Article IV, § 275-52;Article IV, § 275-53<br>Article IV, § 275-58;Article IV, § 275-59<br>Article IV, § 275-60;Article IV, § 275-61<br>Article IV, § 275-62 |
| **Floodplain Zone** | Article VI, § 275-64 |
| **Soil Removal and Landfill** | Article III, § 275-31 |
| **Site Plan Review** | Article II, § 275-6 |
| **Off-Street Parking** | Article III, § 275-40 |
| **Setbacks** | Article IV, § 275-52;Article IV, § 275-53<br>Article IV, § 275-58;Article IV, § 275-59<br>Article IV, § 275-61;Article IV, § 275-62 |
| **Yards** | Article IV, § 275-52<br>Article IV, § 275-53 |
| **Rear and Side Yards in Business Districts** | Article IV, § 275-59 D.3 |
| **Fences** | Article III, § 275-44 |
| **Corner View Clearance** | Article III, § 275-33 |
| **Screening** | Article IV, § 275-62 |

**Table 15: Springfield Zoning Ordinance**

| | **Zoning Exemption Requested** |
|---|---|
| **Uses** | Article V, Section 501 |
| **Height Regulations** | Article V, Section 503<br>Article XIV, Section 1402 |
| **Floodplain District** | Article XIV-A |
| **Soil Removal** | Article XV, Section 1510.2 |
| **Off-Street Parking** | Article XVII, Sections 1700, 1701 |
| **Off-Street Loading** | Article XVII, Sections 1703, 1704 |
| **Public Street and Road Frontage And Access** | Article XV, Section 1502.1 |
| **Special Regulations for Industrial Districts** | Article XIV, Section 1404 |

**Table 16: Ludlow Zoning Bylaw**

| | **Zoning Exemption Requested** |
|---|---|
| **Uses** | Section III, 3.2.2 |
| **Stormwater Management** | Section V,5.5<br>Section VII, 7.2 |
| **Earth Removal** | Section VI, 6.1 |
| **Floodplain Overlay** | Section V, 5.0 |
| **Site Plan Approval** | Section VII, 7.1 |
| **Building Permit** | Section III, 3.0.1.1 |
| **Fences** | Section III, 3.0.4 |
| **Lots on Narrow Streets** | Section IV, 4.0.3 |
| **Front Yards** | Section IV, 4.0.1 and 4.0.7 |
| **Buffers Strips/Buffer Areas** | Section IV, 4.0.12 and 4.0.12(a) |
| **Parking Requirements** | Section VI, 6.4 |

Exhs. WMECo-4; WMECo-DDC-4

c. Community Input

All of the communities along the Northern Alternative have written letters of support for the Siting Board's granting of both specific and comprehensive zoning exemptions (Exhs. EFSB-Z-1(8); EFSB-Z-2-SP01(2); EFSB-Z-3(4); EFSB-Z-4(4); EFSB-Z-5(5); and WMECo-DDC-1). All of the communities along the Northern Alternative also have signed MOUs with WMECo, which include agreements regarding the zoning exemptions (Exhs. EFSB-Z-1-SP01; EFSB-Z-2-SP01; EFSB-Z-3-SP01; EFSB-Z-4-SP01; EFSB-Z-5-SP010). In addition, the Company

conducted outreach to the city and town governments (Exhs. EFSB-Z-1; EFSB-Z-2; EFSB-Z-3; EFSB-Z-4; EFSB-Z-5; WMECo-JPF-3; WMECo-DDC-1). The Company maintained that it is the preference of the cities and towns for the Siting Board to grant all of the necessary zoning exemptions in order to lessen the burden that otherwise would be placed on the resources of the communities in the zoning process (Exh. EFSB-Z-34).[90]

d. Discussion

The Company has identified the above-described provisions of the Agawam, West Springfield, Chicopee and Springfield Zoning Ordinances and Ludlow Zoning Bylaw from which it seeks exemption to minimize delay in the construction and ultimate operation of the proposed project.

The proposed project may not be an allowable use under the Agawam, West Springfield, and Chicopee Zoning Ordinances; and Public Utility Use requires Site Plan approval under Ludlow Zoning Bylaw (Exhs. WMECo-4, at 16, 19, 35, 43). Use variances are not allowed under the Agawam, Chicopee and Springfield Zoning Ordinances. Further, while use variances are allowed under the West Springfield Zoning Ordinance, the Siting Board concurs with the Company that obtaining a variance can cause undue delays and subject the project to a difficult legal standard to meet and uphold in court (Exh. WMECo-4, at 16). The Siting Board concludes the same factors apply to provisions for the Flood Hazard Overlay and River Protection Districts in Springfield; the and Floodplain Overlay District in Chicopee; fencing and setbacks for substations, switching stations, and/or access roads in Agawam, Chicopee, Springfield, Ludlow

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90 The Company filed its Zoning Exemption Petition before the issuance of Russell T-Line. See NSTAR Electric Company, D.P.U. 08-1, at 34-35 (2009). The Siting Board notes, however, that WMECo's actions here with respect to the cities and towns are consistent with the spirit and intent of EFSB 07-4 regarding communications with municipalities before filing zoning exemption petitions with the Siting Board. For instance, prior to filing the Zoning Exemption Petition, WMECo consulted with each municipality, informing each about the project and WMECo's plan to file for zoning exemptions from the Siting Board (Exhs. EFSB-Z-1; EFSB-Z-2; EFSB-Z-3; EFSB-Z-4; EFSB-Z-5). WMECo made a good faith effort to accommodate the reasonable recommendations of the municipalities with respect to the project. Moreover, as evidenced by the execution of the MOUs, each municipality has expressed support for the Zoning Exemption Petition.

and West Springfield; public street and road frontage access in Springfield; and landscaping and development standards for mobile home parks in West Springfield, given the potential necessity for variances under those provisions (Exh. WMECo-4, ¶¶ 33A, 46B, 67B, 78, 90, 90B, 90C, 90E, 90F)

The Siting Board notes that there is uncertainty for a number of these issues in each municipality as to whether: referenced height, parking and loading regulations, landscaping, lot coverage, corner view clearance, setbacks for transmission lines, screening, front yards, side and rear setbacks and yards, buffer strips and buffer areas, lots on narrow streets, and building permit requirements apply to the proposed project (Exh. WMECo-4, ¶¶ 30, 31, 33B, 36, 37, 39, 40,43, 46A, 46C, 46D, 46E, 48, 52, 53, 54, 55, 62, 67C, 67D, 67E, 70, 71, 75, 76, 79, 80, 88, 90D). If the provisions were to apply to the public utility use, the proposed project would exceed the height, lot coverage, fencing, setback regulations and would not meet the parking and loading, landscaping, buffer, and perhaps building permit requirements. While variances for height, parking and loading regulations, landscaping, lot coverage, corner view clearance, setbacks for transmission lines, screening, front yards, side and rear setbacks, buffer strips and buffer areas, screening and building permits are not prohibited under any of the zoning ordinances, obtaining a variance can cause undue delays and subject the project to a difficult legal standard.

With regard to the provisions relating to the permitting and reviews needed for removal of topsoil, adherence to stormwater management, locating in a floodplain zone, and site plan review, the Company maintains that exemptions are required as such reviews could cause delay and could result in burdensome or restrictive conditions that may interfere with established utility standards for safety and reliability (Exhs. WMECo-4, at ¶¶ 33, 41, 44, 45, 46, 56, 65, 66, 67, 73, 74, 80, 89; EFSB-Z-33). The Siting Board acknowledges that while these provisions do not on their face prevent the development of the proposed project, there is some likelihood that these provisions would result in an adverse outcome, a burdensome requirement, or an unnecessary delay as part of zoning review.

The Siting Board finds that the substantive sections of the Agawam, West Springfield, Chicopee and Springfield Zoning Ordinances, and the Ludlow Zoning Bylaw included in Tables 12 through 16 above, would or could affect the Company's ability to implement the project as

proposed. Accordingly, the Siting Board finds that WMECo has demonstrated that the requested zoning exemptions are required pursuant to G.L. c. 40A, § 3.

5. Conclusion on Request for Individual Zoning Exemptions

As described above, the Siting Board finds that: (1) WMECo is a public service corporation; (2) the proposed use is reasonably necessary for the public convenience or welfare; and (3) the specifically named zoning exemptions, as identified by WMECo, are required for purposes of G.L. c. 40A, § 3. There are a number of cities and towns affected by this project, each of which has expressed support for the requested zoning exemptions. Such support followed extensive outreach to the municipalities by the Company. Accordingly, we grant the Company's request for the individual zoning exemptions listed above in Tables 12 through 16.

B. Request for Comprehensive Zoning Exemptions

1. Standard of Review

The Company has requested a comprehensive exemption from the Agawam, West Springfield, Chicopee and Springfield Zoning Ordinances and Ludlow Zoning Bylaw. The Siting Board will grant such requests on a case-by-case basis and only where the applicant demonstrates that issuance of a comprehensive exemption could avoid substantial public harm by serving to prevent a delay in the construction and operation of the proposed use. Russell T Line at 72; WMECo, D.P.U. 09-24/09-25, at 34; NEP, D.P.U. 09-27/09-28, at 48.

2. The Company's Position

In addition to the individual exemptions stated above, the Company requests comprehensive zoning exemptions (Exh. WMECO-4, at 1).[91] WMECo asserts that granting

[91] Section 9.6 of the West Springfield Zoning Ordinance refers to Environmental Performance Standards, which address impacts relating to: dust, dirt, fly ash and smoke; odors; gases and fumes; noise; vibration; wastes; light, glare and heat; and, danger (Exh. WMECO-4, App. 2 at 9-28). Section 1511 of the Springfield Zoning Ordinance refers to Prohibited Uses and Performance Standards, which address impacts relating to: air pollution, water pollution, noise, vibration, nuisance odors, heat and glare, insects and rodents, and wastes and refuse (Exh.WMECO-4, App. 3 at XV-10). Section 9.6 contains exceptions for noise and vibration associated with construction activities (Exhs.

comprehensive exemptions is appropriate because the need for the proposed project is immediate, numerous exemptions are required, and any possible delays in project implementation could result in public harm (id. at ¶¶ 137, 139). The Company maintains that the zoning relief that would be needed to construct the proposed project is extensive and complex. (Exh. WMECo-4, at 76; Tr. 20, 3463- 3465). By nature, the local zoning process is unsuited to large, multi-community infrastructure projects (Exh. EFSB-Z-33). The Company asserts that a comprehensive exemption is necessary to assure the uniformity of zoning relief in all of the 30 different zoning districts in the five municipalities (Tr. 20, at 3445-3446).

According to WMECo, absent comprehensive zoning exemptions, the project could be delayed for numerous reasons including necessary project changes during construction or differing interpretation of zoning requirements by local officials, either of which could require further zoning review and subsequent court appeals (Exh. WMECo-4, at ¶¶ 141, 142; Tr. 20, at 3427, 3447, 3449-3452). WMECo also asserts that project delays could result if a Town changes its Zoning Ordinances during project construction (Exh. WMECO-2, at ¶ 144). The Company concludes that the need to commence the construction of the proposed reliability project without undue delay warrants the issuance of comprehensive zoning exemptions (id. at ¶ 145).

3. Analysis and Findings

Here, as discussed in Sections III and IV, above, the record shows that the GRSP is needed to address reliability of supply in Greater Springfield, and that there is a need for additional resources in Greater Springfield in order to meet reliability criteria. The Siting Board also notes that each city and town has expressed support for the Siting Board's issuance of comprehensive zoning exemptions from the municipalities' Zoning Ordinances. Such support followed extensive outreach to the municipalities by the Company. Specifically, prior to filing the Zoning Exemption Petition, the Company consulted with each municipality, informing each

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WMECO-4, App. 2 at 9-28; EFSB-Z-11). The Company asserts that its activities for the proposed project would meet both municipalities' Performance Standards during construction and operation, and therefore, it did not request an individual exemption from these sections (Exh. EFSB-Z-10).

about the project and the Company's plan to seek comprehensive zoning exemptions from the Siting Board, which efforts resulted in the execution of the MOUs. In addition, there is no opposition to the issuance of comprehensive exemptions in this case. A comprehensive exemption also will ensure uniformity in the development of a large project that spans five municipalities. Based on a consideration of the above case-specific circumstances, and with implementation of the conditions set forth below in Section IX, the Siting Board finds that given the existing need for new resources in Greater Springfield, moving this reliability-based project forward could avoid substantial public harm and is in the public interest.

However, as noted above, the Environmental Performance Standards of the West Springfield Zoning Ordinance Section 9.6, and Environmental Performance Standards of the Springfield Zoning Ordinance Section 1511 regulate not only the nature and characteristics of the facility to be constructed, but also the on-going operation of the proposed facility. Were the Siting Board to grant a comprehensive zoning exemption from the West Springfield Zoning Ordinance and the Springfield Zoning Ordinance, local zoning control over relevant environmental considerations listed in Section 9.6 and Section 1511, respectively, would no longer be applicable to the on-going operation of the proposed facility. See Braintree Electric Light Department, 16 DOMSB 78, at 186-187 (2008). The Company has testified that it is able to meet the requirements of both Section 9.6, and Section 1511, and further that Section 9.6 contains exceptions for impacts associated with noise and vibration during construction, and that it is a matter of interpretation whether or not Section 1511 applies to temporary conditions during construction (Exh. EFSB-Z-10; Tr. 20, at 3470, 3473).

Accordingly, the Siting Board approves WMECo's request for comprehensive exemptions from the Town of Agawam, Town of West Springfield, City of Chicopee and City of Springfield Zoning Ordinances, and the Town of Ludlow Zoning Bylaws, with the exception related to the enforcement of Section 9.6 of the West Springfield Zoning Ordinance and Section 1511 of the Springfield Zoning Ordinance. These comprehensive exemptions shall apply to the construction and operation of the proposed facility as described herein, to the extent applicable. See Planning Bd. of Braintree v. Department of Public Utilities, 420 Mass. 22, at 29 (1995).

C. Decision on G.L. c. 40A, § 3

The Siting Board finds pursuant to G.L. c. 40A, § 3 that construction and operation of the Company's proposed facility is reasonably necessary for the public convenience or welfare of the public. Accordingly, subject to the conditions set forth in Section IX, below, the Siting Board approves the Company's petition for an exemption from the provisions of the Town of Agawam, Town of West Springfield, City of Chicopee and City of Springfield Zoning Ordinances, and the Town of Ludlow Zoning Bylaws set forth in Tables 12 through 16, above. The Siting Board further approves the Company's petition for comprehensive exemptions from the Town of Agawam, Town of West Springfield, City of Chicopee and City of Springfield Zoning Ordinances, and the Town of Ludlow Zoning Bylaws, with the exception related to the enforcement of Section 9.6 of the West Springfield Zoning Ordinance and Section 1511 of the Springfield Zoning Ordinance.

D. Analysis under G.L. c. 164, § 72

1. Standard of Review

G. L. c. 164, § 72, requires, in relevant part, that an electric company seeking approval to construct a transmission line must file with the Department a petition for "authority to construct and use . . . a line for the transmission of electricity for distribution in some definite area or for supplying electricity to itself or to another electric company or to a municipal lighting plant for distribution and sale ... and shall represent that such line will or does serve the public convenience and is consistent with the public interest. . . . The [D]epartment, after notice and a public hearing in one or more of the towns affected, may determine that said line is necessary for the purpose alleged, and will serve the public convenience and is consistent with the public interest."[92]

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92 Pursuant to G.L. c. 164, § 72, the electric company must file with its petition a general description of the transmission line, a map or plan showing its general location, an estimate showing in reasonable detail the cost of the line, and such additional maps and information as the [Siting Board] requires.

The Department, in making a determination under G.L. c. 164, § 72, is to consider all aspects of the public interest. Boston Edison Company v. Town of Sudbury, 356 Mass. 406, 419 (1969). Section 72, for example, permits the Department to prescribe reasonable conditions for the protection of the public safety. Id. at 419-420. All factors affecting any phase of the public interest and public convenience must be weighed fairly by the Department in a determination under G.L. c. 164, § 72. Town of Sudbury v. Department of Public Utilities, 343 Mass. 428, 430 (1962). In evaluating petitions filed pursuant to G.L. c. 164, § 72, the Department relies on the standard of review established for G.L. c. 164, c. 40A, § 3 for determining whether the proposed project is reasonably necessary for the convenience or welfare of the public.

2. Analysis and Conclusion

Based on the record in this proceeding and the above analyses in Sections I through VI, and with implementation of the specified mitigation measure proposed by the Company and conditions set forth by the Siting Board in Section IX, below, the Siting Board finds pursuant to G.L. c. 164, § 72 that the proposed transmission facilities are necessary for the purpose alleged, will serve the public convenience, and are consistent with the public interest. Thus, the Siting Board approves the Section 72 Petition.

E. Section 61 Findings

The Massachusetts Environmental Policy Act ("MEPA") provides that "[a]ny determination made by an agency of the Commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." G.L. c. 30, § 61. Pursuant to 301 CMR § 11.01 (3), these findings are necessary when an Environmental Impact Report ("EIR") is submitted by a petitioner to the Secretary of Environmental Affairs, and should be based on such EIR. Where an EIR is not required, G.L. c. 30, § 61 findings are not necessary. 301 CMR § 11.01 (3). The record indicates that a DEIR and FEIR were required for the WMECo's proposed transmission

project and ancillary facilities. Therefore, a finding under G.L. c. 30, § 61 is necessary for the Company's Zoning Exemption Petition and its Section 72 Petition.[93]

The Siting Board recognizes the Commonwealth's policies relating to greenhouse gas emissions, including G.L. c. 30, § 61 and the Executive Office of Energy and Environmental Affairs Greenhouse Gas Emission Policy and Protocol. The Siting Board notes that this proposed project will have minimal greenhouse gas emissions as it is an overhead transmission. As such, the GSRP will not have direct emissions from a stationary source or indirect emissions from energy consumption. The Siting Board addresses indirect emissions from off-road construction vehicles and equipment in Section V.B.9.

In Section V, above, the Siting Board conducted a comprehensive analysis of the environmental impacts of the proposed transmission project and found that the impacts of the proposed transmission project along the primary route would be minimized and that the proposed project along the primary route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost. Accordingly, the Siting Board finds that all feasible measures have been taken to avoid or minimize the environmental impacts of the proposed facility.

## VIII. MONITORING PROJECT COST AND SCHEDULING ISSUES

### A. The Attorney General's Recommendations

The Attorney General recommends that the Siting Board monitor the construction progress and expenditures associated with the GSRP by requiring periodic compliance filings by WMECo to the Siting Board. According to the Attorney General, the compliance filing should be filed quarterly and include projected and actual construction costs, projected and actual segment completion dates, and explanations for any discrepancies between projected and actual costs and completion dates (Attorney General Initial Brief at 25-26, citing NSTAR Gas Company, D.P.U. 07-87, at 28 (2008) (Department required NSTAR to provide quarterly updates on construction costs for a natural gas pipeline)).

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93 The Siting Board is not required to make a G.L. c. 30, § 61 finding under G.L. c. 164, §69J as the Siting Board is exempt from MEPA filing requirements.

The GSRP is one of the largest and certainly the most expensive transmission construction project ever to be built in Massachusetts. Although the Siting Board does not have jurisdiction over regulatory cost recovery, the Siting Board's statutory mandate concerning the GSRP is to review the need for, *cost of*, and environmental impacts of transmission lines. G.L. c 164, § 69H (emphasis added). In order to review the costs of the GSRP, and in an effort to better understand the factors that may lead to cost overruns and delays in construction of Siting Board-approved facilities, we conclude that semi-annual compliance filings by WMECo to the Siting Board, as recommended by the Attorney General, are a reasonable and prudent condition to our approval of the GSRP. We direct WMECo to file semi-annual compliance reports with the Siting Board, starting within 60 days of the commencement of construction, that include projected and actual construction costs, projected and actual segment completion dates, and explanations for any discrepancies between projected and actual costs and completion dates.

B. MMWEC's Request for Construction Deadlines

MMWEC requests that the Siting Board, through the Department, condition approval of the GSRP on WMECo completing construction by December 31, 2013 (assuming Siting Board approval on or before June 30, 2010) (MMWEC Initial Brief at 10).[94] According to MMWEC, to the extent the GSRP is not completed on time, the Department, pursuant to G.L. c. 164, § 76, should enter a "show-cause" order requiring WMECo to appear before the Department and explain why the construction was not completed and why the Department should not open a docket to reduce the WMECo rate of return (MMWEC Initial Brief at 10). We decline to adopt MMWEC's request.

Based on the Attorney General's recommendation the Board will receive periodic information concerning the construction schedule and explanations for any delays from WMECo in semi-annual compliance filings. It is not necessary to establish a more detailed procedural framework to address potential construction delays at this juncture.

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94 MMWEC suggests that if the Siting Board approves the GSRP after June 30, 2010, the date by which WMECo must complete construction be adjusted accordingly (MMWEC Initial Brief at 10, n.4).

## IX. DECISION

The Siting Board's enabling statute requires the Siting Board to implement the provisions contained in G.L. c. 164, §§ 69H to 69Q, so as to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G.L. c. 164, § 69H. In addition, the statute requires that the Siting Board determine whether plans for the construction of energy facilities are consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth. G.L. c. 164, § 69J.

In Section III, above, the Siting Board found that additional energy resources are needed under certain contingencies to reliably serve Greater Springfield.

In Section IV, above, the Siting Board found that the GSRP is, on balance, superior to alternative project approaches in terms of reliability, cost, environmental impact, and in its ability to meet the identified need.

In Section V, above, the Siting Board found that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternatives to the proposed project in a manner which ensures that it has not overlooked or eliminated any routes which are clearly superior to the proposed project. The Siting Board also found that the Company has identified a range of practical transmission line routes with some measure of geographic diversity. As a result, the Siting Board found that WMECo has demonstrated that it examined a reasonable range of practical siting alternatives.

In Section V.A, above, the Siting Board found that the Northern Alternative is preferable to the Southern Alternative with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. In Section V.J, the Siting Board found that with the implementation of the specified mitigation and conditions, and compliance with all local, state and federal requirements, the environmental impacts of the proposed project would be minimized.

In Section VI, above, the Siting Board reviewed environmental impacts of the proposed transmission project in light of current health, environmental protection, and resource use and development policies as adopted by the Commonwealth. As evidenced by the findings in Section VI, the proposed GSRP along the Northern Alternative would be generally consistent

with the Commonwealth's health policies, environmental protection policies, and resource use and development policies.

Accordingly, the Siting Board approves the Company's petition to construct the GSRP using the Northern Alternative, as described herein, subject to the following Conditions A through Y:

In addition, the Siting Board has found pursuant to G.L. c. 164, § 72 that WMECo's proposed facilities are necessary for the purpose alleged, and will serve the public convenience and is consistent with the public interest, subject to the following Conditions A through Y.

In addition, the Siting Board has found pursuant to G.L. c. 40A, § 3 that construction and operation of the Company's proposed facilities are reasonably necessary for the public convenience or welfare. Accordingly, the Siting Board approves WMECo's petition for an exemption from certain provisions of the Zoning By-laws of Agawam, Chicopee, Ludlow, Springfield, and West Springfield, as enumerated in Section VII, above. The Siting Board further approves the Company's petition for a comprehensive exemption from the operation of the Zoning By-laws of Agawam, Chicopee, Ludlow, Springfield, and West Springfield, as described in Section VII, subject the the following Conditions A through Y.

A. The Siting Board directs the Company to confine construction-related tree-clearing at Sawmill Road in Ludlow to the period from late fall to early spring for the protection of wood turtles.

B. The Siting Board directs the Company to submit a Plan to the Siting Board at the time construction at the West Springfield High School commences, detailing the terms of a Company agreement with the Town and school officials with regard to acceptable construction hours and safety measures, to avoid or minimize construction conflicts with activities during school hours, scheduled games, and practices.

C. The Siting Board directs the Company, in consultation with the Town of West Springfield, to submit a preliminary landscaping plan for Cook Playground prior to commencement of construction. The Board further directs the Company to submit a final landscaping plan for Cook Playground for approval to the Board within three months following construction that includes provisions to: (1) place additional trees in and around the Cook Playground to minimize views to the extent possible of the proposed GSRP; and (2) establish additional shaded areas through the use of tall trees or other shade structures. Additionally, the Siting Board directs the Company in consultation with the Town of West Springfield, to submit a construction plan for Cook Playground for approval to the

Siting Board prior to the commencement of construction at that site that includes provisions to refrain from construction through the playground when the ballfield is in use for games or practice.

D. With respect to construction hours, the Siting Board first directs the Company to conduct no construction work on Sundays and holidays, absent unusual circumstances. Second, because the Northern Alternative is located in residential areas in close proximity to the edge of the right-of-way, absent unusual circumstances, WMECo shall limit construction activities along the entire route and at all substations and switching stations (with the exception of XS-3, XS-14, XS-19 and at the Cadwell Substation) to the hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, excluding holidays (for purposes of this sentence, circuit or equipment outages required for project construction and approved by CONVEX shall constitute "unusual circumstances" relieving all outage-dependent work activities from otherwise applicable hour and Saturday restrictions set forth in this sentence). Third, absent unusual circumstances, in XS-3, XS-14, XS-19 and at the Cadwell Substation, WMECo shall limit construction activities to the hours of 7:00 a.m. to 7:00 p.m., Monday through Saturday, excluding holidays.

E. The Siting Board directs the Company, in consultation with the Towns of Agawam, West Springfield, and Ludlow and the Cities of Chicopee and Springfield, to develop a community outreach plan for project construction. This outreach plan should, at a minimum, lay out procedures for providing prior notification to affected residents of: (a) the scheduled start, duration, and hours of construction; (b) any construction the Company intends to conduct that, due to unusual circumstances, must take place outside of the hours detailed above; and (c) complaint and response procedures including contact information, the availability of web-based project information, a dedicated project hotline for complaints, and protocols for notifying schools of upcoming construction.

F. The Siting Board directs the Company to submit for Siting Board approval a draft Support Site and Substation/Switching Station Plan, prior to the commencement of project construction, to be developed with input from the communities where the support sites will be located. The plan should include both a written description and map of the specific location of each support site including the boundaries of each support site, and a description of all of the activities that will occur at each site. The plan should describe: (a) the hours that activities will occur; (b) an estimate of the timeline for use of each support site; (c) the duration and location of police details and/or flagmen if proposed; (d) maintenance of the support site to avoid impacts to the surrounding properties; (e) use restrictions; (f) additional mitigation as appropriate; (g) plans to return the site to its original use and condition; and (h) a description of how community input was obtained.

G. The Siting Board directs the Company, in consultation with municipalities and Company contractors, to develop and implement a Traffic Management Plan to minimize traffic disruption, which includes, but is not limited to, the following measures: (1) signs erected to identify construction work zones; (2) police details and/or flagmen to direct traffic near public road crossings; (3) police details and/or flagmen to direct traffic at construction work sites along roads; and (4) anti-tracking pads to be installed at right-of-ways and substation access roads at intersections with public roads.

H. The Siting Board directs that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of project construction have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine. Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition and a list of retrofitted equipment, including type of equipment, make/model, model year, engine horsepower, and the type of emission control technology installed.

I. The Siting Board directs the Company, prior to the commencement of construction, to provide to the Siting Board a construction recycling plan, and at the end of construction to report on the Company's recycling rate.

J. The Siting Board directs the Company to configure lines and structures such that the 345 kV circuit is placed between two 115 kV circuits between the Agawam Substation and the Chicopee Substation.

K. In order to reduce EMF impacts, the Siting Board directs the Company to: (1) raise the 345/115 kV composite lines minimum conductor heights 20 feet above the minimum level modeled in the focus areas listed in Section V.F.4; (2) raise the 345/115 kV composite lines minimum conductor heights 30 feet above the minimum level modeled at the Cook Playground and the area of West Springfield High School and West Springfield Middle School, John Ashley School, and the Bellamy Middle School; and (3) raise the easterly 115 kV lines minimum conductor heights 20 feet above the minimum level modeled in the South and North Fairmont areas.

L. To reduce visual impacts, the Siting Board directs the Company to move the two poles at Larchwood Street in West Springfield approximately 30 to 40 feet to the north of the original proposed locations.

M. To reduce visual impacts, the Siting Board directs the Company to use tangent composite poles on a direct line at the Mass Turnpike crossing in Willimansett.

N. To reduce visual impacts, the Siting Board directs the Company to implement the WMECO Plan for Minimizing the Visual Impacts of Final Pole Placement, to consult with, and attempt to resolve the visual concerns of, the individual owners of homes within 125 feet of proposed poles that have the potential for beneficial pole location adjustments. Upon consensus with these homeowners, the Company shall relocate the structure or pair of structures to a nearby location and/or otherwise modify the structure(s). Upon completion of construction, the Company shall file a compliance report with the Siting Board describing its procedural compliance, all pole relocations that were proposed to homeowners, and the pole relocations and other modifications that were adopted as a result of implementing the Pole Placement Plan.

O. Absent necessary engineering or environmental constraints, and except as may be required to achieve consensus under the Company's Pole Placement Plan, in order to reduce visual impacts, the Siting Board directs the Company to place the pole of one line as nearly as practical directly across from the pole of the second line rather than staggering them.

P. To minimize visual impacts the Siting Board directs the Company to use straight, horizontal arms throughout the GSR. In addition, the Siting Board directs the Company to install straight arms with the top edges horizontal, such that the top edge of the arms on both sides of the pole form a straight line (provided that they can be readily manufactured).

Q. To minimize visual impacts, the Siting Board directs the Company to implement an off-site screening program to include the following requirements:
(a) upon completion of construction the Company will notify in writing by first class mail all owners of property located on or abutting the right-of-way and substations and switching stations of the option to request that the Company provide off-site screening. The Company will follow up with a phone call to non-responding property owners for whom a phone number is accessible. The off-site screening may include, but is not limited to, shrubs, trees, window awnings and fences, provided that the Company's operating and maintenance requirements for its right-of-way facilities are met;
(b) provide property owners with a selection of renderings of possible mitigation approaches. Such renderings shall be for guidance purposes only, and shall not limit a property owner's ability to request different mitigation;
(c) meet with each property owner who requests mitigation to determine the type of mitigation/screening package the Company will provide, provided that the Company has received a response from the property owner within three months of receipt of the Company's written notification;
(d) honor all property owners' requests for reasonable and feasible mitigation/screening that are submitted within six months of a meeting with the Company and/or its consultants;

(e) provide a warranty to property owners to ensure that all plantings are established and replaced if needed at the end of one year from the date of planting; (f) submit to the Siting Board for its approval, at least three months before the conclusion of construction, a draft of the notification letter to property owners prior to mailing; and
(g) submit a compliance filing within 18 months of completion of construction detailing: (i) a list of all properties that were notified of the available off-site landscaping; (ii) the number of property owners that responded to the offer for off-site mitigation; (iii) a list of any property owners whose requests were not honored, and the rationale therefore; (iv) a general description of the types of off-site landscaping provided; and (v) the average cost of landscaping per property, broken down by installation, material, and design costs.

R. The Siting Board directs the Company to submit a preliminary landscaping plan for the Chicopee Substation to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Chicopee Substation for approval to the Board within three months following construction. The landscaping plan shall be developed in conjunction with the City of Chicopee, the Chicopee Electric Light Department, and surrounding landowners and shall contain provisions for new, as well as supplementing existing, vegetative buffers of mature plantings along the perimeters of the Chicopee Substation to screen residential and pedestrian views into the substation.

S. The Siting Board directs the Company to submit a preliminary landscaping plan for the Fairmont Switching Station to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Fairmont Switching Station for approval to the Board within three months following construction. The landscaping plan shall be developed in conjunction with the City of Chicopee, and surrounding landowners and shall contain provisions for: (1) the location, type, number and size of the trees and plantings; (2) landscaped buffers placed to the north, east, and south of the fence line, including deciduous trees of 10-12 feet or taller; and (3) landscaped areas outside of the direct perimeter of the fence line on-site if necessary to maintain clearance with transmission lines. Further, the Siting Board directs the Company to extend the offer of off-site visual mitigation, described in Condition Q, above, to those home owners along Prospect, Ingham, and Frink Streets, that have either a front, side or rear view of the switching station.

T. The Siting Board directs the Company, upon completion of the new Fairmont Switching Station, to decommission and dismantle the existing switching station.

U. The Siting Board directs the Company to submit a preliminary landscaping plan for the Agawam Substation to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Agawam

Substation for approval to the Board within three months following construction. The landscaping plan shall be developed in conjunction with the Town of Agawam, and surrounding landowners and shall contain provisions for: (1) new, as well as supplementing existing, vegetative buffers of mature plantings along the western perimeter of the Agawam Substation to screen residential and pedestrian views from the Sutton Place Apartments, the access road to the facility, and Maple Street, including deciduous trees of 10-12 feet or taller (greater than 6-7 feet described in the original landscaping plan); and (2) additional landscaping to the southern portion of the site near Springfield Street where the capacitors will be constructed. Further, the Siting Board directs the Company to extend the offer of off-site visual mitigation, described in Condition Q, above, to those owners of homes along the access road and Maple Street which have either a front, side or rear view of the Agawam Substation.

V. The Siting Board directs the Company to meet on a quarterly basis during construction, and/or as requested by management of the Sutton Place Apartments and representatives of the Prospect Street neighborhood to provide updates, gather comments, and address complaints. Further, the Company is directed to notify these representatives of this directive.

W. The Siting Board directs the Company to submit a preliminary landscaping plan for the Ludlow Substation to the Board prior to the commencement of construction. The Siting Board further directs the Company to submit a final landscaping plan for the Ludlow Substation for approval to the Board within three months following construction. The landscaping plan shall be developed in conjunction with the Town of Ludlow, and surrounding landowners and shall contain provisions for: (1) new, as well as supplementing existing, vegetative buffers of mature plantings along the southern perimeter of the Ludlow Substation to screen residential and pedestrian views from Center Street, Saw Mill Road and Pine Glen Drive into the substation; and (2) additional landscaping to the southwest where the new clearing for the 115 kV lines will occur. Further, the Siting Board directs the Company to extend the offer of off-site visual mitigation, described in Condition Q, above, to those home owners along Center Street which have either a front, side or rear view of the switching station.

X. The Siting Board directs the Company to file semi-annual compliance reports with the Siting Board, starting within 60 days of the commencement of construction, that include projected and actual construction costs, projected and actual segment completion dates, and explanations for any discrepancies between projected and actual costs and completion dates.

Y. The Siting Board directs the Company that under its continuing vegetative management program, that any application of herbicides must be consistent with utility right-of-way Integrated Vegetation Management Practices and applicable rules and regulations of the Commonwealth.

Because the issues addressed in this Decision relative to this facility are subject to change over time, construction of the proposed facility must commence within three years of the date of this Decision.

The Siting Board notes that the findings in this decision are based on the record in this case. WMECo has an absolute obligation to construct and operate its facilities in conformance with all aspects of its proposal as presented to the Siting Board. Therefore, the Siting Board requires the Company to notify the Siting Board of any changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. The Company is obligated to provide the Siting Board with sufficient information on changes to the proposed project to enable the Siting Board to make these determinations.

The Company shall to serve a certified copy of this decision on the Towns of Agawam, West Springfield, and Ludlow, and the Cities of Chicopee and Springfield; and the Town Councils of Agawam, West Springfield, and Ludlow and the City Councils of Chicopee and Springfield; the Planning Boards of the Towns of Agawam, West Springfield, and Ludlow and the Cities of Chicopee and Springfield; the Zoning Boards of Appeals of the Towns of Agawam, West Springfield, and Ludlow and the Cities of Chicopee and Springfield, within five days of its issuance. The Company shall certify to the Secretary of the Department within ten business days of its issuance that such service has been made.

Stephen H. August
Presiding Officer

Dated this 28th day of September, 2010

APPROVED by the Energy Facilities Siting Board at its meeting of September 23, 2010, by the members and designees present and voting. Voting for approval of the Tentative Decision, as amended: Kenneth L. Kimmell, General Counsel for the Executive Office of Energy and Environmental Affairs (Acting Energy Facilities Siting Board Chair/Designee for Ian A. Bowles, Secretary, Executive Office of Energy and Environmental Affairs); Jolette A. Westbrook, Commissioner, Department of Public Utilities; Robert Sydney (Designee for Commissioner, Department of Energy Resources); James Colman (Designee for Commissioner, Department of Environmental Protection); Robert Mitchell (Designee for Secretary, Executive Office of Housing and Economic Development); Dan Kuhs, Public Member; and Penn Loh, Public Member.

Kenneth L. Kimmell, Acting Chair
Energy Facilities Siting Board

Dated this 28th day of September, 2010

Appeal as to matters of law from any final decision, order or ruling of the Siting Board may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the order of the Siting Board be modified or set aside in whole or in part. Such petition for appeal shall be filed with the Siting Board within twenty days after the date of service of the decision, order or ruling of the Siting Board, or within such further time as the Siting Board may allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the clerk of said court. (Massachusetts General Laws, Chapter 25, Sec. 5; Chapter 164, Sec. 69P).

**Appendix: Elements of Greater Springfield Reliability Project**

The GSRP will consist of the following components:

**345-kV Facilities**

Modify the 345-kV switchyard at the Ludlow Substation to connect the new Ludlow – Agawam 345-kV circuit; reconnect the existing 345-kV Ludlow – Carpenter Hill (CT) 301 circuit, reconnect the existing 345-kV Ludlow – Barbour Hill (CT) 3419 circuit; replace the existing two 345/115-kV, three-phase 600-MVA autotransformers with two new standard 345/115-kV, 600-MVA autotransformers (each employing three single-phase 200-MVA units).[95]

Build a new 345-kV switchyard at the existing Agawam Substation to connect the new 345-kV Ludlow – Agawam circuit, the new 345-kV Agawam to North Bloomfield (CT) circuit, and two new 345/115-kV, 600-MVA autotransformers.

Build a new 345-kV circuit from Ludlow Substation to Agawam Substation, for approximately 16.7 miles, using two bundled 1590 kcmil steel-supported aluminum conductors ("ACSS") per phase.

Build a new 345-kV circuit from Agawam Substation to the North Bloomfield (CT) Substation, for approximately 18.0 miles (approximately 6.0 miles of which is in Massachusetts), using two 1590 kcmil ACSS conductors per phase.

**115 kV Facilities**

Rebuild the existing 115-kV Fairmont Switching Station at a nearby site to connect the existing circuits interconnecting at the station and the two replacement 115-kV circuit segments from East Springfield Junction.

Build a new 115-kV switching station in the vicinity of the East Springfield Substation ("Cadwell"). Cadwell will interconnect the 115-kV 1481, 1426, 1603, 5001 and 5002 circuits.

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95 Although originally planned for the Ludlow Substation, two new 345-kV 120-MVAR capacitor banks will no longer be needed as a result of the CSC's decision on July 20, 2010 to reconsider its earlier denial without prejudice and to grant a Certificate of Environmental Compatibility and Public Need for the Manchester Substation to Meekville Junction Circuit Separation Project Variation in Manchester, Connecticut. The cost of the capacitor banks is approximately $10 million. Findings of Fact (Reconsideration), Docket No. 370A MR, at ¶ 55 (July 20, 2010).

Rebuild the 115-kV Ludlow – Shawinigan 1845 circuit, for approximately 6.2 miles, using two 1272-kcmil ACSS conductors per phase. This 115-kV circuit will share double-circuit structures with the new 345-kV Ludlow – Agawam circuit.

Reconductor the 115-kV Ludlow – Cadwell (formerly East Springfield) 1481 circuit, for approximately 7.3 miles, using a single 1590-kcmil ACSS conductor per phase, adding side guys, strain conversions, and a small number of new structures. Where parallel, the 1481 and 1552 circuits will share double-circuit monopole structures, as will the 1481 and 1426 circuits.

Reconductor the 115-kV Ludlow – Orchard 1552 circuit, for approximately 5.5 miles, using a single 1272-kcmil ACSS conductor per phase, adding side guys, strain conversions, and a small number of new structures. Where parallel, the 1481 and 1552 circuits will share double-circuit monopole structures.

Rebuild the 115-kV Orchard – Cadwell (formerly East Springfield) 1426 circuit, for approximately 3.2 miles, using a single 1272-kcmil ACSS conductor per phase, adding side guys, strain conversions, and a small number of new structures. Where parallel, the 1481 and 1426 circuits will share double-circuit monopole structures.

Rebuild the 115-kV Shawinigan – Fairmont portions of the former 1254 circuit (to be designated circuit 1604), for approximately 5.0 miles, using two 1272-kcmil ACSS conductors per phase on single-circuit monopole structures.

Rebuild the 115-kV Cadwell (formerly East Springfield) – Fairmont portions of the former 1723 circuit (to be designated circuit 1603), for approximately 5.3 miles, using two 1272-kcmil ACSS conductors per phase. The re-built circuit will share double circuit structures with the new 345-kV Ludlow – Agawam circuit east of East Springfield Junction and with the 115-kV Fairmont to Chicopee 1602 circuit north of East Springfield Junction.

Rebuild the 115-kV Fairmont – Chicopee portions of the former 1254 circuit (to be designated circuit 1602), for approximately 2.4 miles, using a single 1272-kcmil ACSS conductor per phase. The re-built circuit will share double-circuit structures with the new 345-kV Ludlow – Agawam circuit west of East Springfield Junction and with the 115-kV Fairmont – Cadwell 1603 circuit north of East Springfield Junction.

Rebuild the 115-kV Fairmont – Piper portions of the former 1723 circuit (to be designated circuit 1601), for approximately 5.9 miles, using a single 1272-kcmil ACSS conductor per phase on single-circuit monopole structures. An outcome of the above-described re-building of 115-kV circuits to Fairmont will be three monopole lines supporting sections of four two-terminal 115-kV circuits (1601, 1602, 1603 and 1604 between East Springfield Junction and Fairmont Switching Station. The 1602 and 1603 lines will share a common double-circuit monopole structure in this section.

Rebuild the 115-kV Piper – Agawam 1230 circuit, for approximately 3.6 miles, using a single 1272-kcmil ACSS conductor per phase. The circuit will be constructed on single-circuit monopole structures.

Rebuild the 115-kV Chicopee – Agawam 1314 circuit, for approximately 7.1 miles, using a single 1272-kcmil ACSS conductor per phase. The circuit will share double-circuit monopole structures with the new 345-kV Ludlow – Agawam circuit.

Rebuild the 115-kV Agawam – Silver – South Agawam 1782 circuit, for approximately 3.0 miles, using a single 1272-kcmil ACSS conductor per phase on single-circuit monopole structures.

Rebuild the 115-kV Agawam – Silver – South Agawam 1781 circuit, for approximately 3.0 miles, using a single 1272-kcmil ACSS conductor per phase. The circuit will share double-circuit monopole structures with the new 345-kV Agawam – North Bloomfield circuit.

Re-configure the existing 115-kV transmission system between the South Agawam Switching Station and the Southwick Substation in western Massachusetts, forming a single South Agawam to Southwick 115-kV circuit 1768 with no connections to North Bloomfield Substation.

Rebuild the Agawam portion of the new 115-kV Southwick – South Agawam 1768 circuit, for approximately 2.5 miles, using a single 1272-kcmil ACSR conductor per phase. This portion of the circuit will share double-circuit monopole structures with the new 345-kV Agawam to North Bloomfield circuit.

Use the existing 115-kV line sections, for about 0.6 miles, between the new Cadwell Switching Station and the East Springfield Substation for two new Cadwell to East Springfield circuits. The new 115-kV 5001 circuit will utilize two 336-kcmil ACSR conductors per phase, and the new 115-kV 5002 circuit will utilize a single 1113-kcmil ACSR conductor per phase.

Leave normally open a 115-kV bus-tie circuit breaker at the Breckwood Substation to split the substation and install a circuit switcher to normally bypass the existing series reactor on the 1322 circuit. A portion of the distribution load served by Breckwood Substation will be fed radially by the 115-kV underground cable 1322 circuit from the East Springfield Substation. The other portion of the distribution load will be fed radially by the 115-kV underground 1433 circuit from the West Springfield Substation. The open bus-tie breaker will automatically close upon and during the outage of either 115-kV circuit.

Replace limiting circuit breakers and terminal equipment at the Agawam and Ludlow Substations, and at Shawinigan Switching Station. Make minor modifications at Orchard, Chicopee, East Springfield, Piper and Southwick Substations and South Agawam Switching Station.

**COMMONWEALTH OF MASSACHUSETTS**
**ENERGY FACILITIES SITING BOARD**

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|---|---|---|
| In the Matter of the Petition of New England Power Company d/b/a National Grid for Approval to Construct a 115 kV Underground Transmission Line in the City of Worcester | ) | EFSB 09-1 |
| In the Matter of the Petition of New England Power Company d/b/a National Grid for a Determination that the Proposed 115 kV Transmission Line is Necessary and Will Serve the Public Convenience and be Consistent with the Public Interest | ) | D.P.U. 09-52 |
| In the Matter of the Petition of New England Power Company d/b/a National Grid for Exemptions from the City of Worcester Zoning Ordinance and the Town of Millbury Zoning Bylaw | ) | D.P.U. 09-53 |

FINAL DECISION

M. Kathryn Sedor
Presiding Officer
March 14, 2011

On the Decision:
William Febiger
Heidi J. Green
Enid Kumin

APPEARANCES: James M. Avery, Esq.
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FOR: New England Power Company
d/b/a National Grid
Petitioner

-and-

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National Grid
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Waltham, MA 02451-1120

FOR: New England Power Company
d/b/a National Grid
Petitioner

TABLE OF CONTENTS

Pursuant to G.L. c. 164, § 69J, the Energy Facilities Siting Board ("Siting Board") hereby approves, subject to the conditions set forth below, the petition of New England Power Company, d/b/a National Grid ("National Grid" or "Company"),[1] for approval to construct a new approximately 3.5-mile-long,[2] 115-kilovolt ("kV") underground transmission line between the Vernon Hill No. 8 ("Vernon Hill") and Bloomingdale No. 27 ("Bloomingdale") substations in Worcester, Massachusetts, and to make ancillary improvements at those substations as well as at the Millbury No. 2 ("Millbury") substation in Millbury and the Rolfe Avenue No. 184 ("Rolfe Avenue") substation in Shrewsbury ("Project"). The Siting Board also hereby approves, subject to the conditions set forth below, National Grid's petitions for exemptions from the City of Worcester Zoning Ordinance and the Town of Millbury Zoning Bylaw pursuant to G.L. c. 40A, § 3 and for approval of the Project pursuant to G.L. c. 164, § 72.

## I. INTRODUCTION

### A. Summary of the Project

The Project consists of (1) an approximately 3.5-mile, 115 kV underground transmission line between the Vernon Hill and Bloomingdale substations, and (2) ancillary improvements at the Vernon Hill, Bloomingdale, Millbury and Rolfe Avenue substations (Exh. NG-2, at 1-1). Approximately 1.5 miles of the proposed 115 kV line will be installed within an existing duct bank which extends along Providence, Aetna, and Coral Streets in Worcester (the "Providence Street duct bank") and the remaining two miles will be underground within a new duct bank. The purpose of the Project is to increase the reliability of MECo's electric distribution system

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1 The Project is proposed by New England Power Company d/b/a National Grid in response to a distribution system need identified by its distribution affiliate Massachusetts Electric Company ("MECo"). In this decision, the Company will be referred to as National Grid as both New England Power ("NEP") and MECo do business as National Grid (Exh. NG-2, at 1-1).

2 Initially, the Project was 3.65 miles in length. Since the filing of the Petition, National Grid has slightly modified the Project to accommodate CSX Transportation Inc.'s ("CSX") proposed expansion of its intermodal rail terminal in Worcester. This modification results in a slightly shorter Project (Exhs. NG-6; NG-G-13). See Section II.D.2.iv, below.

serving the City of Worcester and to provide additional capacity to reliably serve anticipated load growth in the area (Exhs. NG-2, at 1-1; EFSB-G-13).

B. Procedural History

On July 9, 2009, the Company filed a Petition with the Siting Board seeking approval, pursuant to G.L. c. 164, § 69J, to construct the Project. This Petition was docketed as EFSB 09-1 ("Siting Board Petition"). In addition, the Company filed two related petitions with the Department of Public Utilities ("DPU" or "Department"): (1) a petition pursuant to G.L. c. 164, § 72 seeking a determination that the proposed transmission line is necessary, would serve the public convenience, and would be consistent with the public interest ("Section 72 Petition"); and (2) a petition pursuant to G.L. c. 40A, § 3 for exemptions from the City of Worcester Zoning Ordinance and the Town of Millbury Zoning Bylaw ("Zoning Exemption Petition"). The Section 72 Petition was docketed as D.P.U. 09-52; the Zoning Exemption Petition was docketed as D.P.U. 09-53.

On July 29, 2009, the Chairman of the Department issued a Consolidation Order which directed the Siting Board to render a final decision in the three cases ("consolidated proceeding"). The consolidated proceeding was docketed as EFSB 09-1/D.P.U. 09-52/D.P.U. 09-53. The Siting Board conducted a single adjudicatory proceeding and developed a single evidentiary record for the consolidated proceeding.

On November 4, 2009, the Siting Board conducted a public comment hearing on the consolidated Petitions in Worcester, Massachusetts. The Siting Board did not receive any petitions to intervene or for limited participant status. The Siting Board held an evidentiary

hearing on February 24, 2010. The Company presented the testimony of six witnesses.[3] Approximately 200 exhibits were entered into the evidentiary record. On April 14, 2010, the Company filed a brief. On May 13, 2010, the Siting Board held a public meeting to discuss case issues ("May 13 Siting Board Meeting"). During the May 13 Siting Board Meeting, the Board voted to direct EFSB staff to draft a Tentative Decision approving the Project, subject to various conditions.

On July 28, 2010, the Company requested a delay in issuance of a Tentative Decision pending review of planned construction by CSX along the preferred route in connection with CSX's expansion of its existing rail yard facilities in Worcester. Thereafter, on October 27, 2010, the Company filed a Supplemental Analysis of a route variation ("the CSX work-around") that anticipated CSX's project. On December 21, 2010, the Siting Board held a public hearing to allow comments about the CSX work-around. The Siting Board received no petitions for intervention or limited participant status in response to the work-around and associated public hearing.[4]

## II. ANALYSIS OF THE PROJECT PURSUANT TO G.L. c. 164, § 69J

### A. Jurisdiction and Scope of Review

The Company filed the Siting Board Petition pursuant to G.L. c. 164, § 69H, which requires the Siting Board to implement its statute so as to provide a reliable energy supply for the

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3 Kathy M. Horelik, Project Manager for National Grid testified regarding Project scope, permitting, real estate acquisition, engineering, public outreach, schedule and budget; Daniel J. Mungovan, Lead Engineer in the Distribution Network Asset Planning Department of National Grid, testified concerning Project need; Todd S. Goyette, Lead Engineer in the Network Asset Planning Department for National Grid, testified regarding the design and cost estimates, Project alternatives, route selection and public outreach; Kate McEneaney, Senior Scientist, Epsilon Associates, Inc., addressed the environmental resource-related permitting related to the Project; Peter A. Valberg, Ph.D., Principal at Gradient Corporation, testified concerning electric and magnetic fields ("EMF"); and Liana P. Moore, Esquire, Partner, at Bowditch & Dewey LLP, addressed the zoning requirements in the City of Worcester and the Towns of Shrewsbury and Millbury applicable to the Project.

4 The work-around is described in more detail in Section II.D.2.iv., below.

Commonwealth with a minimum impact on the environment at the lowest possible cost, and pursuant to G.L. c. 164, § 69J, which requires a project applicant to obtain Siting Board approval for the construction of proposed energy facilities before a construction permit may be issued by another state agency. The Company's Project falls within the definition of "facility" set forth in G.L. c. 164, § 69G, which provides that a "facility" includes:

> a new electric transmission line having a design rating of 69 kilovolts or more and which is one mile or more in length on a new transmission corridor.

The substation improvements also fall within the definition of facility, which includes ancillary structures that are an integral part of the operation of any transmission line that is a facility. G.L. c. 164, § 69G.

In accordance with G.L. c. 164, §§ 69H and 69J, before approving a petition to construct, the Siting Board requires an applicant to justify its proposal in four phases. First, the Siting Board requires the applicant to show that additional energy resources are needed (see Section II.B, below). Second, the Siting Board requires the applicant to establish that, on balance, its proposed project is superior to alternative approaches in terms of cost, environmental impact, reliability and the ability to address the identified need (see Section II.C, below). Third, the Siting Board requires the applicant to show that it has considered a reasonable range of practical siting alternatives and that the proposed site for the project is superior to a noticed alternative site in terms of cost, environmental impact, and reliability of supply (see Sections II.D and II.E, below). Finally, the applicant must show that its plans for construction of its new facilities are consistent with the current health, environmental protection and resources use and development policies of the Commonwealth (see Section II.F, below.)

## B. Need

### 1. Standard of Review

G.L. c. 164, § 69J provides that the Siting Board should approve a petition to construct if the Board determines that the petition meets certain requirements, including that the plans for the construction of the applicant's facilities are consistent with the policies stated in G.L. c. 164, § 69H to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the least possible cost. To accomplish this, the Board must, among other matters,

review the "need for" the transmission facilities to meet reliability, economic efficiency, or environmental objectives. G.L. c. 164, § 69H. Consistent therewith, G.L. c. 164, § 69J requires applicants to include in their petitions an analysis of need for the transmission facility.[5]

Here, the Company asserts that the Project is needed for reliability purposes (Exh. NG-2, at 1-1). Reliability, in this context, means the delivery of power to customers at adequate voltage levels with a minimum of interruption. To ensure reliability, each transmission and distribution company establishes planning criteria for construction, operation, and maintenance of its transmission and distribution system. Compliance with the applicable planning criteria can demonstrate a "reliable" system. See e.g., New England Power Company, 7 DOMSB at 333, 346-353 (1998), Boston Edison Company, 6 DOMSB, at 208, 243-245 (1997).

Accordingly, to determine whether system improvements are needed, the Siting Board first examines the reasonableness of the Company's system reliability planning criteria. The Siting Board then evaluates: (1) whether the Company uses reviewable and appropriate methods for assessing system reliability over time based on system modeling analyses or other valid reliability indicators; (2) whether the relevant transmission and distribution system meets these reliability criteria over time under normal conditions and under certain contingencies, given existing and projected loads; and (3) whether acceleration of conservation and load management programs, and pursuant to c. 249 of the Acts of 2004, the use of other alternatives to the facility, including other methods of transmitting or storing energy, might eliminate or slow the need for

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5 The Siting Board's review of proposed transmission facilities is conducted pursuant to G.L. c. 164, § 69J. This section states, in part, that "[n]o applicant shall commence construction of a facility at a site unless . . . in the case of an electric or gas company which is required to file a long-range forecast pursuant to section sixty-nine I, that facility is consistent with the most recently approved long-range forecast for that company." The Siting Board notes that, pursuant to the Department's Order in D.T.E. 98-84A, Massachusetts electric companies, including National Grid, are now exempt from the requirements of G.L. c. 164, § 69I. Thus, the Siting Board need not consider whether the proposed transmission facilities are consistent with a recently-approved long range forecast.

such additional energy resources.[6] Boston Edison Company d/b/a/ NSTAR Electric, 14 DOMSB 233, at 7-8 (2005) ("NSTAR Decision").[7]

2. Description of the Existing System

The need in this case arises in the Company's distribution network in the Worcester area. The table below identifies the substations serving each of the six geographic sub-areas that comprise the Worcester area electric distribution system. Three sub-areas do not have firm supply (Exh. NG-2, at 2-3).[8]

**Table 1: Substations Serving City of Worcester's Electric Distribution System**

| Sub-Area | Substation | Firm Supply? |
|---|---|---|
| Worcester North | Greendale | Yes |
| Worcester Northwest | Cooks Pond | Yes |
| Worcester Southwest | Webster Street | Yes |

6 Pursuant to c. 249 of the Acts of 2004, applicants proposing a new transmission line are required to provide ". . . (3) a description of alternatives to the facility, such as other methods of transmitting or storing energy . . . or a reduction of requirements through load management . . .." In addition, applicants are required to demonstrate that "projections of the demand for electric power . . . include an adequate consideration of conservation and load management." G.L. c. 164, § 69J. See Section, II.C, below.

7 When a petitioner's assessment of system reliability and facility requirements are, in whole or in part, driven by load projections, the Siting Board reviews the underlying load forecast. The Siting Board requires that forecasts be based on substantially accurate historical information and reasonable statistical projection methods. See G.L. c. 164, § 69J. Here, as explained below, the Company presents a case in which its determination of a reliability need as well as its identification of the least cost, minimum environmental impact solution to that need is not driven by future load projections. Thus, although the Board investigated the reasonableness of the Company's load forecast, the ultimate decision in this proceeding does not rely on that analysis.

8 A supply is considered "firm" if the loss of a single element will not cause a loss of load for longer than the time required for automatic switching (i.e., in the event that a single piece of equipment fails, duration of load loss is no more than the time required for automatic switching to shift the affected load elsewhere) (Exh. NG-2, at 2-3).

| Sub-Area | Substation | Firm Supply? |
|---|---|---|
| Worcester East | Bloomingdale<br>Shrewsbury | No |
| Worcester Southeast | Vernon Hill | No |
| Central Worcester | Webster Street<br>Vernon Hill<br>Nashua Street | Portion supplied by Vernon Hill is not firm. |

Source: Exh. NG-2, at 2-3.

As indicated in Table 1, the Bloomingdale and Shrewsbury substations together serve the Worcester East load, including load from Plantation, Shrewsbury, and Hamilton Streets, and the areas surrounding the Route 9 corridor. The Bloomingdale substation has two 115/13.8 kV, 33/44/55 MVA transformers off a single 115 kV line (P-142 line). These two transformers supply seven 13.8 kV distribution circuits and two 13.8 kV tie cables that are also connected at the Shrewsbury substation. The Shrewsbury substation has three 69/13.8 kV, 7.5 MVA transformers off a single 69 kV line (I-35 line). The Shrewsbury transformers supply one 13.8 kV distribution circuit and the two above-mentioned 13.8 kV tie cables. The tie cables between the Bloomingdale and Shrewsbury substations provide "firm" back-up to the Shrewsbury substation if the I-35 line is lost, but only partial automatic backup in the event of loss of the P-142 line to the Bloomingdale substation (Exh. NG-2, at 2-3 to 2-4).

The Vernon Hill substation has one 115/13.8 kV, 33.3 MVA transformer (transformer #1) and a 115/13.8 kV, 24/32/40 MVA transformer (transformer #2) supplied by a single 115 kV line (M-165 line). Transformer #1 partially supplies the Central Worcester sub-area; transformer #2 is the sole supply for the Worcester Southeast sub-area.[9]

[9] The Company is now undertaking work, scheduled for completion in 2011, to expand its distribution facilities at Vernon Hill to address reliability and loading concerns elsewhere in the Worcester area distribution system. The Company expects to transfer about 9 MW of load from other Worcester-area substations to Vernon Hill once the Vernon Hill substation expansion is complete (Exh. NG-2, at 2-4).

3. Reliability of Supply

a. Criteria and Methods for Reliability Analysis

The Company's applicable planning criteria are found in its Guide for Area Supply and Distribution Planning (Exh. NG-2, at App. 2-2) ("Planning Guide"). The Planning Guide was last revised in 1998. The criterion at issue in this case provides that a single contingency event (an outage of a single supply line or substation element, also known as an N-1 condition) should not cause a potential service interruption of greater than 480 megawatt hours ("MWh"), based upon peak load (Exh. NG-2, at 2-4).[10] The Company explained that the 480 MWh service interruption limit is "service-based," meaning that it is intended to ensure that MECo satisfies the DPU's established service quality guidelines for System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) (Tr. at 25-26; see, also, Service Quality Standards for Electric Distribution Companies and Local Gas Distribution Companies, D.T.E. 04-116-C, at Appendix 2007, Sections V, VI (2007)). As SAIDI and SAIFI standards are used by the DPU to establish service quality indices for distribution companies such as MECo, it is reasonable for the Company to use those measures to establish reasonable service interruption limits for system planning purposes.

National Grid regularly conducts reliability analyses of its distribution system in accordance with the provisions of its Planning Guide, using well-accepted analytical modeling software (Exh. NG-2, at App. 2-2). Various assumptions - such as the actual and projected area loads under normal and extreme weather conditions and the actual equipment ratings for facilities in the relevant study area - are entered into the software model (Exh. NG-2, at App. 2-1).[11] Then the model is run under a range of scenarios including a base case with all major

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10 A single contingency MWh exposure value is created by defining the amount of load in megawatts ("MW") left out of service after automatic actions in response to a particular contingency and multiplying it by the time required to restore service (Exh. NG-2, at App. 2-2).

11 The Company applies extreme weather conditions (5% probability of occurrence) in its system load analyses to capture the effect of operating with system uncertainties coincident with peak-day weather conditions (Exh. EFSB-N-6 (Supp.) Att. at 11).

system elements in service and various contingency situations with major elements out of service (Exh. NG-2, at 2-1, App. 2-1 at 5-7).[12]

The Planning Guide expressly requires the analysis of the loss of a single transmission supply to test the 480 MWh service interruption limit (Exh. NG-2, at 2-1, App. 2-1 at 6). The areas served by the Bloomingdale and the Vernon Hill substations were identified as particular areas of concern, because each of those substations are supplied by a single transmission line - the Bloomingdale substation by the P-142 line and the Vernon Hill substation by the M-165 line (id. at 2-4 to 2-5). The loss of either line might trigger an interruption of greater than 480 MWh in the Worcester sub-areas served by the respective substations (id. at 2-5).

Assuming the loss of the single transmission line and resulting automatic actions, National Grid planners evaluated operational procedures and developed specific action plans to restore service to the areas served by the Bloomingdale and Vernon Hill substations in the most orderly and efficient manner (see, e.g., Exhs. NG-2, at App. 2-1; EFSBN-10(a) at 3). These action plans were then employed to calculate the exact magnitude and duration of any load that must be shed in order to prevent relevant electrical equipment from overloading and overheating.[13] Having determined the amounts and duration of required load shedding, the Company then analyzed whether potential service interruptions would violate its 480 MWh criterion.

We note that in a 2007 review to approve new transmission under G.L. c. 164, § 72, the Department accepted a measure of the frequency of service interruption and the duration of service outages among reliability criteria cited to demonstrate need for a proposed project. See, New England Power Company, D.T.E. 06-37, at 7, 18 (2007). In past cases, the Siting Board has not reviewed a transmission facility proposal based on such service interruption criteria. In 1991 and 1995 reviews, however, the Board accepted reliability criteria as a basis for approving

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12 In addition to establishing the planning criteria used to design and construct the Company's distribution system, the Planning Guide describes the assumptions and processes that should be used to test the system to determine if the system operates within the planning criteria.

13 The Company also examined the voltage, stability, transfer capability and ability to respond to short circuits of its system (Exhs. NG-2, App. 2-1; EFSB-N-10; EFSB-N-15).

NEP transmission projects. At that time, the Board directed use of a standard that "non-firm peak load in a contiguous area" not exceed specified MW levels.[14] New England Power Company, 4 DOMSB 109, at 122-124 (1995) ("1995 NEP Decision"); New England Power Company, 21 DOMSC 325, at 338-339 (1991) ("1991 NEP Decision"). The MWh service interruption criterion cited in the present case, like the MW non-firm peak load criterion from past reviews, provides a systematic means to establish a level of benefit for which implementing additional supply is warranted to address risks of single-contingency service interruption in a system area, balanced against incurring cost. In addition, we note the Company's use in its reliability analysis of an extreme weather load forecast, in order to reflect uncertainties inherent in system-coincident and peak-day weather - an approach the Siting Board often has accepted as part of analyses of need. See e.g., New England Power Company, 5 DOMSB 1, at 17 (1996); 1995 NEP Decision, 4 DOMSB at 125-126 (1995).

For these reasons, the Siting Board finds that the Company's combination of software modeling and unserved load calculations using specific service restoration action plans are reviewable and appropriate to assess the reliability of the Worcester area distribution system.

b. Reliability Analysis

A single 115 kV transmission line, the P-142 line, supplies the Bloomingdale substation, which supplies the Worcester East sub-area (Exh. NG-2, at 2-5 to 2-6). The Company's Supply Study, inter alia, assessed the potential consequences of the Bloomingdale substation losing the P-142 line (Exh. NG-2, App. 2-1). The Company's assessment indicated that its 480 MWh service interruption limit would likely be exceeded given loss of the P-142 line at a peak load of 56 MW or more (Exh. NG-2, at 2-5 to 2-6).

In the event of loss of the P-142 line at 56 MW, the 13.8 kV tie cables between the Bloomingdale and Shrewsbury substations would initially supply about 12 MW of load, leaving

[14] The criteria provided that non-firm peak load in a contiguous area not exceed 30 MW; further, as a tighter standard applicable for areas with a past incidence of outages above certain levels, the criteria provided that non-firm peak load not be above 20 MW in an area where either of two outage rates - a 3-hour outage once in three years or a 24-hour outage once in ten years - was exceeded. 1995 NEP Decision, 4 DOMSB at 122-124; 1991 NEP Decision, 21 DOMSC at 338-339.

approximately 44 MW initially unserved (id.). Up to another 30 MW of Bloomingdale load would then be transferred to nearby substations through manual load transfer capability over, on average, 7.2 hours (Exh. EFSB-N-10).[15] No supply would be available, however, for the remaining 14 MW of load; this load would necessarily be shed to protect system equipment (Exh. NG-2, at 2-6). As a consequence of the time for manual transfers and the load shed, the Worcester East sub-area potentially would suffer a service interruption greater than the 480 MWh maximum established by the Company's planning guidelines (Exhs. NG-2, at 2-6; EFSB-N-10).

The Worcester East sub-area experienced load levels of 56 MW in both 2006 and 2008 (Exh. NG-2, at 2-5 to 2-6). Load levels in the Worcester East sub-area are growing. Continued growth is expected, with associated greater potential for longer and more frequent service interruptions (Exhs. NG-2, at 2-5, 2-8; EFSB-N-10).[16]

A single 115 kV transmission line (the M-165 Line) also supplies the Vernon Hill substation, a major energy supply source for central Worcester and the sole source for the southeastern Worcester sub-area. Year 2006 and 2008 peak loads for the Vernon Hill substation were below levels that would cause an exceedance of the Company's 480 MWh service interruption limit with contingency loss of the M-165 line. The Company's Supply Study, however, pointed to continued sub-area load growth such that contingency loss of the M-165 line might result in violation of the Company's 480 MWh service interruption criterion by 2013,

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15 This assumes "optimum operational flexibility," resulting in resolution of the event in no more than 24 hours (Exh. EFSB-N-25).

16 National Grid estimates future load using an econometric forecast for each of the 26 PSAs, including the Worcester PSA, that comprise the New England service area of the Company and its electric distribution affiliates (Exh. EFSB-N-6 (Supp.) Att.). As part of its Supply Study and 2009 reliability analysis of the Worcester electric system, the Company derives substation and other system area demand forecasts from the Worcester PSA forecast (id.; Exh. NG-2, App. 2-1). Because the Company serves a number of large customers out of its Bloomingdale and Shrewsbury substations, such as the University of Massachusetts Medical Center, Worcester State Hospital, Memorial Hospital and certain customers in the biotechnology industry, it states that the peak load in those sub-areas will grow more quickly than the Worcester area in general (Exh. NG-2, at 2-5 to 2-6).

approximately one year after the scheduled completion date of the Project (Exhs. NG-2, at 2-6 to 2-8; EFSB-N-10; NG-6, at 9).

The Company noted that in updating its forecast of 2013 Vernon Hill substation load, it employed the overall Worcester Power Supply Area ("PSA") growth rates from its 2009 reliability analysis (Exhs. EFSB-N-6 (Supp.) Att.; EFSB-N-14; Tr. at 33-35). At the same time, the Company cited evidence that the Vernon Hill substation load has in fact grown at a rate higher than that of the overall Worcester PSA and indicated that continued higher than average growth is anticipated for portions of the load along the Route 146 and Route 20 commercial corridors (Exhs. EFSB-N-6 (Supp.) Att.; EFSB-N-27; RR-EFSB-1; Tr. at 33-37). In addition, in its reliability analysis National Grid conservatively assumed optimal conditions in place for transferring load under a contingency 115 kV supply outage at the Vernon Hill substation (Exhs. EFSB-N-24; EFSB-N-25; Tr. at 74-75). In actuality, under certain contingencies, the same distribution circuits may be necessary to maintain reliable service at two different substations (Exh. EFSB-N-18; Tr. at 22-23).

Based on the foregoing, the Siting Board finds that the Company has demonstrated that the existing electric transmission system is inadequate under certain contingencies to reliably serve existing and projected loads in the Worcester sub-areas supplied by the Bloomingdale substation. Furthermore, given the Company's load forecast in combination with the conservative assumptions concerning load growth and optimal load transfers in sub-areas supplied by the Vernon Hill substation as described above, it is likely that the existing transmission system serving the Vernon Hill substation area will be inadequate by 2013, approximately one year after the scheduled completion date of the Project.

In this case, the Siting Board need not make a finding as to the precise year that the existing transmission system will become inadequate to serve Vernon Hill, as defined by the Planning Guide. Even at existing loads, a single contingency event could interrupt a significant amount of Vernon Hill sub-area load, i.e., the extent of customers' inconvenience would approach that resulting from an interruption of 480 MWh. Moreover, as discussed in Section II.C, below, the record supports a finding that the best project approach alternative to solving the problems at the Bloomingdale substation is a transmission line between the Bloomingdale and

Vernon Hill substations – a project approach that is a solution in common to address problems at both substations. Since the common solution, the Bloomingdale-Vernon Hill line, is needed now to address need at the Bloomingdale substation, the Vernon Hill-area need will be addressed now whether that need is established in 2013 or sometime after.

4. Conclusions on Need

Based on the foregoing, the Siting Board finds that the Company has demonstrated that the existing electric transmission system is inadequate under certain circumstances to reliably serve existing loads in Worcester sub-areas supplied by the Bloomingdale substation and projected loads supplied by the Vernon Hill substation. Accordingly, the Siting Board finds that additional energy resources are needed for reliability in the affected Worcester sub-areas.

C. Alternative Approaches to Meeting the Identified Need

1. Standard of Review

G.L. c. 164, § 69J requires a project proponent to present alternatives to the proposed facility which may include: (a) other methods of transmitting or storing energy; (b) other sources of electrical power; or (c) a reduction of requirements through load management.[17] In implementing its statutory mandate, the Siting Board requires a petitioner to show that, on balance, its proposed project is superior to such alternative approaches in terms of cost, environmental impact, and ability to meet the identified need. In addition, the Siting Board requires a petitioner to consider reliability of supply as part of its showing that the proposed project is superior to alternative project approaches. Western Massachusetts Electric Company, EFSB 08-2/D.P.U. 08-105/106, at 41 (September 28, 2010) ("GSRP Decision"); Cape Wind Associates, LLC, 15 DOMSB 1, at 33 (2005); NSTAR Decision, 14 DOMSB 233, at 266 (2005).

2. Identification of Project Approaches for Analysis

The Company considered a range of approaches for meeting the identified need in the Worcester area, including:

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17 G.L. c. 164, § 69J also requires an applicant to present "other site locations." This requirement is discussed in Section II.D, below.

- two direct single-line alternatives (115 kV) from Vernon Hill to Bloomingdale substations: the Project, involving use of the existing Providence Street duct bank and an alternative approach, without use of the Providence Street duct bank;[18]
- two two-line alternatives (115 kV), each with one line between Rolfe Avenue and Bloomingdale substations and with a second line between Millbury and Vernon Hill substations in one instance and between Webster Street and Vernon Hill substation in the other;
- a distribution alternative;
- a distributed generation alternative;
- demand side solution alternatives relying on energy efficiency, demand response, and targeted demand response; and
- 69 kV transmission alternatives.[19]

The Company argues that the direct single-line alternative using the Providence Street duct bank is superior to the other alternatives in terms of ability to meet the need, cost and environmental impacts.

a. 115 kV Direct Single Line Alternatives

Either of the direct single line 115 kV alternatives (i.e., using the Providence Street duct bank or the alternative direct route via all new duct bank) will meet the identified need (Exhs. NG-2, at 3-2 to 3-16, 3-28; EFSB-PA-5; EFSB-PA-6).[20]

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18 Chapter 372 of the Acts and Resolves of Massachusetts, passed by the Massachusetts General Court in 1902, prohibits the installation of overhead wires along or crossing public streets in Worcester within an area bounded by a circle of two-miles' diameter and centered at the intersection of Main and Front Streets. The affected district includes the area of the two single-line alternatives evaluated for the Project.

19 The Company also considered a no-build alternative. The Company's analysis, based on the Company's Supply Study and PSA forecast, indicates that existing transmission facilities in Worcester would not meet the Company's 480 MWh supply standard without modification. The Company therefore gave the no-build alternative no further consideration (Exh. NG-2, at 3-2).

20 The Company likely would install high voltage extruded dielectric (HVED) cable if constructing either of the 115 kV direct single line options in a duct bank (Exh. NG-2, at

b. 115 kV Radial Transmission Alternatives

The Company also explored two-line 115 kV radial supply alternatives to supply each substation separately, comprised of one feasible connecting option to the Bloomingdale substation and a choice of two connections to the Vernon Hill substation. The 115 kV radial transmission alternative to the Bloomingdale substation would run underground from the Company's Rolfe Avenue substation (Exh. NG-2, at 3-6 to 3-11). Of the two 115 kV radial transmission alternatives to supply Vernon Hill substation, one would run 4.7 miles overhead from Millbury substation (i.e., from the southeast); the second would originate at the Webster Street No. 6 substation ("Webster Street substation") and run underground, generally to the east, approximately 4.1 miles (id. at 3-28). Either of these two-line alternatives could meet the identified need (id. at 3-26).

c. Distribution Upgrade Alternative

National Grid also assessed whether a distribution rather than a transmission alternative enhancing supply via the Bloomingdale or Vernon Hill substation could address the established need. The distribution system, however, is not capable of picking up sufficient load to maintain compliance with the Company's supply standard in the event of the loss of the existing 115 kV supply to the Bloomingdale substation (Exh. NG-2, at 3-19). Moreover, even if additional distribution could be constructed, the Company still would need to add transmission to serve the load in Worcester sub-areas served by the Bloomingdale substation in the event of a 115 kV contingency situation (id.).

d. Distributed Generation

The Company identified 24 recently-installed and eight planned distributed generation projects in the City of Worcester, for a total of 1,373 kW of new distributed generation (Exh.

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3-29 to 3-32). HVED cable offers generally lower cost and easier installation and maintenance than does the other cable system most typically used in the United States, high-pressure pipe-type (HPPT) cable (id.).

NG-2, at 3-24).[21] These projects include 19 existing and five planned solar installations, four existing and two planned natural gas cogeneration projects, one planned biofuel project, and one installed wind project (id.).[22]

When operating at full capacity, new and planned distributed generation resources in Worcester could reduce demand by as much as 0.7 MW at the Vernon Hill substation and an additional but lesser amount at the Bloomingdale substation (Exh. NG-2, at 3-24). The addition of these resources, however, would not resolve the identified existing potential for service interruption at the Bloomingdale substation, or even the anticipated potential for service interruption at the Vernon Hill substation (id.).

e. Demand-Side Solutions

In addition to distributed generation, the Company evaluated other demand-side management ("DSM") solutions including demand response and energy efficiency as potential approaches to meet the established resource need (Exh. NG-2, at 3-20 to 3-25). Based on its analysis, the Company anticipates that it could only reduce single contingency outage exposures to a level that meets its supply standard at the Bloomingdale and Vernon Hill substations with demand response, energy efficiency, and distributed generation resources that collectively would (1) reduce peak demand at the Bloomingdale substation to 2006 levels and offset all future demand growth, and (2) offset planned increases in demand at Vernon Hill beginning in 2013 (id. at 2-9). Use of demand-side resources cannot reduce demand to this level and in the needed locations to meet the need in the requisite timeframe (Exh. NG-2, at 3-19 to 3-25). While a contribution of demand-side resources might allow the Company to meet the supply standard at

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21 The energy and capacity provided by long-standing customer generation at institutions such as the University of Massachusetts are reflected in historical peak loads (Exh. NG-2 at 3-24). Thus, they do not serve to reduce projected peak demand (id.).

22 The installed wind project is a 600 kW wind turbine at Holy Name Central Catholic High School ("Holy Name"), served from the Vernon Hill substation (Exh. NG-2, at 3-24). The protective systems of the Holy Name wind turbine, however, force shutdown of the turbine in the event of a grid outage (id.). Thus, even if operating at the time, the wind turbine could not help serve load in a contingency involving loss of the M-165 transmission line (id.).

the Vernon Hill substation for a limited period of time, significant load shedding could still occur if certain lines serving the Bloomingdale or Vernon Hill substation were lost (id.; Exh. EFSB-PA-27; Tr. at 60-81).

f. 69 kV Transmission Alternative

The Company evaluated 69 kV transmission options wherever 115 kV transmission alternatives were considered. The 69 kV direct connection single-line option between Vernon Hill and Bloomingdale substations requires installation of four new 115/69 kV transformers, but could meet the identified need (Exh. NG-2, at 3-16). Similarly, a 69 kV radial two-line transmission alternative involves system modifications beyond that entailed by construction of a 115 kV two-line radial transmission alternative, but could meet the identified need (Exh. NG-2, at 3-16 to 3-18, 3-26).

3. Reliability

Both the one and feasible two-line 115 kV transmission alternatives would reliably serve the identified need (see Sections II.C.2.a and II.C.2.b, above). Other alternatives, including distributed generation, demand-side alternatives, and the distribution upgrade alternative, may meet the identified need but likely would fall short of preventing a service interruption greater than the Company's supply standard (see Section II.B.3.a, above). Relative to comparable 115 kV transmission alternatives, a one or two-line 69 kV transmission alternative would likely introduce the need for greater system modification. The Siting Board finds that, on balance, the Project or another of the 115 kV transmission alternatives is superior to other considered alternative approaches with respect to the ability to reliably meet the identified need.

4. Environmental Impacts

Environmental impacts of the 115 kV and 69 kV transmission alternatives to meet the identified need primarily would be temporary impacts associated with construction. The environmental impacts of single line transmission alternatives directly connecting Bloomingdale and Vernon Hill substations would be limited, for the most part, to new duct bank installation, predominantly within city streets. Both two-line alternatives, longer than the one-line alternatives, would involve greater environmental impact on the basis of length. A 69 kV or 115

kV transmission line segment to connect Webster Street and Vernon Hill substations would, in addition, require lake and river crossings, with an attendant increase in environmental impacts (Exh. NG-2, at 3-6 to 3-16). Overhead line alternatives (i.e., outside the area prohibited under Chapter 372 of the Acts and Resolves of Massachusetts) would entail more permanent impacts, including, for example, visual impacts and possibly greater EMF and wetlands impacts (id. at 3-12, 3-13). The Siting Board finds, on balance, that the Project is superior to the alternative approaches with respect to environmental impacts.

5. Cost

The Company provided approximate cost information for four 115 kV transmission line approaches to addressing the identified need and their 69 kV equivalents. The following table provides estimated costs for the 115 kV transmission line approaches. Costs for the 69 kV options are comparable or higher.

**Table 2: Estimated Costs for the 115 kV Transmission Line Approaches**

| Approach | Approximate Cost |
|---|---|
| Vernon Hill substation – Bloomingdale substation, 115 kV<br>Uses Providence Street duct bank | $33,530,000 |
| Vernon Hill substation – Bloomingdale substation, 115 kV<br>Does not use Providence Street duct bank | $37,700,000 |
| Two lines:<br>Rolfe Avenue substation – Bloomingdale substation, 115 kV (underground); Millbury – Vernon Hill (overhead) | $35,200,000 |
| Two lines:<br>Rolfe Avenue substation – Bloomingdale substation, 115 kV (underground); Webster Street – Vernon Hill (underground) | $70,000,000+<br>[Cost affected by engineering challenges along the second segment.] |

Sources: Exhs. NG-2, at 3-2 to 3-28; EFSB-PA-5; EFSB-PA-6; EFSB-PA-14; EFSB-PA-15; EFSB-PA-23; EFSB-PA-25; NG-6, at 6.

Based on the cost information above, the Siting Board finds, on balance, that the Project is superior to the alternative approaches with respect to cost.

6. Conclusions on Project Approaches

The Company has conducted a thorough analysis of a variety of approaches to meet the established resource need, including a no-build and distribution alternative, distributed generation, and a range of demand-side solutions. As part of its analysis, the Company has assessed factors, including cost and environmental factors, which may make a particular approach unworkable. Based on its review of materials submitted by the Company, the Siting Board agrees with the Company that only the transmission alternatives meet the identified need. With respect to these transmission alternatives, the 115 kV approaches avoid system modifications inherent in the 69 kV approaches and are therefore superior. Furthermore, the Siting Board concludes that the use of the Providence Street duct bank allows the Company to limit environmental impacts and costs of construction. Accordingly, the Siting Board finds that the direct (single line) 115 kV approach using the Providence Street duct bank, i.e., construction of a 115 kV underground transmission line between Vernon Hill and Bloomingdale substations, in part via an existing conduit in the Providence Street duct bank is, on balance, (1) superior to alternative project approaches in terms of cost and environmental impact; and (2) superior to considered alternative project approaches other than the 115 kV transmission approaches in its ability to reliably meet the identified need. The Siting Board thus finds that the direct (single line) 115 kV approach of the Project is superior to other considered approaches with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

D. Analysis of the Proposed and Other Site Locations

1. Standard of Review

G. L. c. 164, § 69J requires a petition to construct to include a description of alternatives to the facility including "other site locations." Thus, the Siting Board requires an applicant to demonstrate that it has considered a reasonable range of practical siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts. To do so, an applicant must meet a two-pronged test. First, the applicant must establish that it developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes which, on

balance, are clearly superior to the proposed route. Second, the applicant must establish that it identified at least two noticed sites or routes with some measure of geographic diversity. CELCo Decision, 12 DOMSB 305, at 323; MMWEC Decision, 12 DOMSB 18, at 119.

2. The Company's Route Selection Process

National Grid describes a multi-step route selection process designed to ultimately identify two potential transmission line routes that provide (1) a reliable technical solution to the identified need, (2) an outcome with balanced environmental and human impacts and cost, and (3) a project that can be permitted, constructed, and placed into service to meet the peak summer load in 2013 (Exh. NG-2, at 1-4).

i. Description of the Initial Universe of Routes

National Grid commenced the process of identifying potential routes for the transmission line by creating a geographic study area between the Vernon Hill and Bloomingdale substations using several highway corridors as natural boundaries for the study area: Interstate 290 ("I-290") to the west, Shrewsbury Street to the northwest, and Route 9 to the north (Exhs. NG-2, Figure 4-1; NG-2, at 4-2). There are no major corridors to the east, so the Company extended the study area boundary from a point on Route 9 several blocks northeast of the Bloomingdale substation, southwesterly to the vicinity of the Vernon Hill substation (id.). The Company then identified three route sub-areas within the study area to assist in the refinement of an overall route (Exh. NG-2, at 4-4).[23]

The Company used a focused set of route selection guidelines to identify potential routes within the study area, seeking potential routes that (1) followed an existing right-of-way

[23] The first sub-area originates at the Vernon Hill substation and proceeds north to the end of the Providence Street duct bank at Grafton Street in the vicinity of Union Place (Exh. NG-2, at 4-7). The second sub-area continues generally northeasterly from Grafton Street to the vicinity of Brown Square (id.). The third sub-area extends northeasterly from Brown Square to the Bloomingdale substation at the end of Frank Street (id. at 4-8). The Company also considered two potential routes along existing ROWs that were not confined to the above sub-areas but instead were further to the northwest (id. at 4-10).

("ROW")[24] and (2) provided a relatively direct connection between the Vernon Hill and Bloomingdale substations (Exh. NG-2, at 4-1).[25] The existing Providence Street duct bank was an important routing opportunity in the study area because it could be used for a substantial portion of the distance between the Vernon Hill and Bloomingdale substations, which would minimize construction and environmental impacts as well as reduce costs compared with the construction of a new duct bank and associated manholes (Exh. NG-2, at 4-1).

ii. The Company's Initial Route Segment Screening Process

To identify the most promising routes for further review, the Company screened the initial set of routes, comprised of segments and variations by sub-area, to eliminate routing that was significantly flawed or obviously inferior to other route alternatives in terms of environmental impacts, cost or reliability (Exh. NG-2, at 4-10). After the screening process, the following ten route segments and variations were carried forward for consideration as candidate routes: Segment 1A; Segment 1B; Segment 2B; Segment 2C; Segment 3A; Segment 3B; Segment 3C; Segment 3D; Variation 2A-1; and Variation 3C-1 (Exh. NG-2, at 4-14).

iii. The Company's Route Segment Analysis

After the Company screened the potential route segments and variations, the next step of the route selection process was to evaluate, score and rank candidate route segments and variations using a set of environmental criteria and conceptual cost estimates (Exh. NG-2, at 4-1). The Company utilized a variety of resources to analyze and score the remaining candidate routes in terms of environmental impacts, cost and reliability, including the Massachusetts Geographic Information System ("MA GIS") to map land use and environmental constraints, field reconnaissance, data and input from meetings with Worcester officials and community groups, and internal Company knowledge of the local area (Exh. NG-2, at 4-13).

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24 Among other reasons, the Company sought to utilize existing ROWs to minimize environmental and land use impacts and to potentially simplify the acquisition of property or access rights (Exh. NG-2 at 4-2).

25 The Company focused on shorter, more direct routes tending to have fewer environmental impacts, less disruption due to construction, and a generally lower cost (Exh. NG-2, at 4-2).

The Company determined that due to the urban nature of the study area, it was appropriate to primarily evaluate the candidate routes based upon potential impacts to the human environment (Exh. NG-2, at 60).[26] The Company established the following six human environmental criteria: (1) residential land use, (2) commercial/industrial land use, (3) sensitive land uses, (4) historic resources, (5) traffic impacts, and (6) public transportation facilities (Exh. NG-2, at 4-21). Additional considerations involved implementation concerns such as construction challenges (e.g., utility density and subsurface conditions)[27] and the number of easements that would be required from private property owners (Exhs. NG-2, at 4-21; NG-2, at 4-32 to 4-33).

Using a simple three-level rating scale (1, 2, 3) with a score of (1) representing the lowest potential impact, the Company assigned a score to each of the route segments under consideration for each environmental criterion (Exh. NG-2, at 4-21). The Company determined that given the underground nature of the Project and proposed construction techniques, criteria such as traffic disruption were of particular concern (Exh. NG-2, at 4-26). The Company thereafter modified the results of its environmental scoring model by assigning a triple weight to scores for traffic volume and a double weight to the scores for three criteria: residential land-use, number of sensitive receptors and number of businesses (id.).[28]

To evaluate the potential construction costs for each route segment, the Company broke down the costs of the Project into substation costs and circuit costs based on pricing obtained from manufacturers and costs of underground projects recently completed by the Company (Exh.

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26 Given the lack of natural resource features such as wetlands, protected habitats, surface waters, stream crossings, drinking water supply districts or Areas of Critical Environmental Concern within the study area, the Company included only one natural environment criterion in the routing analysis: the potential for encountering subsurface contamination during construction (Exhs. NG-2, at 4-21; EFSB-G-3).

27 Increased utility density and subsurface conditions such as ledge can slow down the construction process, increase the exposure time for traffic impacts, lengthen the time for noise disruptions, and increase cost (Exhs. NG-2, at 4-21; NG-2, at 4-32 to 4-33).

28 Weighting did not impact the ranking of the candidate segments (Exh. NG-2, at 4-26).

NG-2, at 4-26 to 4-28).[29] The Company specifically considered the cost of materials, contractor and manufacturer availability, subsurface conditions and potential work restrictions within the study area (id.).[30] The Company developed estimates for rock or ledge removal based upon approximated percentages of ledge calculated by length for each route segment.[31] Lastly, National Grid applied internal cost factors, including costs for permitting, legal and engineering services, interest associated with borrowing money to construct the line, and sales tax for materials not involved in the transmission of electricity (e.g., pavement restoration costs) (Exh. NG-2, at 4-29).

The Company also considered whether there was a difference in the candidate routes with regard to system reliability (Exh. NG-2, at 4-34). The Company determined that, in this instance, the only factor that might provide a marginal basis for comparing the reliability and operating characteristics of the route segments was line length (id.; Tr. at 131-133).[32] The Company's analysis concluded that there was no appreciable difference among the candidate route segments in terms of system reliability or operating characteristics (Exh. NG-2, at 4-34).

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29 The cost of the substation upgrades will not vary depending on which route is ultimately selected. Therefore, while reflected in the estimates of the overall route cost, the substation costs were not significant in differentiating between alternative route segments and variations (Exh. NG-2, at 4-33).

30 The Project is designed to include the installation of three 200 thousand-circular-mil ("kcmil") copper cables in a concrete-encased duct bank (Exh. NG-2, at 4-28). Any new duct bank required would consist of four 6-inch PVC conduits, one 4-inch diameter PVC circuit for fiber-optic communication and two 2-inch diameter PVC conduits for fiber-optic cables for temperature monitoring and a ground cable (id.).

31 At the time the Petition was filed, no geotechnical investigations had been performed. For the initial stage of the route analysis, the amount of ledge was estimated based on historical information at 20 percent and 30 percent of the length of the Primary Route and Alternative Route, respectively (Exh. EFSB-NO-3). However, subsequent to filing the Petition, the Company completed a series of geotechnical borings along the Primary Route and the results of such analysis are consistent (although slightly lower) than the original estimate (id.).

32 As a general matter, the longer the cable length, the greater the possibility for reliability and operational issues, principally from third-party encroachments (Tr. at 131-133).

For each candidate route segment, the following table depicts the length of route segment, the environmental score (raw score, weighted score and rank) and the conceptual costs (amount and ranking):

**Table 3: Environmental and Cost Scoring of Candidate Route Segments**

| Candidate Routes | Length (feet) | Environmental Score | | | Total Conceptual Cost (millions) | Cost Ranking |
|---|---|---|---|---|---|---|
| | | Score | Weighted | Rank | | |
| **Sub-Area 1-Vernon Hill Substation to Grafton Street** | | | | | | |
| **Segment 1A** Vernon St/Arlington St | 9,400 | 16 | 27 | 2 | $11.5 | 2 |
| **Segment 1B** Existing Providence St duct bank | 8,500 | 9 | 15 | 1 | $4.3 | 1 |
| **Sub-Area 2-Grafton Street to Brown Square** | | | | | | |
| **Segment 2B** Franklin St/Norfolk St | 7,000 | 16 | 28 | 1 | $11.4 | 1 |
| **Segment 2C** Grafton St/Orient St | 8,300 | 25 | 43 | 2 | $14.6 | 2 |
| **Sub-Area 3-Brown Square to Bloomingdale Substation** | | | | | | |
| **Segment 3A** Plantation St/ Route 9/Frank St | 4,800 | 18 | 32 | 4 | $8.5 | 4 |
| **Segment 3B** Plantation St/Wells St/ Frank St | 3,200 | 15 | 26 | 3 | $5.9 | 2* |
| **Segment 3C** Plantation St/ Northboro St/Frank St | 3,200 | 13 | 22 | 2 | $5.5 | 1 |
| **Segment 3D** Franklin St/Pollock St/ Frank St | 3,400 | 10 | 17 | 1 | $5.8 | 3* |
| *Cost estimates for Segments 3B and 3D are essentially the same. However, because Segment 3D requires property rights from eight property owners, while Segment 3B requires property rights from three property owners, the Company ranked Segment 3B second and Segment 3D third. | | | | | | |

Sources: Exhs. NG-2, at 4-31; NG-2, at Table 4.5-2

The Company next performed an overall route analysis to ascertain the Primary and Alternative Routes, combining route segments that were advantageous based on low potential for human environmental impact and low estimated circuit costs, as well as considerations of constructability and number of easements (Exh. NG-2, at 4-34). The Company's route comparison analysis determined that the Primary Route would consist of Segments 1B, 2B and 3C[33] and the Alternative Route would consist of Segments 1A, 2C and 3D[34] (Exhs. NG-2, at 4-34; NG-2, at 4-37; NG-2, at Table 4.7-1).[35]

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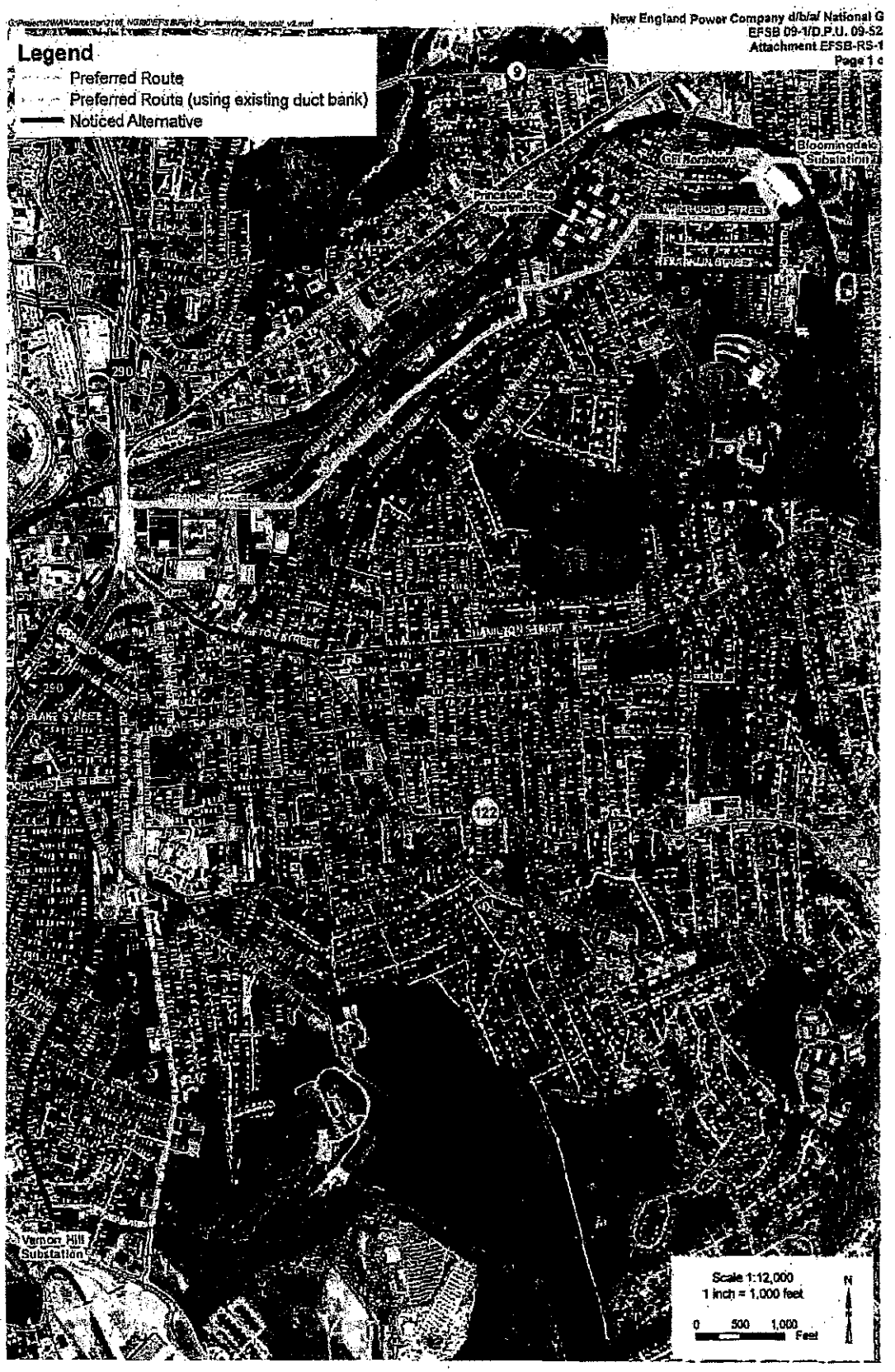
33 Segment 3D scored slightly better than Segment 3C in terms of environmental impact due to the additional distance on Plantation Street, however, Segment 3C cost less and required half as many easements. The Company determined that potential Segment 3C traffic impacts could be controlled through the implementation of traffic management measures (Exh. NG-2, at 4-37).

34 In comparing Segments 3B and 3D, the Company determined Segment 3D should be included as part of the Alternative Route because it is geographically distinct from Segment 3C (incorporated in the Primary Route) while portions of 3B and 3C overlap (Exh. NG-2, at 4-37).

35 The Company proposed a Primary Route variation for Foche Avenue in the event of excessive utility congestion in Brown Square, but this option was subsequently eliminated (Exhs. NG-2, at 4-7; EFSB-RS-1). The Company also proposed a Primary Route variation to cross the GFI property and CSX railroad tracks (Exh. NG-2, at 4-9). Subsequent to filing the Petition, the Company performed surveys and geotechnical investigations along both sides of the GFI property and determined that there would be increased construction complexity and cost crossing on the east side of the GFI property because of a significant grade change and preexisting foundations that would have to be removed (Exh. EFSB-RV-2). The Company thus incorporated the Western CSX crossing with the northwest crossing of the GFI property into the Primary Route (id.).


New England Power Company d/b/a National G
EFSB 09-1/D.P.U. 09-52
Attachment EFSB-RS-1
Page 1 o
Legend
Preferred Route
Preferred Route (using existing duct bank)
Noticed Alternative
Princeton Place Apartments
Bloomingdale Substation
Vernon Hill Substation
Scale 1:12,000
1 inch = 1,000 feet
0 500 1,000 Feet
N

iv. CSX Work-Around

After the Siting Board's May 13, 2010 Meeting, the Company became aware of CSX's intention to expand its intermodal rail terminal in Worcester (Exh. NG-6, at 1). A component of CSX's terminal expansion involves raising the grade of Franklin Street and constructing a below-grade crossing to connect CSX's existing freight yard north of Franklin Street with a new proposed freight area on the south side of Franklin Street (id. at 2). CSX's proposed realignment of Franklin Street and relocation of existing utilities would affect approximately 800 linear feet of National Grid's proposed 115 kV cable along the Primary Route (id.). Initially, the Company considered maintaining the Project along the Primary Route, but was concerned that CSX's plans could adversely affect the construction and operation of the underground 115 kV line.[36] The Company therefore concluded that it should consider a work-around to reroute the cable away from CSX's proposed tunnel (Exh. NG-6, at 3). Accordingly, the Company analyzed six work-around options in the vicinity of Franklin Street as illustrated on the next page (id.).[37]

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36 To avoid interference with CSX's tunnel and elevation of Franklin Street, portions of the Company's facilities would have to be buried in excess of 20-25 feet (by comparison elsewhere on the route the cable would be buried approximately five to eight feet) (Exh. NG-6, at 2). The Company dismissed this option because: (1) the greater depth of burial would expose the line to increased soil thermal resistivity, which may have a negative impact on the underground cable system's capacity and may necessitate installing a larger conductor size to achieve the desired circuit capacity which would increase costs; and (2) any future need to access the duct bank under the tunnel would be difficult and would restrict CSX's operation to use the tunnel to move freight (id. at 6).

37 The work-around options analyzed by the Company include Waverly Street to Barbara Lane via private property (Option 1); cut-through from Grafton Street to Barbara Lane (Keese Street) (Option 2); cut-through from Grafton Street to Barbara Lane (a private driveway) (Option 3); a route south of the overpass (Option 4); a route north of the overpass (Option 5); and the Alternative Route (Option 6) (Exh. NG-6, at 3-4).

Worcester Cable Project Worcester, MA

Epsilon

**Figure 4**
*Work-Around Alternatives*

The Company's analysis included meetings and discussions with CSX representatives and consultants, and took into account environmental considerations, cost, reliability, property acquisition requirements and zoning factors (id. at 1). The Company concluded that the Waverly Street to Barbara Lane option (i.e., Option 1) would be the best work-around because it (1) responds effectively to the changed circumstances resulting from the CSX terminal expansion and allows both projects to move forward expeditiously; (2) shortens the total cable length by approximately 900-1,000 feet,[38] (3) requires the acquisition of property rights solely from CSX, which has a mutual interest in coming to an agreement;[39] (4) avoids a sensitive abutter (the fire station on Franklin Street); (5) reduces the Project cost by $70,000,[40] (6) will not require any more zoning relief than the Company initially requested in its Zoning Petition; and (7) may provide a reliability benefit by allowing the Project to be completed in a timely manner (Exh. NG-6, at 4,5,9).

3. Conclusions on Site Selection

a. Reasonable Set of Criteria

The Company examined the environmental and human impacts of the construction and operation of the proposed transmission line, which are the types of criteria that the Siting Board previously has found to be appropriate for the siting of energy facilities. See NSTAR Gas Company, 13 DOMSB 143 at 177; MMWEC Decision, 12 DOMSB 18, at 125. As part of its multi-step route selection process, National Grid also considered criteria including project cost, reliability, ease of permitting, construction complexity (including utility congestion and subsurface conditions), impacts on local businesses and residents, ability to mitigate construction

38 This option requires several hundred feet of additional duct bank construction through property owned by CSX (Exh. NG-6, at 3-4).

39 CSX confirmed that it acquired all property within the CSX work-around as of December, 2010 (Exh. EFSB-LU-6). CSX and the Company are negotiating the terms for the rights to install and maintain the Company's proposed transmission line (Exh. EFSB-LU-7).

40 This reduction is modest compared to the Company's estimate of the overall cost of the original Primary Route which is approximately $33.6 million (Exh. NG-6, at 6).

impacts and the number of easements required, as well as input from municipal officials and community groups, which are also appropriate criteria to consider in selecting a route consistent with G.L. c. 164, § 69H and 69J. Therefore, the Siting Board finds that the Company developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes that, on balance, are clearly superior to the proposed route.

b. Geographic Diversity

The Company identified a study area that would encompass all viable siting options, given the limitations imposed by an interconnection between the Vernon Hill and Bloomingdale substations. Although various segments of the routes analyzed were within blocks of each other, given the urban setting and relatively short distance between the substations, each route offers a unique set of environmental and cost advantages and disadvantages within the area designated by the Company as encompassing viable siting options for its proposed transmission line. The Siting Board finds that the Company established two routes (the Primary and the Alternative Routes) for the Project with some measure of geographic diversity.

c. Conclusion on Site Selection

The Company has demonstrated that it has considered a reasonable range of practical siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts.

E. Analysis of Primary and Alternative Routes

1. Standard of Review

In implementing its statutory mandate under G.L.c. 164, § 69H, the Siting Board requires a petitioner to show that its proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply. To determine whether such a showing is made, the Siting Board requires a petitioner to demonstrate that the proposed route for the facility is superior to the alternative route on the basis of balancing cost, environmental impact, and reliability of supply. CELCo Decision, 12 DOMSB 305, at 334; MMWEC Decision, 12 DOMSB 18, at 127.

Accordingly, in the sections below, the Siting Board examines the environmental impacts, reliability and cost of the proposed facilities along the Primary and Alternative Routes to determine: (1) whether environmental impacts would be minimized; and (2) whether an appropriate balance would be achieved among conflicting environmental impacts as well as among environmental impacts, cost and reliability. In this examination, the Siting Board compares the Primary and Alternative Routes to determine which is superior with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

2. Description of the Primary Route and Alternative Route

a. Primary Route

The Primary Route is approximately 3.5 miles extending from the Vernon Hill substation to the Bloomingdale substation (Exhs. NG-2, at 1-8; EFSB-G-13 ). From the Vernon Hill substation, the Primary Route entails use of the Providence Street duct bank for the first 1.5-mile segment (id.; EFSB-G-13). The second segment of the Primary Route is two miles long. It exits the Providence Street duct bank approximately 100 feet south of the corner of Waverly and Coral Streets, travels in a new duct bank north on Coral Street, east on Waverly Street, crosses Grafton Street and enters CSX's property along a driveway to the former Shaw's supermarket property, continues to Barbara Lane, proceeds east on Franklin Street to Norfolk Street to Villa Nova Street for a short distance then to Franklin Street and to Brown Square (intersection of Franklin and Plantation Streets) (Exhs. NG-2, at 1-9; NG-6, at 5). From Brown Square, the Primary Route extends northeasterly on Plantation Street, turns east to the end of Northboro Street, travels northwest across the GFI property to a railroad right-of-way owned by CSX, crosses beneath the CSX railroad tracks to a driveway owned by Eastview Apartment Associates, and then enters the Bloomingdale substation (Exhs. NG-2, at 1-9; EFSB-RS-1).

b. Alternative Route

The Alternative Route is approximately four miles long and begins at the Vernon Hill substation and travels north along Vernon Street, turns east on Dorchester Street and continues to Arlington Street (Exh. NG-2, at 1-9). The Alternative Route then zigzags for a short distance on

a number of streets: Columbia Street, Blake Street, Harrison Street, Waverly Street, Providence Street, Union Place and Coral Street (Exh. NG-2, at 1-10). At the intersection of Coral Street and Grafton Street, the Alternative Route travels east on Grafton Street to Orient Street, proceeds on Plantation Street to Brown Square, turns east on Franklin Street, then turns north on Pollock Street (id.). At this point, the route travels east across the GFI property to the CSX ROW, crosses under the CSX railroad tracks to the driveway owned by the Eastview Apartment Associates, then enters the Bloomingdale substation (id.).

3. Environmental Impacts

The Project will have temporary (i.e., from construction) and permanent environmental impacts. The Siting Board addresses temporary impacts in Section 3.a and permanent impacts in Section 3.b, below.

a. Temporary Environmental Impacts

In this section, the Siting Board reviews the temporary environmental impacts associated with the construction of the proposed transmission line and substation improvements. First, the Siting Board describes the construction methodology and sequencing that the Company will utilize for either the Primary or Alternative Route. Then, the Board describes and compares the environmental impacts of the Primary and Alternative Routes. As addressed below, the Siting Board finds that (1) the Primary and Alternative Routes have comparable temporary impacts on water resources, endangered species and hazardous materials; (2) the Primary Route has less adverse temporary environmental impacts on land use and historical resources, air emissions, traffic and noise; and (3) subject to specified mitigation and certain conditions, temporary environmental impacts along the Primary Route would be minimized.

i. Construction Methodologies and Sequencing Applicable to Either Route

(A) Substation Upgrades

The Project includes upgrades to four substations, Vernon Hill, Bloomingdale, Millbury and Rolfe Avenue substations (Exh. NG-2, at 1-11 to 1-18). To accommodate the 115 k V line, the following equipment will be installed at the existing Vernon Hill substation: one 115 kV gas

circuit breaker; two motorized disconnects; three circuit switchers; six 115 kV coupling capacitor voltage transformers; one 115 kV cable termination riser structure and associated equipment; one 115 kV dead-end structure for the M-165 overhead line; 115 kV tubular aluminum bus and support structures; and associated 115 kV relaying and controls (Exh. NG-2, at 1-11). The following equipment will be installed at the Bloomingdale substation to accommodate the 115 kV line: one 115 kV gas circuit breaker; two motorized disconnects; two circuit switchers; six 115 kV coupling capacitor voltage transformers; one 115 kV cable termination riser structure; 115 kV tubular aluminum bus and support structures; control house extension with additional relay; and control panels and associated bus work and equipment (Exh. NG-2, at 1-15).

The Millbury substation is geographically separate from the proposed transmission line (Exh. NG-2, at 1-15). The Project necessitates the installation of two 115 kV gas circuit breakers in an existing bay to separate the existing 115 kV M-165 and E-157 overhead lines at the Millbury substation (id.; Exh NG-2, at 1-15; 1-18).[41] The Millbury substation upgrades also include two 115 kV coupling capacitor voltage transformers; 15 gang-operated disconnect switches; associated equipment relaying and controls; and 115 kV tubular aluminum bus and support structures (Exh. NG-2, at 1-18). Finally, the Rolfe Avenue substation (which is also geographically separate from the proposed transmission line) will require new protection and control equipment to support the upgrades at the Blooomingdale substation, including a new line trap and capacitor voltage transformers (Exh. NG-2, at 1-18). Most of the work at the Rolfe Avenue substation will be within the existing control house with the exception of one coupling capacitor voltage transformer which will be located outside the control house (id.).

(B) Transmission Line

The proposed transmission line will consist of three solid dielectric insulated cables in individual polyvinyl chloride ("PVC") conduits (Exh. NG-2, at 1-23). The duct bank will consist of four six-inch diameter PVC conduits, one four-inch diameter PVC conduit for fiber-optic communication to protect the transmission lines, two two-inch diameter PVC conduits for fiber-

41 The substation upgrades at the Millbury substation provide a second transmission source to the Bloomingdale substation (Exh. NG-2, at 3-6).

optic cables for temperature monitoring and a ground cable (id.). The PVC conduits will be encased in a common concrete envelope (id.).

The Company's construction of the underground transmission line will proceed in several phases conducted in sequence at each particular location so that construction can progress simultaneously along different portions of the route (Exhs. NG-2, at 5-6; EFSB-T-8). The five principal phases of construction consist of: (1) manhole installation; (2) trench excavation; (3) duct bank installation and pavement patching; (4) cable pulling, splicing and testing; and (5) final pavement restoration (Exh. NG-2, at 5-6). The Company estimates a construction period for the transmission line of approximately nine months from the date that the Company obtains all permits (Exh. EFSB-G-9).

The Company plans to start construction with the installation of manholes and duct bank (Exh. NG-2, at 5-6). Pre-fabricated concrete manholes approximately eight feet wide by 20 feet long will be installed every 1,500 to 2,000 feet (id.). The basic method for constructing the underground duct bank will be by open-cut trenching. To mitigate any sedimentation or nuisance dust and to minimize traffic impacts, the Company will employ a "clean trench" method of excavation whereby the excavated soil is loaded directly into a dump truck for off-site recycling or disposal (Exh. NG-2, at 5-9). To further reduce the impacts of dust during excavation, the Company will require the contractor to cover truck loads containing excavated soils and to wet down the project site, if necessary (Exh. EFSB-T-1; Tr. at 165). The Company asserts that implementing the "clean trench" approach is itself a dust suppression methodology as it results in substantially reduced fugitive dust emissions compared to other construction techniques (Exh. EFSB-T-1).

In terms of the CSX ROW near the Bloomingdale substation, a trenchless boring technique known as "pipe-jacking" or "jack and bore" will be utilized (Exh. NG-2, at 5-9).[42] The results of the Company's soil boring testing on both sides of the proposed crossing location determined that the casing should be above the bedrock (RR-EFSB-8). The estimated duration

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42 This technique involves creating a tunnel for the conduit: a casing equipped with a tunneling shield is pushed forward incrementally by hydraulic jacks located at the jacking pit (Exh. NG-2, at 5-9).

of the pipe jacking procedure is eight to eleven weeks (id).[43] Once the trench is excavated, PVC conduit will be assembled and lowered into the trench and the area around the conduit will be filled with a high-strength, thermal concrete (Exh. NG-2, at 5-9). The trench will then be backfilled and the site restored (id.). Once the manholes and duct bank are complete, the cable will be installed, spliced, tested and energized (Exh. NG-2, at 5-10).

ii. Pavement Restoration

After construction of the duct bank is complete, the pavement will be temporarily patched. Thereafter the pavement will be repaired or replaced upon request of the Worcester Public Works Department ("PWD") (Exh. NG-2, at 1-23). A DPU standard and a Worcester municipal ordinance govern the restoration of the streets for utility projects.[44] The DPU Street Restoration Standards state at § 9.16 that "The Municipality shall have jurisdiction to determine the pavement repair method to be utilized on all pavements which have been installed for less than five years."

Furthermore, the City of Worcester Revised Ordinances, Part 1, Chapter 12, §118, Replacing Disturbed Portion of Street provide that:

(a) Whenever any person…shall remove or disturb any portion of a street, way, pavement or sidewalk for any purpose whatsoever, such street, way, pavement or sidewalk shall be replaced in a safe and suitable condition for the public travel as may be directed by the commissioner, it shall be so replaced by the commissioner at the expense of the person so disturbing or removing the same….

The Company has had several discussions with the City concerning pavement restoration (Exh. EFSB-C-13). The City recognizes that based on the Company's proposal to start construction in the spring of 2011, some of the streets previously identified as "new" would be

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43 If the ledge elevations are consistent with the results of the soil borings, the construction time frame should be between eight to eleven weeks, but if substantial ledge or bedrock is encountered pipe jacking construction may be extended an extra six weeks and may require special tooling (RR-EFSB-8).

44 The DPU standard is the Street Restoration Standard (D.T.E. 98-22, Standards to be Employed by Public Utility Operators When Restoring Any of the Streets, Lanes and Highways in Municipalities) and the municipal standard is City of Worcester Revised Ordinances of 2008 (Exh. EFSB-C-13).

more than five years old (id.). However, the PWD noted that the abutters along these routes would still expect full curb-to-curb repaving based on their initial understanding of the Project's requirements (id.). While there are currently no formal agreements in place between the City and the Company regarding pavement restoration, the Company has agreed to work cooperatively with the City to assess the condition of each street prior to the start of construction and come to an agreement as to whether the Company would repave each street curb-to-curb, provide a full depth patch along the trench only or contribute funds for full repaving to be performed by the City (id.). The Siting Board finds that pavement restoration is necessary to mitigate the Project's construction impacts. Thus, the Siting Board directs the Company to continue to collaborate with City officials to assess the condition of each roadway and reach an agreement regarding pavement restoration for each roadway affected by the Project prior to the commencement of construction of the Project.

iii. Asian Long Horn Beetle

Both the Primary and Alternative Routes are within an area currently being regulated by the Massachusetts Department of Conservation and Recreation ("DCR") for an infestation by Asian Long Horn Beetles (Exh. NG-2, at 5-26). The Company will require contractors to review the DCR requirements and consult with the DCR and the City of Worcester regarding proper disposal techniques (id.). To ensure that tree removal for the Project does not impact the area affected by the infestation by Asian Long Horn Beetles, the Siting Board directs the Company and its contractors to comply with the regulations and requirements of DCR and the City of Worcester regarding the proper disposal of trees, limbs and debris from regulated Project areas.

iv. Water Resources and Endangered Species

There are no wetland resource areas and no surface waters along the Primary or Alternative Routes or at substations to be upgraded (Exh. NG-2, at 5-23). The Worcester Conservation Commission has determined that there are no jurisdictional storm drains leading to wetland resources and wetlands will not be impacted by the Project (Exhs. EFSB-G-3; EFSB-G-3(a)). There is a low potential for erosion and sedimentation resulting from construction within City streets along both the Primary and Alternative Routes (Exh. NG-2, at 5-23). However, the

Company will prepare a Storm Water Pollution Plan ("SWPP") that will specify measures to be implemented, including the installation and maintenance of filter fabric barriers to prevent sedimentation to the storm drain system (id.). In addition, the trench spoils will be loaded into dump trucks and promptly removed, which limits the potential for soils to be transported into nearby storm drains (id.).

The Natural Heritage and Endangered Species Program ("NHESP") has determined that there are no mapped habitats in the vicinity of the Primary or Alternative Routes or the substations (id. at 5-24).

Based on the record information noted above, the Siting Board finds that impacts to endangered species and, with the implementation of the SWPP and clean trench method of excavation, impacts to water resources along the Primary Route would be minimized. The Siting Board further finds that the Primary and Alternative Routes are comparable with respect to impacts on water resources and endangered species.

v. Land Use and Historical Resources

(A) Primary Route

With few exceptions, the alignment for the Primary Route is within public roadways (Exh. NG-2, 5-16, 5-17). The Primary Route utilizes the Providence Street duct bank for the first 1.5 miles of the route (Exh. EFSB-G-13). Providence Street contains a mix of land uses, including high density residential development, the Worcester Senior Center Campus, medical office buildings, small businesses and two educational institutions: the Worcester Academy, a private co-ed day and boarding school for grades 6-12 and postgraduates, and the Vernon Hills School, which is a public elementary school (id.). Also on Providence Street is the Worcester Academy Community Park which includes athletic areas (Exh. NG-2, at 5-16, 5-17). From Providence Street, the duct bank travels onto Aetna and Coral Streets, which consist of residential development (Exh. NG-2, at 5-17).

The portion of the Primary Route requiring new duct bank construction first traverses Waverly Street, which consists of multi-family residences and proceeds via a driveway into CSX's property, which will have an industrial use as an intermodal rail terminal (Exh. NG-6, at 5). From Norfolk Street to Brown Square, the Primary Route is mostly comprised of single and

multi-family homes, and on Plantation Street between Brown Square and Northboro Street, the route also is mostly residential with a small dry cleaner (Exh. NG-2, at 5-17). The route continues on the northwestern side of the GFI property, which has several commercial buildings, and then travels under the CSX tracks to the driveway serving the Eastview Apartment complex into the Bloomingdale substation (id.).

There are 15 historic resources along the Primary Route, more than half along the Providence Street duct bank. These include four properties on the Inventory of Historic and Archaeological Assets of the Commonwealth and three National Register properties as well as two Districts listed with National Register of Historic Places (Exhs. NG-2, at 5-28 to 5-29; NG-2, at Figure 5-7).[45] Along the new duct bank portion, there are three properties on the Inventory of Historic and Archaeological Assets of the Commonwealth (Exh. NG-2, at 5-28). In addition, the Bloomingdale Fire House is listed on the State and National Registers of Historic Places and the Worcester Multiple Resource Area (id.).[46] The Company will submit a Project Notification Form to the Massachusetts Historical Commission ("MHC") in compliance with M.G.L. c. 9, §§ 26-27C as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00) (Exh. NG-2, at 5-26).

Regarding mitigation measures, the Company will implement a variety of measures to reduce the short-term impacts of construction, including implementing the clean trench method of excavation, suppressing dust by covering dump trucks and wetting down the site, if required (Exhs. NG-2, at 5-13; EFSB-T-1; Tr. at 165). Additionally, the Company will develop a Construction Communication Plan ("CCP") which will be implemented in advance of and during construction of the Project (Exh. EFSB-C-1). The CCP will describe the outreach activities to inform abutters and stakeholders of the construction of the Project as well as the Company's plans to coordinate construction activities so that impacts are minimized (id.). The Project's

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45 The noted 15 historic buildings abutting the Primary Route exclude the Worcester Cold Storage Company Warehouse at 256-268 Franklin Street because it was burned down and the Boston & Albany Freight Station at 271 Franklin Street because it was demolished (Exh. NG-2, at 5-28).

46 The Bloomingdale Fire House is also adjacent to the Alternative Route (Exh. NG-2, at 5-28).

Community Outreach Coordinator will also contact the operations directors at institutions, hospitals and medical offices to inform them of the Project, its location and the expected duration of construction activities, and will respond to inquiries (id.). The Community Outreach Coordinator also will remain available to discuss any potential concerns throughout the course of construction (id.). The Company also will distribute flyers and maintain a website informing abutters in advance of construction activities and parking restrictions specific to the Project (Exh. EFSB-T-11).

In sum, because the Project is underground primarily under public roadways, any impacts on land use and historical resources will be temporary. Such impacts will be further minimized because using the Providence Street duct bank will not require excavation (i.e., cables simply will be installed and spliced within the existing duct bank). The Siting Board finds that subject to the mitigation discussed above, including implementation of the Company's dust suppression methods, its outreach efforts including the CCP informing abutters of construction activities with Company contact information, flyers distributed to abutters in advance of construction activities, and the Company's website describing construction progression, the impacts on land use and historical resources along the Primary Route would be minimized.

(B) Alternative Route

In lieu of the Providence Street duct bank segment of the Primary Route, the Alternative Route will require new duct bank construction along Vernon Street, which has large multi-family homes, several small businesses and an outpatient medical center (Exh. NG-2, at 5-17). Land use along the remainder of this route segment extending from Dorchester Street to Coral Street is residential (id.). In lieu of the new duct bank portion of the Primary Route, the Alternative Route traverses Grafton Street between Route I-290 and Billings Square, which is a dense commercial business district with an elementary school (id.). Beyond Billings Square, the Alternative Route is predominantly residential, but includes a nursing home and a park containing playground equipment and sports areas (id.). The Alternative and Primary Routes are similar from the end of Northboro Street to the Bloomingdale substation (id.).

There are 18 historic resources along the Alternative Route, including 15 properties listed on the Inventory of Historic Archaeological Assets of the Commonwealth and 3 properties listed

on both the National and State Registers of Historic Places (Exh. NG-2 at 5-28). The Alternative Route historic resources are similar in type and number to the 15 resources along the Primary Route (id.). The Company asserts that there is little potential to impact these historic resources as the Project will consist of temporary alteration and restoration of the public roadways (Exh. NG-2, at 5-26; 5-29).

Community receptors and historical resources are compared for the Primary and Alternative Routes in the table below:

**Table 4: Community Receptors and Historic Resources Along the Primary and Alternative Routes**

| Community Receptor | Primary Route | | Alternative Route |
|---|---|---|---|
| | Entire route | Portion of route requiring new duct bank | |
| Residences | 384 | 216 | 403 |
| Businesses | 25 | 18 | 45 |
| Schools | 2 | 0 | 3 |
| Parks | 1 | 0 | 2 |
| Other | Senior Center Medical Offices | 0 | Senior Center, Nursing Home Medical Offices |
| Historic Resources | 15 | 6 | 18 |

Source: Exhs. NG-2, at 5-28; EFSB-LU-12; RR-EFSB-5

In sum, for both the Primary and Alternative Routes, transmission facilities are to be located under streets, and have temporary construction impacts to land use and historical resources. However, compared to both the existing and new duct bank portions of the Primary Route, the Alternative Route's temporary impacts will be greater because installation of new duct bank along the Alternative Route entails a longer, more disruptive construction process – a clear land use impact disadvantage. For the remainder of its length, where use of either route requires new duct bank installation, the Alternative Route passes more residences, businesses and schools than the Primary Route and thus has more land use impacts as well. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to temporary construction impacts on land use and historic resources.

vi. Construction Equipment Air Emissions

(A) Background

As a transmission facility, the Project generally will not negatively impact air quality. However, the EFSB has concerns regarding emissions from construction vehicles. Diesel engines produce significant amounts of particulate matter ("PM"), which are small solid and liquid particles composed primarily of carbon that can be easily inhaled and that pose a significant health risk to humans (Exh. EFSB-1, at 1). Reducing PM pollution from all sources, including construction equipment, is important for the health of workers and communities (id.). Because construction equipment emits such a significant portion (27 percent) of the state's diesel $PM_{2.5}$, the Massachusetts Department of Environmental Protection ("MADEP") established the Massachusetts Diesel Retrofit Program ("MDRP") (id. at 4). The program involves using contract specifications to require contractors working on state-funded projects to install retrofit pollution controls on their construction equipment engines to reduce PM, volatile organic compounds ("VOCs"), and carbon monoxide ("CO") (id.).[47] In a recent case, the Siting Board imposed a condition requiring the applicant to retrofit certain diesel powered construction equipment. (See Western Massachusetts Electric Company, EFSB 08-2/D.P.U. 08-105/106, at 80 (September 28, 2010) ("GSRP Decision")).

(B) Substation Upgrades

For the substation upgrades, which will be the same whether the Primary or Alternative Route is used, the Company will be using in-house construction crews (Exh. EFSB-C-16; Tr. at 154). The duration of construction is estimated to be nine months for the Vernon Hill substation; eight months each for the Bloomingdale and Rolfe Avenue substations; and seven months for the Millbury substation (Exh. EFSB-G-9). The Company set forth the following non-road construction equipment to be used for the upgrades: excavators to dig foundations, cranes to set and offload equipment, and lifts (Tr. at 159). The Company indicates that the construction

47 Other strategies include (1) reducing idling; (2) replacing/repowering/rebuilding older engines; and (3) using cleaner diesel fuels (Exh. EFSB-1, at 4).

equipment would be operated on an as-needed basis and used for short durations to install the equipment at the substations (id.).

(C) Underground Transmission Line

The underground transmission line portion of the Project will use a similar construction methodology whether the Primary or Alternative Route is used. The Company estimates the duration of construction for the Primary Route to be nine months, whereas for the Alternative Route, the construction period would be 17.5 months due to two more miles of duct bank construction and a restriction on excavation between mid-November and mid-April imposed by the City of Worcester (Exhs. EFSB-C-15; EFSB-G-9). Construction of the underground line will be comprised of civil and electrical construction activities to be performed by a contractor hired by the Company using the following non-road construction equipment: grinders to remove existing pavement; excavators to do trenching, cranes to set manholes, and pavers to lay final pavement (Exh. EFSB-C-6; Tr. at 155). The Company is assuming an average progression of 100 feet per day for the pipe-laying portion of the Project (Exh. EFSB-T-1; Tr. at 156-158).

(D) Company's Position

The Company argues that it has not had the opportunity to thoroughly evaluate and offer evidence on project-specific issues that could affect either the appropriateness of retrofitting certain equipment or the Company's ability to comply with a retrofit condition while maintaining the construction schedule (Company Brief at 76). The Company further argues that it has not had an opportunity to discuss retrofitting construction equipment with prospective bidders, nor has it had the opportunity to work through the logistics of retrofitting certain equipment and then ensuring that those specific pieces of equipment are available for this Project (id. at 76, 77).

(E) Mitigation

The Company requires that contractors' equipment be in good working order, which the Company asserts helps to reduce emissions (Exh. EFSB-C-11). The Company indicated that it would encourage contractors invited to bid on this Project to consider engine retrofits and review this factor as part of the overall contractor selection process, noting that many large contractors already employ retrofits on their construction equipment (Exh. EFSB-10). With respect to its

own fleet, the Company proposes minimizing air quality impacts by using ultra-low sulfur diesel fuel (Exhs. EFSB-C-11; EFSB-C-12; EFSB-RR-9). The Company also requires that all construction vehicles (whether operated by the Company or by a construction contractor) comply with state law (G.L. c. 90, §16A) and DEP regulations (310 CMR 7.11(1)(b)) limiting vehicle idling to no more than five minutes in most cases (Exhs. EFSB-C-11; EFSB-C-12).

Because of the Siting Board's concern for air emissions caused by the Project's construction equipment and the dense urban environment in which the Project will occur, the Board concludes that additional mitigation is warranted. Thus, in addition to the mitigation specified by the Company, the Siting Board directs that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available), installed on the exhaust system side of the diesel combustion engine.[48] Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition and a list of retrofitted equipment, including type of equipment, make/model, model year, engine horsepower, and the type of emission control technology installed. The Siting Board finds that with the Company's specified mitigation, in conjunction with the implementation of the preceding diesel retrofit condition, the environmental impacts related to air emissions from construction equipment along the Primary Route would be minimized. Construction equipment air emissions would be less for the Primary Route due to its shorter construction schedule. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to the construction equipment air emissions.

vii. Traffic

(A) Overview of Construction Impacts

Both the Primary and Alternative Routes are densely populated and urban in nature and use portions of well-traveled local arterial roadways (Exh. NG-2, at 5-13). The typical width of

48 In imposing this condition, the Siting Board notes that during this proceeding the Company had ample opportunity to submit evidence regarding diesel retrofits.

the construction corridor will be one traffic lane or approximately ten to twelve feet. If construction barriers (e.g. cones or jersey barriers) are used, an additional two to three feet would be added to the construction corridor (Exh. EFSB-C-9). Approximately 100 linear feet of trench will be excavated each day based on trench dimensions of 2.5 feet wide and five feet deep (Exh. EFSB-T-7). There will be approximately 50 cubic yards of material excavated from the trench daily which will necessitate approximately five to six truck trips per day for soil removal purposes and three truck trips per day for back filling (id.). The trench will be sheeted and shored, mitigating traffic impacts by allowing the trench to be covered during non-working hours so that traffic can pass over it and access to businesses and residences can be maintained (Exhs. NG-2, at 5-9; EFSB-T-7; EFSB-T-9).

For either route, the Company anticipates that traffic control by a detail officer will be necessary during the periodic delivery of construction material and equipment (Exh. EFSB-T-4). To the extent possible, all material for the underground transmission line will be delivered to one of several lay down areas and will be transported to the job site on an as-needed basis (id.).[49] Delivery of the materials or trucks exiting the work zone to transport soil and rock may create periodic, short-term traffic impacts. The contractor will work with the on-site detail officer to manage traffic flow during these temporary operations (Exh. EFSB-T-4). Additionally, some materials such as manholes and concrete will be site-delivered, which may require temporary traffic restrictions during offloading, expected to be of short duration (id.). The equipment deliveries for the substation construction will not require any special traffic control measures because there is sufficient space at each of the substations to allow offloading of material out of the public way (id.).

(B) Primary Route

The Primary Route utilizes the Providence Street duct bank for 1.5 miles, which will substantially reduce and mitigate traffic impacts because work in this area will be limited to

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49 The Company has not finalized its plans for staging and lay down areas but has identified potential locations including, National Grid's office in Worcester, the Bloomingdale substation, the Vernon Hill substation and area under the Interstate 290 overpass next to the Grafton Street substation (Exh. EFSB-C-7).

cable pulling and splicing activities at existing manholes (Exhs. NG-2, at 5-14; EFSB-G-9). For the remainder of the route, the Company estimates from geotechnical borings where new duct bank will be installed, that approximately 18 percent of the trench spoils will be ledge (Exh. EFSB-NO-3). Considering the length of new duct bank and the extent of ledge, the Company estimates that the Primary Route construction period will be nine months (Exh. EFSB-G-13).

The Company noted that, in aligning the new duct bank, proposed locations were not limited to travel and parking lanes but included sidewalks and other public portions (e.g. shoulders) of the roadway (id.). The total length of sidewalks that will be impacted by construction on the Primary Route is approximately 1,620 feet (0.31 miles) (Exh. EFSB-T-10). There will be some short-term parking prohibitions along the Primary Route during construction, primarily during the trenching and duct bank installation, which will be done in a continuous progression with the roadway being returned to service as the progression passes (Exh. EFSB-T-11). However, there may be limited areas where parking restrictions will be applied only during construction hours (id.). In general, if approved by the City, parking restrictions will be in place for the duration of construction at any given location along the route for a relatively short duration (typically one to two weeks). The Company has made several outreach efforts to make residents and abutters aware of the potential construction issues, including short-term parking restrictions (id.). The Company will continue its outreach efforts and notify abutters of intended dates of construction in their area. Further, the Company will attempt to identify nearby parking alternatives in areas of the route where on-street parking restrictions would cause particular hardship (id.).

The Company expects it will be possible to maintain two lanes of traffic for 85 percent of the length of the Primary Route (16,160 feet) (Exh. EFSB-T-7). The Company estimates that the crossing of Grafton Street will take between three to four days (Exh. NG-6 at 6). The Company consulted with the Worcester PWD concerning possible night construction at the Grafton Street crossing for the CSX work-around (Exh. EFSB-NO-6). There is, however, a high probability that construction could be performed during regular hours and the Company would be successful

in maintaining two lanes of travel during construction activities (id.).[50] The City has directed the Company to provide sufficient prior warning in the form of message boards in advance of construction activities in this area (id.). The Siting Board directs the Company to continue working with the City of Worcester regarding the Grafton Street crossing.

The remaining portions of the route will require temporary lane closures with alternating traffic patterns managed by police details (Exh. EFSB-T-7). Less than two percent of the Primary Route will require temporary road closures (id.). Most likely 360 feet of Villa Nova Street will require a full road closure because it is narrow but the length of the proposed duct bank along this street is relatively short and construction activities should be completed in one to two weeks (id.). Local and emergency access will be maintained for any road closures approved by the Worcester PWD (id.).

The Company completed its initial Traffic Management Plan, which was presented at a meeting with various City agencies and officials, including the PWD and School Department on June 2, 2010 (Exh. EFSB-T-13). The Company will continue its working relationship with City Departments throughout the planning stages and construction of the Project (Exh. EFSB-T-12).

Traffic impacts associated with the Project will be temporary in nature and subject to the Company's proposed mitigation measures to minimize traffic impacts, including utilizing detail officers, implementing a Traffic Management Plan and CCP, delivering flyers with pertinent construction and traffic information, and maintaining a website specific to the Project, traffic impacts will be minimized along the Primary Route. The Siting Board anticipates that the Company will make every effort to avoid night construction. Should nighttime construction be required, however, the Siting Board directs the Company to provide the Siting Board with the Company's nighttime construction mitigation plan prior to the commencement of nighttime construction, encompassing any and all impacts and associated mitigation, including but not limited to, impacts to neighboring land uses, illumination spill-over and glare, noise and traffic impacts.

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50 The PWD anticipated that night work would not be necessary at the Grafton Street crossing location, but indicated that its Traffic Engineering Department would advise the Company if on-going review of the Project revealed new concerns (Exh. EFSB-NO-6).

(C) Alternative Route

The Alternative Route entails four miles of new duct bank, which is two more miles than the Primary Route. Further, the Company estimates that 30 percent of the Alternative Route would involve construction through ledge, approximately three times as much as the Primary Route (Exh. EFSB-NO-3). The Alternative Route, while traversing some local residential streets, also includes more heavily traveled urban arteries and a dense commercial business district with an elementary school on Grafton Street (Exh. NG-2, at 5-17). Additionally, there are three Worcester Regional Transit Authority bus routes along Grafton Street (id.). Input from the City of Worcester and neighborhood groups attending initial outreach meetings expressed concern regarding construction impacts and restrictions on traffic flow along Grafton Street (Exhs. NG-2, at 5-15; EFSB-C-8). Another challenge expressed by City officials concerning the Alternative Route is significant traffic volumes along Plantation Street (id.).

Based on the additional two mile duct bank construction required and the likely presence of more ledge on the Alternative Route, as well as local concern about traffic impacts on Grafton and Plantation Streets, the Siting Board finds that the Primary Route would be preferable to the Alternative Route with respect to temporary traffic impacts associated with construction.

viii. Noise

(A) Substations Upgrades

The new equipment and other improvements proposed at the Bloomingdale, Vernon Hill, Millbury and Rolfe Avenue substations are not expected to contribute to a significant increase in the noise levels experienced by surrounding receptors (Exh. NG-2, at 5-21). The proposed scope of the upgrades to the substations does not differ between the Primary and Alternative Routes (id.). Sources of noise would be limited to construction (i.e., excavating and installing equipment) (Exh. NG-2, at 5-21). The associated temporary construction noise will occur between 7:00 a.m. to 6:00 p.m. daily, Monday through Friday (Exh. EFSB-C-14). Work outside those hours may occur during planned outages to energize the new substation equipment but the Company will seek permission from the City of Worcester prior to any such work (id.). The duration of construction is estimated to be nine months for the Vernon Hill substation, eight months each for the Bloomingdale and Rolfe Avenue substations and seven months for the

Millbury substation (Exh. EFSB-G-9). Because any noise impacts will be temporary and will primarily occur during regular working hours, the Siting Board finds that the noise impacts associated with the construction at the substations will be minimized and that the noise impacts would be comparable for the Primary and Alternative Routes.

(B) Underground Cable Installation

(1) Primary Route

All phases of project construction will involve some noise. However, due to the progressive nature of the Project, at an average rate of approximately 100 feet per day, the duration of construction at any given location under normal trenching conditions will be about seven days (Exhs. NG-2, at 5-6; NG-2, at 5-19; NG-2, at 5-20 to 5-21; EFSB-T-1) (See Section II.D.3.a.i). The manhole installation and trench excavation phases utilize more substantial construction equipment, creating more noise than cable pulling and cable splicing, which does not generate significant noise (Exh. NG-2, at 5-20).[51] Typical sound levels from construction equipment at a reference distance of 50 feet would range between 60 dBA for the air conditioner to be used for cable splicing to 90 dBA for the pavement saw to be used for trench excavation (Exh. NG-2, at 5-19).[52] The excavation of ledge will be another source of noise because geotechnical boring tests completed by the Company indicate that approximately 18 percent of the Primary Route trench spoils will be rock (Exh. EFSB-NO-3). The Company will require that the contractor use mufflers and equipment with low noise levels where practical (Exh. NG-2, at 5-20).

The cables will be spliced inside connecting manholes which typically requires four to five work days per manhole to complete the splicing of all three cables (Exh. NG-2, at 5-10). The splicing operation requires the use of vehicles that contain all of the equipment and materials

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51 The typical construction equipment to be used for the project include the following: mobile crane, pavement saw, asphalt paver, concrete batch truck, pneumatic hammer, mounted impact hammer, backhoe, dump truck, generator and air conditioner (Exh. NG-2, at 5-19).

52 These estimates are conservative and based on maximum sound levels for each piece of construction equipment to be used on the Project (Exh. NG-2, at 5-20).

and a generator to provide electrical power for both the splicing van and an air conditioning unit often necessary to control moisture (id.). Cable splicing is a relatively quiet activity because the work takes place in the manhole, but there will be some noise created by the electric generator and ventilation fans while the manholes are occupied (id.). The Company will minimize noise from cable splicing by requiring the use of sound attenuated generators, which in the Company's experience will approximate a 25 percent reduction in noise levels at a 23 foot setback, which is consistent with the urban environment of the Project area (Exhs. EFSB-NO-2; RR-EFSB-7).[53]

Construction activities will typically occur between 7:00 a.m. and 6:00 p.m. Monday through Friday.[54] The Company indicated the possibility that it may seek approval from the City to work at night or on weekends to minimize disruption or if requested by the PWD. The Company expects this approach would be applicable principally for the commercial-industrial area near Route I-290 and on part of Franklin Street, rather than areas of residential use (Exh. NG-2, at 5-12; Tr. at 109-110). As noted above, the Company consulted with the City concerning the possibility of performing construction for the Grafton Street crossing at night to minimize traffic impacts.[55] While nighttime work is unlikely, should it be required, the Company indicated that the work would likely occur between 7:00 p.m. and 5:00 a.m. for three to four weekday nights (Exhs. EFSB-NO-5; NG-6, at 6). Construction activities would involve

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53 The industry standard is to reference the noise level at seven meters (approximately 23 feet) (RR-EFSB-7). This reduction estimate is based on the WhisperWatt™ manufactured by MultiQuip as a comparison of noise levels for generators with and without attenuation equipment compared to the U.S. Department of Transportation Federal Highway Administration published values for maximum construction equipment noise levels for generators (id.).

54 These hours comply with Chapter 8 and Chapter 9 of the City of Worcester's Ordinance, which limit the hours of construction to weekdays from 7:00 a.m. to 9:00 p.m. (Exhs. EFSB-NO-1; EFSB-NO-7; NG-2, at 5-12).

55 During the Company's consultation with the City regarding the possibility of nighttime construction for the Grafton Street crossing, the Worcester PWD observed that the land use was primarily commercial and that businesses would be closed at night (Exh. EFSB-NO-6). However, there are three multifamily residences on Waverly Street approximately 160-205 feet from the nearest Project location in the Grafton Street vicinity (Exh. EFSB-NO-9).

use of backhoes, dump trucks, a pneumatic hammer and generators, which would result in typical noise levels in the 80-90 dBA range (id.). If nighttime construction were to occur, the Company proposes the following mitigation measures: additional notice and community outreach in the Grafton Street crossing area, including message boards to alert abutters; measures to address and minimize the use of vehicles' back-up alarm noises; tasks having the highest sound levels (e.g., pavement cutting) scheduled in the early evening hours; use of exhaust systems and mufflers with the lowest associated noise levels and truck cleanout staging areas remote from work site to minimize slamming tailgates (Exh. EFSB-NO-8). The Company will continue to communicate with local officials and any sensitive receptors along the construction route to coordinate construction logistics and scheduling (Tr. at 106). The Company will also comply with Condition (e) in Section VI regarding nighttime construction.

Give the progressive nature of the Project, the use of mufflers and equipment with low noise levels and sound-attenuated generators, and the fact that construction will occur primarily on weekdays during daytime hours, the Siting Board finds, subject to compliance with Condition (e) in Section VI, that the noise impacts resulting from the construction of the Project along the Primary Route will be minimized.

(2) Alternative Route

The Company will use essentially the same equipment and construction techniques along either the Primary or the Alternative Route, resulting in essentially the same sound levels along either route. However, given that the Alternative Route requires an additional two miles of duct bank construction with a greater number of receptors and may have a greater amount of ledge (in which work generates slightly more noise and takes longer than excavation of fill or soft soils), the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to noise impacts associated with construction.

ix. Hazardous Materials

Some excavated materials may have the potential to be contaminated from historical releases or former land development practices in the vicinity of both the Primary and Alternative Routes (Exh. NG-2, at 5-24). According to DEP's database of Reportable Releases, for the

Primary Route and Alternative Route there are approximately 16 and 12 subsurface contamination sites respectively (Exh. NG-2, at App. 5-1). In addition, for the CSX work-around, DEP records indicate that previous soil characterization efforts, conducted by others, (DEP Site Tracking Numbers 2-0014903 and 2-0014943) resulted in reportable levels of subsurface contamination attributed to the quality of the urban fill that underlies the site and releases to soil from a former petroleum underground storage tank (Exh. EFSB-S-5).[56] In the area of the CSX work-around, construction will proceed pursuant to 310 CMR 40 and in accordance with the Activity and Use Limitation ("AUL") recorded in 2007 (id.).[57] Of the 16 sites on the Primary Route, 13 have been classified as Response Action Outcome ("RAO") indicating that the sources of contamination had been abated and that a condition of no significant risk had been achieved. For the Alternative Route, of the 12 sites, four have been classified as RAO and four have been closed (id.).

The Company has not yet conducted a pre-construction soil sampling effort. However, prior to the commencement of construction the Company will conduct sampling within the cable route trench which will provide soil management characterization data (Exh. EFSB-S-2). Should the route appear to be contaminated, the Company will submit either a Release Abatement Measure Plan ("RAMP") or a Utility-Related Abatement Measure Plan ("URAM"), pursuant to the Massachusetts Contingency Plan ("MCP"), 310 CMR 40 (id.). If contamination is found, the Company will contract with a Licensed Site Professional as necessitated by conditions encountered along the cable route trench, consistent with the MCP (Exh. NG-2, at 5-25).

The Company is also preparing a Health and Safety Plan to prevent worker and public receptor exposures to contaminated soils (Exh. EFSB-S-5). These plans provide assurance that contaminated soils or groundwater encountered during construction will be handled appropriately, regardless of the number of instances of contamination. Thus, the Siting Board

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56 The DEP records are available online at http://db.state.ma.us/dep/cleanup/sites/search.asp (Exh. EFSB-S-5).

57 The AUL prohibits uses such as single or multifamily residences, schools, day care facilities, recreational fields or playgrounds; and use of site soils for cultivation of fruits and vegetables (Exh. EFSB-S-5).

finds that subject to the Company's mitigation discussed above, impacts pertaining to hazardous material along the Primary Route would be minimized. The Siting Board notes that the record is unclear regarding the precise degree and extent of contaminated soils the Primary and Alternative Routes would traverse. However, the mitigation set forth above ensures the Company will identify and fully manage contaminated sites. The Siting Board finds that the Primary and Alternative Routes are comparable with respect to hazardous materials impacts associated with construction.

x. Conclusions on Temporary Impacts

The chart below summarizes the comparison between the Primary and Alternative Routes in terms of temporary environmental impacts due to construction of the Project.

**Table 6: Summary of the Temporary Construction Impacts for the Primary and Alternative Routes**

| Type of Impact | Less Adverse Impact if the Primary Route Is Selected | Less Adverse Impact if the Alternative Route Is Selected | Comparable Impacts |
|---|---|---|---|
| Water Resources | | | X |
| Endangered Species | | | X |
| Land Use and Historical Resources | X | | |
| Construction Equipment Air Emissions | X | | |
| Traffic | X | | |
| Noise | X | | |
| Hazardous Materials | | | X |

The Siting Board finds that the information provided by the Company regarding temporary environmental impacts of Project construction is substantially accurate and complete. In addition, the Siting Board finds that with the implementation of specified conditions and mitigation, and compliance with all local, state and federal requirements, the environmental impacts arising from the construction of the Project would be minimized. In comparing construction impacts along the two routes, the Siting Board finds that the Primary Route is preferable to the Alternative Route primarily because the Primary Route uses the Providence

Street duct bank for 1.5 miles of the 3.5 mile route, which significantly reduces the duration of construction (nine months for the Primary Route compared to 17.5 months for the Alternative Route). However, even discounting the obvious benefits of using the Providence Street duct bank for the Primary Route, if one were to compare the temporary construction impacts from where the Providence Street duct bank ends to the Bloomingdale substation with the corresponding segments of the Alternative Route, the Primary Route would still be superior because there would be (1) less traffic impacts to the dense business district on Grafton Street on the Alternative Route; and (2) less noise and traffic impacts because the Company estimates there will be more ledge along the Alternative Route. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to temporary construction impacts.

b. Permanent Environmental Impacts

Due to the lack of natural resources along the Primary and Alternative Routes,[58] the permanent environmental impacts associated with the Project are limited to visual, hazardous materials and magnetic fields.[59] As addressed below, the Siting Board finds that (1) the Primary and Alternative Routes have comparable permanent environmental impacts; and (2) with implementation of certain mitigation measures and conditions, permanent environmental impacts along the Primary Route would be minimized.

i. Visual Impacts

Because the transmission line primarily will be located underground within public streets along either the Primary or Alternative Route, any visual impacts would be limited to the substations and the GFI property.

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58 There are no wetlands, vernal pools, surface waters, wellhead protection areas or protected species that would be permanently impacted by the Project using either the Primary or Alternative Route (Exh. NG-2, at 5-23, 5-24).

59 Because the proposed transmission circuit will be installed underground, no above-ground electric fields will be produced and no changes in ambient electric field strengths will result from the Project (Exh. NG-2, at App. 5-2). Accordingly, the Company evaluated only magnetic fields along the Primary and Alternative Routes.

(A) Substations

The existing Vernon Hill substation is bordered by residential uses on Vernon Street to the west, Gloucester Road to the north, Grammont Road to the east, and commercial/industrial uses to the south (Exh. NG-2, at 1-11; 5-21). The tallest existing 115 kV equipment at the Vernon Hill substation is a dead-end structure which is 45 feet in height and an airbreak switch tower which is approximately 40 feet in height; both of which will be removed (Exh. EFSB-V-1). The proposed new layout at the Vernon Hill substation will involve the installation of a new steel dead-end structure that will be 30 feet-6 inches in height and a breaker, switches, 115 kV bus and the UG cable termination structure, which will be less than 25 feet tall (id.). To provide space for the necessary upgrades, the fenced area on the east side of the site will be expanded by approximately 4,100 square feet within an existing grassed area along Grammont Road (Exh. NG-2, at 5-22). Thus, the highest proposed equipment will be shorter than the existing equipment being replaced but the area occupied by equipment will be expanded.

The vegetative buffering at the Vernon Hill substation currently is minimal and consists of a limited number of evergreen plantings screening the view from Vernon Street (Exh. NG-2, at Figure 1-4). As visual mitigation, the Company submitted a landscape plan for the Vernon Hill substation dated March 25, 2010 that was accepted by the City (Exhs. RR-EFSB-6(b); RR-EFSB-6(c)). The landscape plan provides Atlantic White cedar trees and pink azaleas along two sides of the facility on Vernon Street and Grammont Road, which appear to provide sufficient vegetative screening. Along Gloucester Road, however, only limited buffering has been proposed, consisting of three pink azalea bushes at the northwestern corner of the property.

The Siting Board is concerned about the lack of facility buffer along Gloucester Road, where homes across the street are at a higher elevation and look down into the Vernon Hill substation. To ensure that visual impacts at the substations are minimized, the Siting Board directs the Company to enhance the proposed landscape plan for the Vernon Hill substation dated March 25, 2010 to add additional vegetation in both the northwest and northeast corners on the Gloucester Road side of the substation. The Company is also directed to provide to the Siting Board a copy of its final landscape plans for the Vernon Hill substation for the Board's information prior to the commencement of construction. Furthermore, the Company shall

provide care for all plantings to ensure that landscaping at the Vernon Hill substation becomes established and is maintained.

The Bloomingdale substation is on a 3.3 acre parcel which is accessed by a private driveway owned by the Eastview Apartment Associates (Exh. NG-2, at 1-11). Abutting land uses consist of single-family residences to the north on Wigwam Avenue, a parking lot for the Eastview Apartments to the east and south (the Eastview Apartment complex is further south across the parking lot), and the driveway to the Eastview Apartments that is parallel to CSX railroad ROW to the west (Exh. NG-2, at 4-15). To accommodate the additional equipment, the Company is proposing to expand the existing fence line by adding a total of approximately 11,000 square feet within an existing vegetated area to the west adjacent to the driveway for the Eastview Apartments and to the north towards abutting single-family residences along Wigwam Avenue (Exh. NG-2, at 1-15). The tallest existing equipment at the Bloomingdale substation includes two transmission structures that are 75 feet and 80 feet tall and two dead-end structures inside the substation fence line that are approximately 38 feet tall (Exh. EFSB-V-1). The proposed new layout at the Bloomingdale substation will involve the removal of these structures and the installation of a single new dead-end structure that will be 64 feet in height (id.). Additional new equipment will be 25 feet or less in height, comparable to existing equipment (id.).

The Company expects to remove one large oak, several crab apple trees and a pine tree to the north and west for substation expansion or site security reasons (id.). In addition, a small section of the screening vegetation between the substation and apartment complex to the south may be removed to provide adequate electrical clearance for the 115 kV transmission line entering the substation (id.). The Company asserts that the fence extension was designed to minimize vegetation impacts by avoiding trees and other vegetation that currently provide screening from residential properties to the east and north of the substation (Exh. EFSB-V-3). In sum, the proposed equipment will be shorter than the existing equipment being replaced. However, there will be visual impacts as a result of clearing vegetation for the substation upgrades.

As part of this proceeding, the Company created a landscape plan for the Bloomingdale substation dated March 25, 2010 that has been accepted by the City (Exhs. RR-EFSB-6(b); RR-EFSB-6(c)). The Company will provide replacement and added landscaping along the north and west sides of the facility. The Siting Board directs the Company to implement the landscaping plan dated March 25, 2010 for the Bloomingdale substation and provide care for the plantings to ensure that the landscaping becomes established and is maintained.

There will be minimal upgrades at the Millbury substation and the fence line will be expanded by approximately 4,500 square feet in a vegetated area to the west towards Cross Street (id.; Exh. NG-2, at 1-18; NG-2, at Figure 1-8). The land use around the Millbury substation is largely undeveloped, with the nearest residence located about 400 feet to the northwest (id.). Due to the minimal upgrades being proposed and the largely undeveloped character of the abutting properties, the Company asserts that the upgrades will not have a significant visual impact relative to the current visual conditions at the site and no mitigation is proposed by the Company (Exh. NG-2, at 5-23).

At the Rolfe Avenue substation, proposed equipment will be mostly within the existing control house, with one coupling capacitor voltage transformer to be located outside the control house but within the existing substation footprint (id.). The Company asserts that the additional equipment will not alter the appearance of the existing substation and thus, there is no potential for any incremental visual impact resulting from the work proposed at this substation and no mitigation is proposed by the Company (Exh. NG-2, at 5-23).

The Siting Board finds that with the Company's implementation of the above condition of enhancing the Vernon Hill substation landscape plan to include mature plantings along Gloucester Road and the implementation of the landscape plan for the Bloomingdale substation as well as the provision of care for the plantings at both substations to ensure the landscaping becomes established and is maintained, the visual impacts of the substation upgrades would be minimized. The Siting Board further finds that the visual impacts of the upgrades to the substations would be comparable for the Primary and Alternative Routes.

(B) Transmission Line

With respect to tree removal overall, the Project should impact very few trees since most of the route is proposed under paved roadways (Exh. NG-2, at 5-25). With respect to the number of trees within 15 feet of the edge of the trench along the Primary Route that could potentially be affected during Project construction, the Company indicates that there are approximately 85 trees, including ten trees on the GFI property (northwestern side crossing) (Exh. EFSB-LU-4).[60] The Company has not identified a proposed trench location along the Alternative Route, however, there are 360 trees within 15 feet from the edge of pavement on either side of the Alternative Route, as well as another 30 trees at the GFI property (eastern side crossing) (Exhs. NG-2, at 4-9; EFSB-LU-2).

The Company is prepared to protect trees that may be vulnerable to harm due to their proximity to trench work for the Project. For example, the record shows that the canopies of trees along Norfolk and Northboro Streets along the Primary Route and Orient, Franklin, Pollock and Northboro Streets along the Alternative Route extend out over the streets (Exh. NG-2, at 5-25). To minimize construction damage to trees, when trees are encountered within 15 feet of the trench edges, the Company will protect trees from bark and limb damage by surrounding the trees with wire-bound two by four lumber to a height of eight feet (id.). When tree roots are encountered during excavation, the Company will cease mechanical excavation and expose the roots by hand and keep them moist with wet burlap or plastic throughout the exposure period (id.). The Company will place thermal backfill in the trench so as to avoid impacting tree roots (id.).

Some tree clearing is likely, however, in conjunction with construction in non-paved areas at the end of Northboro Street using either the Primary or Alternative Route, where the routes traverse the GFI property (Exh. NG-2, at 5-25). For the Primary Route, the Company's proposal to cross the GFI property on the northwest side (Variation 3C-1) would require clearing approximately 4,000 square feet of vegetation (id.). For the Alternative Route, the Company

60 In addition, the CSX work-around on the Primary Route may involve removal of up to three coniferous trees (Exh. EFSB-LU-13). The fact that these trees do not appear on the CSX terminal expansion plans, however, suggests that they may be slated for removal with or without the Project (Exh. NG-6, at 7).

proposes to cross the GFI property on the east side of the property, which would require clearing approximately 15,000 square feet of vegetation (Exhs. NG-2, at 4-9; EFSB-LU-2). The area in question, the GFI property, is characterized as forested upland, with a dense shrub layer and scattered mature trees throughout (Exh. NG-2, at 5-25).

The transmission line would be installed almost entirely underground along either the Primary or Alternative Route, which limits the visual impacts of the Project to those at the GFI property. The Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to visual impacts of the transmission line due to the extent of tree clearing. Overall, the Siting Board finds that, with the Company's implementation of the landscaping screening plans at the Vernon Hill substation, with enhanced screening along Gloucester Road and the landscaping plan for Bloomingdale substation, the visual impacts of the proposed facilities would be minimized, and that the Primary Route is preferable to the Alternative Route.

ii. Air Impacts

The Project requires the long-term use of sulfur hexafluoride ($SF_6$) for the circuit breakers proposed to be installed at the Bloomingdale, Millbury and Vernon Hill substations (Exh. EFSB-S-3). The use of this material would occur regardless of route. $SF_6$ gas has been identified as a non-toxic greenhouse gas ("GHG"). In this regard, the Company developed plans to:

1) monitor and report on the use and loss of $SF_6$ gas on a system-wide basis;
2) recover and reuse $SF_6$ whenever possible;
3) identify leaking equipment for repair or replacement;
4) purchase and use equipment that minimizes the possibility of $SF_6$ emissions;
5) report $SF_6$ losses to National Grid corporate on a quarterly basis; and
6) report $SF_6$ losses to the Environmental Protection Agency ("EPA") annually (Exh. EFSB-S-3).

The Siting Board finds that with the implementation of the above $SF_6$ mitigation plan, the permanent air impacts of the Project along the Primary Route would be minimized.[61] Given that the long-term impacts from $SF_6$ are not route-dependent, the Siting Board finds that the Primary and Alternative Routes would be comparable with respect to permanent air impacts.

iii. Magnetic Fields

(A) Substations

Implementation of the Project will generally decrease magnetic fields at the Vernon Hill substation, both directly under the overhead lines and at locations along the fence line (with the exception of the eastern side of the substation, which increases 0.10 milligauss ("mG") (id.). For the Bloomingdale substation, the overhead currents flowing into the Bloomingdale substation will increase magnetic fields from about 25 mG to about 50 mG directly under the overhead lines. However, for the majority of the fence line perimeter the magnetic field levels will remain below 5 mG (id.). The fence line will be extended on the west side, which abuts the driveway and a row of parking spaces for the Eastview Apartment complex (Exh. NG-2, at Figure 1-6). The fence line also will be extended on the north side, which abuts the rear property line of the single family residences on Wigwam Avenue. The closest house to the fence line, however, is approximately 125 feet away (id.).

61 The Siting Board notes that after the final public hearing in this case the Secretary of Energy and Environmental Affairs issued the Massachusetts Clean Energy and Climate Plan for 2020 (dated December 29, 2010). See G.L. c. 21N. This Plan adopts a 2020 statewide GHG emissions limit of 25 percent below 1990 emissions levels and sets forth an integrated portfolio of policies to reach the Commonwealth's clean energy and climate goals. One of the policies set forth in the Plan is reducing $SF_6$ emissions to achieve the warming reduction equivalent to that associated with 0.2 million metric tons of $CO_2$ relative to 1990 levels by 2020. In future cases, as part of the Siting Board's mandate to ensure that new energy facilities are consistent with the Commonwealth's current health, environmental protection, and resource use and development policies, the Siting Board will be reviewing petitioners' proposed use of $SF_6$ to ensure that $SF_6$ emissions are being reduced to the maximum extent possible.

With respect to the Millbury substation, magnetic field levels will remain unchanged because the only modification will be to separate two incoming 115 kV circuits (the M-165 and the E-157) (id.). Moreover, the fence line will be extended an additional 20 to 50 feet, resulting in lower magnetic field levels compared to current levels along the fence line (Exh. EFSB-E-1). The area surrounding the Millbury substation is largely undeveloped, with the nearest residence located about 400 feet to the northwest (id.). The Rolfe Avenue substation upgrades include new protection and control equipment to support the upgrades at the Bloomingdale substation, which will not require expansion of the existing substation footprint (Exh. NG-2, at 1-18).

Because magnetic field levels at the substations will decrease, stay the same or only slightly increase, the Siting Board finds that the magnetic field impacts as a result of the upgrades to the substations will be minimized. The magnetic field impacts resulting from the substation upgrades are comparable for the Primary and Alternative Routes.

(B) Transmission Line

(1) Primary Route

The Primary Route utilizes the existing Providence Street duct bank for the first 1.5 miles extending from the Vernon Hill substation to Coral Street (Exh. NG-6, at 5). The Providence Street duct bank consists of a three by three arrangement with nine cable conduits, of which three conduits currently contain distribution circuits (id.). Each of the three-phase conductors of the proposed transmission line will be installed in separate conduits in a vertical configuration on the right side of the Providence Street duct bank (Exh. EFSB-E-2). A fourth conduit (the center conduit of the center row of the three by three duct bank) is reserved for the ground continuity conductor and as a spare conduit should one of the phase conductors fail (Exhs. NG-2, at 5-29; EFSB-E-7). The remainder of the Providence Street duct bank is reserved for distribution circuits (Exh. NG-2, at 5-29; Exh. EFSB-E-7).

The Company's expert calculated the peak magnetic field from the existing distribution circuits measured at a point three feet above grade directly over the Providence Street duct bank to be in the range of 25 to 32 mG at the centerline (Exh. NG-2, at 5-29). By adding the proposed 115 kV transmission line to the Providence Street duct bank, the peak magnetic field from the circuits would increase to the range of 45 to 50 mG at the centerline under normal loading (id.).

Given that magnetic fields fall off rapidly with distance from the centerline of the source, the magnetic fields would decrease on either side of the circuit centerline, to approximately 15 mG at a distance of ten feet to approximately five mG at a distance of 20 feet (id.). According to the Company, levels within any house or business would be "below ambient magnetic fields and likely undetectable" (Exh. RR-EFSB-3). The distance from the nearest edge of the public way to the transmission centerline along the Providence Street duct bank ranges from three feet (at the corner of Coral Street and Clarkson Street) to 30 feet (on Providence Street south of Ames Street) (Exh. EFSB-E-6).

For the remainder of the Primary Route, where the transmission line would be installed alone in a new duct bank, the Company calculated the peak magnetic field measured at a point three feet above grade directly over the proposed new duct bank to be in the range of 17 to 20 mG (Exh. NG-2, at 5-30). The magnetic field would decrease to approximately seven mG at a distance of approximately ten feet to either side of the circuit centerline and about five mG at a distance of 20 feet (id.).

Consistent with the Siting Board's cases directing Companies to use practical and cost-effective designs to minimize magnetic fields, EFSB staff requested that the Company examine an alternative cable configuration. The purpose of the request was to determine whether the alternative configuration would increase cancellation effects, thereby reducing magnetic fields. The requested alternative configuration involved arranging the conductors in triangular configuration, moving the top 115 kV phase conductor from the upper-right conduit of the duct bank (as proposed) to the center conduit of the duct bank.

The Company's analysis indicated that the alternative configuration would reduce magnetic field levels: with the alternative configuration, magnetic fields above the duct bank centerline would decrease from 45.2 mG to 33.6 mG based on 2013 normal loading levels (Exhs. EFSB-E-2; RR-EFSB-3). At 20 feet from either side of the duct bank centerline, the magnetic field would decrease from 4.6 mG to 3.5 mG (id.). Thus, the reduction in magnetic field levels offered by the alternative configuration would range from 11.6 mG at the centerline to 1.1 mG at 20 feet from the centerline (id.). However, while the alternative cable arrangement would reduce calculated magnetic fields, the greatest reduction would occur directly over the duct bank,

physically located in the public way. In addition, the Company demonstrated that the alternative cable arrangement would make cable installation and maintenance more difficult (Exh. EFSB-E-2; RR-EFSB-3).

The Siting Board notes the reliability concerns associated with the alternative cable arrangement and the evidence that magnetic fields will decline rapidly with distance from the transmission cable centerline and will therefore not be above background levels in occupied structures. The Siting Board therefore does not require that the Company utilize the alternative cable configuration and finds that the environmental impacts with respect to magnetic fields for the Primary Route will be minimized.

(2) Alternative Route

For the Alternative Route, the Company proposes to have the transmission circuit installed alone in a new duct bank for the entire four miles (Exh. NG-2, at 5-30). The Company calculated the peak magnetic field measured at a point three feet above grade directly over the proposed new duct bank to be identical to the new duct portion of the Primary Route, in the range of 17 to 20 mG (id.).

Because the Primary Route utilizes the Providence Street duct bank, which already contains distribution circuits, the magnetic fields would be higher within the existing duct bank and magnetic fields would be the same for the new duct bank portion of the Primary Route and the Alternative Route (Exh. NG-2, Table 5.4-5). Accordingly, the Siting Board finds that the Alternative Route is preferable to the Primary Route with respect to magnetic field impacts related to the transmission line.

c. Conclusions on Analysis of the Primary and Alternative Routes

The chart below summarizes the comparison between the Primary and Alternative Routes in terms of permanent environmental impacts.

**Table 7: Summary of the Permanent Environmental Impacts for the Primary and Alternative Routes**

| Type of Impact | Less Adverse Impact if the Primary Route is Selected | Less Adverse Impact if the Alternative Route is Selected | Comparable Impacts |
|---|---|---|---|
| Visual | X | | |
| Air Impacts | | | X |
| Magnetic Fields | | X | |

The Siting Board finds that the information provided by the Company regarding the Project's permanent environmental impacts is substantially accurate and complete.

Permanent visual impacts at the substations and permanent air impacts would not be route dependent as they are limited to the upgrades to the substations. In comparing the permanent impacts along the two routes, the Siting Board finds that the Primary Route would have less visual impacts than the Alternative Route due to less tree clearing at the GFI property. As for magnetic field impacts, the Alternative Route would be preferable to the Primary Route because the magnetic field levels are higher in the Providence Street duct bank due to the existing distribution circuits.

On balance, the Siting Board finds that the Primary and Alternative Routes are comparable with respect to permanent environmental impacts. The Siting Board also finds that with the implementation of specified conditions and mitigation, and compliance with all local, state and federal requirements, the permanent environmental impacts of the Project along the Primary Route would be minimized.

4. Cost

The Company developed refined cost estimates for both the Primary and Alternative Routes based on pricing obtained from manufacturers and recent underground projects (Exhs. NG-2, at 5-32; EFSB-PA-5). The cost estimates for the routes are summarized in the table below:

**Table 8: Route Cost Comparison**

| | Circuit Costs (millions) | Substation Improvements[62] (millions) | Total (millions) |
|---|---|---|---|
| Primary Route | $25.13 | $8.4 | $33.53 |
| Alternative Route | $31.9 | $8.4 | $40.3 |

Source: Exhs. NG-2, at 5-32; NG-6, at 5

The Company notes that the estimates do not include the cost of obtaining easements, which are required for both routes over the GFI property and on Frank Street (Exh. NG-2, at 5-32). The Company estimates total easement costs for the Primary Route are $156,900 plus a $4,000 annual fee for the CSX ROW and $24,900 for the Alternative Route plus the $4,000 annual fee for the CSX ROW (Exh. EFSB-LU-1(a)).[63] Thus, the easement costs for the Alternative Route are $132,000 less than for the Primary Route. However, the Company's estimate of the cost of the Project along the Primary Route ($33.53 million) excluding easement costs is $6.77 million less than that of the Alternative Route ($40.3 million). Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to cost.

5. Reliability

Construction of the Project along either the Primary or the Alternative Routes provides similar levels of reliability (Exh. NG-2, at 5-33; Tr. at 132-133). The length, physical environment and construction methodology for both the Primary and the Alternative Routes are very similar (id.). Thus, the Siting Board finds there is no material difference between the two routes in terms of reliability.

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62 The cost estimates for the substation improvements do not vary depending on whether the Primary or the Alternative Route is ultimately selected. As such, the Company did not use the substation cost estimates as a factor in differentiating between the Primary and Alternative Routes (Exh. NG-2, at 4-33 to 4-34).

63 The Company's estimated cost of easements for the Primary Route excludes the easement costs for the CSX work-around near Franklin Street because the easement costs are currently under negotiation by the parties (Exh. EFSB-LU-8).

6. Conclusions on Route Comparison

Based on review of the record, the Siting Board finds that the Company provided sufficient information regarding cost, reliability, and environmental impacts to allow the Siting Board to determine whether the Project has achieved a proper balance among cost, reliability and environmental impacts.

The Primary Route uses the existing Providence Street duct bank, which reduces construction time and temporary environmental impacts. On balance, use of the Primary Route provides the greatest assurance that the Project can be put in place in a timely, environmentally sensitive manner. The Primary Route also costs less than the Alternative Route, with comparable reliability benefits. Moreover, the Siting Board notes that the City of Worcester prefers the Primary Route (Exh. NG-2, at App. 1-1). Thus, the Siting Board finds that the Primary Route is superior to the Alternative Route on the basis of balancing cost, environmental impact, and reliability of supply.

Based on the information presented in Section II.E, above, the Siting Board finds that with the implementation of the specified mitigation and conditions, and compliance with all local, state and federal requirements, the temporary and permanent environmental impacts of the Project along the Primary Route would be minimized. The Siting Board also finds that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost. The Siting Board thus finds that the proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply.

F. Consistency with Policies of the Commonwealth

1. Standard of Review

G.L. c. 164, § 69J requires the Siting Board to determine whether plans for construction of the applicant's new facilities are consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth.

2. Analysis and Conclusions

a. Health Policies

In Section 1 of the Electric Utility Restructuring Act of 1997, the Legislature declared that "electricity service is essential to the health and well-being of all residents of the Commonwealth. . ." and that "reliable electric service is of utmost importance to the safety, health, and welfare of the Commonwealth's citizens . . . ." See c. 164 of the Acts of 1997, Section 1(a) and (h). In Section II.B. above, the Siting Board finds that the Project will improve the reliability of electric service in the Worcester area. In addition, in Section II.E.3.a, the Siting Board requires the Company to use only retrofitted off-road construction vehicles to limit emissions of PM during Project construction. This condition is consistent with DEP's Diesel Retrofit Program designed to address health concerns related to diesel emissions. In Section II.E.3, the Siting Board finds that the Project's magnetic fields, hazardous materials and air impacts have been minimized. Accordingly, subject to the specified mitigation and the Siting Board's conditions set forth below, the Siting Board finds that the Company's plans for construction of the Project are consistent with the current health policies of the Commonwealth.

b. Environmental Protection Policies

In Section II.E.3, above, the Siting Board reviews how the Project will meet various state environmental protection requirements. The Siting Board also (1) considers the Project's environmental impacts, including those related to water, endangered species, land use, historical resources, air emissions, noise and visual impacts; and (2) concludes that subject to the specified mitigation and conditions set forth below, the Project's environmental impacts have been minimized.

The Siting Board also recognizes the Commonwealth's policies relating to GHG emissions, including G.L. c. 30, § 61 and the Executive Office of Energy and Environmental Affairs' Greenhouse Gas Emission Policy and Protocol. While the Siting Board in its review under G.L. c. 164, § 69J is not subject to G.L. c. 30, § 61[64] (see G.L. c. 164, § 69I), the Siting

[64] Findings under G.L. c. 30, § 61 also are not required here for the Company's Section 72 or Zoning Exemption Petitions because an Environmental Impact Report is not required for the Project (Exh. EFSB-NG-4, Att. C). See 301 CMR 11.01(3).

Board notes that this Project will have minimal GHG emissions as it is an underground transmission line under existing paved roadways. The Siting Board addresses emissions from off-road construction vehicles and equipment as well as $SF_6$ emissions[65] in Sections II.E.3.a and II.E.3.b.ii., above.

Subject to the specified mitigation and conditions set forth in this Decision, the Siting Board finds that the Company's plans for construction of the Project are consistent with the current environmental policies of the Commonwealth.

c. Resource Use and Development Polices

In 2007, pursuant to the Commonwealth's Smart Growth/Smart Energy policy produced by the Executive Office of Energy and Environmental Affairs, Governor Patrick established Sustainable Development Principles. Among the principles are (1) supporting the revitalization of city centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources and integrates uses; (2) encouraging reuse of existing sites, structures and infrastructure; and (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes. The Siting Board notes that the Project is designed to improve the reliability of the City of Worcester's electric system and support the expansion of this formerly industrial City, including expansion of the CSX intermodal terminal. The Project is located underground, in existing roadways with a portion within an existing duct bank. In addition, local officials and community groups have played a significant role in developing the route for the Project as well as construction mitigation plans. In Section II.D., above, the Siting Board reviews the process by which the Company sited and designed the Project. Finally, the Siting Board finds in Section II.E, above, that there is no mapped habitat in the Project vicinity and the Project is unlikely to impact water or historic resources.

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65 See footnote 61 for further discussion regarding the Commonwealth's Policy on reducing $SF_6$ emissions.

Subject to the specific mitigation and the conditions set forth in this Decision, the Siting Board finds that the Company's plans for construction of the Project are consistent with the current resource use and development policies of the Commonwealth.

G. Decision on G.L. c. 164, § 69J

The Siting Board's enabling statute directs the Siting Board to implement the energy policies contained in G.L. c. 164, §§ 69H to 69Q, to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G. L. c. 164, § 69H. Thus, an applicant must obtain Siting Board approval under G.L. c. 164, § 69J, prior to construction of a proposed energy facility.

In Section II.B, above, the Siting Board finds that the existing electric transmission system is inadequate to reliably serve current and projected loads in the Worcester area under certain contingencies, and thus additional energy resources are needed in the Worcester area.

In Section II.C, above, the Siting Board finds that the proposed transmission Project, on balance, is superior to the alternative project approaches in terms of cost and environmental impact and with respect to the ability to reliably meet the identified need. The Siting Board thus finds that the Project is superior to the identified project alternatives with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section II.D, above, the Siting Board finds that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternatives to the proposed Project in a manner that ensures that the Company has not overlooked or eliminated any routes that, on balance, are clearly superior to the proposed Project. The Siting Board also finds that the Company has identified a range of practical transmission line routes with some measure of geographic diversity. Consequently, the Siting Board finds that National Grid has demonstrated that it examined a reasonable range of practical siting alternatives

In Section II.E, above, the Siting Board reviews environmental impacts of the proposed transmission Project and finds that with the implementation of the specified mitigation and conditions, and compliance with all applicable local, state and federal requirements, the temporary and permanent environmental impacts of the Project along the Primary Route would

be minimized. The Siting Board also finds that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost.

In Section II.E, above, the Siting Board finds that the proposed facilities along the Primary Route would be superior to the proposed facilities along the Alternative Route on the basis of balancing cost, environmental impact and reliability of supply. The Siting Board thus finds that the proposed facilities along the Primary Route would be superior to the proposed facilities along the Alternative Route with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section II.F, above, the Siting Board finds that with the implementation of specified mitigation and conditions, the Project is consistent with the health, environmental and resource use and development policies of the Commonwealth.

Accordingly, the Siting Board APPROVES the Company's petition to construct the three-circuit 3.5 mile, 115 kV underground transmission line in Worcester, Massachusetts using the Primary Route, and to upgrade the Bloomingdale, Vernon Hill, Millbury, and Rolfe Avenue substations, subject to the conditions set forth in Section VI.

## III. ANALYSIS UNDER G.L. C. 40A, § 3 - ZONING EXEMPTIONS

Pursuant to G.L. c. 40A, § 3, the Company requests an individual zoning exemption from the City of Worcester Zoning Ordinance ("Worcester Zoning Ordinance") for the proposed transmission line, as well as several individual zoning exemptions from the Worcester Zoning Ordinance and the Town of Millbury Zoning Bylaw ("Millbury Zoning Bylaw") for the proposed substation upgrades. The Company also seeks a comprehensive zoning exemption from each municipality's zoning ordinance.

### A. Individual Zoning Exemptions

#### 1. Standard of Review

G.L. c. 40A, § 3 provides, in relevant part, that:

> Land or structures used, or to be used by a public service corporation may be exempted in particular respects from the operation of a zoning ordinance or by-law if, upon petition of the corporation, the [Department] shall, after notice given pursuant to section eleven and public hearing in the town or city, determine the exemptions required and find that the present or proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public . . .

Thus, a petitioner seeking exemption from a local zoning by-law under G.L. c. 40A, § 3 must meet three criteria.[66] First, the petitioner must qualify as a public service corporation. Save the Bay, Inc. v. Department of Public Utilities, 366 Mass. 667 (1975) ("Save the Bay"). Second, the petitioner must establish that it requires exemption from the zoning ordinance or by-law. Boston Gas Company, D.T.E. 00-24, at 3 (2001) ("Boston Gas Decision"). Finally, the petitioner must demonstrate that its present or proposed use of the land or structure is reasonably necessary

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[66] G.L. c. 40A, § 3 applies to the Department. The Department refers zoning exemption cases to the Siting Board for hearing and decision pursuant to G.L. c. 25, § 4. When deciding cases under a Department statute, the Siting Board has the power and the duty:

> to accept for review and approval or rejection any application, petition or matter related to the need for, construction of, or siting of facilities referred by the chairman of the department . . . provided, however, that in reviewing such application, petition or matter, the board shall apply department and board standards in a consistent manner.

G.L. c. 164, § 69H.

for the public convenience or welfare. Massachusetts Electric Company, D.T.E. 01-77, at 4 (2002) ("MECo Decision (2002)"; Tennessee Gas Pipeline Company, D.T.E. 01-57, at 3-4 (2002) ("Tennessee Decision (2002)".

2. Public Service Corporation

a. Standard of Review

In determining whether a petitioner qualifies as a "public service corporation" ("PSC") for the purposes of G.L. c. 40A, § 3, the Massachusetts Supreme Judicial Court has stated:

> among the pertinent considerations are whether the corporation is organized pursuant to an appropriate franchise from the State to provide for a necessity or convenience to the general public which could not be furnished through the ordinary channels of private business; whether the corporation is subject to the requisite degree of governmental control and regulation; and the nature of the public benefit to be derived from the service provided.

Save the Bay at 680. See also, Boston Gas Decision, D.T.E. 00-24, at 3-4; Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997) ("Berkshire Power").[67]

b. Analysis and Conclusion

The Company is an electric company as defined by G.L. c. 164, § 1 and, as such, qualifies as a public service corporation. New England Power Company, D.P.U. 09-27/09-28, at 7-8 (March 26, 2010). Accordingly, the Siting Board finds that the Company is a public service corporation for the purposes of G.L. c. 40A, § 3.

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[67] The Department interprets this list not as a test, but rather as guidance to ensure that the intent of G.L. c. 40A, § 3 will be realized, i.e., that a present or proposed use of land or structure that is determined by the Department to be "reasonably necessary for the convenience or welfare of the public" not be foreclosed due to local opposition. See Berkshire Power, D.P.U. 96-104, at 30; Save the Bay at 685-686; Town of Truro v. Department of Public Utilities, 365 Mass. 407 (1974) ("Town of Truro"). The Department has interpreted the "pertinent considerations" as a "flexible set of criteria which allow the Department to respond to changes in the environment in which the industries it regulates operate and still provide for the public welfare." Berkshire Power, D.P.U. 96-104, at 30; see also Dispatch Communications of New England d/b/a Nextel Communications, Inc., D.P.U./D.T.E. 95-59-B/95-80/95-112/96-113, at 6 (1998). The Department has determined that it is not necessary for a petitioner to demonstrate the existence of "an appropriate franchise" in order to establish PSC status. See Berkshire Power, D.P.U. 96-104, at 31.

3. Public Convenience or Welfare

a. Standard of Review

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. Save the Bay at 680; Town of Truro at 407. Specifically, the Department is empowered and required to undertake "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964) ("New York Central Railroad"). When reviewing a petition for a zoning exemption under G.L. c. 40A, § 3, the Department is empowered and required to consider the public effects of the requested exemption in the State as a whole and upon the territory served by the applicant. Save the Bay at 685; New York Central Railroad at 592.

Therefore, when making a determination as to whether a petitioner's present or proposed use is reasonably necessary for the public convenience or welfare, the Department examines: (1) the need for, or public benefits of, the present or proposed use; (2) the present or proposed use and any alternatives or alternative sites identified;[68] and (3) the environmental impacts or any other impacts of the present or proposed use. The Department then balances the interests of the general public against the local interest and determines whether the present or proposed use of the land or structures is reasonably necessary for the convenience or welfare of the public. Boston Gas Decision, D.T.E. 00-24, at 2-6; MECo Decision (2002), D.T.E. 01-77, at 5-6; Tennessee Decision (2002), D.T.E. 01-57, at 5-6; Tennessee Gas Company, D.T.E. 98-33, at 4-5 (1998).

b. Analysis

With respect to need for, or public benefits of, the Project, the Siting Board finds, in Sections II.B and II.C, that (1) the existing electric system is inadequate under certain

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68 With respect to the particular site chosen by a petitioner, G.L. c. 40A, § 3 does not require the petitioner to demonstrate that its primary site is the best possible alternative, nor does the statute require the Department to consider and reject every possible alternative site presented. Rather, the availability of alternative sites, the efforts necessary to secure them, and the relative advantages and disadvantages of those sites are matters of fact bearing solely upon the main issue of whether the primary site is reasonably necessary for the convenience or welfare of the public. Martarano v. Department of Public Utilities, 401 Mass. 257, 265 (1987); New York Central Railroad at 591.

circumstances to reliably serve current and projected loads in the Worcester sub-areas supplied by the Bloomingdale and Vernon Hill substations; and (2) the Project will address these reliability issues.

Regarding alternatives, in Section II.C, the Siting Board analyzes a number of different project approaches other than the Company's proposed direct single-line alternative that the Company might use to meet the reliability need (such as distributed generation, energy efficiency, and demand response) and concludes that the proposed approach is superior to other approaches. The Siting Board also reviews the Company's route selection process in Section II.D, and determines that the Company applied a reasonable set of criteria for identifying and evaluating routes to ensure that no clearly superior route was missed. The Siting Board also compares the benefits of the Primary and Alternative Routes and concludes that the Primary Route is superior to the Alternative Route in providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Finally, regarding Project impacts, in Section II.E.3, the Siting Board reviews the environmental impacts of the Project and finds, while the Project may result in some local adverse impacts (primarily during construction), generally, with the implementation of certain mitigation and conditions, the impacts of this underground line would be minimized. The Siting Board also finds that Worcester area residents will benefit from the Project as it will improve the reliability of electricity delivery.

Based on the foregoing, the Siting Board finds that the general public interest in constructing the Project outweighs any adverse local impacts. Accordingly, the Siting Board finds that the proposed Project is reasonably necessary for the convenience or welfare of the public.

4. Individual Exemptions Required

a. Standard of Review

In determining whether exemption from a particular provision of a zoning by-law is "required" for purposes of G.L. c. 40A, § 3, the Department looks to whether the exemption is necessary to allow construction or operation of the petitioner's Project. See MECo Decision (2002), D.T.E. 01-77, at 4-5; Tennessee Decision (2002), D.T.E. 01-57, at 5; Western

Massachusetts Electric Company, D.P.U./ D.T.E. 99-35, at 4, 6-8 (1999); Tennessee Gas Company, D.P.U. 92-261, at 20-21 (1993).[69]

b. List of Exemptions Sought

The Company seeks exemption from the following provisions of the Worcester Zoning Ordinance and Millbury Zoning Bylaw in order to construct and operate the Project (Exh. JP-2, at 10-18):[70]

**Table 9: List of Individual Exemptions Sought**

| Municipality/Facility | Topic | Provision |
|---|---|---|
| Worcester - Bloomingdale substation | Special Permit: Frontage/Nonconforming Structure | Article XVI, § 4(D)1 |
| Worcester - Bloomingdale and Vernon Hill substations | Site Plan Review: Earth Alteration/Landscaping | Article V, §§ 2 (A) and 5 (C) |
| Worcester - Bloomingdale and Vernon Hill substations | Erosion Control Approvals | Article IV, §§ 5 (A) and 5 (B) |
| Millbury – substation | Special Permit: Fence Height | Article 3, §35.7 |
| Worcester - transmission line | Use Restrictions | Article IV |

69 It is the petitioner's burden to identify the individual zoning provisions applicable to the proposed Project and then to establish that exemption from each of those provisions is required:

> The Company is both in a better position to identify its needs, and has the responsibility to fully plead its own case . . . The Department fully expects that, henceforth, all public service corporations seeking exemptions under c. 40A, § 3 will identify fully and in a timely manner all exemptions that are necessary for the corporation to proceed with its proposed activities, so that the Department is provided ample opportunity to investigate the need for the required exemptions.

New York Cellular Geographic Service Area, Inc., D.P.U. 94-44, at 18 (1995).

70 The Project includes upgrades to a substation in Shrewsbury, but the Company has not requested any exemptions from the Shrewsbury Zoning Bylaw.

c. Consultation with the Municipalities

i. Russell Decision

Before addressing the merits of the individual exemptions requested by the Company, the Siting Board first reviews the Company's compliance with the Siting Board's April 2009 decision in Russell Biomass LLC and Western Massachusetts Electric Company, EFSB 07-4/DPU 07-35/07-36 (2009) ("Russell"). In Russell, the Siting Board set forth the following approach to be used by applicants when seeking zoning exemptions:

> First, in cases where (1) a local zoning provision would on its face preclude construction and operation of a proposed energy facility, and (2) there is no provision in a local zoning by-law for a special permit, variance, or other relief, relief under G.L. c. 40A, § 3 could be considered without further consultation with the local zoning authority. Second, if relief appears to be available, but consultations with the local zoning authority demonstrate that a petitioner is unlikely to obtain that relief, relief under G.L. c. 40A, § 3 could be considered without further local efforts. Absent such circumstances, it is our expectation that a project proponent will make a good faith effort to consult with local zoning authorities and apply for necessary zoning approvals or other relevant relief, as appropriate.

Russell, EFSB 07-4/DPU 07-35/07-36, at 62.

ii. Post-Russell Zoning Exemption Cases

This is the Siting Board's first zoning exemption case to directly address and apply Russell.[71] However, the Department has issued three zoning exemption decisions since the issuance of Russell, each of which does address, although it does not strictly apply, the Russell approach.[72]

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71 In September, 2010, the Siting Board granted zoning exemptions in the GSRP Decision. However, the Siting Board did not apply the Russell approach in the GSRP Decision because WMECo filed its EFSB petition before the issuance of Russell and was thus grandfathered from the application of Russell. See GSRP Decision at 133, n. 90.

72 In its post-Russell Orders, the Department does not strictly apply the Russell approach because each of the three cases was initially filed with the Department prior to the issuance of Russell, and the Department determined that they were grandfathered from having to comply with Russell. However, as discussed below, in its post-Russell Orders, the Department does specifically describe applicants' duties to consult with municipalities prior to filing a Chapter 40A, § 3 case.

In the first case, the Department states:

> In applying Russell in the future, the Department will consider the relevant facts on a case-by-case basis. We recognize that there may be factual circumstances where it may not be appropriate for an applicant to apply for local zoning approvals or other relevant relief prior to filing a G.L. c. 40A, § 3 zoning exemption petition, even when such relief may theoretically be available.

NSTAR Electric Company, D.P.U. 08-1, at 34 (2009) ("NSTAR 2009 Decision").

In its next two cases, involving time-sensitive, reliability-based transmission projects in multiple municipalities, the Department notes that even though the applicants did not formally apply for any local zoning relief prior to filing their zoning exemption petitions, the applicants' actions with respect to communications with the municipalities before filing zoning exemption petitions were "consistent with the spirit and intent" of Russell. Western Massachusetts Electric Company, D.P.U. 09-24/09-25, at 33, n. 15 (March 19, 2010) ("WMECo"); New England Power Company, D.P.U. 09-27/09-28, at 48, n. 16 (March 26, 2010) ("NEP"). Specifically, in each case, prior to filing for zoning exemptions, the applicant engaged in extensive communications with the applicable towns about the proposed project and the needed zoning relief. In addition, in WMECo, the Department notes that the applicant's consultations included the applicant's making a good faith effort to abide by the reasonable recommendations of town officials with respect to the applicant's project. In both cases, the Department notes that none of the municipal officials expressed any objection to the Company seeking zoning relief from the DPU in the form of exemptions pursuant to G. L. c. 40A, § 3.[73]

iii. Analysis

We agree with the Department that the spirit and intent of Russell (1) is to favor the resolution of local issues on a local level whenever possible to reduce local concern regarding any intrusion on home rule; and (2) that the most effective approach for doing so is for applicants to consult with local officials regarding their projects before seeking zoning exemptions pursuant to

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[73] In the GSRP Decision, the Siting Board also notes that the Company's communications with the affected municipalities were consistent with the spirit and intent of Russell. In that case, the Company consulted with each municipality regarding the Company's intention to seek zoning exemptions, the communities along the preferred route wrote letters of support for the granting of the zoning exemptions and also signed MOUs with the Company that included agreements regarding zoning exemptions. GSRP Decision at 132-133, and n. 90.

G.L. c. 40A, § 3. We also agree that relevant facts should be considered on a case-by-case basis. See NSTAR 2009 Decision, D.P.U. 08-1, at 34.

Here, the applicant did not formally apply for any local zoning permits prior to filing its zoning exemption petition with the Department, even though local relief (at least in Millbury) was theoretically available. However, as in WMECo and NEP, before filing its G.L. c. 40A, § 3 petition, the Company had significant contact and consultation with the relevant municipalities regarding the Company's Project and the Company's intention to seek zoning exemptions under G.L. c. 40A, § 3, and neither municipality objected to the Company's plan (Exhs. LPM-1, Att. H; EFSB-Z-2).[74] Moreover, the Company made a good faith effort to meet the municipalities' reasonable requests regarding the Project (such as providing landscaping at the Bloomingdale and Vernon Hill substations in consultation with the City of Worcester) (id.). By doing so, the applicant complied with the spirit and intent of Russell. See WMECo, D.P.U. 09-24/09-25, at 33, n.15; NEP, D.P.U. 09-27/09-28, at 48, n.16. The Siting Board also notes that, as in WMECo and NEP, the Company seeks zoning exemptions for a time-sensitive, reliability-based transmission project to be located in more than one municipality and the applicable municipalities have not objected to the applicant seeking G.L. c. 40A, § 3 zoning exemptions. Thus, sending the applicant back to formally apply for local permits would be inconsistent with the municipalities' approach towards the permitting of this Project. Accordingly, based on the specific facts outlined above, the Siting Board finds that the Company has complied with the approach reflected in Russell.

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74 With respect to Worcester, the Company began consultations regarding zoning exemptions in November 2007, meeting with the Deputy City Solicitor (Exh. EFSB-Z-4). In March 2009, the Company met with the Building Inspector and Town Planner regarding zoning matters (Exh. NG-2, at 1-24 to 1-25). In April, 2009, the Company met with the Acting Building Commissioner, the Assistant Commissioner of the Department of Public Works and the Deputy City Solicitor (id). In July 2009, in a letter signed by the Deputy City Solicitor, the City stated that it "does not object to the Company's efforts to secure a DPU exemption from the Worcester zoning ordinance" (Exh. EFSB-Z-4(a) at 1).

With respect to Millbury, the Company met with the Building Inspector and Town Planner in March 2009 and "encountered no objections" regarding its plan to seek zoning relief from the Department (Exh. NG-1, at 9). Millbury stated in a December 2009 letter signed by the Town Planner and the Building Inspector that the Town "supports the Company's determination to seek a DPU exemption from the Millbury Zoning By-law" for the project (Exh. EFSB-Z-2 (b)).

d. Reasons Why Exemptions are Required Here

i. Company's Position

The Company argues that it requires exemptions from the applicable zoning provisions for the following reasons:

**Table 10: Reasons Exemptions are Required**

| Municipality/Facility | Exemption Sought by Company | Reason Exemption Sought |
|---|---|---|
| Worcester - transmission line | Use Restrictions: Article IV | Proposed use may not be allowed. Zoning Board has no authority to issue a use variance. |
| Worcester - Bloomingdale substation | Special Permit/Nonconforming Structure: Article XVI, Section 4(D)(1) | Substation frontage does not comply with existing frontage requirements. Substation is a prior non-conforming structure. A Special Permit is required to alter a prior non-conforming structure. Special Permits are discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of Special Permit would be time-consuming. |
| Worcester - Bloomingdale and Vernon Hill substations | Site Plan Approval/Earth Alteration and Landscaping: Article V, Sections 2(A) and 5(C) | Site plan review required from Planning Board. Site Plan approval is discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of site plan approval would be time-consuming. |
| Worcester - Bloomingdale and Vernon Hill substations | Erosion Control Approvals: Article IV, Sections 5(A) and 5(B) | Slope protection and erosion control methods must be approved by Director of Code Enforcement or the Director of Public Works. Such approvals are discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of local approvals would be time-consuming. |
| Millbury- substation | Special Permit/Fence Height: Article 3, Section 35.7 | Special Permit required from Zoning Board for fencing in excess of six feet in height. Special Permit is discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of Special Permit would be time-consuming. |

Source: Exh. NG-4, at 10-18.

ii. Use

Those portions of the proposed transmission line on private or public property (outside of City Streets) are located in three zoning districts: BG-3 (General Business), MG-1.0 (General Manufacturing) and RL-7 (Limited Residence) (Exh. NG-5, at 13). The Worcester Zoning Ordinance classifies the proposed transmission line as an "Essential Service" (id. at 13-14), which is not a use expressly permitted in any zoning district, including the three districts in which the transmission line would be located (id. at 14). The Worcester Zoning Ordinance prohibits any use not specifically permitted (Exh. NG-5 at 14; see Exh. NG-5, App. D at 31, Sec. 1.A). The Zoning Board of Appeals does not have the express authority under the Zoning Ordinance to grant use variances (Exh. NG-5, at 14).

The Siting Board finds that without exemption from Article IV, the Project may be classified as an unpermitted use, without the possibility of a variance or other zoning relief. Accordingly the Siting Board finds that the exemption from Article IV of the Worcester Zoning Ordinance is required to allow construction of the proposed Project, within the meaning of G.L. c. 40A, § 3.

iii. Frontage and Fencing Special Permits

The Worcester Zoning Ordinance requires 65 feet of lot frontage in the RL-7 district where the Bloomingdale substation is located (id. at 15). The Bloomingdale substation has 50 feet of frontage and is a prior nonconforming lot (id.). Thus, pursuant to Article XVI, Section 4D(1) of the Zoning Ordinance, the Bloomingdale substation requires a Special Permit from the Zoning Board of Appeals.

Article 3, Section 35.7 of the Millbury Zoning Bylaw prohibits fences in excess of six feet in height (Exh. NG-5, App. A at 66). A fence in excess of six feet may, however, be allowed by Special Permit from the Millbury Zoning Board of Appeals, if the fence "will not endanger health or safety, or unreasonably impair vision or circulation of air" (id.; Exh. NG-5, at 12). The expanded Millbury substation fence will be seven feet tall with an additional one foot of barbed wire at the top (Exh. NG-5, at 12). Thus, the Company requires a Special Permit for the fence expansion (id. at 12-13).

The Siting Board recognizes the uncertainty that would result from requiring the Company to obtain these Special Permits, both in terms of obtaining the Special Permits through the local

zoning process and in terms of a potential appeal of the Special Permits. An adverse outcome, a burdensome requirement or unnecessary delay could result. The Siting Board also notes that the proposed fence height is based on an industry safety standard in the National Electric Safety Code and also is required by the Company's internal chain link fence engineering specifications (Exhs. EFSB-Z-3; Z-3(a); Z-3(b)). Moreover, this is a reliability-based project, and the record shows that it is time-sensitive. Accordingly, the Siting Board finds that exemption of the Project from the Special Permit requirement of Article XVI, Section 4(D) (1) of the Worcester Zoning Ordinance and Millbury Zoning Bylaw Article 3, Section 35.7, is required to allow timely construction of the Project.

iv. Site Plan Review, Landscaping and Erosion Control Approvals

Article V, Section 2 (A) of the Worcester Zoning Ordinance requires site plan review for "any structure and/or outdoor use and/or any substantial improvement . . . that requires a building permit and also involves earth moving or earth alteration in an area with a slope of 15 percent or greater" (Exh. NG-5, at 16). The control house expansion at Bloomingdale and possibly the fence expansions at both substations will require building permits, and the work at both substations will involve earth moving or earth alteration in an area that contains a slope of 15 percent or greater (Exh. NG-5, at 16 to 18). Accordingly, the Company will require site plan review and approval for the proposed improvements at both substations (id. at 16-17). The Company also will be required to meet the landscape design criteria set forth in Article V, Section 5(C) (id. at 17).

Article IV, Sections 5(A) and 5(B) of the Worcester Zoning Ordinance requires erosion control for areas disturbed by earth filling and excavation (id. at 17). The selected control methods must be approved by the Director of Code Enforcement or the Commissioner of the Department of Public Works and Facilities (id.). In addition, Sections 5(A)(3) and 5(B)(3) require some form of slope protection or retaining wall for any finished slopes greater than 2.5:1 (id. at 17-18), and any such measure must also receive the approval of the Director of Code Enforcement or the Commissioner of Public Works and Facilities (id. at 18).

The Siting Board recognizes the uncertainty that would result from requiring the Company to comply with the zoning provisions for site plan, landscaping and erosion control both in terms of obtaining the requisite reviews/approvals through the local zoning process and in a potential appeal thereafter. An adverse outcome, a burdensome requirement or unnecessary delay could

result. In addition, this is a reliability-based project, and the record shows that it is time-sensitive. Accordingly, the Siting Board finds that exemption of the Project from Article V, Sections 2(A) and 5(C) and Article IV, Sections 5(A), (B) of the Worcester Zoning Ordinance is required to allow timely construction of the Project, within the meaning of G.L. c. 40A, § 3.

5. Conclusion on Request for Individual Zoning Exemptions

As described above, the Siting Board finds that (1) the Company is a public service corporation; (2) the proposed use is reasonably necessary for the public convenience or welfare; and (3) the specifically named zoning exemptions set forth in Table 9 are required for construction of the Project within the meaning of G.L. c. 40A, § 3. Accordingly, the Siting Board grants the Company's request for the individual zoning exemptions listed above in Table 9.

B. Comprehensive Zoning Exemptions

1. Standard of Review

The Company has requested a comprehensive exemption from both the Worcester Zoning Ordinance and Millbury Zoning Bylaw. The Siting Board will grant such requests on a case-by-case basis and only where the applicant demonstrates that issuance of a comprehensive exemption could avoid substantial public harm by serving to prevent a delay in the construction and operation of the proposed use. GSRP Decision, EFSB 08-2/D.P.U. 08-105/106, at 135; Russell, EFSB 07-4/DPU 07-35/07-36, at 72; WMECo, D.P.U. 09-24/09-25, at 34; NEP, D.P.U. 09-27/09-28, at 48.

2. Company Position

The Company identifies several reasons for the granting of the requested comprehensive exemptions. The Company is concerned that the multiple zoning-related permits and reviews required under the Worcester Zoning Ordinance and Millbury Zoning Bylaw might result in requirements that are inconsistent with regulatory and industry standards applicable to transmission facilities (Exh. NG-4, at 19). The Company points out that the Project is reliability-based and time-sensitive, and that a comprehensive exemption would allow the Project to go forward on a timely basis should provisions of the existing Ordinance and Bylaw other than those specifically identified subsequently be deemed applicable to the Project, or if any new zoning exemptions are enacted in either municipality prior to completion of the Project (id.; Tr. at 111-114, 116-117). A comprehensive exemption also would enable the Company to implement any

necessary design changes that might otherwise require zoning relief as the Project goes forward, including changes designed to reduce Project impacts (Exh. NG-4, at 19). The Company concludes that a comprehensive exemption "will therefore help this important project to avoid delays, maintain its schedule, and remain in compliance" with applicable requirements and restrictions governing the construction and operation of transmission facilities (id.).

3. Analysis and Conclusions

As discussed in Section II.B, above, the record shows that the proposed Project is needed for reliability reasons and that the need is time-sensitive. Delay in construction of the Project could result in an area transmission system that does not meet applicable reliability standards, and could therefore cause significant public harm in the form of unacceptable service outages.

The record shows that the Project, which will bring a second source of electric supply to the Bloomingdale and Vernon Hill substations, is needed immediately to bring the Bloomingdale substation into compliance with the Company's established reliability supply standard. The Company has demonstrated that the supply standard currently would not be satisfied in the event of a single supply contingency (or N-1 condition) at the Bloomingdale substation, i.e., the loss of the existing 115 kV transmission supply to the substation, at loads already experienced in 2006 and 2008. This contingency would result in substantial public harm in the form of loss of electric service to numerous customers. Were the Project not completed by its anticipated 2012 on-line date or within a year thereafter, this contingency could result in the loss of service to thousands of existing commercial and industrial customers as well as the growing Route 20 and Route 126 corridors.[75] The granting of comprehensive zoning exemptions will help ensure that construction of the Project can proceed and be completed in a timely manner, i.e., that once begun, construction will not be interrupted due to unanticipated disputes over the application of local zoning requirements or unanticipated changes to such requirements during the pendency of the Project. Based on the facts of this case, the Siting Board accordingly grants the Company's request for a

[75] A similar contingency, i.e., the loss of the existing 115 kV supply at the Vernon Hill substation would result in significant load loss, and would result in the failure to meet the supply standard at that substation by the Project on-line date in 2013, or sometime thereafter.

comprehensive exemption from the Worcester Zoning Ordinance and the Millbury Zoning Bylaw.[76]

C. Decision on G.L. c. 40A, § 3

The Siting Board finds pursuant to G.L. c. 40A, § 3 that construction and operation of the Company's proposed facility is reasonably necessary for the public convenience or welfare of the public. Accordingly, subject to the conditions set forth in this decision, the Siting Board approves the Company's petition for an exemption from the provisions of the Worcester Zoning Ordinance and Millbury Zoning Bylaw set forth in Table 9 subject to the conditions set forth in Section VI. The Siting Board further approves the Company's petition for comprehensive exemptions from the Worcester Zoning Ordinance and Millbury Zoning Bylaw subject to the conditions set forth in Section VI.

## IV. ANALYSIS UNDER G.L. c. 164, § 72

### A. Standard of Review

G. L. c. 164, § 72, requires, in relevant part, that an electric company seeking approval to construct a transmission line must file with the Department a petition for "authority to construct and use . . . a line for the transmission of electricity for distribution in some definite area or for supplying electricity to itself or to another electric company or to a municipal lighting plant for distribution and sale ... and shall represent that such line will or does serve the public convenience and is consistent with the public interest. . . . The [D]epartment, after notice and a public hearing in one or more of the towns affected, may determine that said line is necessary for the purpose alleged, and will serve the public convenience and is consistent with the public interest."[77]

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[76] Granting the requested comprehensive exemptions in this case is consistent with the Department's analysis and decisions in WMECo and NEP. See WMECo, D.P.U. 09-24/09-25, at 34-37; NEP, D.P.U. 09-27/09-28, at 48-53. Granting the comprehensive exemption also is consistent with the Siting Board's decision in the GSRP Decision at 136-137.

[77] Pursuant to G.L. c. 164, § 72, the electric company must file with its petition a general description of the transmission line, a map or plan showing its general location, an estimate showing in reasonable detail the cost of the line, and such additional maps and information as the [Siting Board] requires.

The Department, in making a determination under G.L. c. 164, § 72, is to consider all aspects of the public interest. Boston Edison Company v. Town of Sudbury, 356 Mass. 406, 419 (1969). Section 72, for example, permits the Department to prescribe reasonable conditions for the protection of the public safety. Id. at 419-420. All factors affecting any phase of the public interest and public convenience must be weighed fairly by the Department in a determination under G.L. c. 164, § 72. Town of Sudbury v. Department of Public Utilities, 343 Mass. 428, 430 (1962). In evaluating petitions filed pursuant to G.L. c. 164, § 72, the Department relies on the standard of review established for G.L. c. 164, c. 40A, § 3 for determining whether the proposed Project is reasonably necessary for the convenience or welfare of the public.

B. Analysis and Decision

Based on the record in this proceeding and the above analyses in Sections I through III, and with implementation of the specified mitigation measures proposed by the Company and conditions set forth by the Siting Board in Section VI, below, the Siting Board finds pursuant to G.L. c. 164, § 72 that the proposed transmission line and ancillary substation upgrades are necessary for the purpose alleged, will serve the public convenience, and are consistent with the public interest.[78] Thus, the Siting Board approves the Section 72 Petition.

## V. SECTION 61 FINDINGS

The Massachusetts Environmental Policy Act ("MEPA") provides that "[a]ny determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact" ("Section 61 findings"). G.L. c. 30, § 61. Pursuant to 301 CMR 11.01 (3), Section 61 findings are necessary when an Environmental Impact Report ("EIR") is submitted to the Secretary of Energy and Environmental Affairs, and should be based on such EIR. Where an EIR is not required, Section 61 findings are not necessary. 301 CMR 11.01 (3). Based on an Advisory Opinion from the MEPA office, National Grid informed the Siting Board that the Project does not require MEPA review (Exh. NG-4, Att. A). Accordingly, Section 61

[78] See footnote 77, above. Section 61 findings are not necessary as part of Section 72 approval.

findings are not necessary in this case as part of any Chapter 40A, § 3 or G.L. c. 164, § 72 determination.

## VI. CONDITIONS

The Siting Board APPROVES the Company's Petition subject to the following conditions:

(a) To ensure that visual impacts at the substations are minimized, the Siting Board directs the Company to enhance the proposed landscape plan for the Vernon Hill substation dated March 25, 2010 to add additional vegetation in both the northwest and northeast corners on the Gloucester Road side of the substation. The Company is also directed to provide to the Siting Board a copy of its final landscape plans for the Vernon Hill substation for the Board's information prior to the commencement of construction. Furthermore, the Company shall implement the final landscape plans for both the Vernon Hill and Bloomingdale substations and provide care for all plantings to ensure that landscaping at both substations becomes established and is maintained.

(b) The Siting Board directs that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction must have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine. Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition and a list of retrofitted equipment, including type of equipment, make/model, model year, engine horsepower, and the type of emission control technology installed.

(c) To ensure that tree removal for the proposed transmission project does not impact the area affected by the infestation by Asian Long Horn Beetles, the Siting Board directs the Company and its contractors to comply with the regulations and requirements of the Massachusetts Department of Conservation and the City of Worcester regarding the proper disposal of trees, limbs and debris from regulated Project areas.

(d) The Siting Board directs the Company to continue to collaborate with the appropriate City of Worcester officials to assess the condition of each roadway to be affected by the Project and, prior to commencing Project construction, reach an agreement with the City as to whether the Company will repave each street curb-to-curb, provide a full depth patch along the trench only, or contribute funds for repaving to be performed by the City.

(e) The Siting Board directs the Company to prepare a nighttime construction mitigation plan in consultation with City of Worcester officials and to submit that Plan for Siting Board approval prior to the commencement of nighttime construction. The nighttime construction mitigation plan shall include, but not be limited to, mitigation of impacts to neighboring land uses, illumination spill-over and glare, noise and traffic impacts. Should nighttime construction be required, the Siting Board directs the Company to conduct that construction in accordance with the approved nighttime construction mitigation.

(f) The Company shall serve a copy of this decision on the City of Worcester City Council, the Worcester Zoning Board, the Worcester Planning Board, the Town of Millbury Board of Selectmen, Millbury Appeals Board, and Millbury Planning Board, within five days of its issuance. The Company shall certify to the Secretary of the Department within ten business days of its issuance that such service has been made.

Because issues addressed in this decision relative to the Project are subject to change over time, construction of the proposed Project must be commenced within three years of the date of the decision.

The Siting Board also notes that the findings in this decision are based upon the record in this case. A project proponent has an absolute obligation to construct and operate its facility in conformance with all aspects of its proposal as presented to the Siting Board. Therefore, the Siting Board requires National Grid, or its successors in interest, to notify the Siting Board of any changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. National Grid or its successors in interest are obligated to provide the Siting Board with sufficient information on changes to the proposed Project to enable the Siting Board to make these determinations.

M. Kathryn Sedor

M. Kathryn Sedor
Presiding Officer

Dated this 14th day of March, 2011

APPROVED by the Energy Facilities Siting Board at its meeting of March 10, 2011, by the members and designees present and voting. Voting for approval of the Tentative Decision, as amended: Ann G. Berwick, Chair, Department of Public Utilities; Jolette A.Westbrook, Commissioner, Department of Public Utilities; Robert Sydney (Designee for Commissioner, Department of Energy Resources); James Colman (Designee for Commissioner, Department of Environmental Protection); Robert Mitchell (Designee for Secretary, Executive Office of Housing and Economic Development); Kevin Galligan, Public Member; Dan Kuhs, Public Member; and Penn Loh, Public Member.

Steven Clark, Acting Chair
Energy Facilities Siting Board

Dated this 14th day of March, 2011

Appeal as to matters of law from any final decision, order or ruling of the Siting Board may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the order of the Siting Board be modified or set aside in whole or in part. Such petition for appeal shall be filed with the Siting Board within twenty days after the date of service of the decision, order or ruling of the Siting Board, or within such further time as the Siting Board may allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the clerk of said court (Massachusetts General Laws, Chapter 25, Sec. 5; Chapter 164, Sec. 69P).

**COMMONWEALTH OF MASSACHUSETTS**
**Energy Facilities Siting Board**

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|---|---|---|
| Rulemaking to Amend the Regulation Found at 980 CMR 1.01(4)(e) in Order to Establish Exclusions from Siting Board Jurisdiction For Certain "Facilities" as Defined Therein. | ) | EFSB 09-RM-1 |

# FINAL DECISION
# ADOPTION OF FINAL REGULATION AT 980 CMR § 1.01(4)(e)

Robert J. Shea
Presiding Officer
June 20, 2011

On the Decision:
John C. Young

The Energy Facilities Siting Board ("Siting Board") hereby adopts a final regulation at 980 CMR § 1.01(4) (e), "Scope and Construction of Rules: Definition, Facility."

## I. INTRODUCTION

Massachusetts General Laws, chapter 164, section 69G, defines a "Facility" as including, "(e) a unit, including associated buildings and structures, designed for, or capable of, the manufacture or storage of gas, *except such units below a minimum threshold size as established by regulation*" (emphasis supplied). Presently, the Siting Board's regulation, 980 CMR 1.01(4)(e), defines "facility" using identical language. Through this rulemaking, the Siting Board will establish such a minimum threshold size, and will also exclude from Siting Board jurisdiction certain units whose storage or manufacture of gas is ancillary to the unit's primary purpose.

A copy of the proposed revised regulation is attached.

## II. STATUTORY AND REGULATORY AUTHORITY

General Laws Chapter 164, section 69H, provides the statutory authority for the Siting Board to adopt regulations and to later amend them.

> There is hereby established an energy facilities siting board . . . . The board shall have powers and duties as follows:
>
> (1) To adopt and publish rules and regulations consistent with the purposes of sections sixty-nine H to section sixty-nine Q, and to amend the same from time to time.

Thus, the Siting Board has express statutory authority to adopt a regulation and to later amend it, provided that the regulation and any amendments are consistent with the purpose of Chapter 164, sections sixty-nine H to sixty-nine Q.

In the present case, the regulation in question relates to the term "facility" which is defined in G.L. c. 164, § 69G. As noted above, the statutory definition of "facility" expressly provides for a *de minimus* exemption from this definition to be established by regulation. Consequently, section 69G expressly provides that a minimum threshold size for a gas storage facility may be established by regulation, and section 69H expressly provides that the Siting

Board is empowered to issue and amend regulations. These statutes together give the Siting Board the authority to amend 980 CMR 1.01(4)(e).

## III. PROCEDURAL HISTORY

The Siting Board issued a decision opening the rulemaking to revise 980 CMR § 1.01(4)(e), on October 8, 2009. The proposed revised regulation was then submitted to the Executive Office of Energy and Environmental Affairs ("EEA"), which approved it and conveyed it to the Executive Office of Administration and Finance ("A&F") on November 16, 2009. By email dated November 24, 2009, A&F represented that it had no objection to the Board proceeding with this regulation.

Notices of public hearings were issued on both January 19, 2010, and again on May 25, 2010. They were published in the Boston Globe, sent to all people and organizations that have requested receipt of such notices, and served upon the Local Government Advisory Board. The first notice inadvertently omitted to pose a question on which the Board wanted to receive comments: namely, whether the clause that exempts landfills and sewage treatment plants is necessary or whether it is redundant, given that it is likely that landfills and sewage treatment plants will be exempted under clause 1, which sets a threshold jurisdictional size. Consequently, the second notice was issued, which included this question, and the second hearing held.

Public hearings were held on February 17, 2010, and July 1, 2010. No one appeared at either public hearing, although National Grid did submit a set of comments which support the proposed changes ("National Grid Comments").

## IV. PROPOSED REVISED REGULATION

As stated above, the definition of a "Facility" under 980 CMR 1.01(4) (e) includes "a unit, including associated buildings and structures, designed for, or capable of, the manufacture or storage of gas, except such units below a minimum threshold size as established by regulation." The proposed regulation deletes the words, "except such units below a minimum threshold size as established by regulation." In their place it adds three clauses, each of which exempts certain units that may manufacture or store gas. There is also some additional language that modifies "unit."

A. Clause (1) Exempts Small Facilities from EFSB Jurisdiction.

Clause (1) exempts from EFSB jurisdiction units that have a storage capacity of less than 25,000 gallons and a manufacturing capability of less than 2,000 MMBtu per day. Any unit that exceeds either the storage capacity limit or the manufacturing capability limit would not qualify for this exemption.

The 25,000-gallon threshold is selected to maintain within Siting Board jurisdiction utility-built LNG tanks in the historical size range, but to exclude any facility holding only as much gas as two overland tractor-trailers.

The 2,000 MMBtu threshold represents the amount of manufacturing capability that would produce 25,000 gallons of gas in one day. Consequently, the manufacturing capability threshold is consistent with the storage size threshold.

B. The Words "multiple tanks" Are Inserted to Modify "unit."

At the beginning of subparagraph (e), the words "multiple tanks" are added; they modify the word "unit." These words add more precision to the scope of the threshold size exemption. The size of the unit includes all tanks that are a part of it. The size threshold, therefore, is a cumulative one: a unit consisting of numerous tanks each smaller than 25,000 gallons may nevertheless be jurisdictional if the combined size of all tanks within the unit exceeds 25,000 gallons.

C. Clause (2) Exempts Research and Development Units from EFSB Jurisdiction.

Clause 2 exempts from EFSB jurisdiction any unit devoted to research, development, or the demonstration of technology as its primary purpose. This exception is intended to facilitate the development of clean natural gas technologies. Developers of such technologies may invest in R&D facilities in the Commonwealth knowing that one potential burden – EFSB approval – has been lifted. The Board believes that such an exemption is consistent with the purposes of G.L. c. 164, § 69J. The Board will retain jurisdiction over gas facilities that store or produce gas for distribution through pipelines for purposes of sale to residential and commercial customers. Gas facilities devoted to R&D will remain subject to applicable environmental and public safety regulations.

D. Clause (3) Exempts Landfills and Sewage Treatment Plants from EFSB Jurisdiction.

The Siting Board has never exercised jurisdiction over landfills and sewage treatment plants that capture within their facilities and store methane that is evolved from the decomposition of sewage sludge or municipal waste in a landfill. Thus, including clause 3 will explicitly state what has heretofore only been implied: the Board does not regulate gas-producing landfills and sewage treatment plants, regardless of size. By explicitly removing EFSB approval as a condition precedent to using such natural gas, the Board hopes to encourage the owners and operators of landfills and sewage treatment plants to extract gas that might otherwise simply remain untapped.

In its comments, National Grid supported the addition of this proposed exemption because it will promote the development of renewable gas in Massachusetts and because it is consistent with existing regulations governing landfill gas projects ("National Grid Comments" § II.C). We agree.

V. ORDER

Accordingly, after due notice, hearing and consideration it is hereby:

ORDERED: That, in accordance with G.L. c. 164, §§ 69H and 69G, and G.L. c. 30A, the Final Regulation amending 980 CMR § 1.01(4)(e), as attached hereto, is hereby ADOPTED; and it is

FURTHER ORDERED: That the Director of the Siting Board attest to a true copy of this Order amending 980 CMR § 1.01(4)(e) and transmit said attested true copy to the Office of the Secretary of the Commonwealth for publication in the Massachusetts Register; and it is

FURTHER ORDERED: That the rules and regulations of the Energy Facilities Siting Board are amended as set forth in the Final Regulation attached to this decision, and shall take effect upon publication in the Massachusetts Register.

Robert J. Shea
Presiding Officer

Dated this 20th day of June 2011.

APPROVED by the Energy Facilities Siting Board at its meeting of June 9, 2011, by the members and designees present and voting. **Voting for** approval of the Tentative Decision: Steven Clarke, Assistant Secretary for Energy, EOEEA (Acting EFSB Chair/ Designee for Richard K. Sullivan, Secretary EOEEA); Ann Berwick, Chair, Department of Public Utilities; Robert Sydney (Designee for Commissioner, DOER); James Colman (Designee for Commissioner, DEP); Jolette Westbrook, Commissioner, DPU ; and Dan Kuhs and Kevin Galligan, Public Members.

Steven Clarke, Acting Chair
Energy Facilities Siting Board

Appeal as to matters of law from any final decision, order or ruling of the Siting Board may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the order of the Siting Board be modified or set aside in whole or in part. Such petition for appeal shall be filed with the Siting Board within twenty days after the date of service of the decision, order or ruling of the Siting Board, or within such further time as the Siting Board may allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the clerk of said court. (Massachusetts General Laws, Chapter 25, Sec. 5; Chapter 164, Sec. 69P).

Code of Massachusetts Regulations Currentness
Title 980: Energy Facilities Siting Council
Chapter 1.00: Rules for the Conduct of Adjudicatory Proceedings (Refs & Annos)

## 1.01: Scope and Construction of Rules

(1) Scope. 980 CMR 1.00 shall govern the conduct of adjudicatory proceedings before the Energy Facilities Siting Board.

(2) Application of 980 CMR 1.00. 980 CMR 1.00 shall apply to all adjudications conducted by the Board except when a specific provision of 980 CMR indicates otherwise.

(3) Effective Date. 980 CMR 1.00 shall take effect on February 19, 2010, and shall apply to proceedings initiated after that date.

(4) Definitions. For the purpose of 980 CMR, the following definitions shall apply unless the context or subject matter requires a different interpretation:

Applicant means a person who submits to the Board an application or petition seeking determination of a matter within the Board's jurisdiction, or who, pursuant to M.G.L. c. 25, § 4, has a matter referred to the Board by the Chairman of the Department of Public Utilities pursuant to M.G.L. c. 164, § 69H.

Board means the Energy Facilities Siting Board.

Board Member means any of the nine persons set forth in 980 CMR 2.03(1) or any person named to serve as a designee under the terms of 980 CMR 2.03(3).

Chairman means the Chairman of the Energy Facilities Siting Board, as described in 980 CMR 2.03(2).

Director means the person appointed by the Chairman of the Department of Public Utilities to direct the work of the siting division and to conduct the day-to-day business of the Board as well as to perform any other duty delegated by the Chairman.

Facility means any "facility" described in M.G.L. c. 164, § 69G including:

(a) any generating unit designed for or capable of operating at a gross capacity of 100 megawatts or more, including associated buildings, ancillary structures, transmission and pipeline interconnections that are not otherwise facilities, and fuel storage facilities;

(b) a new electric transmission line having a design rating of 69 kilovolts or more and which is one mile or more in length on a new transmission corridor;

(c) a new electric transmission line having a design rating of 115 kilovolts or more which is ten miles or more in length on an existing transmission corridor except reconductoring or rebuilding of transmission lines at the same voltage;

(d) an ancillary structure which is an integrated part of the operation of any transmission line

which is a facility;

(e) a unit, including multiple tanks and associated buildings and structures, designed for, or capable of, the manufacture or storage of gas, except: 1) a unit with a total gas storage capacity of less than 25,000 gallons and also with a manufacturing capability of less than 2,000 MMBtu per day; 2) a unit whose primary purpose is research, development, or demonstration of technology and whose sale of gas, if any, is incidental to that primary purpose; or 3) a landfill or sewage treatment plant.

(f) a new pipeline for the transmission of gas having a normal operating pressure in excess of 100 lbs. per square inch gauge which is greater than one mile in length except restructuring, rebuilding, or relaying of existing pipelines of the same capacity; and

(g) any new unit, including associated buildings and structures, designed for, or capable of, the refining, the storage of more than 500,000 barrels or the transshipment of oil or refined oil products and any new pipeline for the transportation of oil or refined oil products which is greater than one mile in length except restructuring, rebuilding, or relaying of existing pipelines of the same capacity.

Generating Facility means any generating unit designed for or capable of operating at a gross capacity of 100 megawatts or more, including associated buildings, ancillary structures, transmission and pipeline interconnections that are not otherwise facilities, and fuel storage facilities.

Hand Delivery means delivery by methods other than pre-paid U.S. mail (*e.g.*, Federal Express or paid courier service). Hand delivery shall not include delivery by electronic mediums such as facsimile or e-mail unless authorized by the Presiding Officer.

Limited Participant means any person allowed to participate in an adjudicatory proceeding pursuant to M.G.L. c. 30A, § 10, and 980 CMR 1.05(2). A limited participant is not a party.

Party means an applicant, any person allowed to intervene in an adjudicatory proceeding pursuant to M.G.L. c. 30A, § 1(3), and 980 CMR 1.05(1), or any person who intervenes in an adjudicatory proceeding by right.

Person means a natural person, partnership, corporation, association, society, authority, agency or department of the Commonwealth, or any body politic or political subdivision of the Commonwealth including municipal corporations.

Mass. Regs. Code tit. 980, § 1.01, 980 MA ADC 1.01

COMMONWEALTH OF MASSACHUSETTS
Energy Facilities Siting Board

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| In the Matter of Brockton Power Company LLC Project Change Filing | ) | EFSB 07-7A/D.P.U. 07-58/59 |

# FINAL DECISION ON BROCKTON POWER COMPANY LLC PROJECT CHANGE FILING

Robert J. Shea
Presiding Officer
September 28, 2011

On the Decision:

Enid Kumin
Mary Menino

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## Table of Contents

## LIST OF ABBREVIATIONS

| | | |
|---|---|---|
| ACE | - | Alternatives for Communities and Environment, Inc., a nonprofit corporation representing various individuals residing in the Town of West Bridgewater and the City of Brockton. The term "ACE" also refers to the intervenors themselves. |
| ACO | - | Administrative Consent Order |
| Air Plan | - | Air Plan Approval Application |
| AWRF | - | Advanced Wastewater Reclamation Facility, a wastewater treatment plant located in Brockton. |
| BMWS | - | Brockton Municipal Water Supply |
| BP | - | The petitioner, Brockton Power Company LLC |
| BWC | - | Brockton Water Commission |
| City | - | City of Brockton |
| CO | - | Carbon monoxide |
| Company | - | The petitioner, Brockton Power Company LLC |
| CWMP | - | The Comprehensive Water Management Plan developed by the City of Brockton |
| Department | - | Department of Public Utilities |
| dBA | - | A-weighted decibel |
| EPA | - | Environmental Protection Agency |
| °F | - | Degrees Fahrenheit |
| EFSB | - | Energy Facilities Siting Board |
| ERC | - | Emission Reduction Credit |
| Final Decision | - | The Final Decision issued in the consolidated cases of EFSB 07-7/ D.P.U. 07-58/D.P.U. 07-59 on August 7, 2009. |

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|---|---|---|
| GHGs | - | Greenhouse gases |
| gpcd | - | Gallons per capita per day |
| GZA Report | - | Jones River Watershed Study: Final Report (2003) undertaken by GZA GeoEnvironmental, Inc. for the Massachusetts Department of Environmental Conservation, introduced into evidence as an attachment to RR-EFSB-ACE-C-25. |
| HRSG | - | Heat Recovery Steam Generator |
| kW | - | Kilowatt |
| $L_{90}$ | - | Sound level exceeded 90 percent of the time |
| MADEP | - | Massachusetts Department of Environmental Protection |
| MA DCR | - | Massachusetts Department of Conservation and Recreation |
| MEPA | - | Massachusetts Environmental Protection Act |
| MGD | - | Million gallons of water per day |
| MGY | - | Million gallons of water per year |
| MISER | - | Massachusetts Institute for Social and Economic Research |
| MW | - | Megawatts |
| NAAQS | - | National Ambient Air Quality Standards |
| NEP | - | New England Power Company |
| $NO_X$ | - | Nitrogen oxide |
| Original Proceeding | - | The consolidated proceeding denominated as EFSB 07-7 /D.P.U. 07-58/07-59, which concerns the Project. |
| PCF | - | The Project Change Filing submitted on April 9, 2010, which commenced the present proceeding. |
| $PM_{2.5}$ | - | Particulate matter of 2.5 microns or less in diameter |
| $PM_{10}$ | - | Particulate matter of 10 microns or less in diameter |

| | | |
|---|---|---|
| Project | - | 350 MW combined-cycle electric generating facility to be constructed adjacent to the AWRF in the Oak Hill industrial park located in Brockton, Massachusetts. |
| PSD | - | Prevention of Significant Deterioration |
| RGGI | - | Regional Greenhouse Gas Initiative |
| Section 69J¼ Petition | - | The petition to construct an energy generating facility brought by Brockton Power Company LLC pursuant to G.L. c. 164, § 69J¼, which was one of the petitions consolidated into the Original Proceeding. |
| Section 72 Petition | - | The petition seeking permission to construct a line for the transmission of electricity for distribution, which was brought pursuant to G.L. c. 164, § 72, and which was one of the petitions consolidated into the Original Proceeding. |
| SILs | - | Significant Impact Levels |
| Siting Board | - | Energy Facilities Siting Board |
| $SO_2$ | - | Sulfur dioxide |
| $SO_X$ | - | Sulfur oxides |
| Teal Study | - | Silver Lake and Jones River Watershed Study (2000) prepared by Teal Ltd. for the Jones River Watershed Association. The Teal Study was introduced into evidence as an attachment to RR-EFSB-ACE-C-25. |
| tpy | - | Tons per year |
| TRWA | - | The Taunton River Watershed Alliance |
| $ug/m^3$ | - | Micrograms per cubic meter of air |
| ULSD | - | Ultra Low Sulfur Distillate |
| VOC | - | Volatile Organic Compound |
| WMA | - | Water Management Act, G.L. c. 21G |

| | | |
|---|---|---|
| Zoning Exemption Petition | - | The petition seeking exemption from the zoning restrictions of the City of Brockton pursuant to G.L. c. 40A, § 3, which was one of the petitions consolidated into the Original Proceeding. |

The Siting Board hereby (1) APPROVES, subject to the condition set forth below, Brockton Power Company LLC's ("Brockton Power" or "Company") proposed change that would eliminate the use of ultra low sulfur distillate ("ULSD") for fuel for the Project; (2) APPROVES Brockton Power's proposed change to the height of the Project's buildings; and (3) DENIES Brockton Power's proposed change that would allow the Project to use water from the Brockton Municipal Water Supply ("BMWS") rather than water from Brockton's Advanced Wastewater Reclamation Facility ("AWRF").

## I. INTRODUCTION

On August 7, 2009, the Siting Board approved Brockton Power's 2007 Petition to construct a 350 MW generation facility in Brockton ("Project"). Brockton Power Company, LLC, EFSB 07-07 (August 7, 2009). On April 9, 2010, Brockton Power submitted a Project change filing ("PCF") to the Siting Board. In its PCF, Brockton Power seeks approval to: (1) eliminate the use of ULSD and to rely solely on natural gas as the Project's fuel; (2) change the design of the buildings in order, the Company asserted, to comply with local zoning restrictions; and (3) rather than using AWRF water for cooling, as originally proposed, use water from the BMWS (Exh. BP-C-1, at 1-6, 1-7). The proposed Project changes are discussed in further detail below.

## II. PROCEDURAL HISTORY

On July 12, 2007, Brockton Power filed a petition with the Energy Facilities Siting Board ("Siting Board" or "EFSB") pursuant to G.L. c. 164, § 69J¼ (the "Section 69J¼ Petition") seeking approval to construct a 350 MW combined-cycle electric generating facility at the Oak Hill Industrial Park in Brockton, Massachusetts ("Project"). On the same day, the Company also filed two petitions with the Department of Public Utilities ("Department"). One of these two petitions requested individual and comprehensive zoning relief for the Project pursuant to G.L. c. 40A, § 3 (the "Zoning Exemption Petition," case number D.P.U. 07-58), while the other petition requested permission to construct and operate a transmission line pursuant to G.L. c. 164, § 72 ("Section 72 Petition," case number D.P.U. 07-59). The two Department cases were referred to the Siting Board for review and decision pursuant to G.L. c. 25, § 4, and all three

were consolidated into one proceeding. These consolidated cases are referred to herein as the "Original Proceeding."

There were six intervenors and six limited participants in the Original Proceeding.[1] A total of 20 days of evidentiary hearings were held, and more than 800 exhibits were introduced into evidence. Five parties and two limited participants filed initial briefs and five parties filed reply briefs. The Siting Board met three times in public session to hear arguments and to deliberate on this matter. In a decision issued on August 7, 2009, ("Final Decision") the Siting Board approved the Section 69J¼ Petition, with conditions, and approved the Section 72 Petition, also with conditions (Final Decision at 117-120). The Board, however, denied the Zoning Exemption Petition (id. at 120). Three of the intervenors appealed, and their appeals were consolidated. A single justice of the Supreme Judicial Court has twice issued a stay of the appeal pending the Board's decision on the PCF. City of Brockton v. Energy Facilities Siting Board, SJ-2009-0453 (orders dated May 25, 2010, and June 27, 2011).

The Company submitted the PCF on April 9, 2010. The Project change proceeding is a continuation of the Original Proceeding. Consequently, the parties and limited participants in the Original Proceeding continued to be parties and limited participants in the Project change proceeding. The Siting Board staff and the intervenors issued extensive discovery relating to the Project change, and staff held six days of evidentiary hearings. The City, the Company, ACE, and TRWA filed initial briefs; and the City, the Company, and ACE filed reply briefs.

## III. STANDARD OF REVIEW

In its 2009 approval of the Project, the Siting Board required the Company to notify it of any Project changes other than minor variations, so that it might decide whether to inquire further into such issues. Final Decision at 120-121. The standard of review to determine

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[1] The intervenors are: the Taunton River Watershed Alliance ("TRWA"), the Town of West Bridgewater ("West Bridgewater"), various residents of Brockton and West Bridgewater represented by Alternatives for Communities and Environment, Inc. ("ACE"); New England Power Company ("NEP"); Custom Blends, LLC ("Custom Blends") and the City of Brockton ("City"). The limited participants are: Brockton City Councilor Thomas G. Brophy; State Representative Geraldine Creedon; former State Senator Robert S. Creedon, Jr.; Linda Balzotti, Mayor of the City of Brockton; State Representative Christine E. Canavan; and Susan Nicastro.

whether further inquiry is warranted was articulated by the Siting Board in the Berkshire Power Decision on Compliance ("Berkshire Compliance Decision") 7 DOMSB 423, at 437 (1997). In the Berkshire Compliance Decision, the Siting Board declined to make further inquiry regarding certain project changes if the change did not alter in any substantive way either the assumptions or conclusions reached in its analysis of the project's environmental impacts in the Original Proceeding. Id.; see also IDC Bellingham LLC Decision on Compliance ("IDC Bellingham Compliance Decision") 11 DOMSB 27, at 38-39 (2000).

In the present PCF, it was established that further inquiry would be required. At the first procedural conference, on May 3, 2010, four of the intervenors moved orally that the Project change be treated as a completely new proceeding (Transcript of Procedural Conference, dated May 3, 2010, at 9, 11, 13-15). This issue was subsequently briefed by the parties and the Presiding Officer issued a ruling denying the motion but concluding that further inquiry was necessary to determine whether the Siting Board could approve the Project as changed in the PCF. Accordingly, the Presiding Officer set forth a procedure that called for discovery, pre-filed testimony, evidentiary hearings, and briefs before the case would be presented to the Siting Board for decision (Ruling on Intervenors' Request That Brockton Power's Project Change Filing Be Treated as a New Petition ("New Petition Ruling") at 11).

In a case such as this one, where the Board has conducted further inquiry, the Board evaluates the environmental impacts of a proposed change or changes to ensure that those impacts have been minimized consistent with the minimization of costs associated with the mitigation, control, and reduction of environmental impacts. In prior project change proceedings, the Board has compared the environmental impacts of the facility as originally approved with the environmental impacts of the project as changed. Where impacts increased, the Board has explored mitigation options. Cape Wind Associates, LLC Project Change ("Cape Wind PC"), 16 DOMSB 194, 214-215 (2008); Fore River Development, LLC Project Change ("Fore River PC"), 15 DOMSB 403, 421-422 (2006); Sithe Mystic Development, LLC Project Change ("Sithe Mystic PC"), 13 DOMSB 118, 137-139 (2001). Where relevant, the Board also has considered whether a rebalancing of environmental impacts with reliability and diversity of supply was needed. Fore River PC, 15 DOMSB at 409. Also, the Board has considered a balancing of environmental advantages of the proposed change against environmental disadvantages, some of which can only partially be mitigated. Cape Wind PC, at 206-215.

In addition to reviewing environmental impacts, the Board has considered whether proposed changes were consistent with the current health and environmental protection policies of the Commonwealth. See IDC Bellingham Compliance Decision, 11 DOMSB at 74-75.

As in the original petition to construct proceeding, Brockton Power has the burden of proving that the Project as changed by the PCF "minimize[s] the environmental impacts consistent with the minimization of costs associated with the mitigation, control and reduction of the environmental impacts of the proposed generating facility . . ." G.L. c. 164, § 69J¼, ¶ 5 (iv). See Fore River PC, 15 DOMSB at 415-420.

## IV. ELIMINATION OF ULSD CAPABILITY

### A. Evidence on ULSD Elimination

The Company proposes to eliminate the capacity to burn ULSD as an alternative to natural gas for up to 60 days (1440 hours) per year (Exh. BP-C-1, at 3-1).[2] The Company stated that while the design and operation of the Project using ULSD for a maximum of 60 days (1440 hours) per year was approved by the Siting Board, and while emissions from the plant when firing ULSD would have met all applicable air quality standards, the Company continued to review several factors related to the use of ULSD as an alternative fuel (Exh. BP-C-1, at 3-1). These factors included community concern over emissions and USLD truck deliveries, as well as the Company's concern that the U.S. Environmental Protection Agency ("EPA") might establish Significant Impact Levels ("SILs") for particulate matter 2.5 microns or smaller in size ("$PM_{2.5}$") (id.).[3] The Company stated that it also reconsidered the dual-fuel design in light of information "reflecting the expansion of natural gas supplies available to the Northeast" and the willingness of Bay State Gas to sign a firm gas transmission agreement (id. at 3-1). The Company asserted that the gas supply expansion, coupled with the firm gas transmission agreement with Bay State

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2 In both the original and gas-only design, there will be three 2,000 kW "black-start" ULSD-fired generators. These black-start generators can be used to restart the turbine in the event that system power is not available (Exh. BP-C-1, at 3-2).

3 At the time of the PCF, the U.S. EPA was considering several different possible SILs for $PM_{2.5}$ (Exh. BP-C-1, at 3-6). As modeled in the approved Project, 24-hour maximum emissions of $PM_{2.5}$ would have exceeded the lowest of the U.S. EPA's proposed 24-hour maximum SILs (id.).

Gas, negotiated by the Company after the EFSB's decision in the Original Proceeding, assured the reliability of a gas-only plant (Exh. EFSB-C-G-7). The Company asserted that a gas-only plant would result in a significant reduction in plant emissions, lower capital and operating costs, reduced visual impacts from the elimination of the ULSD storage tank, elimination of most of the truck deliveries of ULSD, and reduced water requirements (Exhs. BP-C-1, at 3-1; EFSB-C-C3).

1. Air Emissions

The Company stated that the elimination of the capability to burn ULSD as an alternative fuel would result in a significant reduction in the Project's potential air emissions, both on an annual and a 24-hour basis (Exh. BP-C-1, at 3-1). The Company explained that it had submitted a revised Air Plan Approval Application ("Air Plan") to the Massachusetts Department of Environmental Protection ("MADEP") in March of 2010 (Exhs. EFSB-C-G-6; EFSB-C-G-6(a)). The revised Air Plan reflected a 100 percent gas-fired facility[4] (Exh. EFSB-C-G-6(a)). MADEP issued a Proposed Conditional Approval of the Air Plan Approval Application on May 3, 2010 (Exh. EFSB-C-G-6). The Company's Air Plan and MADEP's Proposed Conditional Approval of the Air Plan indicated that significant reductions in annual potential emissions for criteria pollutants would result from the proposed change from gas/ULSD to a gas-only facility (Table 1) (Exh. BP-C-1, at 3-3).[5] These reductions range from a low of ten percent for carbon monoxide ("CO") to a high of 42 percent for $PM_{2.5}$ (id.).

4 For purposes of the "Potential to Emit" calculations in the Air Plan, the Company assumed the equivalent of one of three "black start" diesel generators operating at full load for 400 hours per year (Exhs. EFSB-C-G-6; EFSB-C-G-6(a)).

5 No party denies that the elimination of the capability to burn ULSD would reduce air emissions associated with the Project. However, the City reasserted its position expressed in the Original Proceeding that the modeled air quality impacts have been inaccurately portrayed by relying on historical meteorological data from Boston's Logan Airport instead of the data available from the Taunton Municipal Airport (COB Brief at 16-17). The decision in the Original Proceeding found that Logan Airport data are likely to be representative of wind patterns in Brockton and that the Company's air modeling approach is likely to comport with MADEP standards. Final Decision at 26.

**Table 1: Reductions in Facility-Wide Potential Annual Emissions***

| Pollutant | Gas and ULSD (tpy) | Gas Only (tpy) | Reduction (tpy) | % Reduction |
|---|---|---|---|---|
| $NO_X$ | 107.1 | 76.1 | 31.0 | -29% |
| CO | 108.9 | 98.5 | 10.4 | -10% |
| VOC | 31.0 | 19.2 | 11.8 | -38% |
| $PM_{10}$** | 85.2 | 51.8 | 33.4 | -39% |
| $PM_{2.5}$** | 85.2 | 49.1*** | 36.1 | -42% |
| $SO_2$ | 6.9 | 5.3 | 1.6 | -23% |

* Annual emissions are based on a 12-month rolling average, calculated on a monthly basis.

** $PM_{10}$ and $PM_{2.5}$ are not separate pollutants; $PM_{2.5}$ emissions are a subset of $PM_{10}$ emissions (Exh. BP-C-1, at 3-3).

*** The Company reported a 2.9 tons per year ("tpy") reduction in $PM_{2.5}$ associated with a change in assumption about $PM_{2.5}$ in cooling tower drift. The 2.9 tpy change is the only reported difference in $PM_{2.5}$ in the gas-only facility, so the total $PM_{2.5}$ in the gas-only facility calculates to 48.9 tpy. This small (0.2 tpy) discrepancy is unexplained.

The proposed change to a gas-only facility would result in potential annual emissions for each criteria pollutant falling below the 100 tpy level at which the facility would be subject to a Prevention of Significant Deterioration ("PSD") review and permitting by the U.S. EPA (id.). However, the Company acknowledged that the U.S. EPA is in the process of developing a PSD threshold for greenhouse gases ("GHGs"), including carbon dioxide ("$CO_2$") (id.). If this PSD requirement for GHGs is in effect when construction of the Project begins, the Company will have to have complied with relevant federal requirements (id.).[6]

Further, the Company stated that as a result of the reduction in potential annual nitrogen oxides ("$NO_x$") emissions associated with the Project change, the facility will require fewer $NO_X$ Emission Reduction Credits ("ERCs") (id.). Specifically, as originally proposed the facility would have been required to offset its $NO_X$ emissions with 135 tons of ERCs per year (107.1 tpy of potential annual emissions of $NO_X$ times a ratio of 1.26) (id.). With the gas-only facility, the required ERCs will be 95.9 tpy, a reduction of 39.1 tpy in ERCs (id.).

In addition to the reductions in potential annual emissions, the Company's modeling of the gas-only facility indicated that there are reductions in the modeled ground level 24-hour and

6 The Company acknowledged that, regardless of the status of the U.S. EPA rule on PSD for GHGs, the Project will be subject to the Regional Greenhouse Gas Initiative ("RGGI") requirements and will need to offset all its GHG emissions (Exh. BP-C-1, at 3-3).

annual maximum concentrations of criteria pollutants (id. at 3-5 to 3-6). These reductions in ground level concentrations of criteria pollutants result from the elimination of ULSD capability, a revised assumption on $PM_{2.5}$ in the cooling tower drift, and the improved aerodynamic downwash associated with the replacement of the 130-foot HRSG enclosure with a 116-foot acoustically treated sound wall (id.). In total, these three factors produce very significant modeled reductions in ground level concentrations of all criteria pollutants (Table 2).

**Table 2: Modeled Air Quality Impacts vs. SILs and NAAQS**

| Pollutant | Averaging Period | Approved Project Max Impact (ug/m3) | Gas Only Max Impact (ug/m3) | % Reduction | SIL (ug/m3) | Gas Only Modeled Air Concentration as % of NAAQS(3) |
|---|---|---|---|---|---|---|
| $NO_2$ | Annual Max | 0.0325 | 0.0265 | 19% | 1 | 9% |
| | 1-Hour Max | | 2.36 | | 8 | 29.4% |
| $SO_2$ | 3-Hour (H2H) | 0.229 | 0.098 | 57% | 25 | 4.4% |
| | 24-Hour (H2H) | 0.137 | 0.055 | 60% | 5 | 9.3% |
| | Annual Max | 0.00225 | 0.002 | 10% | 1 | 10.0% |
| $PM_{10}$ | 24-Hour (H2H) | 3.43 | 1.90 | 45% | 5 | 24.4% |
| | Annual Max | 0.25 | 0.24 | 5% | 1 | 37.1% |
| $PM_{2.5}$[(1)][7] | 24-Hour[(2)] | 3.43 | 0.61 | 82% | 1.2[(1)] | 80.9% |
| | Annual Max | 0.25 | 0.03 | 89% | 0.3[(1)] | 63.1% |
| CO[8] | 1-Hour (H2H) | 7.78 | 1.44 | 82% | 2,000 | 8.6% |
| | 8-Hour (H2H) | 4.43 | 0.69 | 84% | 500 | 18.9% |

Sources: Exhs. BP-C-1, at 3-5 and 3-6; EFSB-C-G-6 (Supp.) at 21
(1) Reflects the U.S. EPA SILs for $PM_{2.5}$ adopted on 10/20/2010 and slated to become effective 10/20/2011
(2) Five-year average of maximum 24-hour high values
(3) Modeled air concentrations include measured background levels
H2H = highest second high value

7 With respect to $PM_{2.5}$, the City contends that the Company has underestimated total PM emissions from the emergency or "black start" generators and that as of January 2011 the applicable standard for these generators will have changed from Tier 2 non-road engine to a more stringent Tier 4 non-road standard (COB Brief at 13-14). The Company asserts that it has correctly followed U.S. EPA calculations and cites the receipt of a Proposed Conditional Air Plan Approval for the Project (without ULSD) from MADEP in May 2010 (Exh. EFSB-C-G-6(a) App. C at 10; EFSB-C-G-6(b); Company Brief at 20; Company Reply Brief at 16-17). Furthermore, the Company stated that Tier 4 standards became effective in January 2011 and, therefore, that the Company will purchase emergency generators that meet those standards (Company Reply Brief at 16-17).

8 The City asserted that the Company has understated the Project's CO emissions (COB Initial Brief at 8-9; COB Reply Brief at 3-6). The Company countered that its calculations are correct and follow acceptable modeling procedures (Company Initial Brief at 22; Company Reply Brief at 13-14). The Company also stated that once the plant has been constructed and is operational, it will be subject to enforceable annual and hourly limits that will have been set out in MADEP's Conditional Air Plan Approval (Company Initial Brief at 14-15).

2. Number of Truck Deliveries

In the Original Proceeding, the Company estimated that after the initial filling of its 750,000-gallon ULSD storage tank (which would have required 12 tanker truck deliveries per day over ten days), tanker deliveries would generally occur sporadically depending upon the number of hours that the plant operated on ULSD (Exh. BP-1, at 4-69). The Company stated that after the initial filling of the tank, the maximum frequency of deliveries would be two trucks per hour during the coldest days of winter when natural gas was unavailable and the plant was operating continuously on ULSD (id.). The currently proposed gas-only plant would eliminate all of the ULSD deliveries associated with fuel for the turbine, leaving only a small number of ULSD deliveries associated with supplying fuel for the emergency "black start" generators.[9] The Company noted that there would continue to be tanker truck deliveries of aqueous ammonia[10] at a rate of two to three per month (id.).

3. Other Environmental Impacts

The elimination of the capability to burn ULSD would also result in a small reduction in the visual impact and total water requirements of the Project (Exh. BP-C-1, at 3-1). The proposed design changes would eliminate the 750,000-gallon ULSD storage tank and its associated containment dike and foam fire suppression system, as well as the ULSD truck unloading area, pumps and piping (id.). The ULSD storage tank would have been located at the southwest corner of the site (Exh. BP-1, at 1-17, 4-86, 4-87).

The elimination of the capability to burn ULSD would eliminate the need for water injection for $NO_X$ control (Exh. BP-C-1, at 2-30). The Company estimated that water injection requirements for $NO_X$ control while firing on ULSD would have been about 150,000 gallons

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9 The record does not indicate the number of ULSD deliveries associated with the black start generators. However, the Air Plan indicates that the maximum permitted hours of emergency generation per year would require 57,160 gallons of ULSD (Exhs. EFSB-C-G-6; EFSB-C-G-6(a) at App. C). If the ULSD were delivered in typical tank trucks with a capacity of 12,500 gallons, this would indicate that as few as five deliveries a year could be required (assuming adequate on-site storage at the plant).

10 Aqueous ammonia is used in the Selective Catalytic Reduction system, which serves to reduce the level of $NO_X$ emissions from the plant (Exh. BP-1, at 4-72).

per day or a maximum of nine million gallons per year assuming the total permitted 60 days of ULSD firing (id.).

The Company also asserts that the elimination of ULSD capability would reduce the impervious proportion of the proposed Project site surface area (Exh. BP-C-1, at 1-7).

4. Reduced Capital and Operating Costs

The Company reported that the capital cost of the Project would be approximately $4.53 million lower for the gas-only plant than for a dual-fuel/ULSD plant (Exh. EFSB-C-C3). The majority of the reduction in capital cost would be associated with the lower cost of a gas-only turbine compared to a dual-fuel turbine ($4 million) (id.). The remaining $532,000 in savings would be due to the elimination of the ULSD storage tank, ULSD unloading facilities, and oil pumping and piping (id.). Operational cost would also be significantly reduced due to reduced need for pre-filtration and chemical treatment of water (Exh. ACE-C-C-1).

5. Impact on Reliability of Regional Electric System

As recently as 2006, the EFSB accepted potential increased air quality and other environmental impacts in exchange for the system reliability and fuel diversity benefits achieved by having dual-fuel capacity at a gas-fired power plant. Fore River PC, 15 DOMSB at 403 (EFSB approved an "Alternative Fuel Plan" in which the applicant agreed to switch from low-sulfur diesel to ULSD in exchange for an increase in the number of days it could run on oil). See also Brockton Power, LLC, 10 DOMSB 157, 192 (2000); Sithe Edgar Development LLC, 10 DOMSB 1 (2000).

The Company asserted that because it has a firm gas transportation agreement with Bay State Gas[11] for gas delivery to the plant and because of recent expansions in the capacity of the interstate gas pipeline infrastructure and added liquefied natural gas ("LNG") receiving terminals serving New England, the Project would provide a reliable energy supply even without ULSD backup capability (Exh. EFSB-C-G-7).

The Company provided evidence that eight Massachusetts merchant power plants built since the Commonwealth's adoption of electric utility deregulation in 1997 operated exclusively

11 The record indicates that the Bay State Gas contract is firm with regard to transmission capacity on the Bay State system (Exh. BP-C-1, at 3-1).

on natural gas in 2008-2009, despite the fact that four of the facilities were also permitted and built to burn distillate fuel oil (Exh. BP-C-1, at 2-32). The Company stated that its firm transmission contract with Bay State Gas should reduce the concern about the facility's reliability (Exh. BP-C-1, at 1-5).

B. Analysis and Findings on ULSD Elimination

The Company has demonstrated that the elimination of the capacity to burn ULSD would result in significant reductions in environmental impacts. The elimination of ULSD would reduce the emissions of criteria pollutants on an annual, 24-hour, and hourly basis. The proposed change would also significantly reduce tanker truck traffic to the plant and reduce somewhat the visual impact, capital and operating costs, and water usage of the facility.

In its past decisions, the EFSB has approved construction of a number of gas-fired plants with oil backup fuel capability. Pioneer Valley Energy Facility, EFSB 08-1, 2009; IDC Bellingham, LLC, 9 DOMSB 225; Sithe Edgar Development, LLC, 10 DOMSB 1. In those cases, the petitioner proposed generating facilities with dual-fuel capability. The Board considered whether the impacts associated with oil backup needed to be mitigated and whether any increased impacts were balanced by the enhancement of reliability. The EFSB has also approved gas-fired plants without oil backup. Nickel Hill Energy, LLC, 11 DOMSB 83 (2000); Sithe West Medway Development, LLC, 10 DOMSB 274 (2000). In a project change case increasing a facility's use of oil, Fore River PC, 15 DOMSB at 420 (2006), the Board found that the air quality and water use impacts were outweighed by the reliability and diversity benefits of the oil backup capability.

However, the Siting Board has not addressed a situation in which a petitioner has proposed to eliminate the capability to burn oil after initially proposing dual-fuel capability. While dual-fuel capability would inherently provide greater reliability, the Company provided evidence that the gas-only Project would provide a reliable energy supply. Based on this record, and subject to the Company's submitting its gas supply strategy as part of a compliance filing prior to operation, the EFSB finds that the elimination of ULSD fuel capability will reduce environmental impacts, without a significant adverse reduction in reliability. Therefore, the EFSB finds that the elimination of ULSD fuel capability would reduce environmental impacts,

consistent with the minimization of costs associated with the mitigation, control and reduction of environmental impacts.

## V. CHANGES IN STRUCTURE DESIGN

### A. Evidence on Structure Changes

The PCF proposes three changes to the design of the facility. First, as originally proposed, the Project would have included a 130-foot building enclosing the Heat Recovery Steam Generator ("HRSG") (Exh. BP-C-1, at 1-7). The PCF proposes to eliminate that building and, in its place, to construct four 116-foot sound walls surrounding the HRSG (id.). The Company argued that the new design, unlike the original design, would not violate the height limitations in the Brockton Zoning Ordinance (id. at 4-1). These four sound walls without a roof, the Company argued, would not constitute a "building" as that term is defined in the ordinance and, therefore, would not be governed by its height limitations (id.).

Second, the main power facility building, as originally proposed, would have had a maximum height of 64 feet. The PCF lowers the maximum height of that building to 60 feet (id.). The Company asserted that this change would bring the building into compliance with the Brockton Zoning Ordinance height limit for a "principal building" (id.).

Third, the Company is proposing to redesign the accessory buildings so that all of them would have a maximum height of less than 25 feet (id. at 4-2). These buildings include the natural gas metering and compressor building, the water treatment building, the cooling tower electric equipment building, the switchgear building, the fire pump house, the switchyard control building, and the aqueous ammonia storage building (id.). The redesign of these buildings, the Company represented, would bring them into compliance with the provisions of the Brockton Zoning Ordinance, including the restrictions on height for accessory buildings (id.). The Company also asserts that the design change would reduce visual and noise impacts, as described below.

#### 1. Noise

Two tables taken from the PCF appear below. Both of them provide a comparison between the predicted operational sound levels of the Project constructed pursuant to the Project

change and the predicted operational sound levels of the Project constructed pursuant to the terms of the Final Decision (Exh. BP-C-1, at 4-13, 4-14).

In each table, the projected noise increase, over the $L_{90}$ background level,[12] for the Project constructed in accordance with the Project change, appears under the column entitled "Updated Increase over Background (dBA)" (id.). In contrast, the projected noise increase, over the $L_{90}$ background level, for the Project constructed in accordance with the Final Decision appears in the column entitled "EFSB Approved Increase (dBA)" (id.).

The first table presents these data as calculated using the ambient daytime and evening background noise at the nearest residences (id.). The second table presents these data as calculated using the ambient nighttime background noise at the nearest residences (id.).

**Table 3: Sound Level Evaluation – Daytime/Evening Background at Nearest Residences**

| Receptor | Brockton Plant (dBA) | Lowest L90 Background (dBA) | Total (dBA) | Updated Increase Over Background (dBA) | EFSB Approved Increase (dBA) |
|---|---|---|---|---|---|
| ST-1 End of Mobile Dr. | 38 | 41 | 43 | 2 | 2 |
| ST-2 Hayward Ave./Rt. 28 Intersection | 42 | 56 | 56 | 0 | 0 |
| ST-3 Crown Place Condos | 41 | 42 | 45 | 3 | 2 |
| ST-4 71 Appleby St. | 40 | 36 | 41 | 5 | 5 |
| ST-6 Brockton Housing Main Street | 34 | 43 | 44 | 1 | 0 |

Source: BP-C-1, at 4-14

12 $L_{90}$ is the sound level in dBA exceeded 90 percent of the time during the measurement period (Exh. BP-1, App. E at 1). It represents the residual sound level, which is the background sound level observed when there are no obvious nearby intermittent noise sources (id.).

**Table 4: Sound Level Modeling Results – Project (with Changes) Plus Nighttime Background at Nearest Residence**

| Receptor | Brockton Plant (dBA) | Lowest $L_{90}$ Background (dBA) | Total (dBA) | Updated Increase Over Background (dBA) | EFSB Approved Increase (dBA) |
|---|---|---|---|---|---|
| ST-1 End of Mobile Dr. | 38 | 39 | 42 | 3 | 3 |
| ST-2 Hayward Ave./ Rte. 28 Intersection | 42 | 39 | 44 | 5 | 5 |
| ST-3 Crown Place Condos | 41 | 41 | 44 | 3 | 3 |
| ST-4 71 Appleby St. | 40 | 36 | 41 | 5 | 5 |
| ST-6 Brockton Housing Main Street | 34 | 40 | 41 | 1 | 1 |

Source: Exh. BP-C-1, at 4-14, Table 4.3-3

Table 3 indicates that the predicted daytime operational sound levels of the Project, if constructed pursuant to the terms of the PCF, would result in an increase of one decibel over the level approved in the Final Decision at two of the six receptors: ST-3 and ST-6. This one decibel increase, however, is primarily the result of rounding. The actual increase at the ST-3 receptor would be 0.1 dBA, and the actual increase at the ST-6 receptor would be 0.2 dBA (Exh. RR-EFSB-C-7).

ACE argued that the Board should require Brockton Power to implement additional noise mitigation to reduce the maximum noise level at receptors ST-4 and ST-2 to 3 dBA for a cost of $3.5 million (ACE Brief at 29-30; Exh. EFSB-C-N-15).

2. Visual Impacts

The Company states that the design changes for the facility would result in reduced visual impacts. The principal design change is the replacement of the 130-foot tall HRSG building by a set of shorter, 116-foot tall, sound walls (Exh. BP-C-1, at 4-1). In the PCF, the Company set forth a viewshed summary (id. at 4-20) that corresponds, in large part, to the viewshed summary in the original Project filing (Exh. BP-1 at 4-87 through 4-102). The PCF viewshed summary

indicates that for the most part, the expected views of the Project will remain the same whether or not the PCF is approved. There are, however, two locations at which the reduced height of the HRSG would result in a mitigation of impacts.

One of the places of reduced visual impacts is found at location number 8, designated as "Crown Place." There, the HRSG walls would be visible if the Project were constructed as approved in the Final Decision, but they would not be visible if the design changes were implemented (Exh. BP-C-1, at 4-20). The other such place is found at location number 4, designated as "Hayward Street." There, the HRSG walls would be more visible if the Project were constructed as originally approved than if the Project were constructed using the design changes proposed in the PCF (id.).

B. Analysis and Findings Regarding Structure Design Changes

The Company has indicated that its goal in lowering the heights of the buildings and substituting sound walls for an enclosed structure around the HRSG is to comply with the Brockton Zoning Ordinance.[13] Whether the change in the height of the buildings would result in a zoning-compliant structure is outside the scope of the Siting Board's consideration in this proceeding. In the Original Proceeding, the Board declined to grant the zoning exemption sought (Final Decision at 120), and the PCF does not seek to obtain a zoning exemption from the Board.[14] Therefore, zoning per se is not an issue in the present proceeding. However, the design changes do warrant evaluation in terms of changes in environmental impacts including those relating to noise and visual impacts.

With respect to noise, the evidence supplied by the Company indicates that the Project change would result in only de minimis increases in noise levels at two of the six receptors during the daytime and evening hours. Table 4 indicates that the predicted operational sound

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13 Since the filing of the Company's Zoning Exemption Petition, the City has amended its zoning ordinance to remove electric power generating plants from the list of permitted uses in the Industrial-2 and 3 zones (Exh. EFSB-C-COB-Z-11-REVISED (Attachment)). The City and Brockton Power disagree as to whether this amendment applies to the Project (Exh. COB-C-MB-1, at 3).

14 We note that the zoning disputes between the parties are presently being addressed in other proceedings that have been brought in other forums, including Land Court (Exh. EFSB-C-COB-Z-16; see also, Company Brief at 29, n. 23).

levels of the Project, if constructed pursuant to the terms of the PCF, would either be identical or very close to the sound levels approved in the Final Decision. Further, we note that in the Original Proceeding, the Board declined to require the Company to implement mitigation that could achieve a similar 2 dBA reduction of nighttime ambient sound level increases at receptors ST-2 and ST-4 for a net increased cost of $1.2 million over the $11.5 million of noise mitigation costs incorporated in the Project design. Final Decision at 54. In so finding, the Board stated, "the proposed facility as planned would already provide a level of noise mitigation consistent with Siting Board precedent." Id. Therefore, the Siting Board finds that the changed facility also would provide a level of noise mitigation consistent with Board precedent and declines to impose the additional mitigation ACE requests.

With respect to visual impacts, the height changes proposed by the PCF would somewhat mitigate the facility's appearance. Altogether, there is no evidence that further noise or visual mitigation would be more feasible or less expensive than the mitigation proposed in the PCF. Therefore, the Siting Board finds that the structure design changes minimize both visual and noise impacts, but otherwise do not affect the environmental impacts of the approved Project, consistent with minimization of the cost associated with mitigation, control and reduction of environmental impacts.

## VI. CHANGE IN WATER SUPPLY

In its Final Decision, the EFSB stated that the proposed use of AWRF water for cooling water makeup was preferable to using BMWS water. Thus, the Board found that water resource impacts would be minimized based on, among other factors, Brockton Power's use of AWRF water as the facility's primary cooling water source.[15] However, recognizing the record evidence indicating some uncertainty around the availability of the City's AWRF water supply, the Siting Board imposed the following condition:

> The Siting Board directs the Company to work with the City of Brockton with respect to water supply issues associated with use of Brockton AWRF water, and

[15] The Siting Board concluded that subject to various water-related conditions and "any further ruling or conditions that the Siting Board may issue as part of its review of a project change review," water resource impacts of the proposed facility, including impacts related to water use, would be minimized. Final Decision at 47.

> to provide a report to the Siting Board with respect to the outcome of such efforts. Furthermore, if the Company intends to use potable water for the majority of the water requirements of its proposed facility, the Siting Board directs the Company to provide a project change filing to the Siting Board, together with an analysis as detailed as that done for AWRF water, but directed to those issues that are germane to the use of potable water, including opportunities for water conservation.
>
> Final Decision at 117.

A. Evidence on Water Supply Changes

Brockton Power stated that it has developed plans to use BMWS water as cooling tower makeup water based upon the City's unwillingness to negotiate an agreement for Brockton Power to purchase treated effluent from the AWRF for that purpose (Exh. BP-C-1, at 1-1).

1. Brockton Municipal Water Use

a. Historical Water Use

Since 1899, the City of Brockton has had the right to take water from Silver Lake, located in Pembroke, Halifax, Plympton, and Kingston, as well as the obligation to provide water to the towns of Whitman and Hanson (and, on an emergency basis, to the towns of Pembroke, Halifax, and East Bridgewater). In the 1960s, the City experienced a severe drought. In 1964, the Legislature granted the City the right, under certain conditions, to divert water from Furnace Pond in Pembroke and Monponsett Pond in Halifax into Silver Lake, thereby expanding the volume of water available to the City from the Silver Lake system (i.e., Silver Lake together with the two ponds). Since 1994, the City has obtained less than ten percent of its supply from the Brockton Reservoir in Avon (Exh. BP-C-1, App. A at 2-1 to 2-5, 2-18).[16]

In addition to the severe drought of the 1960s, the City of Brockton experienced a prolonged drought in the early 1980s. The 1964-1967 drought is, for Brockton and surrounding communities, the "drought of record," defined as the period of hydrological record keeping during which natural hydrological conditions have contributed the least to water supply volumes

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16 MADEP, under its Water Management Act ("WMA") Permit, allows the City an authorized withdrawal volume of 0.83 MGD from Brockton Reservoir (Exh. BP-C-1, App. A at Table 1-1).

(Exh. BP-C-1, App. A at 2-6 to 2-7). The drought of the 1980s is classified as a "20-year drought," i.e., a level of drought that occurs approximately once every 20 years (id.).[17]

In 1986, the combination of prolonged drought conditions, leaky pipes and the City's lack of water conservation precipitated: (1) a Declaration of State Water Supply Emergency and Order ("Emergency Declaration") by MADEP; and (2) subsequent direct intervention by MADEP in the City's water supply management (Exh. ACE-4). In November 1995, MADEP and the City entered into an ACO (ACO-SE-95-5005) that replaced the Emergency Declaration (id.).

The ACO imposed many requirements on the City. It mandated that the 12-month running average of water pumped to the City's water distribution system not exceed 11.3 MGD (the equivalent of 110 percent of the system safe yield established at the time of the ACO) (Exh. BP-C-1, App. A at sub-appendix B at 3-4 to 3-5).[18] In addition, the ACO required the City:

- to re-establish the Brockton Board of Water Commissioners ("BWC");[19]
- to plan for short-term and long-term water supply needs subject to MADEP approval;
- to develop a five-year water management plan addressing water conservation and new connections;[20] and
- to submit monthly demand reports to MADEP (id.).

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17 MADEP uses the drought of record to determine the average annual withdrawal permitted from a reservoir, unless the applicant has a detailed drought management plan that complies with MADEP standards.

18 The ACO also provided that a Declaration of Emergency would go into effect if the 12-month running average exceeded the designated amount (Exh. BP-C-1, App. A at sub-appendix B at 3-4 to 3-5). The designated amount excluded volumes from the more recently constructed Aquaria Water, LLC ("Aquaria") desalination facility (id. at 3-5).

19 The BWC is variously referred to as the Brockton Board of Water Commissioners and the Brockton Water Commission.

20 Specifically, "[t]he City shall submit a five-year water management plan to the Department for its approval which proposes at a minimum to manage and regulate conservation measures and new water hookups in a manner that will ensure that the City's water consumption does not exceed its safe yield and ensures an equitable allocation of a limited water supply" (Exh. ACE-4).

The ACO, which grew out of the 1986 Emergency Declaration, was amended twice, first in February 1997 and again in December 1997. The February 1997 modification of the ACO mandated that the City develop agreements with Whitman and Hanson concerning new connections in those towns; submit a report to MADEP on short-term water sharing; and prepare a comprehensive water management plan ("CWMP") concerning existing water supplies (Exh. BP-C-1, App. A at sub-appendix B at 3-4 to 3-5). The December 1997 amendment of the ACO changed only the deadline for the City's submission of its work plan and long-term water supply strategy (id.).

The ACO represents a joint effort by MADEP and the City to develop a long-term approach to the management of Brockton area water supply and resources (Exh. ACE-4). The City has not been released from the requirements of the ACO. However, the City stated in the 2009 CWMP that it had complied with the requirements of the ACO (Exh. BP-C-1, App. A at sub-appendix B at 2-24).

The re-established BWC has undertaken a range of water conservation measures including: a pipe replacement program; leak detection and repair; dissemination of water conservation information; meter testing, replacement, and calibration; installation of efficient water fixtures in new buildings; retrofit of water fixtures in public office buildings and housing; water rates designed to promote conservation; and more frequent billing, to emphasize the connection between water cost and use (Exh. BP-C-1, App. A at sub-appendix B at 5-1 to 5-2). On an on-going basis, the BWC institutes water demand controls as necessary, including outdoor water use restrictions. In addition, the BWC reviews all applications for new water service and may refuse service to water-intensive uses[21] for which compelling need has not been demonstrated (id.).

b. Aquaria Desalination Facility

In 1993, the Massachusetts Executive Office of Environmental Affairs published a report outlining a strategy for meeting the water needs of the City and other Taunton River Basin communities through the year 2020. Among other things, the report proposed a desalination

[21] Notably, the November 2009 draft of the City's Water Supply Operations Plan identifies laundromats and car washes as water intensive uses (Exh. BP-C-1, App. A at sub-appendix B at 5-1 to 5-2).

plant as a solution for the long-term water needs of these communities (Exh. BP-ACE-C-AM-10(1), at 5). In December 2008, the Aquaria desalination water treatment facility (which draws water from the Taunton River) was connected to the BMWS (Exh. BP-C-1, at 2-6, 2-18).[22]

Under the Aquaria contract, the City is entitled to a "Firm Commitment" from Aquaria that represents the minimum amount of water that Aquaria must make available to the City and for which the City is obligated to make an annual fixed payment (Exh. BP-C-1, at 2-6). The annual payment is independent of the volume of water actually used by the City (id.). In addition to the fixed payment, the City pays a separate charge for each 100,000 gallons of Aquaria water it receives (id.).[23] In 2014, when the Project is expected to begin operation, the City's Firm Commitment from Aquaria will be 3.5 MGD. The City's Firm Commitment amount increases incrementally yearly until a maximum of 4.07 MGD is reached in 2019. The Firm Commitment remains 4.07 MGD through 2029. The City also has the right to buy the first 1.0 MGD of "excess water" from Aquaria on a "daily and yearly average basis" (Exh. BP-C-1, Section 2, Att. 2, at 11). During June, July and August, the City has the right to demand that Aquaria produce and provide a minimum of 0.5 MGD of excess water in addition to the Firm Commitment (id. at 12).

The Massachusetts Environmental Policy Act ("MEPA") certificate for the Aquaria facility required each community that wanted to use Aquaria water to apply for modification of its WMA permit. In 2005, in accordance with this directive and an application from the City of Brockton, MADEP modified the WMA permit it had issued to the City (Exh. BP-ACE-C-AM-10(1)). The WMA permit required the City to submit a CWMP for MADEP approval that would identify the City's water withdrawals and all its sources, and how the City would "manage its

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22 The City entered into a 20-year agreement with Aquaria in 2002 to purchase water from the Aquaria facility (Exh. BP-C-1, Section 2, Att. 2). Deliveries of water to the BMWS began in April 2009 (Exh. BP-C-1, at 2-6, 2-18, 2-22). This agreement with Aquaria also grants the City options to renew for an additional 30 years in five-year increments (Exh. BP-C-1, Section 2, Att. 2, at 11, 16-17).

23 The fixed and variable components each have escalation clauses beginning in the fourth year (Exh. BP-C-1, Section 2, Att. 2, at 11, 16-17). The annual fixed payment is $167,480 per 0.1 MGD of Firm Commitment, before any escalation (id.). In 2014, the annual payment will be $5.8 million plus escalation (id.). From 2019-2029, the annual payment will be $6.8 million plus escalation (id.). There is no required minimum daily or annual take incumbent upon the City (id.).

withdrawals, including any volumes purchased, to minimize the environmental impacts associated with the withdrawals" (Exh. BP-C-1, App. A at sub-appendix C at 8). MADEP further stated:

> While the Department believes the Aquaria connection will provide [the City] with a long-term source of water and the opportunity to better manage its other water sources to minimize environmental impacts, it is premature to make a judgment on the appropriate management of [the City's] sources, until the [CWMP] is reviewed and approved. The Department will modify [the City's] permit upon the Department's approval of the management plan to require the implementation of a plan that minimizes the impacts of the existing withdrawals (Exh. BP-C-1, App. A at sub-appendix C at 2).

The City submitted a draft CWMP (which addresses demand management and includes a draft Drought Demand Management Plan) in May 2007. In its CWMP, the City requests that the ACO be lifted. MADEP provided comments on May 21, 2009. The City submitted its response to those comments in November 2009. MADEP has not yet approved the CWMP (Exh. BP-C-1, App. A).

c. Current Water Use

For the years 1996 through 2010, the City's annual average water demand was approximately 10 MGD (RR-EFSB-ACE-C-24(1); Exhs. BP-C-1, at 2-25; ACE-C-W-10, at 2). In 2009 and the first ten months of 2010, respectively, finished water (after water treatment) from the Silver Lake system and Brockton Reservoir averaged 9.28 MGD and 8.93 MGD (RR-EFSB-C-24(1)). Finished water volumes from the Brockton Reservoir averaged 0.63 MGD in 2009 and 0.59 MGD in 2010 (through October) (id.).

Water demand for the Project would vary depending on the temperature and capacity factor at which the Project was operated. The Company provided water demand projections based on three operating scenarios. The Company's projections are indicated in Table 5 below.

**Table 5. Brockton Power Estimated Water Consumption**

| | |
|---|---|
| Daily Average (100% capacity factor,[24] 59°F[25]) | 1.75 MGD |
| Average Annual Basis (70% capacity factor,[26] 59°F) | 1.1 MGD |
| Daily Maximum (100% capacity factor, 90°F) | 2.1 MGD |

Source: Exh. EFSB-C-W3

Thus, on an annual basis, the Project would add more than ten percent to the current water demand on the City's municipal water system (Exh. BP-C-1, at 2-5, 2-8). During the summer electrical peak period, the period that the Silver Lake-Jones River ecosystem is most stressed, the Project is expected to use water at the rate of 2.1 MGD, or roughly twice its annual average rate of 1.1 MGD (Exhs. BP-C-1, at 2-8; EFSB-C-W-26, at 2).

The Project as a prospective water customer of the City provides a striking comparison to the existing large customers of the water system. According to the 2009 Brockton WMA Filing to MADEP ("2009 Brockton WMA Filing"),[27] as of the end of 2009, BMWS provided 266 residential institutions (e.g., public housing) with 473.97 million gallons of water per year ("MGY"), or approximately 1.3 MGD shared among the 266 connections in the category (Exh. COB-C-W-7(A)). In the municipal/institutional/non-profit (including hospitals) category, 76 connections used 17.618 MGY, or approximately 0.232 MGD (id.). In the industrial sector, 179 connections shared 78.366 MGY, or 0.215 MGD (id.). Thus, although large residential institutions together consume 0.2 MGD more than the Project, that category consists of 266 locations. In the industrial category, existing water users in the City require significantly less water on an average daily basis than would the Project.

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24 The capacity factor is the ratio of actual output over a period of time and what the facility would produce operating at full capacity over the same time period.

25 Except in estimating daily maximum water demand, the Company projected water demand based on a 59 degree Fahrenheit ("°F") temperature day. According to the Company, 59°F is used by the Independent System Operator ("ISO") as an average daily temperature (Tr. 1, at 25).

26 The Company states that its best judgment is that the Project would operate at a 70 percent capacity factor (Tr. 1, at 25).

27 The BWC submitted the filing (MADEP PWSID#4044000) to MADEP for the reporting period 1/1/2009 – 12/31/2009) (Exh. COB-C-W-7(A)).

d. Projected Water Use

In October 2009, the Massachusetts Department of Conservation and Recreation ("MA DCR") issued projected 2015 and 2020 estimates of BMWS water use by Brockton, Whitman, and other communities historically supplied by the City of Brockton's municipal water system (Exh. BP-C-1, at App. A sub-appendix A at 5). These are provided in Table 6, below.

**Table 6. Projected BMWS Demand**

| Location | Year 2015 | | Year 2020 | |
|---|---|---|---|---|
| | Low (MGD) | High (MGD) | Low (MGD) | High (MGD) |
| Brockton | 9.17 | 10.29 | 9.31 | 10.46 |
| Whitman | 0.93 | 1.08 | 0.94 | 1.08 |
| All Other | 0.05 | 0.07 | 0.05 | 0.07 |
| Total | 10.15 | 11.44 | 10.30 | 11.61 |

Source: Exh. BP-C-1, at App. A sub-appendix A at 5

For Brockton and Whitman, MA DCR based its demand estimates on information from Brockton's Annual Statistical Reports and on Metropolitan Area Planning Council data for the two communities (id.). Low and high estimates incorporate different assumptions of daily per capita water use (id.). Low estimates assume water use based on the City of Brockton's actual gallons per capita per day ("gpcd") water use in 2009 (id.). High estimates assume water use at the rate of 65 gpcd (id.). Both low and high estimates also provide for "unaccounted-for" water loss (id.).[28]

MADEP has designated 65 gpcd as the water conservation standard for residential water use (Tr. 2, at 357-359). Brockton's actual rate of water use, at 63 gpcd, has been lower than the conservation target set by MADEP (Exh. BP-C-1, App. A at 3-1). Since the ACO has been in place, from 1996 to 2010, Brockton's average annual use has remained relatively constant (around 10 MGD), as has its gpcd water use (RR-EFSB-ACE-C-24(1); Exhs. BP-C-1, at 2-25;

28 For Whitman, low and high estimates were derived by a process similar to Brockton's. MA DCR used historical annual norms (0.02 and 0.07 MGD) to represent its low and high estimates for use by other communities (i.e., other than Brockton and Whitman) (Exh. BP-C-1, at App. A sub-appendix A at 5).

ACE-C-W-10, at 2; BP-C-1, App. A sub-appendix A at 4-5).[29] In its updated CWMP filed with MADEP in 2009, as indicated in Section VI.A.1.a, above, the City describes its continuing efforts to conserve water by detecting leaks, replacing water pipes, maintaining and replacing water meters, and implementing other conservation programs.

Table 7, below, presents the availability of water volumes from the City of Brockton's traditional water supply (the Silver Lake system and Brockton Reservoir), given the projected level of the City's water demand under various scenarios in 2014. This is the year that the Company anticipates the initial operation of its Project. In 2014, as Table 7 indicates, the range of total Brockton water demand with the Project would range between 11.25 and 12.54 MGD, assuming average annual potable water demand of the Project of 1.1 MGD. If the Project's peak daily demand of 2.1 MGD were assumed, total Brockton water demand would range from 12.2 to 13.54 MGD in 2014.

29 Census data show less than two percent population growth in the decade from 1990 to 2000 in the Brockton water service area (Exh. BP-C-1, App. A at 3-2). Year 2010 census data were not available for the City of Brockton at the time of the evidentiary hearings. The City provided two forecasts of population growth in its 2009 comments to MADEP. At that time, the Massachusetts Institute for Social and Economic Research ("MISER") forecasted no population growth for the decade 2001 to 2010 (id.). MISER forecasted a slight decrease in Brockton water service area population from 2010 to 2020 (id.). The Old Colony Planning Council forecasted a five percent increase from 2000 to 2010 and a three percent increase from 2010 to 2020 (id.).

**Table 7.**
**City of Brockton Municipal Water Supply Scenarios, Traditional Water Supply Sources**
**Projections for Calendar Year 2014, Initial Project Operation**
**All Figures in MGD**

| Year | City Water Demand Before Project | Project Water Requirements | Total Water Demand City & Project | Available Water (ACO in place) | Water Balance (ACO in place) |
|---|---|---|---|---|---|
| 2010 (Average of Jan.-Oct.) | 10.23* | -- | -- | 11.3□ | -- |
| 2014 (Low Estimate) | 10.15* | 1.1^(a)<br>1.75^(b)<br>2.1^(c) | 11.25<br>11.90<br>12.25 | 11.3□ | +0.05<br>-0.6<br>-0.95 |
| 2014 (High Estimate) | 11.44* | 1.1^(a)<br>1.75^(b)<br>2.1^(c) | 12.54<br>13.19<br>13.54 | 11.3□ | -1.24<br>-1.89<br>-2.24 |

* City of Brockton, average finished water demand, January through October (2010) (RR-EFSB-C-24). Silver Lake raw water withdrawals for the same period averaged 9.90 MGD (id.). The range of withdrawals from Silver Lake was 7.9 to 12.6 MGD. Withdrawals exceeded the average more than half the time (id.).

* The high and low forecasts for City of Brockton water use in 2014 are from Exh. BP-C-1, at 2-25, Table 2.3-1 and checked against information in Exhs. EFSB-C-W-3, at 2, ACE-C-W-10, Table 2.4-1, and BP-C-1, App. A sub-appendix A at 4-5. For further detail, see Exh. BP-C-1, at 2-24 (discussion) and Exh. BP-C-1, App. A sub-appendix A at 4-5.

^ (a) Demand for water, anticipated annual average daily demand (70% capacity factor, 59 °F) (Exh. BP-C-1, at 2-7).

^ (b) Average daily demand, 100% capacity factor, 59 °F (Exh. ACE-C-W-10).

^ (c) Maximum daily demand, 100% capacity factor, 90 °F (Exh. EFSB-C-W-3).

□ 110% of 9.4 MGD from the Silver Lake system and 0.83 MGD from the Brockton Reservoir (Exhs. BP-C-1, at 2-17 to 2-18, 2-22; EFSB-C-W-3).

Should the City choose to use it, Aquaria gives the City greater flexibility in making BMWS withdrawals from its traditional resources (Tr. 5, at 718-722). In other words, the City might choose to use water from Aquaria for the Project rather than from its traditional sources

(id.). Daily data for City of Brockton withdrawals from its various water resources in 2009 and 2010, however, suggest that incremental BMWS water supply might also come entirely or in part from the City's traditional sources, especially the Silver Lake system (RR-EFSB-ACE-C-24(1)). The City, in addition, has indicated that it treats Aquaria as a supplemental water source to its use of Silver Lake and Brockton Reservoir (RR-EFSB-COB-C-26).[30] The Company testified that it is unable to affect the City's decisions in this regard (Tr. 5, at 721).

The Company asserted that the City is using the City's traditional system sources at or near ACO limits and that, therefore, incremental water to supply the Project would come from Aquaria, not the City's traditional water resources (Tr. 6, at 948). The Company further argued that projections of the City's water requirements in 2014 indicate that the City would potentially demand more water than its ACO allows at that time, the planned first year of operation of the Project (Exh. EFSB-C-W-1; Tr. 6, at 948). The Company therefore anticipated that the Project would not require further drawdown of the City's historical water supply system, nor have a material effect on measures, such as seasonal releases to the Jones River, that might affect the environmental health of the sources of the City's water supply (Exh. EFSB-C-W-20).

ACE argued that even the City's use of Aquaria water to supply the Project's cooling towers might increase environmental impacts on the Silver Lake system (Exh. BP-ACE-C-AM-10). According to ACE, Aquaria volumes that might otherwise moderate impacts of the City's water demand on its traditional potable water sources, including the Silver Lake system, would be diverted for Project use (id.). This outcome would counter what was, in part, the reason for

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30 In a letter to MADEP in November 2009, the Chair of the BWC states that the BWC's preference is to rely on its traditional water supply sources to the extent possible as a cost-saving measure:

> ...Aquaria was always intended to be, and remains, a supplemental water source.... The City...[is] now contracted with Aquaria LLC for over $3 million a year in Year 2 of our 20-year contract for this supplemental water supply. That amount will escalate annually [with the increase of] our contractual obligations to buy water from Aquaria....
>
> Given the significant cost differential between treating water from our reservoir system and water purchased from Aquaria, the Brockton Water Commission must continue to protect its registered and permitted water resources while continuing to act as good stewards. It is our responsibility to our ratepayers to control costs as much as possible (Exh. BP-C-1, App. A).

Aquaria's construction, at least as understood by MADEP (id.). MADEP, in its 2005 modification of the City's WMA Permit #9P-4-25-044.01, expresses its belief that Aquaria "will [not only] provide Brockton with a long-term source of water... [but also] the opportunity to better manage [its] other water sources to minimize environmental impacts" (Exh. BP-ACE-C-AM-10(1) at 2).

2. Environmental Impacts

a. Environmental Impacts on the City's Historic Water Supply Sources under the Existing Withdrawal Regime

Historically, Silver Lake, Furnace Pond, and Monponsett Pond (the Silver Lake system) together have provided 90 percent of BMWS water (Exh. BP-C-1, App. A at 2-7 to 2-8). Silver Lake, the largest of these three water bodies, drains an area of approximately 4.1 square miles and is fed by groundwater, small streams, and transfers from Furnace Pond and Monponsett Pond (id. at 2-4 to 2-5). Diversions from Monponsett Pond to Silver Lake occur between October and May when water level in Silver Lake is below 47.5 feet and water in Monponsett Pond is above 52.0 feet (id.). Silver Lake is separated from Forge Pond (a pond not in the Silver Lake system) by a low-lying strip of land at an approximate elevation of 45 feet (id.). When Silver Lake waters are higher than 45 feet, Forge Pond and Silver Lake are essentially connected; at water levels higher than 47.5 feet, water from the system spills over the Forge Pond Dam into the upper Jones River (id.). Water also flows from Monponsett Pond to Stump Brook, where a spillway and flume connect to a fish ladder (id. at 2-4). Cranberry growers withdraw water from both Monponsett and Furnace Ponds (id. at 2-3, 2-4).

In June 2005, MADEP modified its permit to the City, WMA Permit #9P-4-25-044.01.[31] MADEP's cover letter to the City notes the agency's on-going interest in the relationship between the City of Brockton's use of existing resources and its Aquaria volumes. The letter makes reference to a condition of the permit modification, that Brockton will develop a CWMP that will "identify how Brockton will manage its withdrawals, including any volumes purchased

[31] Under this permit, MADEP allows the City to withdraw water from the Taunton River Basin. Modification of the permit in June 2005 was due to anticipated withdrawals from the Taunton River for Aquaria operations, in large part, if not entirely, to provide water to the City of Brockton (Exh. BP-ACE-C-AM-10(1)).

[from Aquaria], to minimize the environmental impacts associated with the withdrawals." Special Condition #4 of MADEP's permit modification, excerpted below states:

> ... [T]he...[CWMP] will review Brockton's long-term water supply strategy and provide an analysis of the City's water needs through 2020, taking into account the purchase of water from Aquaria, the alleviation of pent-up demand, redevelopment within the City, continued conservation implementation, the potential needs of the Town of Whitman, and the capacity of Brockton's sources. In developing this plan Brockton should consider existing data studies, including the ... Jones River Watershed Study prepared by GZA for DCR (Exh. BP-ACE-C-AM-10(1)).

Two studies are particularly instructive with respect to how the City's water withdrawals affect its water resources and their associated ecosystems. The first of these, referenced above, is the Jones River Watershed Study: Final Report (2003), undertaken by GZA GeoEnvironmental, Inc. ("GZA Report") for the Massachusetts Department of Environmental Conservation (now DCR) (RR-EFSB-ACE-C-25(1)). The second is the Silver Lake and Jones River Watershed Study (2000), prepared by Teal Ltd. ("Teal Study") for the Jones River Watershed Association (RR-EFSB-ACE-C-25(2)). Both studies indicate that withdrawals from Silver Lake may negatively affect habitat for freshwater mussels (RR-EFSB-ACE-C-25(1) at 10; RR-EFSB-ACE-C-25(2) at 3-34).[32] The Teal Study concludes that the upper Jones River is stressed, that Silver Lake flow discontinuities are a contributing factor, and that longer or more intense flow discontinuities would only increase stress on Jones River ecosystems (RR-EFSB-ACE-C-25(2) at 3-34).[33]

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[32] Research results indicated a general decrease in shell size of stranded mussels with time, based on a sampling effort in 1999 that entailed 45-minute collection efforts on nine separate days (August 30 to October 14) as the water levels of Silver Lake were reportedly receding (RR-EFSB-ACE-C-25(1) at 10; RR-EFSB-ACE-C-25(2) at 3-34). The GZA Report and Teal Study reported that 1997 research by Normandeau Associates suggested that mussels lived at a depth of 17 feet, below lake fluctuation levels; however, subsequent research suggested that smaller size mussels and younger age classes were not well represented by the Normandeau Study, and lake level fluctuations may have an impact on such classes (RR-EFSB-ACE-C-25(1) at 10; RR-EFSB-ACE-C-25(2) at 3-34).

[33] Alex Mansfield, witness for ACE, referenced the GZA Report and Teal Study in describing on-going negative environmental consequences to the Jones River and Silver Lake system resulting from the City's use and approach to management of its potable water supply (Exh. ACE-C-AM-1). With respect to mussels in Silver Lake, Mr.

According to ACE and its expert witness, these and other studies indicate that the City of Brockton's chronic water supply problems have led to higher than desirable withdrawals from the Silver Lake system and resulting environmental harm (Exh. ACE-C-AM-1, at 22-23; Tr. 5, 860-868). ACE alleged that this environmental harm includes impairment of fish migration, loss of spawning habitats, reduced ability to sustain diverse fish species, and entrapment of fish in Silver Lake, in addition to impacts to mussels, other aquatic species, and water quality and clarity (Exh. ACE-C-AM-1, at 22-23; RR-EFSB-ACE-C-25).

The Company argued in response that the environmental concerns raised by ACE regarding the City's current use of Silver Lake (e.g., impacts to mussels, fish migrations, and water quality of Silver Lake) are existing issues unrelated to the Project, and that the City has made significant progress in addressing these concerns (Company Reply Brief at 10). The Company argued further that, rather than contributing to the existing situation, the Project can be part of its solution because its payments for BMWS supply would enhance the City's ability to address the identified issues (Exhs. BP-C-1, at 2-33 to 2-34; EFSB-C-W-8; Company Reply Brief at 10-11).

b. Environmental Impacts from Change of Cooling Water Supply

The Company maintained that reuse of resources is a fundamental tenet of environmental engineering and protection and is generally preferable to using other resources for the same purpose (Tr. 4, at 685). The Company indicated that this principle guides its belief that use of recycled effluent would be a better overall solution for the Project than using BMWS supplies (id. at 687). This is reflected in the Final Decision, which states:

> The Siting Board notes that the record shows that the Company has indicated its strong preference for use of water from the Brockton AWRF for the majority of the water requirements of its proposed facility. The Siting Board concludes, consistent with the Company's preference, that proposed use of recycled water for the proposed facility would be preferable to using City of Brockton potable water – the identified backup water supply source to operate the proposed facility (Final Decision at 42)

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Mansfield stated that freshwater mussels continue to die with each Silver Lake drawdown; reduction in mussel populations reduces filtration rates in the water column, and this, in turn, reduces the photic zone (Exh. ACE-C-AM-1, at 21-23).

The Company asserted in its PCF, however, that use of AWRF effluent is not feasible because the City has refused to discuss the Company's preferred supply alternative (Exh. BP-C-1, at 2-1 to 2-2). The Company further argued that water resource impacts of the Project have been minimized in its PCF because (1) the BMWS has an ample surplus of water from which to supply the Project with all its water needs, and (2) the environmental impacts associated with the Project's use of BMWS water for cooling tower makeup have been properly minimized in accordance with Siting Board precedent (Company Initial Brief at 8; Exh. BP-C-1, at 2-33 to 2-34).

On the other hand, the Company argued, use of BMWS water would have advantages over using AWRF water with respect to Project cost and the volume of water required (Exh. BP-C-1, at 2-1 to 2-24). The Company stated that design changes associated with the use of BMWS would allow lower construction and operating costs (id.). The Company stated that BMWS water has lower concentrations of total dissolved solids than AWRF effluent, which would allow for operation of the Project cooling system at higher cycles of concentration, thus reducing cooling tower blowdown and overall water volumes (Exh. BP-C-1, at 2-7). The use of BMWS water would also reduce the need for pretreatment and reduce the amount of water discharged to the AWRF.

ACE asserted that the Siting Board has already found that environmental impacts would be minimized if the Company used AWRF volumes; therefore, ACE argued, the Company's proposal to use BMWS water to cool its facility does not minimize environmental impacts (ACE Initial Brief at 14).

B. Analysis and Findings on Change in Water Supply

The Siting Board notes that the record indicates that the City has been unwilling to meet with the Company to discuss the Company's preferred water supply alternative. Given the City's position, it is reasonable for Brockton Power to conclude that use of AWRF effluent is not feasible at this point, and that it should therefore look to other alternatives. Although described by the Company, the benefits of potable water over AWRF water are therefore not relevant to our analysis of the environmental impacts of the change to potable water and any balancing of those impacts. Accordingly, and contrary to ACE's argument, the Board will not compare the two water sources and choose the one that on balance best minimizes the environmental impacts.

However, consistent with the Siting Board's statutory mandate, the Board will review the proposed use of BMWS water to determine whether "it minimize[s] the environmental impacts consistent with the minimization of costs associated with the mitigation, control and reduction of the environmental impacts of the proposed generating facility." In making this determination, the Siting Board must take into account that approval of the proposed Project change would result in potable water being taken from the BMWS, a municipal water system with a long history of serious water supply difficulties.

The record in this case indicates that the City of Brockton has not had to manage the demand of a water customer of the magnitude presented by the Project. Indeed in its Water Supply Operations Plan, submitted as part of its CWMP, the City of Brockton identifies laundromats and car washes as water intensive uses. In contrast, the Company would increase the City's water demand by more than ten percent of current use. The Company's assertion that its water would come from Aquaria and not Silver Lake is dubious. The Board is not convinced that by 2014 the City's water demand absent the Project would be at the ACO limit. The City's BMWS water use has been approximately 10 MGD, on average, for more than the last ten years. This is 1.3 MGD less than the ACO limit. Over the last decade, per capita water consumption in Brockton has remained constant or slightly decreased; the population has either remained stable or slightly increased; and total water consumption has remained stable. Over the coming decade, forecasts range from slight population decline to slight population increase in the Brockton area. Given the City's relatively stable population and its recent history of successful efforts at water conservation, the Siting Board concludes that the lower projections of BMWS water use are more appropriate and reliable. Given these population and water use trends, BMWS average water consumption, absent the Project, could quite conceivably remain about 1.0 MGD less than the ACO limit.

As a BMWS customer, Brockton Power would not be in a position to restrict its water use to Aquaria water. The City operates the municipal water system and it states that it would elect to use its traditional water sources before using Aquaria water. Brockton Power will not be able to influence that decision. Therefore, the Board concludes that some, and possibly even a significant portion, of the Project's municipal water could come from Silver Lake.

As the Company asserts, the Siting Board has approved the use of municipal potable water for generating facility cooling towers in previous cases including Pioneer Valley Energy

Center, LLC, EFSB 08-1 (2009); Berkshire Power, Inc., 4 DOMSB 221 (1996); Masspower, Inc., 20 DOMSC 301 (1990); and Altresco-Pittsfield, Inc., 17 DOMSC 351 (1988). However, those previous decisions by the Siting Board did not present a long and significant history of water supply and environmental resource stresses of the magnitude evident in Brockton. The magnitude of these stresses is put into sharp focus by the 25 years of MADEP involvement in the City's water management. Issues with water supply management in the City have been sufficiently severe as to warrant the declaration of a water emergency, the institution of an ACO with MADEP, and the construction of the Aquaria desalination facility as a supplementary source of water supply.

The City's water supply problems have resulted in significant environmental impacts to the Silver Lake system. As noted in Section VI.A.2.a, above, the GZA Report and Teal Study indicate that environmental impacts continue to have an influence on the ecosystem health of the City's traditional water sources.

The Company did not provide information on or analysis of the different environmental impacts on the Silver Lake system that would result from the City's water consumption with the Project's use of BMWS water as compared to the City's water consumption without the Project. Rather, the Company restricted its argument to the unsubstantiated and, in fact, highly questionable, claim that its cooling tower water would predominantly come from Aquaria. Without analysis specific to the Silver Lake system, the environmental impacts of the Project change cannot be reliably assessed. Accordingly, the Company has not met its burden of proof and the Board cannot find that the environmental impacts of the proposed change have been minimized consistent with the minimization of costs associated with the mitigation, control, and reduction of environmental impacts.

## VII. DECISION

Consistent with the Siting Board's directive to Brockton Power in the Final Decision to inform the Board of any changes to the Project, other than minor variations, the Company has informed the Siting Board of three such changes: the elimination of ULSD as a fuel option; changes in the designs of the buildings; and the use of water from the BMWS, rather than from the AWRF, for cooling tower makeup. In Section IV, the Board found that the elimination of ULSD as a fuel option, subject to one condition, would result in beneficial environmental

impacts and, therefore, that these impacts have been minimized. Furthermore, in Section V, the Board found that design changes to Project structures would have beneficial visual impacts and de minimis noise impacts; therefore, these impacts also have been minimized. However, in Section VI, the Board found that the Company did not demonstrate that its use of water from the BMWS would result in a minimization of environmental impacts.

Accordingly, based on the findings articulated above, the Board approves the PCF insofar as it proposes design changes to Project buildings and elimination of the use of ULSD as fuel, subject to compliance with Conditions (1) through (9) in the Final Decision[34] and with the following condition:

Condition 10:

> The Siting Board directs the Company to submit a written gas supply strategy to the Board as part of a compliance filing prior to operation.

The Siting Board denies approval of the PCF, however, with respect to the proposal to use water from the BMWS rather than water from the AWRF.

The evidence in this case demonstrated that the three proposed Project changes are not interrelated in such a way that implementation of one Project change without implementation of one, or both, of the other two changes is prevented. Accordingly, our findings stated above are made considering each proposed change on a stand-alone basis.

Our conclusion about the cooling water source Project change is not changed if the Siting Board considers all three Project changes collectively. To evaluate the combination of the three proposed changes, the Siting Board balances the environmental advantages and disadvantages of the entire Project as changed by all three Project changes, in order to determine if the Project minimizes environmental impacts consistent with the minimization of costs associated with the mitigation, control and reduction of environmental impacts.

The PCF's air impacts are quantified and include a reduction in six criteria pollutants, with the range of reduction from ten percent to 42 percent. The design changes result in improved visual impacts and de minimis noise impacts. Against these benefits, however, the

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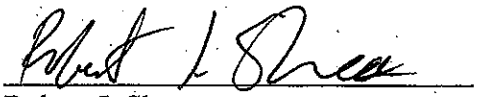
34 The Siting Board recognizes that this Decision renders moot the first of the nine conditions of the Final Decision.

Board balances the burden that would be imposed on the BMWS as a result of approving the PCF. This impact has not been quantified or even analyzed by the Company in this proceeding. Therefore, the Board is balancing known air emissions reductions and visual benefits against unknown water detriments. As a result, the Board cannot conclude that environmental impacts would be minimized if the PCF were approved in its entirety.

Accordingly, regardless of whether the Siting Board considers the water supply Project change as a stand-alone proposal or the Siting Board balances the effects of all three proposed changes, the Siting Board finds that the Company has not sustained its burden of proving that the environmental impacts of the proposed change or changes have been minimized consistent with the minimization of costs associated with the mitigation, control, and reduction of environmental impacts.

Findings in this decision are based upon the Project change information provided by the Company examined in light of findings the Siting Board made in the Final Decision. Because the Project changes outlined in this decision pertain to the facility approved by the Siting Board in the Original Proceeding, the Company must construct and operate its facility in conformance with its proposals presented in the Original Proceeding; the only modifications permitted are those set forth in this decision.

The Siting Board requires the Company to notify the Siting Board of any further changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. The Company is obligated to provide the Siting Board with sufficient information on changes to the proposed Project to enable the Siting Board to make these determinations.



Robert J. Shea
Presiding Officer

Dated this 28th day of September, 2011

APPROVED by the Energy Facilities Siting Board at its meeting of September 22, 2011, by the members present and voting. Voting for approval of the Tentative Decision as amended: Steven Clarke (title) (Acting Energy Facilities Siting Board Chair/Designee for Richard Sullivan, Secretary, Executive Office of Energy and Environmental Affairs); Ann G. Berwick, Chair of the Department of Public Utilities; Jolette A. Westbrook, Commissioner, Department of Public Utilities; James Coleman (Designee for Commissioner, Department of Environmental Protection); Robert Sydney (Designee for the Commissioner, Division of Energy Resources); and Kevin Galligan, Public Member. Voting against approval of the Tentative Decision as amended: Dan Kuhs, Public Member.

Steven Clarke, Acting Chair
Energy Facilities Siting Board

Dated this 28th day of September 2011

Appeal as to matters of law from any final decision, order or ruling of the Siting Board may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the order of the Siting Board be modified or set aside in whole or in part.

Such petition for appeal shall be filed with the Siting Board within twenty days after the date of service of the decision, order or ruling of the Siting Board, or within such further time as the Siting Board may allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing a party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the clerk of said court. (Massachusetts General Laws, Chapter 25, Sec. 5; Chapter 164, Sec. 69P).

**COMMONWEALTH OF MASSACHUSETTS**
**ENERGY FACILITIES SITING BOARD**

| | | |
|---|---|---|
| In the Matter of the Petition of New England Power Company d/b/a National Grid and Western Massachusetts Electric Company for Approval of the Construction of a New 115 kV Overhead Transmission line in the Towns of Hampden, Palmer and Monson and Necessary Ancillary Facilities in the Towns of Hampden and Palmer, pursuant to G.L. c. 164, § 69J. | ) | EFSB 10-1 |
| In the Matter of the Petition of New England Power Company d/b/a National Grid and Western Massachusetts Electric Company For Approval to Construct and Operate Transmission Facilities, pursuant to G.L. c. 164, § 72. | ) | D.P.U. 10-107 |
| In the Matter of the Petition of New England Power Company d/b/a National Grid and Western Massachusetts Electric Company for Individual and Comprehensive Zoning Exemptions from the Zoning Ordinance of the Town of Palmer and the Zoning Bylaws of the Towns of Monson and Hampden, pursuant to G.L. c. 40A, § 3. | ) | D.P.U. 10-108 |

**FINAL DECISION**

Stephen H. August
Presiding Officer
May 16, 2012

On the Decision:
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Barbara Shapiro

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Intervenor

TABLE OF CONTENTS

ABBREVIATIONS

| | |
|---|---|
| BECo/Hopkinton | Boston Edison Company, 6 DOMSB 208 (1997) |
| Berkshire Power | Berkshire Power Development, Inc., D.P.U. 96-104 (1997) |
| Boston Gas Decision | Boston Gas Company, D.T.E. 00-24 (2001) |
| Cape Wind | Cape Wind Associates LLC, 15 DOMSB 1 (2005) |
| CELCo/Kendall | Cambridge Electric Light Company, 12 DOMSB 305 (2001) |
| GSRP | Western Massachusetts Electric Company, EFSB 08-2/D.P.U. 08-105/08-106 (2010) |
| Hydro-Quebec | Massachusetts Electric Company/New England Power Company, 13 DOMSC 119 (1985) |
| MECo/Westford | Massachusetts Electric Company, D.T.E. 01-77 (2002) |
| NSTAR/Stoughton | NSTAR Electric, 14 DOMSB 233 (2005) |
| NY Central Railroad | New York Central Railroad v. Department of Public Utilities, 347 Mass. 586 (1964) |
| Russell | Russell Biomass, 17 DOMSB 1 (2009) |
| Save the Bay | Save the Bay v. Department of Public Utilities, 366 Mass. 667 (1975) |
| Tennessee/Agawam | Tennessee Gas Pipeline Company, D.T.E. 01-57 (2002) |
| Town of Truro | Town of Truro v. Department of Public Utilities, 365 Mass. 407 (1974) |
| Worcester Decision | New England Power Company, EFSB09-1/D.P.U. 9-52/9-53 (2011) |
| BMPs | Best Management Practices |
| BVW | Bordering vegetated wetlands |
| CELT | Capacity, Energy, Loads, and Transmission (forecast) |
| CHP | combined heat and power |
| CO | Carbon monoxide |
| $CO_2$ | carbon dioxide |

| | |
|---|---|
| Company | New England Power LLC |
| Companies | New England Power LLC and Western Mass Electric Co |
| CL&P | Connecticut Light & Power |
| dBA | A-weighted decibels |
| DCR | Massachusetts Department of Conservation and Recreation |
| DCT | double circuit tower |
| DG | distributed generation |
| DOMSB | Decisions and Orders of Massachusetts Energy Facilities Siting Board |
| DOMSC | Decisions and Orders of Massachusetts Energy Facilities Siting Council |
| draft ISO Guidelines | ISO-NE's proposed Transmission System Planning Load Interruption Guidelines (November 2010) |
| DSM | demand-side management |
| EFSB | Energy Facilities Siting Board |
| GHG | Greenhouse Gas |
| GIS | Geographic Information System |
| G.L. c. | Massachusetts General Laws chapter |
| GSRP | Greater Springfield Reliability Project |
| HCRP | Hampden County Reliability Project |
| HVAC | Heating, Ventilating and Air Conditioning |
| IRP | Interstate Reliability Project |
| ISO-NE | Independent System Operator of New England |
| kV | kilovolts |
| LSP | Licensed Site Professional |

| | |
|---|---|
| MassDEP | Massachusetts Department of Environmental Protection |
| MDRP | Massachusetts Diesel Retrofit Program |
| MECo | Massachusetts Electric Company |
| MEPA | Massachusetts Environmental Protection Act |
| mG | milligauss |
| MHC | Massachusetts Historical Commission |
| MOU | Memorandum of Understanding |
| MVA | megavolt-amperes |
| MVAR | megavolt-amperes, reactive |
| MW | megawatts |
| MWh | megawatt-hours |
| NEEWS | New England East – West Solution |
| NEP | New England Power Company |
| NERC | North American Electric Reliability Corporation |
| NHESP | National Heritage and Endangered Species Program |
| NPCC | Northeast Power Coordinating Council |
| NPDES | National Pollutant Discharge Elimination System |
| NRHP | National Register of Historic Places |
| NU | Northeast Utilities |
| PP-3 | ISO-NE Planning Procedure No. 3 |
| PM | particulate matter |
| ppm | parts per million |
| PREP | Palmer Renewable Energy Project |
| Project | Hampden County Reliability Project |

| | |
|---|---|
| PSA Forecast | Power Supply Area |
| PSC | Public Service Corporation |
| ROW | right-of-way |
| Siting Board | Energy Facilities Siting Board |
| $SF_6$ | sulfur hexafluoride |
| SPCC | Spill Protection, Control, and Countermeasure Plan |
| Study Area | Towns of Palmer, Monson, Wilbraham, Hampden, and East Longmeadow |
| SVC | static VAR compensator |
| Three Towns Area | East Longmeadow, Hampden, and Wilbraham |
| TMP | Traffic Management Plan |
| USEPA | United States Environmental Protection Agency |
| VOC | Volatile Organic Compounds |
| WHO | World Health Organization |
| WMECo | Western Massachusetts Electric Company |

Pursuant to G.L. c. 164, § 69J, the Massachusetts Energy Facilities Siting Board ("Siting Board") hereby approves, subject to the conditions set forth below, the petition of New England Power Company d/b/a National Grid ("NEP" or the "Company") and Western Massachusetts Electric Company ("WMECo," together with NEP, the "Companies") to construct a new 115 kilovolt ("kV") overhead transmission line between Palmer Substation and a new West Hampden Substation. Pursuant to G.L. c. 164, § 72, the Siting Board hereby approves, subject to the conditions set forth below, the petition of NEP and WMECo for a determination that the proposed 115 kV transmission line is necessary, serves the public convenience and is consistent with the public interest. Pursuant to G.L. c. 40A, § 3, the Siting Board hereby approves, subject to the conditions set forth below, the petition of NEP and WMECo for individual and comprehensive exemptions from the zoning ordinance of the Town of Palmer, and the zoning bylaws of the Towns of Hampden and Monson in connection with the proposed transmission facilities, as described herein.

## I. INTRODUCTION

### A. Summary of the Proposed Transmission Project

According to the Company, the proposed transmission project, known as the Hampden County Reliability Project ("HCRP" or the "Project") is designed to address reliability needs in Palmer, Monson, Hampden, Wilbraham and East Longmeadow (the "Study Area") (Exh. NEP-1, at 1-1). The Study Area is currently served radially by a limited number of transmission lines that emanate from Palmer Substation. If one or more of these "feeder" lines were to experience an unplanned outage, the remaining lines would experience insufficient voltages, particularly at the end of the radial service to the Study Area (id. at Figure 3.2.2-1).

The Project consists of the following: (1) replacing approximately ten miles of NEP's existing 69 kV transmission line designated as O-15S with a new 115 kV line to be designated as the R-170 line (running in the existing O-15S right-of-way ("ROW") between the Palmer Substation and the proposed West Hampden Substation); (2) constructing a new 2.7-acre 115/69 kV substation in the town of Hampden ("West Hampden Substation"); (3) constructing a new 750-foot loop line connecting WMECo's existing 115 kV 1515 transmission line with the proposed West Hampden Substation; and (4) retiring and removing the existing Hampden

Substation. In addition, NEP would also refurbish the remaining 4.4-mile portion of the existing O-15S line (which would remain 69 kV) from the new West Hampden Substation to the East Longmeadow Substation and the Shaker Road Substation (id. at 1-1 to 1-2).[1] Construction of the HCRP is estimated to take two years beginning in spring 2012. The estimated cost of constructing the HCRP is $35.25 million (Exh. EFSB-8).

The Company is required by G.L. c. 164, § 69J to present both a Primary Route and an Alternative Route for its Project. A description of the Alternative Route and its comparison to the Primary Route can be found in Section V.B.

B. Procedural History

On August 31, 2010, NEP and WMECo filed three petitions with the Siting Board and the Massachusetts Department of Public Utilities ("Department") relating to the HCRP. In the first petition, the Companies request approval of the Project, pursuant to G.L. c. 164, § 69J ("Siting Board Petition"). A second petition seeks specific and comprehensive exemptions from the zoning bylaws or ordinances in the towns along the preferred route for the HCRP pursuant to G.L. c. 40A, § 3 ("Zoning Petition"). The third petition requests approval for the HCRP pursuant to G.L. c. 164, § 72 ("Section 72 Petition").

The Siting Board Petition was docketed as EFSB 10-1, the Zoning Petition as D.P.U. 10-107, and the Section 72 Petition as D.P.U. 10-108. Pursuant to the Petitioners' motion, on September 17, 2010 the Chairman of the Department issued a Consolidation Order, referring the Section 72 and Zoning Petitions for review and approval or rejection to the Siting Board pursuant to G.L. c. 164, § 69H(2). The consolidated proceeding was docketed as EFSB 10-1/D.P.U. 10-107/10-108. Accordingly, the Siting Board conducted a single adjudicatory proceeding and developed a single evidentiary record for the consolidated petitions ("Petitions").

A public hearing was held for the purpose of taking public comment on the HCRP on October 27, 2010 in Hampden. By Hearing Officer ruling dated December 7, 2010, intervenor status was granted to Theresa Corey Dzierwinski and Richard J. Dzierwinski of Wilbraham.

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1 The refurbishment entails replacing 22 wooden transmission poles and modifying 13 others and is estimated to take five to six weeks.

The Petitioners presented the testimony of the following twelve witnesses in support of the Petitions: Bradley Bentley, Jeffrey Brandt, Dena M. Champy, James M. Clark, Andrea M. Desilets, Colin P. Duncan, Dean M. Latulipe, Alfred Morrissey, Jessica Farrell, Paul E. Robinson, Timothy R. Roughan, and Dr. Peter Valberg.

The Siting Board held five days of evidentiary hearings beginning on May 17, 2011 and ending on June 15, 2011. The Company filed its Brief on July 27, 2011. On October 27, 2011, Staff issued its original Issues Memorandum for the case in preparation for discussion at the Siting Board's November 10, 2011 meeting. On November 1, 2011, NEP requested that the Issues Memorandum be taken off the Siting Board's meeting agenda so that it could file a motion for leave to submit additional evidence in the case before the Siting Board began its deliberations. The Siting Board removed the Issues Memorandum from its November agenda. On November 4, 2011, the Company filed a Motion for Leave to Submit Additional Evidence, which was granted by the Presiding Officer on November 21, 2011.

NEP's request to supplement the record related to the discussion of project alternatives. NEP submitted supplemental prefiled testimony on December 15, 2011. The Siting Board conducted an additional evidentiary hearing on January 10, 2012, and the Company submitted a Supplemental Brief on February 1, 2012. On February 27, 2012, Staff issued its second Issues Memorandum for the case. NEP filed comments on March 5, 2012, and the Siting Board held a public meeting on March 10, 2012 to discuss the Issues Memorandum. On March 10, 2012, the Siting Board voted unanimously to direct the Staff to write a tentative decision approving the Company's Project and the Company's request for individual and comprehensive zoning exemptions.

## II. JURISDICTION AND STANDARD OF REVIEW UNDER G.L. c. 164, § 69J

The Company filed the Siting Board Petition pursuant to G.L. c. 164, § 69J, which requires a project applicant to obtain Siting Board approval for the construction of a proposed energy "facility" before a construction permit may be issued by another state agency.

G.L. c. 164, § 69G defines a "facility" to include:

> a new electric transmission line having a design rating of 115 kilovolts or more which is ten miles or more in length on an existing transmission corridor, except [for] reconductoring or rebuilding of transmission lines at the same voltage.

The proposed 115 kV transmission line is clearly a "facility" with respect to Section 69J. The Company asserts that the 4.4 mile-long refurbishment of the O-15S line between West Hampden Substation and Shaker Hill Road Substation is maintenance-related and does not require Department or Siting Board review. However, the Company presented and analyzed all aspects of the Project, including the refurbishment of the 4.4-mile portion of the existing O-15S line from the new West Hampden Substation to the East Longmeadow Substation and the Shaker Road Tap, on an integrated and consolidated basis. Accordingly, the Siting Board reviews the refurbishment of the 4.4-mile portion of the exsiting O-15S line on a consolidated basis with the proposed R-170 115 kV line. See Western Massachusetts Electric Company, EFSB 08-2/ D.P.U. 08-105/08-106, at 6-7 (2010).

In accordance with G.L. c. 164, §§ 69H and 69J, before approving a petition to construct, the Siting Board requires an applicant to justify its proposal in four phases. First, the Siting Board requires the applicant to show that additional energy resources are needed (see Section III, below). Second, the Siting Board requires the applicant to establish that, on balance, its proposed project is superior to alternative approaches in terms of reliability, cost, and environmental impact, and in its ability to address the identified need (see Section IV, below). Third, the Siting Board requires the applicant to show that it has considered a reasonable range of practical siting alternatives and that the proposed site for the project is superior to a noticed alternative site in terms of cost, environmental impact, and reliability of supply (see Section V, below). Finally, the applicant must show that its plans for construction of its new facilities are consistent with the current health, environmental protection and resource use and development policies as developed by the Commonwealth (see Section V.C., below).

## III. NEED FOR THE PROPOSED FACILITIES

### A. Standard of Review

G.L. c. 164, § 69J provides that the Siting Board should approve a petition to construct if the Board determines that the petition meets certain requirements, including that the plans for the

construction of the applicant's facilities are consistent with the policies stated in G.L. c. 164, § 69H to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. To accomplish this, the Siting Board must, among other matters, review the "need for" the facilities to meet reliability, economic efficiency, or environmental objectives. G.L. c. 164, § 69H. Consistent therewith, G.L. c. 164, § 69J requires applicants to include in their petitions an analysis of need for the facility. Here, the Petitioners assert that the HCRP is needed for reliability purposes (Exh. NEP-1, at 2-12).[2]

To ensure reliability, each transmission and distribution company establishes planning criteria for construction, operation, and maintenance of its transmission and distribution system. Compliance with the applicable planning criteria can demonstrate a "reliable" system. See e.g., New England Power Company, 7 DOMSB 333, at 346-348 (1998); Boston Edison Company, 6 DOMSB 208, at 243-245 (1997) ("BECo/Hopkinton").

To determine whether system improvements are needed, the Siting Board takes the following steps: (1) examines the reasonableness of the petitioner's system reliability planning criteria; (2) determines whether the petitioner uses reviewable and appropriate methods for assessing system reliability over time based on system modeling analyses or other valid reliability indicators; and (3) determines whether the relevant transmission and distribution system meets these reliability criteria over time under normal conditions and under certain contingencies, given existing and projected loads.

When a petitioner's assessment of system reliability and facility requirements are, in whole or in part, driven by load projections, the Siting Board reviews the underlying load forecast. The Siting Board requires that forecasts be based on substantially accurate historical

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2 The Siting Board's review of proposed transmission facilities is conducted pursuant to G.L. c. 164, § 69J. This section states, in part, that "[n]o applicant shall commence construction of a facility at a site unless . . . in the case of an electric or gas company which is required to file a long-range forecast pursuant to section sixty-nine I, that facility is consistent with the most recently approved long-range forecast for that company." The Siting Board notes that, pursuant to the Department's Order in D.T.E. 98-84A, Massachusetts electric companies, including NEP and WMECo, are now exempt from the requirements of G.L. c. 164, § 69I. Thus, the Siting Board need not consider whether the proposed transmission facilities are consistent with a recently approved long-range forecast.

information and reasonable statistical projection methods that include an adequate consideration of conservation and load management. G.L. c. 164, § 69J. To ensure that this standard has been met, the Siting Board requires that forecasts be reviewable, appropriate and reliable. NSTAR Electric, 14 DOMSB 233, at 252-253 (2005) ("NSTAR/Stoughton"); BECo/Hopkinton at 232 (1997). A forecast is reviewable if it contains enough information to allow a full understanding of the forecast method. A forecast is appropriate if the method used to produce the forecast is technically suitable to the size and nature of the company that produced it. A forecast is considered reliable if its data, assumptions and judgments provide a measure of confidence in what is most likely to occur. NSTAR/Stoughton at 253.

B. Understanding the Existing Transmission System in the Area

A transmission system map of the area is attached as Figure 1. Four substations (East Longmeadow, Shaker Road, Hampden, and Wilbraham Substations) serve load in the area of East Longmeadow, Hampden, and Wilbraham ("Three Towns Area"), south and east of Springfield. The four substations are served exclusively by the N-14 and the O-15S lines, which are 69 kV feeders from Palmer Substation.[3] The N-14 and O15S lines effectively form an open loop because both travel to Kibbe Road Switching Station; however, the N-14 line is typically operated in the "open" position (i.e., the circuit is not feeding electricity to the Kibbe Switching Station ) (Exh. NEP-1, at Figure 2.2-2). There is no utility-scale generation in the Three Towns Area.

Palmer Substation provides power to the N-14 and O-15S lines and also serves local load in the Palmer and Monson area. Palmer Substation receives power from two 115 kV lines: the X-176 line, which is nine miles long and connects to Ludlow Substation (which is operated by WMECo); and the W-175 line, which is 18 miles long and connects to Carpenter Hill Substation in Charlton. Palmer Substation is also linked to the O-15N line, a 69 kV line that connects at Ware to 66-mile-long 69-kV lines (lines E5 and F6) extending to Deerfield 3 Substation and Millbury 3 Substation (RR-EFSB-63). The O-15 line is known as O-15S line from Palmer Substation south, and as the O-15N line from Palmer Substation north.

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[3] According to NEP, the O15-S line requires rehabilitation because of deteriorating structures, should they remain in operation (Exh. NEP-1, at 3-3).

Ludlow Substation and Carpenter Hill Substation are connected by the 345 kV 301 line, which connects at Carpenter Hill to the 345 kV 302 line. The 302 line then travels further east to Millbury Substation 3, where it terminates. The N-14 and O-15S lines, which are the only sources of power serving load in the Three Towns Area, are crossed by, but do not interconnect with, WMECo's 345 kV 3419 line and the 115 kV 1515 line extending from Ludlow Substation south towards Connecticut (Exh. NEP-1, at Figure 2.2-1).

An unusual number of severe weather events has affected the Study Area in 2011 including: (1) a tornado on June 1, 2011; (2) a severe wind storm on July 26, 2011; (3) Tropical Storm Irene on August 28, 2011; (4) an extremely early substantial snow storm on October 29, 2011; and (5) a severe wind storm on December 27, 2011 (Exh. DM-PFT-Supp, Attachment DML (Supp) H – Revised). During each of these storms, the Company reported losing its transmission supply to one or more substations in the Study Area. The Company maintains that had the Project been in place during these weather events, the Company would not have experienced a loss of transmission supply because the West Hampden Substation would have been supplied by WMECo's 1515 line, which remained in service (Exhs. DML-PFT-Supp at 13-14; EFSB-PA-25 Supp at 2).[4]

C. Description of Company's Demonstration of Need

1. Regional/National Context for Company Reliability Planning

The Company described key aspects of the regional and national reliability-planning regime and the resulting standards and procedures applicable to the Company's transmission system (Exh. NEP-1, at 2-1 to 2-5). As a transmission provider, NEP must maintain its system consistent with the reliability standards and criteria developed by the Northeast Power Coordinating Council ("NPCC"), and Independent System Operator of New England ("ISO-NE") (id. at 2-2). These criteria are established under the purview of the North American Electric Reliability Council ("NERC"), which sets the standards for electric power transmission for all of North America. The criteria established by these entities require transmission

[4] The Company also noted that transmission lines are not designed to withstand tornadoes, and, therefore, it is not certain that the steel structures proposed for the Project would have sustained less damage than experienced by the O-15S line and N-14 line during the June 1, 2011 tornado (Exh. EFSB-PA-25 Supp at 4).

operators, such as NEP, to design, test, and operate their systems to maintain adequate voltage and thermal requirements for their transmission lines under various identified contingencies. The Company is generally required to plan for system upgrades that would bring the transmission system into compliance with the applicable criteria (id., at 2-2).

A single contingency, known as an "N-1" contingency, includes the outage of any 115 kV or 345 kV transmission system element (e.g., circuit, underground cable, breaker-failure, or 345/115 kV transformer). A single contingency also includes the simultaneous outage of double-circuit tower ("DCT") facilities, i.e., two transmission circuits sharing a common transmission line tower (id. at 2-3). After the first contingency has occurred, if a second non-related transmission or generation outage follows at least 30 minutes after the first contingency, the two contingencies together are known as an "N-1-1" contingency condition (see Exh. NEP-1, at 2-8). The reliability of the Bulk Power System portion of the transmission system must also be tested and be capable of serving load without violating any thermal or voltage standards under both N-1 and N-1-1 contingencies (see Exh. NEP-1, at 2-7 to 2-9).[5]

To test the system under contingencies, transmission planners study the thermal performance of the local transmission facilities and voltage levels on the system to determine whether the loss of certain transmission elements would either cause the remaining elements to become loaded beyond their temperature-based capability ratings or system voltages to fall below acceptable limits (see Exh. NEP-1, at 2-8).

2. Description of the Company's Reliability and Need Analysis

a. Load Forecasting Methodology

The Company's petition relied upon ISO-NE's 2010 Capacity, Energy, Loads, and Transmission ("CELT") Report for its peak-load forecast of New England as a whole, and on a Company-developed local power supply area forecast ("2010 PSA Forecast") to establish load conditions for the Study Area (Exh. NEP-1, at 2-6). The load-flow analyses, described below,

[5] The Bulk Power System is defined in NPCC's Document A-10, Classification of Bulk Power System Elements. The NPCC definition of Bulk Power System does not include NEP's lines O-15S and N-14, which are 69 kV lines. As a result, NPCC does not require that the transmission system be studied to consider the effects on the larger Bulk Power System of losing either of these lines as a first contingency event.

that rely on the 2010 PSA Forecast are based on the forecasted loads for 2011, 2014, and 2019 (id.). One week prior to the last day of evidentiary hearings, the Company submitted a new 2011 Forecast, dated March 31, 2011, which relied, in part, on the 2011 CELT Report (RR-EFSB-25). The Company used its 2011 PSA Forecast to re-run the transmission model with forecasted loads for 2012, 2015, and 2020 (id.).

The Company developed its demand forecast using econometric models which relate the historic peak load demand for electricity to historic levels of econometric/demographic activity, such as local employment, the number of households, and peak-day weather conditions (Exhs. NEP-1, at 2-7; EFSB-N-14). The models predict future load growth based on forecasts of employment and households, provided by Moody's Economy (Exh. EFSB-N-14). The Company's initial load forecast relied on summer peak load conditions with extreme weather that would occur with a frequency of once in 20 years ("95/5 weather") (Exh. NEP-1, at Appendix 2-6, at 3). Using 95/5 weather, the Company forecasted approximately 224 MW of load in 2020 for the Study Area (RR-EFSB-58). In response to a Siting Board record request, the Company adjusted its forecast to reflect 90/10 weather (that would occur with a frequency of once in ten years), resulting in a forecasted load of approximately 222 MW for the Study Area (id.). The results of the analysis using 90/10 weather indicate a reduction of forecasted peak load for the Palmer PSA of approximately two MW, which the Company reported had no effect on the scope of the Company's Project or any of the studied alternatives (id.).

In its 2010 PSA Forecast, the Company reflected demand-side management ("DSM") savings in Massachusetts associated with existing programs, as approved through 2012 only (Exh. EFSB-N-15). However, the Company acknowledged that it is likely that Massachusetts Electric Company ("MECo") would either add new programs or continue existing programs beyond 2012 to offset the impact of reductions in savings from programs whose product lifetimes expire, preventing a decline in cumulative DSM savings, and potentially increasing rather than decreasing estimated savings beyond 2012 (id.). In its 2011 PSA Forecast, the Company modified the way it reflected DSM savings in Massachusetts by including both the effects of historic DSM savings (embedded in the metered load data), and a DSM component that continues existing programs beyond 2012, thereby preventing a decline in forecasted DSM savings (RR-EFSB-25, at 19).

In both its 2010 and 2011 PSA Forecasts, the Company included 100 percent of the passive demand response associated with its energy efficiency programs, but no active demand response (RR-EFSB-25, at 10, 19).[6] According to the Company, there are no active demand response ("DR") program participants currently in place in the Study Area (Tr. 1, at 82-84). The Company surveyed large industrial customers served by the Shaker Road and East Longmeadow Substations to identify any potential larger net-metered generation projects or possible DR customer interest (Exh. NEP-1, at Appendix 3-2, at 3). The results indicated that one customer was contemplating a 1 MW solar photovoltaic system, but that there were no other reported project intentions (id.).

The Company reports that its forecast does not include savings from interruptible programs, direct load control, various non-wires alternatives, "smart grid" or other active programs, but that "forecast scenarios for these can be used to adjust the baseline forecasts . . ." (RR-EFSB-25, at 19).

b. The Company's Generation and Load Flow Assumptions

The Company used software developed by Siemens Power Technologies International, known as PSS/E, to simulate load flows on its transmission system over a ten-year forecast period (Exh. NEP-1, at 2-5). The Company updated the load flow model to reflect changes in the electrical configuration of its system, substation load requirements, and power supply statistics at the substation level (id.). The Company then modeled the thermal and voltage characteristics of each transmission element, including normal, long-term emergency, and short-term emergency ratings, and the resulting voltages at various locations within the system under single contingency and double contingency outage assumptions (id. at 2-6).

The Company modeled its system under stressed conditions by incorporating significant electric power transfers from eastern New England to western New England at peak system conditions (Exh. NEP-1, at 2-7). In particular, the Company modeled generation in western New England to be sufficiently unavailable so that 3,500 MW of power would flow from east to west,

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6 In general, active demand response systems are dispatchable in a manner similar to generation units, whereas passive demand response systems are continuously in effect and require no special action to be activated. GSRP at 31.

as served by available generation in eastern New England.[7] The Company also modeled the 360 MW Millennium generating facility in Charlton as off line to further stress the local transmission system (Exh. NEP-1, at 2-8).

According to the Company, ISO-NE did not comment as to whether Millennium should be assumed off line for the purposes of the Company's analysis (Exh. EFSB-N-52). The Company states that "[t]here are no formalized rules or guidance at this time that outline whether and under what circumstances a single large generating unit should be assumed off line for purposes of conducting a transmission planning study relative to the size of the study area" (id.). Nevertheless, the Company assumed Millennium out of service for purposes of modeling the transmission system from a reliability perspective because "the transmission system should not be designed such that a [particular] generator must run in order to meet reliability criteria" (Exh. EFSB-N-51). The Company maintains that a generator may experience an unplanned outage that keeps the unit off line for weeks or months for repair (id.). Accordingly, the Company stated that "dispatches in planning studies are constructed so as not to assume dependence on any single large generating unit or any other specific local generation" (Exh. EFSB-N-52).

c. Company's Voltage Criteria

Voltage standards are established to protect customer equipment (particularly motors) from voltage drops above or below acceptable levels (Exh. NEP-1, at 2-3). Low voltages can damage customer equipment (particularly motors), while collapsing voltages result in loss of load throughout the affected area (id.). Table 1, below, reflects NEP's voltage criteria:

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7 The existing east-to-west interface is currently 2,400 MW, but is expected to increase to 3,500 MW after construction of the proposed Interstate Reliability Project ("IRP") (Exh. EFSB-N-7). The IRP is a 75-mile 345 kV overhead transmission line that would run from Millbury, MA to North Smithfield, Rhode Island, and then to Connecticut where it would terminate in Lebanon, Connecticut.

**Table 1: NEP's Voltage Criteria**

| **NEP Allowable Voltage Ranges for Critical and Non-Critical Buses** (as a percentage of nominal voltage) | | |
|---|---|---|
| **Condition** | **Critical Buses** (345 kV, 230 kV, bulk power system buses and selected other buses) | **Non-Critical Buses** (115 kV buses outside of bulk power system and not otherwise selected) |
| Normal Operating | 98% to 105% | 95% to 105% |
| Post-Contingency and Automatic Actions | 95% to 105% | 90% to 105% |

Source: Exh. NEP-1, at 2-9

d. Results of the Company's Contingency Analysis

The Company's modeling indicates that two different combinations of transmission line losses (i.e., N-1-1 contingencies) could cause voltage violations (Exh. NEP-1, at 2-9 to 2-11). Depending on the load levels at the time of an N-1-1 contingency, and upon certain system operator actions taken after the first contingency in anticipation of the second contingency, customer loads served by certain substations in the Study Area could be interrupted as a result of the second contingency of an N-1-1 event (Exh. EFSB-N-50).

One adverse contingency combination is the loss of the 301/302 345 kV lines that run between Ludlow Substation, Carpenter Hill Substation, and Millbury 3 Substation, followed by the loss of the X-176 115 kV line that runs between the Ludlow Substation and the Palmer Substation (the "301/176 contingency").[8] According to the Company, this contingency combination potentially results in voltage violations as early as 2011, and voltage collapse beginning in 2015 resulting in 328 MW of lost customer load. By 2019, the Company forecasts this load loss would grow to approximately 350 MW (Exhs. EFSB-N-50; NEP-1, at 2-10).[9]

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[8] The loss of the 301 line and the 302 line is considered a single contingency because there is not an existing breaker between the two lines. As a result, a fault on either line results in the loss of both lines. The sequence of the pairs of contingencies does not matter in this instance.

[9] The 350 MW is combined load served from the following substations: Palmer, East Longmeadow, Hampden, Wilbraham, Shaker Road, East Webster, West Charlton, Little Rest Road and North Oxford (Exh. EFSB-N-50).

The second adverse contingency combination is the loss of the W-175 line that runs between Palmer Substation and Carpenter Hill Substation, followed by the loss of the X-176 line that runs between Palmer Substation and Ludlow Substation (the "175/176 contingency"). If these two lines are lost, all of the load served through Palmer would be served by a lower-voltage line from Ware Substation. According to the Company, this contingency combination would potentially result in voltage collapse in the East Longmeadow area (Shaker Road, East Longmeadow, Hampden, Wilbraham, and Palmer Substations) beginning in 2011. Such a voltage collapse would cause the interruption of service equal to approximately 131 MW in 2015, and 192 MW in 2019, as load is predicted to grow (Exhs. NEP-1, at Attachment 2.1; EFSB-N-50; RR-EFSB-57). Based on this information, the Company maintains that the consequences of either of the two contingencies, the 301/176 contingency or the 175/176 contingency, demonstrate a need for additional energy resources.

Although not described by the Company in its Petition, it should be noted that the loss of the X-176 line, as an N-1 event, would automatically cause the loss of loads served by the Thorndike Substation (16 MW), which is served exclusively by the X-176 line (RR-EFSB-62). Similarly, the loss of the W-175 line, as an N-1 event, would automatically cause the loss of loads served by the Little Rest Road Substation (16 MW) and West Charlton Substation (28 MW), which are served exclusively by the W-175 line (RR-EFSB-57). Thus, the two contingencies identified by the Company above result in the immediate interruption of loads as a result of an N-1 event, separate and apart from the additional resulting voltage issues. The Company's modeling for the 175/176 contingency indicates that there would be a potential voltage collapse in portions of the Palmer/East Longmeadow area in 2011 and in the entire area in the 2019 forecast period (Exh. NEP-1, at 2-11). Table 2, below, summarizes the results of the Company's voltage modeling for the 301/176 contingency.

**Table 2: NEP's Voltage Modeling for the 301/176 Contingency**

| 301/176 Post-Contingency (N-1-1) Voltage Levels | | | | |
|---|---|---|---|---|
| **Substation** | **Low Limit** | **2011 Level** | **2014 Level** | **2019 Level** |
| Shaker Road | 90% | 88% | 85% | ** |
| East Longmeadow | 90% | 88% | 85% | ** |
| Hampden | 90% | 90% | 88% | ** |
| Wilbraham | 90% | 89% | 86% | ** |
| Palmer (69 kV bus) | 90% | 91% | 89% | ** |
| Palmer (115 kV bus) | 90% | 91% | 90% | ** |
| Little Rest Road | 90% | 92% | 91% | ** |
| Carpenter Hill (115 kV bus) | 95% | 93% | 92% | ** |
| ** Indicates voltage collapse of the entire Palmer/E. Longmeadow area. | | | | |

Sources: Exhs. NEP-1, at 2-10; EFSB-N-61
Note: Under this contingency, the load at Thorndike Substation would be interrupted as a direct consequence of the identified contingency.

The Company reports no thermal or voltage violations for any transmission facility in the Study Area under N-0 or N-1 conditions for forecasted peak load conditions through 2019 (Exh. NEP-1, at 2-9).[10] According to the Company, the construction of the HCRP would allow the local transmission system to continue to operate within normal allowed thermal and voltage ratings under N-1-1 contingencies.

D. Analysis and Findings on Need

With regard to the forecast, the Company's 2011 PSA Forecast represents an improvement over its 2010 PSA Forecast concerning the inclusion of existing DSM programs going forward into the forecast period. However, the Siting Board is concerned that the Company is not also including savings from interruptible programs, direct load control, net-metered generation, smart grid, or other active programs. At a minimum, such savings

[10] N-0 represents the modeled condition of the transmission system with no unexpected generation or transmission contingencies.

should be reflected in the Company's forecast as a sensitivity case for inclusion in the Company's forecast. Where reasonable savings estimates can be calculated, they should be included as a reduction to the Company's peak load forecast for greater forecast accuracy.

The Company used both a 95/5 and 90/10 weather forecast to run its transmission model in this case. Neither the identified need nor the potential alternatives to meet that need were affected by the difference between 90/10 weather and 95/5 weather. We note that ISO-NE as well as transmission-owning utilities in Massachusetts place primary reliance on 90/10 weather when analyzing the potential need for additional transmission resources. We believe that the use of a 90/10 weather assumption is sufficiently conservative for transmission planning purposes, although it may be useful to also evaluate more extreme weather conditions in a sensitivity analysis.

Overall, the Company has provided sufficient information to permit a general understanding of its forecasting method and has provided evidence that it generally uses substantially accurate historical data, independent variables, and quantitative methods.

We are somewhat concerned over what the Company itself has identified as the absence of formalized rules or guidance at this time concerning substantial transmission planning assumptions to be used in modeling the system (Exh. EFSB-N-52). We note, as we did in GSRP, that ISO-NE is in the process of developing a new draft Planning Procedure No. 2, which should address many of the underlying planning assumptions to be used in formulating a need determination for substantial new transmission within ISO-NE. GSRP at 30, fn. 24. The Siting Board encourages all stakeholders to participate actively in this process, and hopes that such participation would lead to greater consensus regarding the numerous critical issues that affect transmission planning analysis. Id.

The Company's initial transmission modeling relied exclusively on the top of the expected range for the East-To-West Interface, assuming the construction of the Interstate Reliability Project ("IRP"), namely 3,500 MW. Upon further study, however, the Company was able to demonstrate that significantly lower East-To-West transfers (e.g., 2,000 MW and 0 MW) produce the same identified voltage violations, and that such voltage violations are therefore primarily driven by local issues (and not modeled transfers of power across a major interface) (Exh. EFSB-N-63). The results demonstrated that the need for additional energy resources was

not dependent solely upon the initially assumed maximum transfer level for the East-To-West Interface (id.).

Based on the foregoing, the Siting Board finds that the existing electric transmission system is inadequate under certain contingencies to reliably serve both existing and projected loads in the Study Area. Accordingly, the Siting Board finds that additional energy resources are needed for reliability of supply in the towns of Palmer, Monson, Hampden, Wilbraham, and East Longmeadow.

## IV. ALTERNATIVE APPROACH FOR MEETING IDENTIFIED NEED

### A. Standard of Review

G.L. c. 164, § 69J requires a project proponent to present alternatives to the proposed facility which may include: (a) other methods of transmitting or storing energy; (b) other sources of electrical power; or (c) a reduction of requirements through load management.[11] In implementing its statutory mandate, the Siting Board requires a petitioner to show that, on balance, its proposed project is superior to such alternative approaches in terms of cost, environmental impact, and ability to meet the identified need. In addition, the Siting Board requires a petitioner to consider reliability of supply as part of its showing that the proposed project is superior to alternative project approaches. NSTAR Electric Company, EFSB 10-2/D.P.U. 10-131/10-132, at 53 (2012) ("Lower SEMA"); New England Power Company, EFSB 09-1/D.P.U. 9-52/9-53, at 19, (March 14, 2011) ("Worcester Decision"); Western Massachusetts Electric Company, EFSB 08-2/D.P.U. 08-105/106, at 41 (September 28, 2010) ("GSRP").

### B. Identification of Project Approaches for Analysis

The Company considered eight approaches for supporting voltages in the Study Area including: (1) a 115 kV transmission line between the Palmer Substation and a new substation, interconnecting to the 1515 line (the Project); (2) a 115 kV transmission line from the Palmer to East Longmeadow and Shaker Road Substations, interconnecting to the 1515 line

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[11] G.L. c. 164, § 69J also requires an applicant to present "other site locations." This requirement is discussed in Section V.A, below.

(Alternative 2); (3) a 115 kV transmission line from the Palmer to East Longmeadow/Shaker Road Substations, interconnecting to Franconia Substation (Alternative 3); (4) the Carpenter Hill Autotransformer (Alternative 4); (5) a step-down substation in West Hamden (Alternative 5); (6) a static VAR compensator ("SVC") at Kibbe Road (Alternative 6); (7) an underground 115 kV line (Alternative 7); and (8) demand-side management (Alternative 8) (Exh. NEP-1, at 3-2 to 3-7).[12]

1. New 115 KV Line

Four of the Company's alternatives and one additional alternative suggested by Siting Board staff consist of construction of a new 115 kV line starting at the Palmer Substation (Exh. NEP-1, at 3-2 to 3-4). The Company stated that these five alternatives (the Project, Alternative 2, Alternative 3, Alternative 3A – the staff suggested alternative, described below – and Alternative 7) all meet the identified need (Exh. NEP-1, at 3-2 to 3-7; RR-EFSB-20).

a. The Project

The Project consists of a new, approximately ten-mile 115 kV transmission line between the Palmer Substation and the a new substation in western Hampden ("West Hampden Substation") interconnecting with WMECo's 115 kV 1515 line, along the existing 69 kV O-15S ROW (Exh. NEP-1, at 3-2).[13] The existing Hampden Substation would be retired (Exh. EFSB-G-6). In addition, NEP would refurbish the 4.4-mile portion of the existing O-15S line that is not removed as part of the Project. The cost of the Project is $35.25 million (Exh. EFSB-8).

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12 The Company also considered a No-build Alternative. However, as discussed in Section III. D, above, the Company determined that additional energy resources were needed to meet reliability standards in the Study Area. Therefore, the Company did not evaluate this option further (Exh. NEP-1, at 3-2).

13 If the Alternative Route is selected, this project alternative would consist of a 115 kV transmission line between the Palmer Substation and a new substation in western Wilbraham, along the existing N-14 69 kV ROW. The entire 14.4-mile existing O-15S line would then need to be refurbished (Exh. NEP-1, at 5-4).

b. Alternative 2

This Alternative consists of a new, approximately 14.4-mile 115 kV transmission line between the Palmer Substation and the East Longmeadow and Shaker Road Substations, along the existing O-15S ROW (Exh. NEP-1, at 3-3). The new West Hampden Substation interconnecting with WMECo's 1515 line would be constructed, and the existing Hampden Substation would be retired. The cost of Alternative 2 is approximately $45 million (id. at 3-8).

c. Alternative 3

This Alternative includes a new, approximately 14.4-mile 115 kV transmission line between the Palmer Substation and the East Longmeadow and Shaker Road Substations, along the existing O-15S ROW (Exh. NEP-1, at 3-4). Instead of a new West Hampden Substation connecting to the 1515 line, Alternative 3 includes a new 1.2-mile 115 kV line between the Franconia Substation and the Shaker Road Substation on a new ROW (id.). The existing Hampden Substation would not be retired and would require a new 115/13 kV transformer (id.). The cost of Alternative 3 is approximately $41.4 million (id. at 3-8).

d. Alternative 3A

During the course of the proceeding, Staff requested a revision to Alternative 3, known as Alternative 3A. Specifically, unlike Alternative 3, Alternative 3A does not require the construction of the 14.4 miles of 115 kV line from western Hampden to the East Longmeadow Substation (Exh. EFSB-N-56; RR-EFSB-19; Tr. 2, at 233-234). Alternative 3A includes: the construction of a new approximately 1.35-mile 115 kV line between WMECo's Franconia Substation and the Company's Shaker Road Substation; three new 115/69 kV transformers at the Shaker Road Substation; two 115 kV circuit breakers at the Franconia Substation, one 115 kV, 14.4 MVAR capacitor bank at both the Franconia and Scitico Substations; a 115 kV capacitor bank at Carpenter Hill Substation; one 13 kV capacitor bank at both Shaker Road Substation and Hampden Substation; and refurbishment of the 14.4 mile O-15S line (Exh. EFSB-8; RR-EFSB-19). The cost of Alternative 3A is estimated to be $37.33 million (Exh. EFSB-8).

e. Underground Line (Alternative 7)

Alternative 7 has the same components as the Project, with the exception that the 115 kV line would be located underground (Exh. NEP-1, at 3-7). The Company asserted that construction of the underground line along the O-15S ROW would not be feasible due to property rights issues along the existing ROW and that obtaining such rights would be costly and add significant time to the Project (Exh. NEP-1, at App. 3-1, at 2). Further, the presence of wetlands, and the necessary construction of a new access road would add to the environmental impacts (id.). NEP therefore based its underground alternative on the use of public roads and developed a 14.2-mile conceptual route (id. at 3). A study-grade estimate of approximately $99.8 million was developed, which did not include the cost of the substation, land acquisition or easement costs, and associated overhead line work or dead end structures (id. at 7).

2. Carpenter Hill Auto Transformer (Alternative 4)

Alternative 4 consists of the installation of a second 345/115 kV autotransformer and three new circuit breakers at the existing Carpenter Hill Substation in Charlton; and the refurbishment of the 14.4-mile O-15S line (Exh. NEP-1, at 3-5).[14] The installation would require the addition of a new 345 kV bay and the subsequent expansion of the existing fence line (id.). As initially presented in the Company's project alternative analysis, Alternative 4 would address the 301/176 contingency, but would not address the 175/176 contingency (Exh. NEP-1, at 3-5). However, as discussed below, Alternative 4 could potentially be a viable option were the Company able to address the 175/176 contingency by means of dropping load in a controlled manner.

a. Load Shedding

Both NERC and ISO-NE reliability standards allow certain loads to be temporarily dropped in response to certain N-1-1 scenarios (Exh. EFSB-N-48). According to the Company, NERC allows controlled load shedding after the second contingency (id.). ISO-NE is in the process of developing draft guidelines on load interruption – the ISO-NE's 2010 proposed

[14] Alternative 4 would provide an operational benefit to the Millennium power plant, since the output restriction currently in place when the Carpenter Hill autotransformer is out of service would then be unnecessary (Exh. EFSB-PA-37).

Transmission System Planning Load Interruption Guidelines ("draft ISO Guidelines") (id.). Similarly, the Company's Transmission Planning Guide also permits customer load to be interrupted in response to N-1-1 contingencies (Exh. NEP-1, at Appendix 2-4, Section 4.2.4; Tr. 5, at 606).

The draft ISO Guidelines propose an ISO-NE policy for when it could be acceptable to rely on planned or controlled load interruption to address an N-1-1 contingency. According to the draft ISO Guidelines, the acceptability of interrupting load depends on "the amount of load at risk, the duration of the interruptions, the frequency of interruptions, the customers affected and the impacts of geography" (Exh. EFSB-N-48(a) at 4).

The draft ISO Guidelines state that load interruption for N-1-1 contingencies is allowed from 0-100 MW, and is "potentially allowable" from 100-300 MW (Exh. EFSB-N-48(a) at 7). With interruptions up to 100 MW, the draft ISO Guidelines state that transmission solutions "would generally not be undertaken and the cost of [the] transmission solution would not generally be approved as a regional cost" (id.). By contrast, transmission solutions may be approved as a regional cost for situations involving the loss of between 100 and 300 MW, depending on the level of the load interruptions, the characteristics of the load being interrupted, restoration time, hours of exposure and the cost of mitigation (id.). According to the draft ISO Guidelines, loads exceeding 300 MW should not be interrupted as a result of N-1-1 contingencies.

b. Alternative 4 with Load Shedding

As noted above, the Company explained initially that Alternative 4 would meet the 301/176 contingency but not the 175/176 contingency, as voltage collapse would result from the loss of the 175/176 lines (Exhs. NEP-1, at 3-5, 3-6; EFSB-N-57).[15] Specifically, under this

[15] With regard to Alternative 4, the Carpenter Hill Substation transformer, the Company initially reported in the Petition that based on current reliability standards it would only have to meet the 301/176 contingency, not the 175/176 contingency (Exh. NEP-1, at 3-5 to 3-6). In the course of reviewing the requirements, NEP determined that under the existing NPCC standards the 175/176 lines do meet the definition of a Bulk Power system element; therefore, the system must be designed to meet the second N-1-1 contingency, and Alternative 4 would not meet the identified need (Exh. EFSB-N-2 (S); Tr. 6, at 724-725).

contingency, the remaining 69 kV supply from the Ware Substation would be unable to support the entire 69 kV load served from the Palmer Substation (Exh. EFSB-PA-30). The Company asserted that Alternative 4 would not address the identified voltage violations, and therefore it did not provide any further substantive analysis of the costs and environmental impacts of Alternative 4.

However, following further analysis at the request of Staff, the Company determined that Alternative 4 could prevent voltage violations by "posturing" the transmission system to drop loads if the solution relied, in part, on the interruption of customer loads in the Study Area to solve the 175/176 contingency (RR-EFSB-57; Exh. DML-PFT-Supp at 6).[16] The evidentiary record in the case indicated that such an approach is consistent with draft ISO-NE guidelines for the interruption of customer loads (Exh. EFSB-N-48). Given the conclusions identified by the additional analysis, Alternative 4 then underwent an in-depth analysis of environmental impacts, costs, and reliability.

As described above in Section I.B, the Company supplemented the record related to the discussion of Alternative 4. Specifically, the Company requested that it supplement the record after Staff concluded in the first Issues Memorandum that Alternative 4, in conjunction with controlled load shedding, could meet the reliability needs of the area. The Company maintained in the supplemental evidence that while Alternative 4 addresses the 301/176 and 175/176 contingencies, it does not safely address the reliability need because it might lead to a voltage collapse on two 69 kV lines (E-5/F-6 lines) (Exh. DML-PFT-Supp at 6). Specifically, in order to rely on the interruption of customer load, operator action would need to be taken to open the 69 kV O-15N line at the Ware Substation (id.). The Company's updated load flow simulations demonstrated that, under 2019 peak load conditions, with the O-15N line open, a contingency on the E-5/F-6 69 kV transmission lines could result in voltage collapse at substations served by the

16 Following the loss of one 115 kV line, the Company can "posture" the system to drop load in the event of a second contingency by opening switches between an area served by the 69 kV line from Ware; this posturing is also known as post-first-contingency switching.

E-5 and F-6 lines (id.).[17] The Company asserted that this additional evidence indicates that Alternative 4 with load shedding is no longer a viable alternative, as it does not solve the modeled second contingency voltage violations.

3. Step-Down Substation (Alternative 5/5A)

Alternative 5 includes the installation of a new substation (that would be constructed at the same location as the proposed West Hampden Substation) consisting of a 115-to-69 kV autotransformer that would connect WMECo's 115 kV system with NEP's 69 kV system via a 750-foot loop line (Exh. NEP-1, at 3-6). With this alternative, the entire 14.4 miles of O-15S 69 kV line would be refurbished for continued use at 69 kV (id.). The existing Hampden Substation on Allen Road would not be retired (Exh. EFSB-PA-32).

In its Petition, NEP rejected Alternative 5 as a viable alternative because WMECo reportedly informed the Company that WMECo's area transmission system could not support NEP's load following the loss of WMECo's 1515N 115 kV line without incurring serious voltage violations (Exhs. NEP-1, at 3-6; EFSB-PA-24; Tr. 2, at 182). However, in response to a Staff information request to re-examine the accuracy of WMECo's concern in light of the recently approved Greater Springfield Reliability Project, the Company asserted that Alternative 5 could address the Company's identified need with certain upgrades to the WMECo system (Exhs. EFSB-PA-24; EFSB-PA-50). To address voltage violations on WMECo's system under certain contingencies, WMECo would need to construct one of the following options on its system: (1) install one 115 kV 14.4 MVAR capacitor bank at both the WMECo Franconia and Scitico Substations, or (2) install one 115 kV 14.4 MVAR capacitor bank at the Franconia Substation and pursue modifications at the WMECo Ludlow Substation (Exh. EFSB-PA-50). With the addition of these additional WMECo elements, Alternative 5 became Alternative 5A.

The Company estimated that installing these upgrades to the WMECo system would cost approximately $8 million for either one of WMECo's two options (Exhs. EFSB-8; EFSB-PA-

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17 The E-5 and F-6 lines run between the Millbury and Deerfield Substations, where they share double-circuit towers for the entire length, and therefore would be a treated as a single design contingency (Tr. 6, at 739-740). Voltage collapse would occur at the following substations: Meadow Street, Lashaway, Ware, Belchertown, and Shutesbury (Exh. DML-PFT-Supp at 6, 7).

50).[18] WMECo explained that it, rather than NEP, would be responsible for paying for the upgrades at the WMECo substations (Tr. 3, at 165). WMECo asserted that it would prefer the Project over Alternative 5A, but that it would install such upgrades if Alternative 5A were selected as the preferred alternative (Tr. 2, at 226-227).

The cost of Alternative 5A is estimated to be $36.2 million (Exh. EFSB-8). The Company stated that Alternative 5A, as revised to include the upgrades to WMECo's system, meets the identified need (Exh. EFSB-PA-50; Tr.5, at 594-597).

4. Kibbe Road Static VAR Compensator (Alternative 6)

Alternative 6 consists of the construction of a 90 MVAR SVC, located in the vicinity of the existing Kibbe Road switch structures in East Longmeadow; and the refurbishment of the 14.4 mile O-15S line (Exh. NEP-1, at 3-6; Tr. 4, at 544). An SVC is a shunt-connected, static VAR generator or absorber whose output adjusts to exchange capacitive or inductive current so as to maintain adequate bus voltages in an electrical power system (Exh. NEP-1, at 3-6). The 90 MVAR SVC is estimated to require a 200 feet by 200 feet area (Tr. 4, at 497). The location identified by the Company as the potential location for the SVC is not owned by the Company, nor is there any available Company-owned land in the vicinity (RR-EFSB-1; Tr. 4, at 499).

The cost of Alternative 6 is $46.46 million, of which approximately $23 million is for the installation of the SVC, $5.65 million is for refurbishment of the O-15S line, and approximately $15 million is for retension, reconductoring, and upgrades from area 69 kV lines and substations (Exh. EFSB-8).

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18 In order to formulate the $8 million estimates, the Companies indicated that it based the estimates on recent installations of two capacitor bank projects (Exh. EFSB-PA-50; RR-EFSB-10). Both projects were completed in 2006 and consisted of two 14.4 MVAR capacitor banks, two circuit switchers, two current limiting reactors and one circuit breaker, which is similar to the proposed capacitor bank installations (RR-EFSB-10). Both projects also included substation yard expansion and associated site work (id.). The cost of the Woodland Substation project was $2.1 million and the Pleasant Substation was $2.6 million (id.). The Company calculated that using a 3.5 percent escalation rate for five years and a 30 percent contingency allowance, the current costs for Woodland and Pleasant Substations would be $3.2 million and $4.0 million, respectively (id.).

The Company maintained that Alternative 6 would not address the identified need because there would be low voltage impacts at the Carpenter Hill, East Webster, and West Charlton Substations (Exh. NEP-1, at 3-6; Tr. 1, at 55). Further, the Company initially asserted that increasing the size of the SVC above 90 MVAR was not a viable option because it would result in high voltage violations in the Kibbe Road area and the Carpenter Hill and East Webster Substations (Exhs. EFSB-PA-21; EFSB-PA-22; Tr. 1, at 57). Although NEP asserted that Alternative 6 could not meet the identified need, there is the possibility of using a larger SVC, as well as other upgrades or enhancements to other facilities. Subsequently, the Company analyzed the ability of a 150 MVAR SVC to meet the identified need, and concluded that even with the increase in size, Alternative 6 would be inadequate (RR-EFSB-8; Exh. EFSB-PA-34).

The nearest residence to the potential site is approximately 360 feet from the proposed SVC, and modeled nighttime noise increases at this residence is calculated to be 13 A-weighted decibels ("dBA"), without additional noise mitigation (RR-EFSB-41; Tr. 5, at 561). Further, there is one residence within 100 feet of the proposed property line of the Kibbe Road site, and seven residences within 300 feet (RR-EFSB-46). Based on the location and size of the Kibbe Road SVC, the Company maintains that there would be significant noise impacts from the operation of the SVC (RR-EFSB-41; Tr. 5, at 561-563). According to the Company, the noise impact would not comply with the Massachusetts Department of Environmental Protection ("MassDEP") Noise Pollution Policy limit of 10 dBA increase over ambient levels (RR-EFSB-41).

5. Demand Side Management

The Company evaluated the potential for DSM measures, including demand response, energy efficiency and distributed generation, to reduce demand sufficiently at substations in the area to address the identified need (Exh. NG-1, App 3-2, at 1). The Company stated that the peak load reductions required to eliminate N-1-1 voltage violations at Shaker Road and East Longmeadow for 2014 are 36 and 28 percent, respectively, and for 2019 are 48 and 51 percent, respectively (Exh. EFSB-PA-44).[19] The Company asserted that these levels of load reduction are

[19] The Company explained that it chose the two substations to model DSM since they are the furthest from the supply at Palmer Substation and are near the end of the radial line,

not available through existing and planned energy efficiency programs, distributed generation, or from customers that could provide demand response (Exhs. EFSB-PA-44; EFSB-PA-46; NG-1, App 3-2, at 1-2). According to the Company, the average peak load savings that it can reasonably expect to achieve from a targeted DSM program is in the range of five percent of peak load (RR-EFSB-5; Tr. 1, at 91). The Company concluded that even if the rate of peak load reduction were doubled and extended into 2014, the voltage violations at the Shaker Road and Longmeadow Substations would still occur (Exh. EFSB-PA-39). Therefore, violations of the two N-1-1 contingencies would continue to occur even with additional DSM (Tr. 1, at 87).

The Company analyzed DSM as a stand-alone ("targeted DSM") solution (Exh. NEP-1, at 3-7 and App. 3-2). Upon request by Staff, the Company also analyzed DSM in combination with the transmission alternatives (Exhs. EFSB-PA-43; EFSB-PA-44; EFSB-PA-45; EFSB-PA-46). According to NEP, supplementing a wires-based solution with a targeted DSM program only makes sense if the target DSM program could either: (1) reduce the scope of an effective wires solution; or (2) enhance a wires solution that is not fully capable of meeting the identified need (Exh. EFSB-PA-25).

The Company asserted that using DSM in conjunction with Alternative 4 would not result in meeting the identified need for the 176/175 contingency because there would be insufficient DSM available (Tr. 1, at 95). With regard to DSM and Alternative 6, the Company modeled a decrease in 50 percent of the East Longmeadow load (14.3 MW), and concluded that the 2019 load flow analysis indicated that the 301/176 contingency would still show voltage violations (Exh. EFSB-PA-25; Tr. 1, at 96). Finally, WMECo testified that it did not consider any DSM or any other non-traditional alternatives for the area associated with Alternative 5 (Tr. 2, at 163).

The Company surveyed industrial customers in the Study Area about their future plans for distributed generation. One customer is considering a one MW photovoltaic array, but there are no final plans, and there were no other indications of pending distributed generation interest

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which would have the higher impedance and therefore a greater voltage drop (Tr. 1, at 89). The Company suggested that it is more effective to install DSM where it can provide the greatest amount of voltage increase (id.).

(Exh. NG-1, App. 3-2, at 1). The Company concluded that distributed generation was insufficient to meet the identified need (Exh. EFSB-PA-45).

6. Alternative Refinement and Analysis

Based on the Company's need analysis, the Company initially stated in its Petition that Alternatives 1, 2, 3 and 4 would go forward for a comparative analysis of reliability, cost and environmental impacts and based the project alternative analysis on these four alternatives. The Company eliminated Alternative 5 since it determined that the WMECo area transmission system could not support NEP's load following the loss of WMECo's 1515 line without voltage violations. The Company eliminated Alternative 6 due to some voltage problems resulting from the 301/176 contingency. Alternative 7, the underground alternative, was not analyzed further due to high costs. There were no variations presented by the Company to any of the above Alternatives. In addition, based on the bulk electric power system designation, the Company asserted that Alternative 4 could meet only the 301/176 contingency, and therefore NEP did not initially provide substantive physical and environmental details on Alternative 4.

Given the above, the bulk of the initial project approach analysis presented in the Petition consisted of three alternatives using basically the same approach – at least ten miles of a new 115 kV transmission line, all in the same location – and the new Carpenter Hill transformer, which the Company concluded did not meet the identified need. Therefore, the initial comparative analysis presented by the Company was limited. As discussed above, the project approach analysis was expanded throughout the course of the proceeding, at the initiative of Staff. The Siting Board identifies the following three principal issues with the Company's approach.

First, as discussed in Section IV.B.2.a above, load shedding is a viable and allowable action within certain parameters, to address voltage and thermal violations. Both NEP and WMECo accept load shedding as an element of their proposed Project. For example, the Company's proposal in this case allows approximately 60 MW of load to be interrupted under the 175/176 contingency. Were the Company's proposed R-170 line to go out of service after it is constructed, together with the loss of WMECo's 1515N line, the Company testified that it would have to interrupt approximately 42 MW of load served by the East Longmeadow, Shaker Road and Hampden Substation. Further, as discussed above, the draft ISO Guidelines set forth

ISO-NE's proposed policy of when it is acceptable to rely on planned or controlled load interruption to address an N-1-1 contingency. However, in evaluating project alternatives, the Company failed to explore the full range of options contemplated by the draft ISO Guidelines in analyzing potential project approaches that could possibly have lower costs and fewer environmental impacts.

Second, the Company initially rejected Alternative 5 as a viable alternative based on its conclusion that the WMECo area transmission system would experience voltage violations if this alternative were installed and WMECo lost its 1515N line. NEP did not attempt to develop a solution or question whether upgrades could be implemented on WMECo's system in order to generate a viable project for Alternative 5. In addition, WMECo, a co-petitioner in this case, did not put forth suggested upgrades to its system required by Alternative 5 to enable its full evaluation. Therefore, NEP and WMECo overlooked analyzing potential project approaches that possibly could have yielded lower costs and fewer environmental impacts. The Siting Board reminds the Company, as well as future applicants, that given the integrated nature of the transmission system in Massachusetts and the region, a Company should not dismiss an alternative because the alternative may also require additional transmission investment on another utility's system.

Finally, in light of the mandate in the Green Communities Act that "electric and gas resource needs shall first be met through all available energy efficiency and demand reduction resources that are cost effectives or less expensive than supply," and the focus on non-transmission alternatives, the practice by NEP of looking at DSM only as a stand-alone alternative is inadequate. See Green Communities Act at Section 21(a). The Siting Board notes that this issue is not confined to the Company, as other utilities have also been hesitant to expand their view of DSM combined with other project alternatives.

The Siting Board recognizes that electric distribution companies are required to prepare energy efficiency plans every three years for approval by the Department, and that the plan submitted by MECo and Nantucket Electric was approved by the Department on January 28, 2010. Here, in addition to the approved plan, the Company analyzed the availability of targeted DSM as a project approach. However, the nature of DSM as a potential complement to a wires approach must be recognized as an important component of a project approach analysis in Siting

Board reviews of transmission lines. Therefore, the Company, as well as future applicants, are reminded that when developing and analyzing project alternatives, DSM should be considered as both a stand-alone alternative and in conjunction with other identified alternatives.

Of the ten alternatives (eight original plus Alternative 3A and Alternative 5A), the Project, Alternative 2, Alternative 3, Alternative 3A, Alternative 5A, and Alternative 7 meet the identified need. The proposed Project, Alternative 2, Alternative 3, Alternative 3A and Alternative 7 all consist of replacing the existing 69 kV O-15S line with a new 115 kV line, the R-170. The Project, Alternative 2, Alternative 7, and Alternative 5A would require the construction of a new substation, while Alternative 3 would rely on a new 1.2-mile 115 kV line from WMECo's Franconia Substation to the Shaker Road Substation instead of a new substation, as well as an extension of the R-170 line to East Longmeadow. The five new 115 kV transmission line alternatives all would meet the identified need using the same type of source, and therefore are all comparable with regard to reliability. The majority of the Project, Alternative 2, and Alternative 3 are basically the same, only varying in terms of the whether the final 4.4 miles are either new 115 kV or refurbished lines, and whether to construct a new substation or a new 1.2-mile 115 kV line on a new ROW. Therefore, the environmental impacts are similar. However, the cost of the Project is less than the two overhead alternatives. Alternative 7, the underground transmission line, would need to be constructed along public ways, with attendant traffic impacts. Further, the cost of Alternative 7 is at least three times the cost of the Project, with the same reliability. Given that Alternative 2 and Alternative 3 are similar to the Project, have no environmental or reliability advantages over the Project, and are more costly, the Project is the preferred 115 kV transmission line alternative.

Alternative 3A is comparable in cost to the Project, varies in configuration from the Project in that it does not require the construction of the new 115 kV line or a new substation, and also addresses the voltage violations. Similarly, Alternative 5A is also comparable in cost to the Project and addresses the voltage violations.

Finally, the installation of a new Carpenter Hill transformer (Alternative 4), installation of the Kibbe Road SVC (Alternative 6), and DSM (Alternative 8) do not meet the identified need and are not analyzed further.

Therefore, in the following sections, the Siting Board compares the Project, Alternative 3A and Alternative 5A in depth as the most feasible alternatives with respect to reliability, environmental impacts, and cost.

C. Reliability

Alternative 1 (the Project), Alternative 3A, and Alternative 5A each meets the reliability criteria applied to the study of the transmission system over the ten-year forecast period (Exhs. NEP-1, at 3-2 to 3-4; EFSB-PA-50). The Project, Alternative 3A and Alternative 5A provide system protection without loss of customer load in the 301/176 contingency. In the case of the 175/176 contingency, the Project, Alternative 3A and Alternative 5A solve the voltage violations that occur in the Study Area under the existing 69 kV system (RR-EFSB-57). However, the Project, Alternative 3A and Alternative 5A require approximately 60 MW of load interruption under the 175/176 contingency (RR-EFSB-62). Even after construction of a new 115 kV line into the Study Area, when the X-176 line contingency occurs, the load served out of the Thorndike Substation is interrupted, and when the W-175 line contingency occurs, service at the Little Rest Road and West Charlton Substations is interrupted.[20] The Company stated that it has no plans to address this load loss because the amount of load that would be interrupted is not a violation of the Company's transmission planning standards (id.). None of the alternatives offers a solution to avoid interrupting load completely in the event that the W-175 or X-176 line goes out of service.

In addition, were the Company's proposed R-170 line to go out of service, together with the loss of WMECo's 1515 line, approximately 66 MW of load served by the East Longmeadow, Shaker Road and West Hampden Substations would be dropped (RR-EFSB-56; RR-EFSB-57). Subsequently, the Company identified a design modification to the planned configuration of the

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20 It should be noted that none of the relevant load flow diagrams produced by the Company accurately represented the loss of these three substations, but instead showed that the three substations continued to function within the Company's acceptable voltage range (see Tr. 6, at 762-765; Exh. EFSB-N-53). According to the Company's witness, Mr. Latulipe, the Company "did not take those substations out when [it] was running the simulation because it just makes the simulation a little harder to run" (Tr. 6, at 763). In the future, if the Company has made simplifying assumptions, then it should clearly note the inaccuracies that appear in the diagram.

West Hampden Substation that would prevent the loss of load at the West Hampden Substation, thereby limiting interruption of load to the East Longmeadow and Shaker Road Substations (RR-EFSB-57). The Company stated that it could restore this 42 MW of interrupted load in approximately five minutes by remote operator action (RR-EFSB-57). Therefore, the net effect of the Project is to reduce, but not eliminate, loss of load in the event that the 175/176 contingency were to occur.[21] The Project would reduce the amount of interrupted load from 192 MW to 60 MW in 2019 (RR-EFSB-57). In addition, under the N-1-1 contingency where the R-170 line itself were to go out of service together with the loss of WMECo's 1515N line, approximately 42 MW of load would be interrupted (id.).

The Company asserts that its Project is more reliable than Alternatives 3A or 5A because the use of a 115 kV line provides better voltage performance than a 69 kV line, due to its lower impedance (Exh. EFSB-PA-50). Importantly, the Project provides 115 kV from two sources, the 115 kV from Palmer Substation and the new interconnection with WMECo's 1515 line (Exhs. NEP-1, at Fig. 3.2.2-1; DML-PFT (Supp) at 15). Further, the Company asserts that a 115 kV line has a higher thermal rating than a 69 kV line, and is easier to expand and integrate with the system (Exh. EFSB-PA-50).

D. Environmental

The Company asserts that its Project has less environmental impact than Alternative 5A since there are slightly more temporary wetland impacts associated with refurbishment than with new construction (Exh. DML-PFT (Supp), Att. 1; Tr. 5, at 571). The Company points to its typical practice of using swamp mats for every structure located in a wetland to be replaced as part of a refurbishment (Tr. 5, at 571). For the new transmission line, the Company asserts it can remove the existing structures and/or avoid locating the monopoles in wetlands; therefore, each structure now located in a wetland may not need a swamp mat (id. at 570, 573).

The existing O-15S line consists of wooden pole structures approximately 45 to 50 feet tall (Tr. 5, at 575). The Project would consist of new steel monopoles approximately 80 feet high, and the refurbishment would consist of using new wood monopoles at the existing height

21 As noted above, Alternatives 3A and 5A do not include the proposed R-170 line. Accordingly, the loss of the proposed R-170 line is not relevant to these two alternatives.

or approximately five to ten feet higher (id. at 575-576). The approximate 30-foot height increase with the 115 kV steel monopoles would impose additional visual impacts on area residents, 102 of whom live within 300 feet of the edge of the ROW (Exh. NEP-2, at 5-12 to 5-13).[22]

The West Hampden Substation would be situated in a protected habitat area and would require five acres of clearing within a large parcel with treed buffer (Exh. NEP-1, at 5-4). The Alternative 5A step-down substation would be located in the same area but would be approximately one-half acre larger than the West Hampden Substation, as the step-down substation would require three transformers and the West Hampden Substation would have two transformers (Exh. EFSB-PA-32; Tr. 6, at 713). The increase in size would be to the north, requiring incorporation of additional mitigation into the plans being prepared with the National Heritage and Endangered Species Program ("NHESP") (Tr. 6, at 715). Both the West Hampden and Alternative 5A step-down substation would be situated outside of wetlands, the 100-foot buffer zone, and the 200-foot Riverfront Area, and the location of the driveway would avoid new wetland and stream crossing (Exh. EFSB-PA-32; Tr. 6, at 718).

For Alternative 3A, the 1.35-mile 115 kV line from the Franconia Substation to the Shaker Hill Substation would be situated in close proximity to a new housing development to the east and an elder care facility to the west (Exh. NEP-1, at 3-10, 3-11; RR-EFSB-48). Specifically, the centerline of the new 115 kV line would be approximately 58 feet to the nearest residential structure and 58 feet to the driveway of the elder care facility (RR-EFSB-48). The new 115 kV line would cross four wetlands, and have direct wetland impacts, although there are no wetlands, streams or vernal pools in the vicinity of the Shaker Road Substation (Exh. NEP-1, at 3-10; Tr. 4, at 513, 533). The total newly disturbed area would be 11.6 acres (Exh. NEP-1, at 3-10). The Shaker Road Substation would be expanded outside of its existing fence line, for approximately 250 feet, in an industrial area (RR-EFSB-18). The Franconia Substation fence line would also have to be expanded to include additional breakers (RR-EFSB-51). In addition,

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22 There are nine residences within 25 feet, 21 residences within 50 feet, and 41 residences within 100 feet of the edge of the ROW (Exh. EFSB-LU-8).

the Company indicated that the property rights for this new ROW could be costly and difficult to obtain (Exh. NEP-1, at 3-11).

E. Cost

The Project is estimated to cost $35.25 million, compared to an estimated cost of $37.3 million for Alternative 3A and $36.2 million for Alternative 5A.[23] Both WMECo substation upgrade options to Alternative 5A are estimated to cost $8 million based on a -50/+200 percent estimate prepared by WMECo (Exh. EFSB-PA-50). However, similar equipment installations in the region were identified with costs at least 50 percent less than the WMECo estimates (Exh. EFSB-5; RR-EFSB-10).

As noted above, the O-15S line requires refurbishment in those sections that are not being replaced by the new 115 kV line. The Project includes the refurbishment of 4.4 miles of the O-15S line that is not converted to 115 kV, which runs from the new West Hampden Substation to the East Longmeadow and Shaker Road Substations, at a total cost of $1.25 million (Exhs. NEP-1, at 3-3; EFSB-8). Alternative 3A and 5A include the refurbishment of the entire 14.4-mile O-15S 69 kV line from the Palmer Substation to the East Longmeadow Substation and the Shaker Road Substation, at a total cost of $5.65 million (Exhs. NEP-1, Att 3-2; EFSB-8).

Based on ISO-NE cost allocation principles, Staff calculated that Massachusetts customers would be responsible for approximately $18.4 million for the Project, $22 million for Alternative 3A, and $20.7 million for Alternative 5A (see Exh. EFSB-8; RR-EFSB-61).[24]

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23 Based on the 2011 Forecast, Alternative 5 showed low voltage violations in 2016, where under the 2010 Forecast, voltage violations did not appear during the forecast period (Tr. 6, at 374-378). To address these forecasted voltage violations, the Company modeled the addition of capacitors to Carpenter Hill and Hampden Substations (Exh. EFSB-PA-50(S)). The Company revised its estimate from $33.2 million to $36.2 million because more capacitors are required based on the 2011 Forecast (Exh. EFSB-8).

24 The calculation is based on Company estimates of the cost of each alternative, divided into pooled transmission facility ("PTF") costs and non-PTF costs (see Exh. EFSB-8; RR-EFSB-61). Massachusetts customers typically pay about 46 percent of the costs of pooled transmission facilities. NEP stated that load share ratio for Massachusetts under NEP's tariff is 72 percent (RR-EFSB-61). Staff added together 46 percent of the PTF amount and 72 percent of the non-PTF amount, to arrive at the cost for Massachusetts customers.

**Table 3: Summary of the Feasible Project Alternatives**

| DESCRIPTION | THE COMPANY'S PROJECT | ALT. 3A | ALT. 5A |
|---|---|---|---|
| Major Facility Components | New 10-mile 115 kV line in existing ROW; new West Hampden Sub connecting to 1515 line; retire existing Hampden Sub | New 1.35-mile 115 kV line in new ROW or underground; new transformers at Shaker Road; new capacitor banks at Franconia, Scitico, Carpenter Hill, Shaker Road and Hampden Subs | New West Hampden step-down substation with 115 kV/69 kV autotransformer; either one or two new capacitor banks at Franconia and/or Scitico Subs |
| General Layout for the existing O-15S right-of-way | New 10-mile 115 kV line; 21 fewer poles than with 69 kV line (originally 177, now 156); 4.4 miles 69 kV refurbished, replace 22 poles and convert 13 poles to present standards | 14.4 miles 69 kV refurbished, replace 123 poles and convert 46 poles to present standards | 14.4 miles 69 kV refurbished, replace 123 poles and convert 46 poles to present standards |
| **ENVIRONMENTAL** | | | |
| Visual | Current poles approx. average height is 38 ft.; new poles approx. average height is 71 ft. (27 poles over 80 ft.); 48 homes now have direct views of poles, additional 16 would have direct views of the 115 kV poles after clearing, others would see above the existing treed buffer; West Hampden Sub on a large parcel, with a large treed buffer in all directions | New 1.35 mile overhead line with new ROW, possible overland route very close to large subdivision and elder care facility; O-15S poles stay the same height or 5 to 10 feet taller; no new substation; expansion of Shaker Road Substation outside of fence line, approx. 250 ft. in industrial area | O-15S poles remain the same height or 5 to 10 feet taller; West Hampden Sub on a large parcel, with a large treed buffer in all directions |
| Noise | Transformer at West Hampden Sub would increase ambient sound by 2 dBA at nearest residence 825 ft away; construction noise along route | 5 dBA increase at nearest residence (w/3 transformers) from Shaker Road Sub; shorter construction schedule for refurbishment vs. new line, less construction noise; construction noise close to residents for 1.35 mile route | Transformer would increase ambient sound by 2 dBA at nearest residence to West Hampden Sub; shorter construction schedule for refurbishment vs. new line, less construction noise along route |
| Wetlands | Would not have to use swamp mats at all existing pole locations in wetlands, have flexibility in placing new poles outside of wetlands; NEP anticipates lower temporary wetland impacts; minimal wetland impacts at substation site for driveway | No wetlands, streams or vernal pools in the vicinity of the Shaker Road Substation, but wetlands on new ROW. For refurbishment, would have to swamp mat at all pole locations and poles stay in same location; however, only replacing 123 poles in total vs. 178 for the Project | For refurbishment, would have to swamp mat at all existing pole locations and poles stay in same location; however only replacing 123 poles in total vs. 178 for the Project; minimal wetland impacts at substation site for driveway |
| Habitat | West Hampden Sub is within NHESP habitat area | No new West Hampden Substation | West Hampden Sub is within NHESP habitat area – NEP states that more mitigation may be required since the step-down station is approximately ½ acre larger than for the Project |
| Magnetic Fields | Slight decrease for 40% of route at edge of ROW, slight increase for 60% of route | Magnetic field levels stay the same with refurbishment | Magnetic field levels stay the same with refurbishment |
| Clearing | 5 acres of forest cleared for sub | Expansion of Shaker Road Sub outside of fence line, approx. 250 ft. | 5 acres of forest cleared for sub |
| **TOTAL COST (using 2011 Forecast)** | $35.25 million | $37.33 million | $36.2 million |
| **Cost to MA Ratepayers** | $18.4 million | $21.1 million | $20.9 million |
| | | | |
| **RELIABILITY** | Resolves the 301/176 contingency; load loss for 176/175 contingency is 60 MW (for loss of just W-175 is 44 MW); new 115 kV line would have higher capacity and higher thermal rating due to lower impedance than 69 kV | Resolves the 301/176 contingency; load loss for 176/175 contingency is 60 MW (for loss of just W-175 is 44 MW) | Resolves the 301/176 contingency; load loss for 176/175 contingency is 60 MW (for loss of just W-175 is 44 MW); system losses are 0.1 MW higher than the Project |

F. Conclusion on Project Approach

The Project, Alternative 3A, and Alternative 5A all meet the reliability criteria applied to the study of the transmission system over the ten-year forecast period. The Project, Alternative 3A and Alternative 5A all have comparable costs. However, as discussed below, Alternative 3A has greater environmental impact than both the Project and Alternative 5A, whereas Alternative 5A has slightly less environmental impact than the Project.

For both Alternative 3A and 5A, the entire O-15S 69 kV line would be refurbished, retaining existing pole heights, and visual impacts would be less significant than those associated with the Project's approximate 30-foot pole height increase for the new 115 kV line. Alternative 3A would not include a new substation; however, the 1.35-mile 115 kV transmission line from Franconia to the Shaker Substation would be located in a new ROW. The new line would itself be in very close proximity, within 58 feet, to residences and an elder care facility. The Shaker Road Substation would require three new transformers with a five dBA noise increase at the nearest residence. Finally, the new 115 kV 1.35 mile line would cross four wetlands. On balance, Alternative 3A has greater environmental impact than the Project or Alternative 5A.

The Company has asserted that the Project would have fewer wetland impacts than Alternative 5A; however, the location of the new structures has not yet been determined. In addition, the Project consists of 156 new structures and the replacement of 22 structures, while Alternative 5A consists of the replacement of only 123 wooden poles.[25] Therefore, the record does not support the Company's assertion that there are slightly more temporary wetland impacts associated with refurbishment than with new construction.

Based on the above, the choice is then narrowed down to the Project and Alternative 5A. As noted, the costs are comparable and the environmental impacts of Alternative 5A are somewhat less than the Project, primarily due to the visual impacts of the new 115 kV versus the refurbished 69 kV line. The new line travels through a rural area, and the residential areas are low density, therefore generally the visual impacts from installation of the new 115 kV line are

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25 Alternative 5A involves the replacement of 123 wood monopoles and conversion of 46 wood monopoles along the entire 14.4 miles of the O-15S line. The O-15S replacement monopoles would be of similar design and remain the same height or be five to ten feet taller in some instances, and in the same general location as the existing poles. As with the Project, the converted monopoles would include new insulators and the replacement of single cross arms with double cross arms.

modest. Further, the visual impacts can be mitigated with off-site landscaping to help screen residences along the ROW.

While Alternative 5A meets the reliability criteria, the Project relies on a new 115 kV line which provides a more robust solution with both higher capacity and greater thermal rating than the refurbished O-15S line, with additional flexibility to accommodate future system growth. The Project would allow the area to be served by two 115 kV sources, the new 115 kV line from the Palmer Substation and a new interconnection with WMECo's 1515 line. Given the comparable costs, and the enhanced reliability and capacity benefits of the Project over Alternative 5A, the overall benefits of the Project outweigh the slight environmental advantage of Alternative 5A. Accordingly, the Siting Board finds that the construction of the Project is preferable to the identified project alternatives with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

## V. ROUTE ALTERNATIVES

### A. Route Selection

#### 1. Standard of Review

G. L. c. 164, § 69J requires a petition to construct to include a description of alternatives to the facility including "other site locations." Thus, the Siting Board requires an applicant to demonstrate that it has considered a reasonable range of practical siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts. To do so, an applicant must meet a two-pronged test. First, the applicant must establish that it developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes that, on balance, are clearly superior to the proposed route. Second, the applicant must establish that it identified at least two noticed sites or routes with some measure of geographic diversity. Worcester Decision, EFSB 09-1/D.P.U. 09-52/09-53, at 19-20 (2011); GSRP, EFSB 08-2/ D.P.U. 08-105/08-106, at 42 (2010); Massachusetts Municipal Wholesale Electric Company, 12 DOMSB 18, at 92 (2001).

2. The Company's Route Selection Process

The Company began the route selection process by establishing a route selection study area that would encompass reasonable routes for a 115 kV transmission line between Palmer Substation and an interconnection with WMECo's 1515 line in either western Hampden or western Wilbraham (Exh. NEP-1, at 4-1). The resulting study area was bordered by Palmer Substation to the east, WMECo's 1515 line to the west, the Company's X-176 line ROW to the north, and a Tennessee Gas Pipeline ROW to the south (id.).

The Company identified two possible endpoints for the Project: (1) an interconnection to the 1515 line at a potential new substation in western Hampden (to be called the West Hampden Substation); or (2) an interconnection to the 1515 line at a potential new substation in western Wilbraham (id. at 4-4). The Company identified six potential route corridors within the study area, five of which were in existing ROWs (id. at 4-2). Route 1 is the Company's Project and Route 2 is the Company's noticed alternative route. As shown in Table 4, below, the Company also developed variations within Route 3 and Route 5.

**Table 4: Description of Six Route Alternatives**

| Alternative | Description |
|---|---|
| **Route 1** | Route 1 is approximately ten miles long and is located within the existing O-15S ROW for the entire length between Palmer Substation and the proposed West Hampden Substation. |
| **Route 2** | Route 2 is approximately 9.6 miles long and is located entirely within the existing N-14 ROW. For its first 4 miles the route is in the same corridor as the O-15S ROW. Route 2 would terminate at a proposed new substation in western Wilbraham. |
| **Route 3** | Routes 3A and 3B are approximately 15.5 and 15.3 miles long, respectively, and are the most southern of the route alternatives considered. The routes rely on existing transmission line, distribution line, and natural gas pipeline ROWs. The final 1.6 mile portion of the routes would require expansion of WMECo's existing 1515 line ROW. |
| **Route 4** | Route 4 is an approximately 12.7 mile-long alternative that does not, for the most part, rely on existing ROWs. It primarily crosses undisturbed forest areas in the towns of Monson and Hampden and would terminate at the proposed West Hampden Substation. |
| **Route 5** | Routes 5A, 5B, and 5C are approximately 12.1, 15.7, and 13.5 miles long, respectively. The routes use existing road, rail, and transmission line ROWs. The three routes are in the northern portion of the route selection study area. Route 5C would require 5.2 miles of new ROW. |
| **Route 6** | Route 6, the longest of the alternatives, is approximately 18.5 miles long. It would be located primarily within existing electric ROWs, but would require 6.1 miles of new ROW adjacent to WMECo's 1515 line ROW. |

Source: Exh. NEP-1, at 4-2 to 4-5

The Company compared the alternative routes based on environmental criteria, cost and reliability (Exh. NEP-1, at 4-1 to 4-11). In examining the environmental impacts of the alternatives, the Company applied nine environmental route-selection criteria to each route including: constructability, directness of the route, availability of existing ROWs, traffic interference, avoidance of conservation land, impact to wetlands and water resources, protection of species habitat, land use impacts, and avoidance of contaminated areas (Exh. NEP-1, at 4-5 to 4-6). Based on field studies and Geographic Information System ("GIS") information, the Company assigned scores to each of the potential routes. The Company developed weighting of one, two, or three for each criterion that represent its judged importance in assessing environmental impacts, community impacts, and constructability (id. at 4-6). Route 1 and Route 2 had the lowest (best) scores (id. at 4-11).

The Company also calculated an estimate of the cost to build each alternative and identified several factors responsible for cost differentials among routes (Exh. NEP-1, at 4-6). Key among the factors affecting route cost are: (1) route length; (2) the need to remove or refurbish the existing O-15S line; (3) the need to upgrade the existing Wilbraham Substation (if the Alternative Route is selected); and (4) the need to acquire additional land rights for ROWs. Route 1 had the lowest cost, and Route 2 and Route 5A (which were virtually the same costs) had the second lowest costs (id. at 4-11). With respect to the element of reliability, the Company concluded that all routes would provide comparable levels of reliability because they would involve similar construction and are comparable in length (id.). Based on the scores and costs, the Company selected Route 1 as the Primary Route and Route 2 as the Alternative Route (id. at 4-12).

In past decisions, the Siting Board has found various types of criteria to be appropriate for identifying and evaluating route options for transmission lines and related facilities. These types of criteria include natural resource issues, land use issues, community impact issues, cost and reliability. Lower SEMA at 55; GSRP at 46-47; New England Power Company, 4 DOMSB 109, at 167 (1995). The Siting Board has also found the specific design of scoring and weighting methods for chosen criteria to be an important part of an appropriate site selection process. Boston Edison Company, 19 DOMSC 1, at 38-42 (1989).

Here, the Company developed numerous screening criteria, which it used to evaluate the routing options. These criteria generally encompass the types of criteria that the Siting Board previously has found to be acceptable. The Company also developed a quantitative system for ranking routes based on compilation of weighted scores across all criteria. This is a type of evaluation approach the Siting Board previously has found to be acceptable. Further, the Company identified and compared a large number of potential routes, nine in total.

The Siting Board finds that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures the Company has not overlooked or eliminated any routes that are clearly superior to the Project.

3. Geographic Diversity

The two routes are in separate ROW for approximately six of the ten miles needed for the proposed interconnection of Palmer Substation with the WMECo 1515 line. Given the limitations imposed by an interconnection between Palmer Substation and WMECo's 1515 line, the Company identified a study area that would encompass all viable siting options. Although the two routes share approximately four of the ten total miles, given the relatively short distance between the substations, each route offers a unique set of environmental and cost advantages and disadvantages within the Study Area. The Siting Board finds that the Company established two routes (the Primary and the Alternative Route) for the Project with some measure of geographic diversity.

4. Conclusion on Route Selection

The Company has: (a) developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes that are clearly superior to the proposed project; and (b) identified a range of practical transmission line routes with some measure of geographic diversity. Therefore, the Siting Board finds that the Company has demonstrated that it examined a reasonable range of practical siting alternatives.

B. Analysis of Primary and Alternative Routes

1. Standard of Review

In implementing its statutory mandate under G.L. c. 164, § 69H, the Siting Board requires a petitioner to show that its proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply. To determine whether such a showing is made, the Siting Board requires a petitioner to demonstrate that the proposed route for the facility is superior to the alternative route on the basis of balancing cost, environmental impact, and reliability of supply. Lower SEMA at 92; Worcester Decision, at 65; GSRP at 84.

Accordingly, in the sections below, the Siting Board examines the environmental impacts, reliability and cost of the Project along the Primary and Alternative Routes to determine: (1) whether environmental impacts would be minimized; and (2) whether an appropriate balance would be achieved among conflicting environmental impacts as well as among environmental impacts, cost, and reliability. In this examination, the Siting Board compares the Primary and Alternative Routes to determine which is superior with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

2. Description of the Primary Route and Alternative Route

a. Primary Route

i. Transmission Line and Refurbishment of the O-15S Line

The Primary Route is ten miles long and is located within the existing O-15S line ROW for its entire length from the Palmer Substation to the proposed West Hampden Substation (Exh. NEP-1, at 5-2). Within the existing ROW, the Primary Route travels through the towns of Palmer (0.06 miles), Monson (5.1 miles), and Hampden (4.8 miles) (id. at App. 6-1, at 4). The width of the existing O-15S line ROW varies from 60 feet (where it contains only the O-15S line) to 110 feet (where it also contains the N-14 line) (id. at 5-2).

The Primary Route also entails refurbishing the remainder of the O-15S line for 2.7 miles between the West Hampden Substation and the East Longmeadow Substation along with 1.7 miles that make up the Shaker Road Tap, for a total of 4.4 miles (Exh. NEP-1, at 5-3; RR-EFSB-

55). This refurbishment of the O-15S line would require the replacement of approximately 22 structures and modifying 13 structures (RR-EFSB-55).

ii. Substations

The Primary Route includes construction of a new substation in West Hampden on 2.7 acres of a 97-acre parcel of land off Allen Street on the north side of the O-15S line ROW, and east of the WMECo 1515 line ROW (Exh. NEP-1, at 5-2). The West Hampden Substation would consist of an open-air 115 kV ring bus, a 115-to-69 kV autotransformer, a 115-to-13 kV autotransformer, 115 kV and 69 kV substation yards, a 13 kV metal clad substation, a 40 feet by 100 feet control house, a 14 feet by 45 feet metal clad 13 kV switch gear enclosure, and related equipment and controls (Exh. NEP-2, at 1-2).

The West Hampden Substation would supply the remainder of the O-15S line extending west to East Longmeadow and Shaker Road Substations, and would also supply local 13 kV feeders currently fed by the existing Hampden Substation. The new West Hampden Substation would interconnect the new R-170 line and WMECo's 1515 line via a new 115 kV loop line (750 feet in length) (Exh. NEP-1, at 5-2; 5-3). To accommodate the loop line, WMECo would construct a single structure to raise the conductor on WMECo's existing overhead 345 kV transmission line located on the same ROW so the loop line could proceed underneath and to the West Hampden Substation (id. at 5-2). NEP would consolidate its distribution and transmission equipment at the West Hampden Substation and retire the existing Hampden Substation (also along the O-15S line ROW) located approximately 0.4 miles east of the proposed West Hampden Substation (id.). Once NEP retires the Hampden Substation, the site would be restored to a vegetated state (id.).

Regardless of the route selected for the Project, upgrades would be required at the Palmer, Scitico and Ludlow Substations (Exh. NEP-1, at 5-3). As part of the Project, NEP would install a new 115 kV, 2000 ampere, circuit breaker and replace an existing 69 kV breaker at the Palmer Substation within the existing fenceline (id.). In addition, relay and protection scheme upgrades are required at both WMECo's Ludlow Substation and CL&P's Scitico Substation in Enfield, Connecticut (id.).

b. Alternative Route

i. Transmission Line and Refurbishment of the O-15S Line

The Alternative Route extends for approximately 9.6 miles within the existing N-14 ROW from the Palmer Substation to the West Wilbraham Substation (Exh. NEP-1, at 5-4). The N-14 line ROW ranges in width from approximately 50 to 60 feet (where it contains only the N-14 line) to approximately 110 feet (where it contains both the N-14 line and the O-15S line) (id.). It should be noted that the N-14 line was refurbished in 2007 (Exh. NEP-1, at 2-1).

Construction of the Project along the Alternative Route would require the refurbishment of the existing O-15S line along its entire 12.7 mile length between the Palmer and East Longmeadow Substations along with the 1.7 miles that make up the Shaker Road Tap, for a total distance of 14.4 miles (Exh. NEP-2, at 5-4; RR-EFSB-55). The refurbishment of the O-15S line would require the replacement of approximately 123 structures and the modification of an additional 46 structures (RR-EFSB-55).

ii. Substations

Construction of the Project along the Alternative Route would require the construction of a new substation to interconnect the new R-170 line with WMECo's 1515 line (Exh. NEP-2, at 5-4). This substation would be located between the N-14 line ROW and the 1515 line ROW identified by the Company as the West Wilbraham Substation (id.). The new substation would be a similar configuration to that of the proposed West Hampden Substation (id.). In addition, the existing Wilbraham Substation, which is currently served from the N-14 line at 69 kV, would need to be upgraded to accommodate 115 kV service (id.).

3. Company's Community Outreach

In 2009, NEP communicated with Palmer, Monson, and Hampden officials, beginning with a series of preliminary meetings with various municipal officials including representatives from each town's Board of Selectmen (Exh. NEP-2, at 1-9). NEP mailed informational materials to Project abutters and established a Project website (id.). NEP conducted open houses in Monson on May 24, 2010 and in Hampden on May 26, 2010, where NEP responded to a range of inquiries including questions concerning vegetative clearing, construction procedures and electromagnetic fields (id.).

The Company stated that prior to construction, NEP would mail fact sheets to abutting property owners and other stakeholders, including municipal officials, departments of public works, police departments, and fire chiefs (Exh. EFSB-G-17). The fact sheets would provide details about the construction phases of the Project, including the locations of the work, how the work would proceed, how long crews would be in each area, what time of day the crews would be working, what abutters can expect to see and hear, staging areas, road closures, and Company contact information (id.). NEP would also provide e-mail updates to stakeholders who provided their contact information during previous outreach activities (id.).

4. Environmental Impacts

a. Construction Methodologies and Sequencing of the Substation and Transmission Line

The Companies would construct, and place in service, the new West Hampden Substation and the loop line to WMECo's 1515 line prior to dismantling the O-15S line east of the West Hampden Substation and constructing the new R-170 line (Exh. EFSB-G-16). The Company estimates that construction of the West Hampden Substation would occur between the fall of 2012 and the spring of 2014, taking twelve to 16 months to complete (Exh. NEP-4, at 2-28). With the West Hampden Substation in service, the East Longmeadow 69 kV load pocket can be supplied during typical construction conditions (i.e., light load and shoulder peak load conditions) (Exh. EFSB-G-16). The West Hampden Substation would provide a 69 kV source with the O-15S line taken out of service during construction (id.).

The installation of the R-170 line would occur from the fall of 2014 to the spring of 2015, taking between six to nine months to complete (id. at 2-28 to 2-29). The construction includes the following sequencing with associated estimated duration: (1) two months for ROW preparation, including tree trimming, removing vegetation from access ways and structure locations, and removing danger trees; (2) one month for contractor mobilization, including onsite worker safety and environmental training and delivery of trailers, fencing, equipment and materials; (3) two and a half months for installation of concrete and embedded foundations for transmission structures; (4) ten to twelve weeks for conductor and shield wire installation; and (5) restoration of the ROW in compliance with applicable environmental permits, which would vary in duration (Exhs. NEP-1, at 1-8; EFSB-G-10).

b. Land Use and Historic Resources Impacts

i. Primary Route

The Primary Route follows the existing O-15S line ROW with the land use directly adjacent to the ROW comprised predominately of forested open space,[26] agricultural lands, and wetlands (Exh. NEP-1, at 5-12). Within 300 feet from the edge of the ROW, there are 102 residences on lots ranging from one half acre to greater than an acre (Exh. NEP-1, at 5-12, 5-13, 5-21). The Primary Route crosses the Laughing Brook Wildlife Refuge which has four miles of hiking trails on 356 acres of woodlands, meadows, and streams (Exh. NEP-1, at 5-13). The Company stated that it would discourage unauthorized road vehicle and all-terrain vehicle users from accessing the ROW by installing gates and road blocks at key locations (Exh. EFSB-LU-4).

The land use impacts of the Project would include construction-related tree clearing (Exh. NEP-1, at 5-14). The Company would clear 5,280 square feet of uplands along the ROW (Exh. NEP-4, Table EOEEA-1, at 2-2). NEP is currently seeking to secure additional vegetation management rights to perform limited pruning or remove hazardous trees ten feet beyond both sides of the existing ROW (Exh. NEP-1, at 5-14). NEP has secured only 25 percent of the easements (23 of 92 easements have been duly executed by the Company and abutters) for the additional vegetation management rights (Tr. 3, at 351). On properties for which NEP has secured easements, an arborist would conduct selective tree and limb removal depending on the tree species (i.e., whether the species is tall, fast-growing trees such as white pine), condition, lean (into the ROW); NEP estimates that up to 1.1 acres of forest canopy cover could be removed from the both edges of the ROW (Exh. NEP-1, at 5-14). For those instances where easements are not obtained, the Company would approach landowners on a case-by-case basis to request permission to remove trees that could potentially impact the Company's infrastructure (Tr. 3, at 352).

In terms of historic resources, there are no structures or historic districts listed in the State or National Register of Historic Places ("NRHP"), either within the Project ROW or at the West Hampden Substation site (Exh. EFSB-HA-2). Within 0.25 miles of the ROW, there are

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[26] The Company classifies the upland forested areas generally as oak, hickory, white pine, and hemlock with pockets of maple, beech and birch trees (Exh. EFSB-LU-3).

eight properties recorded in the Massachusetts Historic Commission ("MHC") Inventory, and one newly identified property that is potentially eligible for listing in the NRHP (id.). NEP's consultant concluded that the Project should have no direct impacts or significant visual impacts on these properties due primarily to the distance between the area of potential effect and the existing visual impacts of the O-15S line (id.; Exh. NEP-1, at 5-46).

With respect to archaeological resources, there are six pre-contact sites along the Primary Route (Exh. EFSB-HA-1(a)).[27] In October of 2009, NEP's archaeological consultant conducted sensitivity assessments of the major components of the Project to identify cultural resources, evaluate their significance and develop mitigation measures (Exh. NEP-4, at 3-6). NEP's cultural resource consultant determined that within the ROW for the Primary Route, there are two archaeological sites considered eligible for listing in the NRHP (id.). NEP indicated that it would relocate the two structures to avoid the two NRHP-eligible sites (id.). Pursuant to NEP's consultant's report dated October 2010, there are also 14 stone walls within the ROW (Exh. EFSB-HA-1(a)). NEP indicated that should the Project affect any stone walls, it would rebuild the walls in their original configuration and alignment (Exh. EFSB-LU-17).

The 2.7-acre footprint of the West Hampden Substation would occupy a portion of a 97-acre parcel currently containing a residence, barns, outbuildings, fields and wooded areas (Exh. NEP-1, at 5-14). The West Hampden Substation site is bordered by a NEP transmission ROW to the south, a WMECo transmission ROW to the west, Allen Street to the east, and forested land to the north (id.). The land use impacts that would result from the development of the West Hampden Substation site would include conversion of a portion of the site from a residential use to a substation (id.). NEP would clear approximately five acres of forest for the new West Hampden Substation (id.). There are no known archaeological sites near the West Hampden Substation site (Exh. NEP-1, at 5-48).

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27 The pre-contact period is documented by archaeologists as the 12,000-year period of Native American occupation of the New England region prior to the 1500s (Exh. EFSB-HA-1(a) at 9). The post contact period begins roughly in 1650 in the New England region (id. at 17-18).

ii. Alternative Route

The Alternative Route would traverse essentially the same type of land use settings as the Primary Route – sharing the ROW with the Primary Route for the first four miles but then diverging west for the remaining 5.6 miles (Exh. NEP-1, App. 5-3, at 4). As with the Primary Route, the Alternative Route would be located entirely within an existing NEP transmission ROW with the land use directly adjacent to the ROW primarily (approximately 61 percent) forested open space (id. at 5-15). Agricultural land and wetlands comprise an additional 9.8 percent and 12.2 percent respectively of the Alternative Route (id.). Approximately nine-tenths of a mile of the Alternative Route passes through low density residential areas (id.). There are 116 residences within 300 feet of the edge of the ROW and two schools, the Minnechaug Regional High School and Mile Tree School within 25 feet of the ROW (Exhs. NEP-1, at 5-15; NEP-2, at 5-24). The land use impacts of the Project along the Alternative Route would include construction-related tree clearing to meet clearance codes (Exh. NEP-1, at 5-16). As with the Primary Route, NEP would pursue an additional ten feet of vegetation management rights on both sides of the ROW (id.).

The Alternative Route includes two properties, the Adams Cemetery and the Glendale Cemetery, eligible for the NRHP (Exh. NEP-1, at 5-46). There are 19 architectural properties recorded in the MHC Inventory located in the study area, but they have not been evaluated for listing in the NRHP (id.). Archeological sites within the study area along the Alternative Route include ten pre-contact sites and one post-contact site (id.).

The Company's identified site for the West Wilbraham Substation is wooded and owned by the Wilbraham Nature and Cultural Center (Exh. NEP-1, at 5-16). This land is designated for conservation purposes with an Article 97 land use restriction (id.). Construction of the West Wilbraham Substation at the Wilbraham Nature and Cultural Center site would conflict with existing land use restrictions and would require an Article 97 approval by the Massachusetts Legislature (id.). There are no known archaeological sites near the West Wilbraham Substation site (Exh. NEP-1, at 5-48).

iii. Conclusion on Land Use and Historic Resources Impacts

With regard to land use impacts resulting from construction activities, the Primary and Alternative Routes are similar. However, the Alternative Route would also include the refurbishment of the entire O-15S line (i.e., 14.4 miles versus 4.4 miles with the Primary Route) and the associated land use impacts. Therefore, land use impacts would occur along both routes if the Project is constructed along the Alternative Route. Additionally, the West Hampden Substation site is preferable to the West Wilbraham Substation site due to the Article 97 Land Use Restriction which would necessitate approval by the Massachusetts Legislature.

During the public hearing for the Project, several residents indicated that when NEP removed vegetation from the ROW in the past, the Company left woody debris on residents' property along the ROW (Public Hearing, Hampden, October 27, 2010, Tr. at 29, 36, 39, 40, 47, 48). The abutters further alleged that requests to the Company to remove the discarded vegetation were unsuccessful (id. at 40). Several abutters stated that they made arrangements to have the discarded vegetation removed at their expense (id. at 36). Therefore, to facilitate site restoration related to this Project, the Siting Board directs NEP to notify affected property owners in writing of the description of the area of tree removal, the timely manner in which the woody debris would be removed or handled in accordance with the affected property owner preference, and/or relevant regulatory requirements, and include Company contact information.

Both the Primary and Alternative Routes are located away from historic structures and mostly likely would not have a direct impact on historic resources. While both routes are near archaeological sites, the Alternative Route may have a slightly greater chance of impacts due to the greater number of pre-contact sites in proximity to the ROW compared to the Primary Route However, the Alternative Route would also include the refurbishment of the entire O-15S line along the Primary Route, with associated potential impacts to archaeological sites. Therefore, impacts to archaeological resources have the potential to occur along both routes if the Project is constructed along the Alternative Route. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to land use and historic resources impacts.

Because construction of the transmission line on the Primary Route would occur primarily within an existing ROW and the footprint for the substation would be located on 2.7

acres of a 97-acre parcel, with a significant vegetative buffer, impacts on land use would be minimal. Further, there are minimal historical resources in proximity to the Project and NEP would relocate two structures to avoid the two NRHP-eligible sites. Therefore, the Siting Board finds that, subject to compliance with the above condition concerning site restoration, the impacts on land use, historic resources, and archaeological resources along the Primary Route would be minimized.

c. Water Resource and Wetland Impacts

i. Primary Route

In terms of water resource impacts, the Primary Route crosses 19 waterways within the Chicopee and Connecticut River Basins (Exh. NEP-1, at 5-49). In addition, the Primary Route crosses or is adjacent to three small ponds (id.). Impacts would be limited to temporary placement of swamp mats across some streams for construction vehicle access (Exh. NEP-1, at 5-52). Swamp mat placement may result in some minor and localized disturbance to vegetation on either side of the stream bank; however, NEP stated that the use of swamp mats does not destroy the root mass of the plants, allowing them to survive and re-grow when the swamp mats are removed (id.).

The Primary Route crosses less than 0.5 miles of two Zone II Wellhead Protection Areas (Exh. NEP-1, at 5-28).[28] The Company would work with its contractor to ensure best management practices ("BMPs") are followed with respect to handling and storing hazardous substances and that no re-fueling of construction equipment would take place within Wellhead Protection Areas (id.). Furthermore, the Company would require its contractors to adhere either to its standard emergency response plan or to a Project-specific spill prevention, containment, and response plan (id. at 5-29).

The Project would result in both temporary and permanent impacts to wetlands (Exh. NEP-2, at 5-33). The Primary Route crosses 32 wetlands with a total crossing distance of

28 Wellhead Protection Areas protect the recharge area around public supply groundwater sources (Exh. NEP-2, at 5-27). A Zone II Wellhead Protection Area is a location determined by hydrogeologic modeling and regulated by MassDEP's Drinking Water Program (id.).

1.9 miles (id. at 5-30). Temporary impacts occurring during construction would include vegetation mowing, placement of swamp mats for wetland crossings, equipment staging pads, and access road improvement (id.). NEP anticipates that approximately 5.1 acres of wetlands would be temporarily affected by swamp mats during Project construction (Exh. NEP-4, at 3-9). Almost all of these temporary wetland impacts would occur within state jurisdictional Bordering Vegetated Wetlands ("BVW"); however, 400 square feet of impacts are within isolated wetlands that may be solely under federal jurisdiction (id.). Wetland impacts would also include increased turbidity during swamp mat installation and removal (Exh. EFSB-W-3). With regard to potential impacts to vernal pool habitat, four vernal pools were verified in the field along the Primary Route (Exh. NEP-2, at 5-35).[29]

Permanent wetland alterations of approximately 0.08 acres (3,480 square feet) of wetlands would occur due to placement of new transmission structures along the Primary Route (Exh. NEP-4, at 3-9). In addition, permanent wetland alterations totaling 0.06 acres (2,450 square feet) would occur at the West Hampden Substation site due to upgrading two existing culverts and upgrading an existing farm access road to Town of Hampden zoning standards (id. at 3-11).

To mitigate permanent wetland impacts resulting from the Project, a 10,000 square foot wetland restoration area would be created adjacent to the Hampden Substation, achieving a mitigation ratio of 3:1 for the forested wetlands impacted by the substation driveway and a mitigation ratio of 2.5:1 for the wetlands impacted by installing structures in Hampden along the ROW (Exh. NEP-4, at 3-12 to 3-13). Approximately 785 square feet of permanent wetland impacts would occur due to installation of the transmission structures along the ROW in Monson (id. at 3-13). NEP is presently finalizing mitigation details and commitments with the Monson Conservation Commission regarding two potential areas where mitigation would be beneficial (id.).

To further mitigate wetland impacts along the Primary Route, NEP would clearly mark boundaries of wetlands to prevent unauthorized vehicular encroachment (Exh. NEP-1, at 5-6).

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[29] The four vernal pools are along the part of the ROW that is also followed by the Alternative Route (Exh. NEP-2, at 5-35).

Pursuant to the request of the U.S. Army Corps of Engineers, to minimize ground disturbance the Company would cut tall trees within wetland areas impacted by the Project close to ground level, leaving the stumps and roots in place except where grading is required for access road construction or at structure sites (id.). NEP would install erosion control devices such as hay bales and siltation fencing in accordance with approved plans and Orders of Conditions from the local conservation commissions (id.). NEP would perform weekly inspections to evaluate potential erosion and sedimentation issues and inspection reports would be submitted until final stabilization has been achieved (i.e., 75 percent vegetative cover for disturbed areas) (id.). Should unforeseen damage occur to the banks associated with the stream crossings, or should rutting occur to vegetated wetlands, the Company would re-grade the affected area to the original topography (Exh. EFSB-W-8).

ii. Alternative Route

The Alternative Route would cross 14 waterways in total in the Chicopee and Connecticut watersheds (Exh. NEP-2, at 5-53). The Primary and Alternative Routes cross the same two Zone II Wellhead Protection Areas (Exh. NEP-1, at 5-29). The Alternative Route would cross within one mile of the outer boundary limit of one other Zone II Wellhead Protection Area and 18 designated groundwater protection areas (Exh. NEP-1, at 5-28).

The Alternative Route crosses 24 wetlands for a total of 1.3 miles (Exh. NEP-1, at 5-33).[30] From the point where the Primary and Alternative Routes diverge to the West Hampden Substation, there are 5,330 feet of wetlands crossed for the Primary Route and 4,260 feet of wetlands crossed for the Alternative Route (Exh. EFSB-W-2). In terms of potential impacts to vernal pool habitat, based on NHESP mapping, a total of seven potential vernal pools are located along the Alternative Route; however, field verification would have to be performed for confirmation (Exh. NEP-2, at 5-35).

30 Wetland impacts along the Alternative Route were estimated based on available GIS mapping rather than field delineations (Exh. NEP-1, at 5-33).

iii. Conclusion on Water Resource and Wetland Impacts

There are slightly more wetland crossings for the Primary Route. However, with advanced engineering design and collaboration with local, state and federal wetlands agencies, the Company has determined that impacts would be limited to 5.1 acres of temporary wetland impacts from swamp mat placement, 0.08 acres of permanent wetland impacts from structure placement, and 0.06 acres of permanent impacts at the West Hampden Substation. The most significant difference for potential water resource and wetland impacts between the Primary and Alternative Routes results from the fact that if the Alternative Route were selected, wetland impacts would occur along both routes. In contrast, if the Primary Route were chosen, only 4.4 miles of the O-15S line would need to be refurbished, thus minimizing potential impacts to water resources and wetlands. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to water resource and wetland impacts.

The Siting Board finds that with mitigation proposed by the Company including creating a wetland restoration area in consultation with the U.S. Army Corps of Engineers and affected communities as well as marking wetland boundaries, and installing erosion control devices, impacts to water resources and wetlands along the Primary Route would be minimized.

d. Protected Species

i. Primary Route

Both the Primary Route and the West Hampden Substation site cross Estimated and/or Priority Habitats of three state-listed protected reptile species and one protected plant species, as identified by the NHESP (Exh. NEP-1, at 5-36).[31] The Primary Route currently crosses approximately 2.7 miles of Priority Habitat and 2.6 miles of Estimated Habitat (id. at 5-37). NEP and its consultants have been coordinating with NHESP staff since the fall of 2008 to better

31 NHESP restricts the release of information about these species because they are highly susceptible to collection (Exh. NEP-1, at 5-36). See Massachusetts Public Records Law, M.G.L. c. 66, § 17D.

understand the nature and extent of rare species habitats within the mapped areas (Exh. NEP-4, at 2-30; Tr. 3, at 360).[32]

Due to the location of the West Hampden Substation relative to documented habitat for the recently discovered reptile species at the West Hampden Substation, NHESP determined that the Project would result in a "take" and requires that NEP prepare a Rare Species Protection Plan for the specific plant and reptile species (Exh. NEP-4, at 2-30).[33] Concerning the operational impacts of the Project, maintenance of the Company's transmission facilities within mapped NHESP estimated and priority habitats is subject to a ROW maintenance permit issued by NHESP (Exh. NEP-1, at 5-38). This type of permit is renewed yearly and includes conditions such as time-of-year restrictions, vehicle and equipment limitations, pre-cutting survey requirements where applicable, and training of maintenance crews with respect to specific species present on the ROW (id.).

ii. Alternative Route

The potential impacts to Protected Species would be similar for the Primary and Alternative Routes. However, in addition to the three protected reptile species and one protected plant species along the Primary Route there is also an additional amphibian species mapped by NHESP along the Alternative Route (Exh. NEP-1, at 5-39). The Alternative Route crosses approximately 3.1 miles of Priority Habitat and 2.5 miles of Estimated Habitat (id.). The identified West Wilbraham Substation site is land designated for conservation purposes and owned by the Wilbraham Nature and Cultural Center (Exh. NEP-1, at 5-16).

iii. Conclusion on Protected Species

Based on NEP's analysis of the data and field surveys, the Primary Route crosses slightly less Priority Habitat than the Alternative Route (i.e., 2.7 miles versus 3.1 miles), but slightly

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32 The Company stated that in addition to the three stated-listed reptile species, there is a reptile species present at the West Hampden Substation site that NHESP did not map (Tr. 3, at 361). NHESP was not aware of the presence of this reptile species at the West Hampden Substation site until the Company submitted the results of its surveys (id.).

33 The plan would include reptile surveys by a biologist, radio-telemetry, use of silt and construction fencing, assignment of a Construction Environmental Compliance Monitor, and establishment of a nine acre conservation restriction area (Exh. NEP-4, at 2-30).

more Estimated Habitat (2.6 miles versus 2.5 miles). If the Alternative Route is selected, habitat on both routes would be affected since line O-15S would also need to be refurbished. Therefore, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to potential impacts to protected species.

NEP would be implementing a Rare Species Protection Plan approved by NHESP with specified mitigation including reptile surveys performed by a qualified reptile biologist, reptiles fitted with radio transmitters, installation and maintenance of fencing around the work area and plant communities, and establishment of a Conservation Restriction within existing known habitat. These measures would mitigate impacts to rare species. Therefore, the Siting Board finds that the environmental impacts related to protected species and their habitat along the Primary Route would be minimized.

e. Visual Impacts

i. Primary Route

There would be permanent visual impacts resulting from NEP's installation of taller transmission structures as well as the clearing of vegetation from the ROW (Exh. NEP-1, at 5-56). The existing O-15S structures are wood poles ranging in height from 39 to 49 feet above grade level (id. at 5-2). The wood monopoles would be replaced with steel monopoles ranging in height from 59 to 103 feet above grade level, which results in an average of approximately 70 percent increase in the height of the structures (RR-EFSB-39(a)). The majority of the R-170 structures would be taller than the average existing height of vegetation, which ranges from 35 to 60 feet (id.). However, the number of transmission structures along the ten-mile ROW would be reduced from 177 to 156 (RR-EFSB-39).

NEP would conduct selective tree and limb removal from the edge of the ROW, estimated to affect approximately 1.1 acres of forest canopy cover (Exh. NEP-1, at 5-14). NEP stated that there are a total of 48 residences that currently have a direct view of the structures and wires in the ROW, with no vegetative buffer between the residences and the ROW (Exh. DPU-V-4). In addition to the 48 residences that currently have a direct view of the structures and wires in the ROW, with construction of the Project an additional 16 residences would also have direct views (id.).

At the West Hampden Substation, the height of substation equipment includes transformers (26 feet tall), a control house (approximately 17 feet high) and transmission structures (not greater than 55 feet) (Exh. EFSB-V-7). NEP would clear approximately five acres of forest to construct the proposed West Hampden Substation (Exh. NEP-1, at 5-14). Visual impacts of the West Hampden Substation would be minimal due to (1) the large parcel of land, (2) setback of the substation (the nearest fence line of the substation is more than 1,700 feet away from Allen Street), and (3) the vegetative buffer between the substation and abutting properties (i.e., approximately 40 foot tall trees within a 500-foot buffer) between the substation and closest residences (id.; Exh. EFSB-V-7).

In terms of mitigation for the visual impacts of the R-170 line along the Primary Route, NEP has been collaborating with several abutters concerning transmission structure placement and height of the structures (Exh. EFSB-V-11). Several abutters have contacted NEP regarding changing the proposed location of transmission structures so that the structures are further from homes and/or closer to the edges of yards (id.). Additionally, a property owner on North Road in Hampden raised concerns with NEP about the height of a transmission structure relative to a steep grade (id.). Based on site visits and collaborations with property owners on North Road, NEP asserts it is in the process of reaching agreement about transmission structure placement and height to strike a balance between the optimum transmission line design and the abutters' concerns (Tr. 3, at 354-355).

ii. Alternative Route

As with the Primary Route, there would be permanent visual impacts resulting from NEP's installation of taller transmission structures as well as from clearing vegetation from the ROW (Exh. NEP-1, at 5-57). The existing N-14 transmission wood monopole structures are similar to the existing O-15S structures ranging in height, from 39 to 49 feet above grade level (Exh. NEP-1, at 5-4). As with the Primary Route, installation of the new steel monopoles would result in an average of approximately 70 percent increase in the height of the structures (RR-EFSB-39(a)).

Visual impacts of the West Wilbraham Substation would be similar to those of the West Hampden Substation due to the proposed equipment height relative to the setback from the road and existing vegetative buffer between the facility and abutting properties (Exh. NEP-1, at 5-57).

iii. Conclusion on Visual Impacts

In addition to the Primary and Alternative Routes sharing the ROW for approximately four miles, the Primary and Alternative Route share similar settings, existing transmission structures, and proposed substation equipment and substation sites. As such, the Siting Board finds that the Primary and Alternative Routes are comparable with respect to visual impacts.

The Company indicated that it would evaluate requests for visual mitigation on a case-by-case basis and that it has already met with some landowners to discuss the potential tree work and the abutters' requests for mitigation (Exh. EFSB-V-6). However, as discussed above, loss of the existing vegetative buffer coupled with the increased heights of the R-170 transmission structures and lines would create greater visual impacts on abutting residential properties. Given the restrictions on planting new vegetation near the transmission lines, a feasible alternative would be to enhance the vegetative buffer using taller plantings on the residential properties abutting the ROW ("off-site screening"). In several recent transmission line cases, the Siting Board directed the Petitioners to offer vegetative plantings in edge-of-ROW or off-ROW locations to abutting residential properties. Lower SEMA at 71; GSRP at 104-106; Russell T-Line at 46. Therefore, due to the significant visual impacts on residences in close proximity to the ROW, the Siting Board finds that mitigation of the visual impacts of the Project along the Primary Route requires an off-site mitigation plan.

Accordingly, in order to minimize visual impacts, the Siting Board directs NEP to implement an off-site screening program to include the following requirements:

(a) upon completion of construction, notify in writing by first class mail with delivery confirmation all owners of property located on or abutting the ROW of the option to request that the Company provide off-site screening. The Company would follow up with a phone call to non-responding property owners for whom a phone number is accessible. The off-site screening may include, but is not limited to,

shrubs, trees, window awnings and fences, provided that the Company's operating and maintenance requirements for its ROW facilities are met;

(b) provide property owners with a selection of generic renderings of possible mitigation approaches. Such renderings shall be for guidance purposes only, and shall not limit a property owner's ability to request different mitigation;

(c) meet with each property owner who requests mitigation to determine the type of mitigation package the Company would provide, provided that the Company has received a response from the property owner within three months of receipt of the Company's written notification;

(d) honor all property owners' requests for reasonable and feasible mitigation that are submitted within six months of a meeting with the Company and/or its consultants;

(e) issue a warranty to property owners to ensure that all plantings are established and replaced if needed at the end of one year from the date of planting, provided that the property owners reasonably maintain the plantings;

(f) submit to the Siting Board for its approval, at least three months before the conclusion of construction, a draft of the notification letter to property owners prior to mailing; and

(g) submit a compliance filing within 18 months of completion of construction detailing: (i) a list of all properties that were notified of the available off-site landscaping; (ii) the number of property owners that responded to the offer for off-site mitigation; (iii) a list of any property owners whose requests were not honored, and the rationale therefore; (iv) a general description of the types of off-site landscaping provided; and (v) the average cost of landscaping per property, broken down by installation, material, and design costs.

In addition to constructing the transmission line and substation, the Primary Route entails retiring the existing Hampden Substation. NEP would remove the electrical structures and components as well as the perimeter fence (Exh. EFSB-V-8). Site restoration would include importing topsoil to establish a finished grade that blends with existing contours and re-

vegetating the site with a grass seed mix (id.). Pursuant to the request of an abutter to the existing Hampden Substation slated to be dismantled, NEP has agreed not to remove the existing arborvitae screening along the northern and western substation fence line (id.). In addition to importing topsoil, re-grading and re-vegetating the Hampden Substation site, the Siting Board directs NEP not to remove the existing screening of arborvitae shrubs along the northern and western fence line after the Hampden Substation is retired.

With NEP's collaboration with abutters regarding transmission structure height and placement as well as implementation of the above conditions, including implementation of an off-site screening program and maintaining the existing arborvitae screening along the northern and western fence line at the Hampden Substation, the Siting Board finds that the visual impacts along the Primary Route would be minimized.

f. Noise Impacts

i. Primary Route

(A) Transmission Line

For the Primary Route, there are nine homes within 25 feet of the edge of the ROW, 21 homes within 50 feet of the edge of the ROW, and 41 homes within 100 feet of the ROW (Exh. EFSB-LU-8). Regardless of which route is selected, there would be noise generated during all stages of the construction of the overhead transmission line (Exh. NEP-1, at 5-5). Noise levels of construction equipment associated with the transmission line installation along either route would range from approximately 60 dBA (for pickup trucks) to 90 dBA (for dump trucks and heavy duty mowers) measured at 50 feet (Exh. NEP-1, at 5-25). NEP expects construction noise levels to be greater than ambient conditions at the closest residences (Exh. NEP-1, at 5-21).

Another potential source of noise is the use of helicopters for wire stringing operations and NEP is still in the process of determining whether traditional ground line pulling methods or aerial construction techniques would be used for wire stringing operations (id.; Exhs. EFSB-G-12; EFSB-G-18). NEP indicated that noise levels associated with helicopter work vary based upon distance and type of helicopter used to perform the work (RR-EFSB-32). Should NEP

pursue the use of helicopters for wire stringing operations, it would notify municipal officials, abutters, and local airports prior to the commencement of wire stringing operations (id.).[34]

The Company proposes that construction take place Monday through Saturday 7:00 a.m. to 5:00 p.m. (Exh. EFSB-NO-11). In addition, NEP indicates that in certain limited instances, such as wire stringing that requires additional time for safety or efficiency, work may extend to 7:00 p.m. (id.). NEP estimates that the extended work hours from 5:00 p.m. to 7:00 p.m. would occur infrequently and only when necessary (Tr. 3, at 375).

In terms of the noise requirements for each of the affected communities, Section 5.1.3 of the Monson Zoning Bylaw includes limitations on "continuous, regular or frequent sources of sound" (Exh. EFSB-Z-4). The Monson Zoning Bylaw includes an exception for construction activity, as long as "very loud" construction activities are not conducted on a site adjacent to a residential use between 10:00 p.m. and 7:00 a.m. (id.). The Company anticipates that it would be able to comply with Monson's noise standard (id.). The Town of Hampden Zoning Bylaw limits noise levels with an exception for construction activities; however, no loud construction activities are permitted between the hours of 9:00 p.m. to 7:00 a.m. if the construction site abuts residential areas (Exhs. NG-LPM-7, at 86). The Company anticipates it would be able to comply with the noise standards set forth in Hampden's Zoning Bylaw (Exh. EFSB-Z-11). The Town of Palmer does not have a noise ordinance.

(B) Substation

NEP conducted 21 hours of noise monitoring at five locations around the identified West Hampden Substation site on May 10-11, 2010 (Exh. NEP-1, App. 5-3, at 1). Ambient sound levels during the day ranged from 35 to 42 dBA and nighttime ambient levels ranged from 24 to 26 dBA (Exh. NG-1, App. 5-3, at 4). Ambient noise levels are influenced by road and aircraft traffic as well as natural sounds such as wind and birds (id.). The Company stated that existing noise levels in the area are typical of lightly developed residential uses with somewhat higher

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34 NEP would also coordinate with abutters and local residents with special requirements such as operators of equestrian facilities (Exh. EFSB-G-18). According to NEP, helicopters tend to disturb horses; therefore, NEP would coordinate flight paths to avoid equestrian operations (id.; Tr. 3, at 345). Where flight paths cannot be altered, NEP would work closely with equestrian owners to address their concerns (id.).

ambient noise levels near more heavily travelled roadways such as Routes 20 and 32 in Monson and Route 83 in Hampden (id.).

The Company indicated that construction of the West Hampden Substation would have similar sound levels to that of the construction of the transmission line (Exh. NG-1, at 5-21; 5-25). The closest four residences to the West Hampden Substation range from 825 feet to 1,175 feet away (Exh. EFSB-G-8). Permanent sources of noise at the West Hampden Substation would include two transformers and a heating, ventilation and air conditioning ("HVAC") unit mounted on the outside of the control building[35] (Exhs. NEP-1, at 5-21; EFSB-NO-9). To mitigate permanent noise levels at the substation, NEP would use low noise transformers with more sound reducing insulation built into the transformer walls compared with a typical transformer (Exh. EFSB-NO-5). According to NEP, the modeled contributions of noise from the substation would be limited to a seven dBA increase over ambient at the closest substation property line and limited to two dBA or less over ambient at any residence (Exh. NEP-1, App. 5-3, at 4).

ii. Alternative Route

Construction activities, sequencing, and work hours would be the same for both the Primary and Alternative Routes. Ambient sound levels along both the Primary and Alternative Routes are generally the same, typical of low density residential uses with somewhat higher noise levels near more heavily travelled roadways (Exh. NEP-1, App. 5-3, at 5). However, if the Alternative Route is chosen, the existing O-15S line would still need to be refurbished, which would entail (1) clearing the ROW; (2) constructing access roads; and (3) removing and replacing certain transmission structures resulting in additional construction noise for a longer duration (Exh. NG-1, at 5-25).

The West Wilbraham Substation equipment would be similar to that of the West Hampden Substation and also would be located on a large parcel set back from roads and residential areas by existing utility line ROWs and forested open space (Exh. NEP-1, at 5-25). NEP assumed that existing ambient noise conditions would be similar at the West Wilbraham

35 The Company has not determined the exact location of the HVAC unit but to be conservative, the noise modeling analysis assumed the HVAC unit would be installed on the western side of the control building, facing the closest residence (Exh. EFSB-NO-9).

Substation compared to the proposed West Hampden Substation (id.). The closest four residences range from 550 feet to 1,370 feet from the proposed West Wilbraham Substation (Exh. EFSB-G-8).

iii. Conclusion on Noise Impacts

With regard to noise impacts, ambient sound levels and the number of residences within 300 feet of the ROW along the Primary and Alternative Routes are similar. Construction activities, sequencing and associated noise levels would be similar for either the Primary or Alternative Route. However, the Alternative Route also includes the refurbishment of 14.4 miles of the O-15S line, and the associated construction noise impacts with the Primary Route include only 4.4 miles of refurbishment. Therefore, construction noise would occur along both routes if the Project is constructed along the Alternative Route. With respect to substations, the West Wilbraham site is located somewhat closer to residences than the West Hampden site (i.e., 825 feet compared with 550 feet). Existing noise levels appear to be similar at both the West Hampden and West Wilbraham Substation sites; consequently, noise impacts associated with the operation of substation equipment would be slightly greater at the West Wilbraham site. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to noise impacts.

To mitigate noise levels generated during construction of the Project along the Primary Route, the Companies would provide functional mufflers on all equipment (id.). In addition, the Companies and its contractors would comply with M.G.L. c. 90, § 16A and MassDEP regulations (310 C.M.R. 7.11 (1)(b)), which limit vehicle idling to no more than five minutes in most cases (Exh. EFSB-AIR-1).[36] Further, the Siting Board directs the Company to conduct all construction between the hours of 7:00 a.m. to 5:00 p.m. Monday through Saturday, excluding holidays. Where there are residences within 300 feet of the ROW, Saturday construction hours would be limited to 9:00 a.m. to 5:00 p.m. To the extent the Company finds that construction is necessary outside of these hours or on Sundays or holidays, the Company shall seek written

36 There are exceptions for vehicles being serviced, vehicles making deliveries that need to keep their engines running and vehicles that need to run their engines to operate accessories (Exh. EFSB-AIR-1).

permission from the relevant municipal authority prior to the commencement of such work, and provide the Siting Board with a copy of such permission. If the Company and municipal officials are not able to agree on any Company request to perform Sunday, holiday, or extended weekday construction, the Company may file a written request for authorization from the Siting Board prior to performing such construction, provided that it also notifies the relevant municipal authorities in writing of such request.

Although the Company has engaged in community outreach as discussed in Section II.E.3, above, a specific plan has not been developed. Therefore, the Siting Board directs the Company in consultation with the Towns of Palmer, Monson, and Hampden to develop a community outreach plan for construction of the Project. The outreach plan should, at a minimum, set forth procedures for providing prior notification to affected residents of: (a) the scheduled start, duration, and hours of construction; (b) any construction the Company intends to conduct that, due to unusual circumstances, must take place outside of the hours detailed above; (c) the availability of web-based Project information; and (d) complaint and response procedures including the Companies' contact information.

The Siting Board finds that, with the implementation of the Company's proposed mitigation including the installation of low noise transformers at the West Hampden Substation, use of mufflers for construction equipment, and implementation of idling restrictions, in addition to implementation of the conditions limiting construction hours near residential areas and development of a community outreach plan, noise impacts resulting from the construction of the Project along the Primary Route would be minimized.

g. Traffic Impacts

i. Primary Route

NEP asserts that construction, operation and maintenance of the transmission line would not significantly affect traffic flow on local roadways (Exh. NEP-1, at 5-17 to 5-18). As construction progresses, the location of worksites would progress along the transmission line ROW (id.). The Primary Route would cross 19 state, local, and private roads (Exh. NEP-1, at Table 5.4.2-1). Existing roads would provide access to the ROW (Exh. NEP-1, at 5-17). Construction of the transmission line along the Primary Route would result in temporary minor

traffic disruptions that would be short-term and localized due to the arrival and departure of construction workers as well as delivery of equipment and materials (id.). Pulling the transmission line over roadways may require temporary lane closures (Exh. NEP-1, at 5-17 to 5-18).

The Company would use a parcel off Fenton Road in Monson and a field adjacent to the proposed West Hampden Substation, both owned by NEP, for temporary lay-down areas, staging activities and parking for construction workers (Exh. EFSB-G-13). The Fenton Road site is located more than 300 feet from the nearest residence (Exh. EFSB-G-13(a)). As for the Hampden Substation site, there is a 500-foot buffer of trees between the site and the closest residences to the north, south, east, and west (Exh. NEP-1, at 5-56). There would be five crews of construction workers ranging from four to eight workers and one crew ranging from 14 to18 workers (Exh. EFSB-G-15). On a daily basis, roughly 25 to 30 personal construction workers' vehicles and between four to eight contractor pick-up trucks would enter and exit the lay-down areas (Exh. EFSB-T-1). Delivery of transmission line construction materials to the lay-down areas would occur during normal work hours (id.).

The construction of West Hampden Substation would likewise have temporary minor disruptions due to the delivery of construction equipment, materials and workers to the site (Exh. NEP-1, at 5-18). Long-term traffic impacts would be limited to periodic maintenance and inspections of the substation (id.).

In terms of mitigation of traffic impacts along the Primary Route, NEP would prepare a Traffic Management Plan ("TMP") in consultation with local officials from the towns of Palmer, Monson, and Hampden (Exh. NEP-1, at 5-19). The TMP would detail access routes, time restrictions, signage identifying construction work zones, travel routes to transport materials, police details for road crossings during wire pulling operations, and a notification process for residents and businesses concerning construction activities (id. at 5-19 to 5-20). NEP would also schedule wire pulling operations during weekday off-peak hours, evenings or weekends to minimize traffic impacts (id. at 5-20).

ii. Alternative Route

NEP stated that traffic impacts associated with the construction and operation of the Project along the Primary and Alternative Routes are similar (Exh. NEP-1, at 5-20). The Primary and Alternative Routes cross almost the same number of roadways (19 and 20 respectively), resulting in similar traffic impacts (id.). For the Alternative Route, NEP proposed access to the West Wilbraham Substation via Soule Road and the WMECo ROW to avoid traffic disruption in the neighboring residential neighborhood (id.). Post-construction, there should be no discernable impact on the flow of traffic, regardless of whether the Primary or Alternative Route is selected (id.).

iii. Conclusion on Traffic Impacts

For either route, there would be short-term localized impacts due to transportation of workers, materials, and equipment for transmission line and substation construction. However, the Alternative Route would also include refurbishing the entire O-15S line and as such, construction would occur along both routes, increasing the possibility of traffic impacts, extending the duration of construction, and expanding the geographical area of potential traffic impacts. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to traffic impacts associated with construction of the Project.

NEP would prepare a TMP in coordination with local officials, and schedule wire pulling for off-peak hours to mitigate traffic impacts. The Siting Board finds that traffic impacts associated with the Project along the Primary Route would be minimized.

h. Air Impacts

i. Construction Equipment Air Impacts

(A) Primary Route

According to MassDEP's Diesel Retrofit Guide, diesel engines produce significant amounts of particulate matter ("PM"), which are small solid and liquid particles composed primarily of carbon which can be easily inhaled and which pose a significant health risk to humans (Exh. EFSB-9, at 1). MassDEP indicates that reducing PM pollution from all sources, including construction equipment, is important for the health of workers and communities (id.). MassDEP has established a Massachusetts Diesel Retrofit Program ("MDRP") (id. at 4). The

MDRP involves using contract specifications to require contractors working on state-funded projects to install retrofit pollution controls on their construction equipment engines to reduce PM, volatile organic compounds ("VOCs"), and carbon monoxide ("CO") (id.). In three recent cases, the Siting Board imposed conditions requiring the applicant to retrofit certain diesel-powered construction equipment. See Lower SEMA at 78; GSRP at 80, 145; Worcester Decision at 41-43, 85.

The Companies have not yet selected a contractor for this Project and as such cannot state with certainty the exact equipment to be used for the Project (Exh. EFSB-AIR-2). However, the Companies have committed to retrofitting all diesel-powered non-road construction equipment rated 50 horsepower or above to be used for 30 or more days over the course of the project with USEPA-verified (or equivalent) emission control devices (e.g., oxidation catalysts or other comparable technologies) (Exh. EFSB-AIR-4). In addition, the Company has committed to using ultra-low sulfur diesel fuel in its diesel-powered construction equipment and limiting vehicle idling to five minutes pursuant to state regulations (Exh. EFSB-AIR-4).

(B) Alternative Route

Air impacts from construction equipment associated with construction of the Project along either the Primary or Alternative Routes would be similar in scope and duration. However, the Alternative Route also includes the refurbishment of the entire O-15S line, and the associated construction equipment air impacts with extended construction duration.

ii. $SF_6$ Impacts

Sulfur hexafluoride ("$SF_6$") gas has been identified as a non-toxic but highly potent greenhouse gas ("GHG").[37] The Massachusetts Clean Energy's Energy and Climate Plan[38] adopts a 2020 statewide GHG emissions limit of 25 percent below 1990 emissions levels and sets forth an integrated portfolio of policies to reach the Commonwealth's clean energy and

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37 One pound of $SF_6$ is considered to have the same global warming impact as eleven tons of $CO_2$. Massachusetts Clean Energy and Climate Plan for 2020, at 77.

38 On December 29, 2010, the Secretary of Energy and Environmental Affairs issued the Massachusetts Clean Energy and Climate Plan for 2020. See G.L. c. 21N.

climate goals. One of the policies set forth in the Plan is reducing $SF_6$ emissions by 2020 equivalent to a reduction of 0.2 million metric tons of carbon dioxide ("$CO_2$") from 1990 levels.

As part of the Siting Board's mandate to ensure that new energy facilities are consistent with the Commonwealth's current health, environmental protection, and resource use and development policies, the Siting Board has reviewed the Company's proposed use of $SF_6$ to ensure that $SF_6$ emissions are being reduced to the maximum extent possible. NEP's Massachusetts nameplate capacity is approximately 101,220 pounds of $SF_6$ (Exh. EFSB-T-5). For 2010, NEP reported 4,194 pounds of emissions for a leakage rate of 4.4 percent (Exh. EFSB-T-5; RR-EFSB-34).

NEP entered into an $SF_6$ Emissions Reductions Partnership MOU with the USEPA in December 2003 (Exh. EFSB-T-5). NEP's $SF_6$ reduction program consists of monitoring, prioritizing, and repairing leaking $SF_6$ equipment (id.). NEP uses an infrared camera specifically designed to detect $SF_6$, halogen leak detectors, and bubble mix to determine the locations of $SF_6$ leaks (id.). NEP is not able to specify an annual cost for its $SF_6$ leak detection program as these activities are incorporated into the Company's overall facility operation and maintenance program (id.).[39]

The Primary Route entails consolidating transmission and distribution equipment by retiring the existing Hampden Substation and installing the 115-to-13 kV transformer and equipment at the West Hampden Substation (Exh. EFSB-G-6). The Project requires the long-term use of $SF_6$ gas as an insulating and electrical arc quenching medium for the circuit breakers and circuit switcher at the West Hampden Substation (Exh. EFSB-T-5). There would be six circuit breakers and one circuit switcher installed, for a total of 358 pounds of $SF_6$ gas at the

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39 For 2010, WMECo reported 14 pounds of emissions for a leakage rate of 0.1 percent (Exh. EFSB-T-5). WMECo has been a participant in the $SF_6$ Emission Reduction Partnership since 1999 (id.). WMECo's $SF_6$ emission reduction program consists of leak monitoring, detection and maintenance (id.). WMECo's program includes the use of integrated $SF_6$ leak detection and monitoring systems with all $SF_6$ equipment purchases as well as periodic evaluation and prescribed maintenance (id.). WMECo estimated that its emission reduction program costs $50,000 annually (id.).

West Hampden Substation (id.).[40] NEP expects that the emission rate would be less than 0.5 percent per year at the West Hampden Substation, (id.).

The Alternative Route assumes the construction of a 115 kV-to-69 kV transformer at the West Wilbraham Substation and the continued utilization of the existing Wilbraham Substation for distribution purposes (RR-EFSB-53). In terms of $SF_6$ air impacts, the West Wilbraham Substation associated with the Alternative Route scenario would have one less 115 kV breaker compared to the proposed West Hampden Substation, resulting in a total of approximately 300 pounds of $SF_6$ (id.). There is one 69 kV circuit switcher at the existing Wilbraham Substation that contains approximately five pounds of $SF_6$, which would remain in service for both the Primary and Alternative Routes (id.).

Mitigation measures to be implemented by NEP at the West Hampden Substation associated with the Primary Route include installing circuit breakers that have a leak rate of less than 0.1 percent per year; installing pressure switches that send an alarm to the Company's central transmission control center upon loss of approximately ten percent of $SF_6$; and using an infrared camera specifically designed to detect $SF_6$ leaks (RR-EFSB-52). Furthermore, NEP would track $SF_6$ emissions as required by the USEPA Mandatory Greenhouse Gas Reporting Rule (id.).

iii. Conclusion on Air Impacts

Construction equipment air impacts would occur along both routes. If the Project is constructed along the Alternative Route, it would entail a longer construction period resulting in more construction equipment air impacts. Accordingly, since the Alternative Route entails construction along both routes, the Alternative Route would have greater air impacts from construction equipment. However, even though there would be similar $SF_6$ emission rates at both substations, there would be less $SF_6$ gas at the West Wilbraham Substation and, due to $SF_6$

40 At the West Hampden Substation there would be six 115 kV circuit breakers installed, each containing 58 pounds of $SF_6$ (RR-EFSB-53). There would also be one circuit switcher which would contain approximately ten pounds of $SF_6$, for a total of 358 pounds of $SF_6$ at the West Hampden Substation (id.).

being more potent than $CO_2$, the Siting Board finds that the Alternative Route is slightly preferable to the Primary Route with respect to potential air impacts.

The Companies have specified mitigation for construction equipment air emissions including using ultra-low sulfur diesel fuel in diesel-powered construction equipment, limiting vehicle idling to five minutes, and retrofitting all diesel-powered non-road construction equipment prior to construction.

The Siting Board directs the Company, as the Company has agreed, that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction must have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine. Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition and a list of retrofitted equipment, including type of equipment, make/model, model year, engine horsepower, and the type of emission control technology installed.

Further, in terms of $SF_6$ air impacts, NEP would be installing circuit breakers with a less than 0.1 percent annual leakage rate, along with pressure switches with alarms and leak detection equipment at the West Hampden Substation. The Company would also comply with USEPA $SF_6$ reporting requirements. Due to the Siting Board's longstanding concerns about GHG emissions and the Company's reliance on new equipment to help minimize future $SF_6$ leakage rates, the Siting Board directs the Company, within one year of operation of the West Hampden Substation, to provide a compliance filing detailing the actual leakage rate of $SF_6$ at the West Hampden Substation. If the Siting Board determines that the $SF_6$ leakage rate is greater than anticipated, the Siting Board may require operating changes or additional measures to address such $SF_6$ emissions rate deviations.

The Siting Board finds that with the implementation of the above conditions potential air impacts from the Project's construction along the Primary Route would be minimized.

i. Potentially Hazardous Materials

The Primary Route would entail the construction of the West Hampden Substation, which would include two transformers: a 115-to-69 kV autotransformer and a 115-to-13.2 kV autotransformer (Exh. NEP-2, at 1-2). With respect to handling and storage of any hazardous substances during construction of the Project, the Company would ensure that its contractors follow BMPs, adhere to regulatory requirements, and follow a Project-specific spill prevention, containment, and response plan (Exh. NEP-2, at 5-28; 5-29). The Company proposes the following mitigation measures: (1) specific oil handling procedures for the filling the transformers upon delivery; (2) compliance with NEP's Spill Response Plan, which requires immediate control, containment, clean-up and reporting of any spills; and (3) no storage of hazardous materials at the substation (Exh. EFSB-3, at 2). In addition, NEP would develop a Spill Prevention, Control, and Countermeasure ("SPCC") Plan, which would include measures such as constructing a berm around the substation perimeter fence, low volume alarms connected to NEP Dispatch, spill containment basins (110 percent volume) for transformers and routine inspection of the substation by NEP personnel (id. at 2, 3).

For the Alternative Route, the West Wilbraham Substation would be similar to the proposed West Hampden Substation, resulting in similar potential impacts from hazardous materials (Exh. NEP-2, at 5-4). The mitigation measures would also be similar for both the Primary and Alternative Routes. The Siting Board finds that the Primary and Alternative Routes are comparable with respect to potential hazardous materials impacts.

The Siting Board further finds that with the Company's implementation of its SPCC Plan, implementation of the Company's oil handling procedures, and compliance with the Company's Spill Response Plans, impacts from potentially hazardous materials would be minimized along the Primary Route.

j. Solid Waste Impacts

The Primary Route would generate solid waste from removing the existing O-15S line components and the retirement of the Allen Street Substation (Exh. EFSB-LU-5). The removal of the O-15S line would generate approximately 183 wood poles, 225 cross-arms, 1,040 insulators, and 107,000 pounds of conductors (id.).

The Alternative Route would generate a greater amount of solid waste compared to the Primary Route (Exh. EFSB-LU-6). While the Alternative Route is slightly shorter (9.6 miles) than the Primary Route (ten miles), and would eliminate the retirement of the existing Hampden Substation, it would not only require the removal of the N-14 line for the installation of the new 115 kV line but would necessitate the refurbishment of the O-15S line as a separate project (id.). Please see the comparison of solid waste between the Primary and Alternative Routes in Table 5, below:

**Table 5: Comparison of Solid Waste Generated from the Project Along the Primary and Alternative Routes**

| Component | Primary Route | Alternative Route |
|---|---|---|
| Line conversation | ten miles (O-15S line) | 9.6 miles (N-14 line) |
| Substation Retirement | Yes, Hampden Substation | No |
| Refurbishment | 4.4 miles of O-15S line | 14.4 miles of O-15S line |
| Wood poles | 183 | 360 |
| Cross-arms | 225 | 440 |
| Insulators | 1,040 | 2,040 |
| Conductor (pounds) | 107,000 | 209,700 |

Source: Exh. EFSB-LU-6; EFSB-RR-55

As shown in the table, the Alternative Route would generate almost twice as much solid waste compared to the Primary Route. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to solid waste impacts. In terms of mitigation of solid waste impacts for the Primary Route, it is NEP's policy to recycle treated wood poles for energy recovery or be reused as commercial products (Exh. EFSB-LU-7). Two examples of NEP's recycling plan include transporting obsolete treated wood poles to a facility in Quebec that reuses poles as guard rail posts (id.). Poles unsuitable for guard rails are chipped and used as a fuel source in the production of Portland cement in Quebec (id.).

The Company would be implementing the above-referenced solid waste reduction plan incorporating recovery and recycling of equipment, materials, and poles. The Siting Board seeks to be informed regarding the plans and effectiveness of recycling efforts associated with the construction of the Project. Therefore, in order to minimize solid waste impacts, the Siting Board directs the Company, prior to the commencement of construction, to provide to the Siting Board a construction recycling plan, and at the end of construction to report on the Company's

percentage of waste materials by waste type that were recycled. The Siting Board finds that, with implementation of the above condition, the solid waste impacts of the Project along the Primary Route would be minimized.

k. Magnetic Field Impacts

i. Primary Route

(A) Transmission Line

NEP is proposing a delta configuration of the conductors along the ROW (Exh. NEP-1, App. 5-4, at 21).[41] To calculate the magnetic field levels as a result of the Project, NEP ascertained current and voltage information for both existing normal and peak loading conditions and proposed future configurations at both normal and peak loading (Exh. NEP-1, App. 5-4, at 12-13; RR-EFSB-28). In addition, NEP determined the loads for the circuits at the proposed West Hampden Substation and the Palmer Substation (Exh. NEP-1, App. 5-4, at 12-13). NEP then calculated magnetic field levels for both normal and peak loads for the present day configuration, which consists of both the O-15S line with and without the N-14 line, and for the proposed configuration, which consists of the proposed R-170 line with and without the N-14 line (id. at 29). Table 6, below, shows the magnetic field impacts comparison for the existing conditions and modeled magnetic field impacts post-Project.

41 The delta configuration means that the davits holding the conductor on the top and bottom positions are on one side of the monopole and the conductor on the middle davit is on the opposite side of the monopole (Exh. NEP-1, App. 5-4, at 21).

**Table 6: Magnetic Fields within and at Edges of ROW for Existing and Proposed Configurations**

| Magnetic Fields | Location | Single Line Configuration | | Co-located with N-14 Line Configuration | |
|---|---|---|---|---|---|
| | | Existing, Present Day Normal/Peak | Proposed Configuration Normal/Peak | Existing, Present Day Normal/Peak | Proposed Configuration Normal/Peak |
| Magnetic Field milligauss ("mG") | Southeast edge of ROW (0 ft) | 3.1/2.8 | 4.5/4.6 | 10.2/17.4 | 5.1/6.3 |
| | Northwest edge of ROW (80 ft) | 8.9/7.9 | 11.4/11.9 | 11.6/13.5 | 10.3/10.2 |
| | At point of peak field within ROW | 23.8/21.1 | 23.2/24.0 | 24.5/43.6 | 19.2/18.5 |

Source: RR-EFSB-28

When comparing the existing conditions of the O-15S line with the replacement of the R-170 line, in areas where only the R-170 line is in the ROW, the magnetic field levels would slightly increase for both normal and peak loads at both the southeast and northwest edges of the ROW (RR-EFSB-28). At the point of peak field the magnetic field levels would decrease slightly for normal loads but would minimally increase for peak loads (id.). In sections of the ROW where the R-170 line would be co-located with the N-14 line, magnetic field levels would generally decrease (id.).

Magnetic field levels drop to lower values as the distance increases from the circuit center line (Exh. NEP-1, App. 5-4, at 25). For the Primary Route, where the R-170 line is solely within the ROW, the magnetic field levels decrease to 2.3 mG at 25 feet and 1.4 mG at 50 feet beyond the southeast edge of the ROW (RR-EFSB-29). In sections of the ROW where the R-170 line would be co-located with the N-14 line, magnetic field levels would decrease to 2.7 mG at 25 feet and 1.6 mG at 50 feet beyond the southeast edge of the ROW (id.).

As for the proposed West Hampden Substation, modeling shows that magnetic fields would be below five mG along most of the fence line (Exh. NEP-1, at 5-43). At locations where the transmission lines enter the substation magnetic fields would generally be below 50 mG with some areas modeled to be approximately 20 mG (id.). The highest magnetic field levels would occur where the 1515 line enters and exits the substation but would not exceed 50 mG (id.). The closest residence to the West Hampden Substation would be 825 feet away (Exh. EFSB-G-8).

ii. Alternative Route

The Alternative Route entails replacing the existing N-14 line with the R-170 line, which shares the O-15S line ROW for four miles (Exhs. NEP-1, at 5-4; NEP-1, App. 5-3, at 4). Table 7, below, summarizes magnetic field impacts of the Primary Route, in comparison to the Alternative Route.

**Table 7: Magnetic Fields within and at Edges of ROW for Primary and Alternative Route Configurations**

| Electromagnetic Fields | Location | Primary Route | | Alternative Route | |
|---|---|---|---|---|---|
| | | Single Line Normal/Peak | Co-located with N-14 Line Normal/Peak | Single Line Normal/Peak | Co-located with O-15S Line Normal/Peak |
| Magnetic Field milligauss ("mG") | Southeast edge of ROW (0 ft) | 4.5/4.6 | 5.1/6.3 | 4.5/4.6 | 11.3/10.4 |
| | Northwest edge of ROW (80 ft) | 11.4/11.9 | 10.3/10.2 | 11.4/11.9 | 7.5/12.1 |
| | At point of peak field within ROW | 23.2/24 | 19.2/18.5 | 23.2/24 | 29.8/37.7 |

Source: Exh. NEP-1, App. 5-4, at 29; RR-EFSB-28

iii. Conclusion on Magnetic Field Impacts

As shown in the tables above, the Primary and Alternative Routes would have the same magnetic field levels in areas where only the R-170 line occupies the ROW. In sections of the ROW where the R-170 line would be co-located with a 69 kV line, the magnetic field levels would be lower for the southeast edge of the ROW and point of peak field for the Primary Route, while the magnetic field levels would be slightly higher on the northwest edge of the ROW for the Primary Route. Accordingly, the Siting Board finds that the Primary and Alternative Routes are similar with respect to magnetic field impacts. Further, the increases in magnetic field levels are minimal along the ROW where the R-170 line would solely occupy the ROW, and the levels would generally decrease where the R-170 line would be co-located with the N-14 line in comparison to existing conditions. Accordingly, the Siting Board finds that electric magnetic field levels would be minimized along the Primary Route.

5. Conclusion on Analysis of the Primary and Alternative Routes

The Siting Board finds that the information provided by the Companies regarding the Project's environmental impacts is substantially accurate and complete. In comparing the environmental impacts along the two routes, the Siting Board finds that the Primary Route would have lower land use and historic resources, water resources and wetlands, protected species, noise, traffic, and solid waste impacts than the Alternative Route due to the fact that selecting the Primary Route obviates the requirement to refurbish the entire length of the O-15S line. Whereas, if the Alternative Route is chosen, the entire 14.4 miles of the O-15S line would have to be refurbished. The Siting Board finds that the Alternative Route would have lower air impacts. The Siting Board further finds that there would be comparable visual, potential hazardous material, and electric magnetic field impacts for the Primary and Alternative Routes. On balance, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to environmental impacts.

The Siting Board also finds that with the implementation of the specified conditions and mitigation presented in Section V.B.4 above, and compliance with all local, state, and federal requirements, the environmental impacts of the Project along the Primary Route would be minimized.

6. Cost

The Companies developed refined estimates based on costs associated with recently completed and ongoing projects for both the Primary and Alternative Routes (Exh. EFSB-C-1; Tr. 5, at 689). The cost estimates for the routes are summarized in the Table 8, below:

**Table 8: Route Cost Comparison**

| Project Component | Primary Route | Alternative Route |
|---|---|---|
| | | |
| Transmission Line | $16,000,000 | $17,400,000 |
| O-15S Refurbishment | $1,250,000 | $5,650,000 |
| New Substation | $14,500,000 | $11,000,000 |
| Substation Retirement | $500,000 | 0 |
| Wilbraham Substation Upgrades | 0 | 3,550,000 |
| Palmer Substation Upgrades | $1,600,000 | $1,600,000 |
| WMECo Upgrades | $1,400,000 | $1,400,000 |
| **Total Estimated Cost** | **$35,250,000** | **$40,600,000** |

Source: Exh. EFSB-C-1

The difference in cost between the Primary and Alternative Route is $5.35 million (Exh. EFSB-C-1). The cost differential is attributable primarily to lower O-15S refurbishment costs for the Primary Route (id.). NEP stated that it has more information on the Primary Route with regard to adaption of structure type and locations to accommodate environmental and engineering concerns, ROW restrictions, and abutter concerns (id.). NEP would bear most of the estimated cost associated with the Project; however, WMECo would be responsible for $1.4 million associated with constructing a 115 kV loop line into and out of the West Hampden Substation to connect the 1515 line as well as upgrades to the Scitico and Ludlow Substations (Exh. EFSB-C-3). The Company states most of the Project would be considered Pool Transmission Facilities and would be eligible for regional cost support (id.; RR-EFSB-61).[42]

Although the Siting Board does not have jurisdiction over regulatory cost recovery, the Siting Board's statutory mandate is to review the need for, cost of, and environmental impacts of transmission lines. G.L. c 164, § 69H. In order to review the costs of the Project, and in an effort to identify the factors that may lead to cost overruns and delays in construction of approved facilities, the Siting Board directs the Company to submit to the Board an updated and certified cost estimate for the Project prior to the commencement of construction. Additionally,

42 Non-Pool Transmission Facilities include the refurbishment of the O-15S line from the West Hampden Substation to the East Longmeadow Substation, the cost of all 69kV equipment (including the 115-to-69 kV autotransformers), and the retirement of the Hampden Substation (RR-EFSB-61).

the Siting Board directs NEP to file semi-annual compliance reports with the Siting Board starting within 60 days of the commencement of construction, that include projected and actual construction costs and explanations for any discrepancies between projected and actual costs and completion dates, and an explanation of the Company's internal capital authorization approval process.

Given the likely lower costs of the Primary Route, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to cost.

7. Reliability

In terms of assessing reliability of transmission projects, the Company typically assesses total exposure (length) of the transmission line, location of the facilities, types of construction methodology, and access to the line for repairs (Exh. NEP-1, at 5-59). Both the Primary and Alternative Routes are reliable means for enhancing electrical service to the towns of Hampden, East Longmeadow, Wilbraham, Monson, and Palmer (id.). The Primary and Alternative Routes would be of similar length, be constructed in similar geographical locations, and involve similar construction techniques (id.).

The Company asserts that while the Primary Route is slightly longer than the Alternative Route, less time would be required to construct the line along the Primary Route as compared to the Alternative Route (Exh. EFSB-R-1). The Company bases its argument on the increased construction time required along the Alternative Route to remove a greater number of N-14 structures and greater number of dead end structures for the R-170 line to address angles in the ROW (id.). It should be noted that the Primary Route also entails refurbishment of 4.4 miles of the O-15S line compared with refurbishment of 14.4 miles of the O-15S line for the Alternative Route, which also increases the duration of construction for the Alternative Route (id.). The Company points out that due to the shorter construction duration for the Primary Route, the transmission line would be out of service for a shorter time than for the Alternative Route (id.). However, the Company could not provide an estimate on the actual construction time difference due to not having firm engineering information regarding the transmission structure design and soil conditions for the Alternative Route (Exh. EFSB-R-2).

Given the fact that Company could not provide sufficient information to support its assertion that reliability would be better during construction of the Project along the Primary Route versus the Alternative Route and that reliability would be comparable for both routes once the Project was operational, the Siting Board finds that reliability is comparable for the Primary and Alternative Routes.

8. Conclusions on Route Comparison

Table 9, below, summarizes the comparison between the Primary and Alternative Routes in terms of environmental impacts, cost and reliability.

**Table 9: Comparison of the Primary and Alternative Routes**

| Type of Impact | Primary Route | Alternative Route | Least Impact Primary(P), Alternative (A) Comparable (C) |
|---|---|---|---|
| Land Use and Historic Resources Impacts | 102 residences w/in 300' of ROW; 8 MHC Inventory properties w/in 0.25 miles of ROW; 4.4 miles of the O-15S line would be refurbished | 116 residences w/in 300' of ROW; 19 MHC Inventory properties w/in 0.25 miles of ROW; 14.4 miles of the O-15S line would be refurbished; substation site has Article 97 land use restriction | P |
| Water Resources and Wetland Impacts | Crosses 19 waterways, 32 wetlands, and 0.5 miles of two Zone II Wellhead Protection Areas; transmission line would permanently impact 0.08 acres of wetlands and West Hampden Sub would impact 0.06 acres of wetlands | Crosses 14 waterways, 24 wetlands and the same 2 Wellhead Protection Areas | P |
| Protected Species Impacts | 2.7 miles of Priority Habitat, 2.6 miles of Estimated Habitat, 4 protected reptile and 1 protected plant species | 3.1 miles of Priority Habitat, 2.5 miles of Estimated Habitat, 3 protected reptile, 1 protected plant, and 1 protected amphibian species | P |
| Visual Impacts | Avg height of existing poles – 38', avg height of new poles is 71' (70% increase), # of structures would be reduced from 177 to 156; 48 homes now have direct views of structures and wires, additional 16 would have direct views post Project | Similar visual impacts resulting from transmission line and substation; Same substation equipment and similar type of site as the Primary Route | C |
| Noise Impacts | Construction noise 60-90 dBA; Transformer and HVAC at Hampden Sub. would increase ambient sound by 2 dBA at nearest residence 825' away | Similar construction, transformer and HVAC noise; Construction noise would occur along both routes due to O-15S refurbishment | P |
| Traffic Impacts | Minor disruptions due to workers and delivery of equipment + materials | Similar impacts, but impacts would occur along both routes for a longer duration and larger geographical area | P |
| Air Impacts | Construction equipment air emissions for 12-16 months for substation and 6-9 months each for R-170 line and Palmer Sub. upgrades; 6 circuit breakers + 1 circuit switcher = 358 lbs of $SF_6$ gas | Similar construction equipment air emissions however the duration would be longer for construction along both routes; 5 circuit breakers + 1 circuit switcher = 300 lbs of $SF_6$ | A |
| Hazardous Materials Impacts | Transformers at the West Hampden Sub include use of oil | Similar potential impacts | C |
| Solid Waste Impacts | Generate ½ the waste of Alternative | Generate twice the waste as Primary | P |
| Magnetic Field Impacts | In sections of the ROW where the R-170 line would be co-located with a 69 kV line, the magnetic field levels would be lower for the southeast edge of the ROW and point of peak | Primary and Alternative Routes would have same magnetic field levels where the R-170 line would solely occupy the ROW. The magnetic fields would be lower on the northwest edge of the ROW | C |
| Cost | $35.25 million | $40.6 million | P |
| Reliability | New 115 kV line would have higher capacity and higher thermal rating due to lower impedance of 69 kV line | Similar reliability benefits | C |

Based on review of the record, the Siting Board finds that the Company provided sufficient information regarding cost, reliability, and environmental impacts to allow the Siting Board to determine whether the Project has achieved a proper balance among cost, reliability and environmental impacts. The Siting Board finds that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost. The Siting Board therefore finds that the Primary Route is preferable to the Alternative Route with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

C. Consistency with the Policies of the Commonwealth

1. Standard of Review

G.L. c. 164, § 69J requires the Siting Board to determine whether plans for construction of the applicant's new facilities are consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth.

2. Analysis and Conclusions

a. Health Policies

In Section 1 of the Electric Utility Restructuring Act of 1997, the Legislature declared that "electricity service is essential to the health and well-being of all residents of the Commonwealth . . ." and that "reliable electric service is of utmost importance to the safety, health, and welfare of the Commonwealth's citizens . . . ." See c. 164 of the Acts of 1997, Section 1(a) and (h). In Section III.D, above, the Siting Board finds that the Project would improve the reliability of electric service in the towns of Hampden, East Longmeadow, Wilbraham, Monson, and Palmer. In addition, in Section V.B.4, the Siting Board requires the Company to use only retrofitted off-road construction equipment to limit emissions of PM during Project construction. This condition is consistent with MassDEP's Diesel Retrofit Program designed to address health concerns related to diesel emissions. In Section V.B.5, the Siting Board finds that the Project's magnetic field, traffic, hazardous materials, and air impacts have been minimized. Accordingly, subject to the Companies' specified mitigation and the Siting Board's conditions set forth in Section IX below, the Siting Board finds that the Company's

plans for construction of the Project are consistent with the current health policies of the Commonwealth.

b. Environmental Protection Policies

In Section V.B, above, the Siting Board reviewed how the Project would meet various state environmental protection requirements. The Siting Board also: (1) considered the Project's environmental impacts, including those related to water resources, wetlands, endangered species, land use, historical resources, air emissions, noise, and visual impacts; and (2) concluded that subject to the specified mitigation and conditions set forth below, the Project's environmental impacts have been minimized. See Section VIII.A, below, for a discussion on the Massachusetts Environmental Policy Act ("MEPA") Greenhouse Gas Emission Policy and Protocol.

Subject to the specified mitigation and conditions set forth in this Decision, the Siting Board finds that the Company's plans for construction of the Project are consistent with the current environmental policies of the Commonwealth.

c. Resource Use and Development Polices

In 2007, pursuant to the Commonwealth's Smart Growth/Smart Energy policy produced by the Executive Office of Energy and Environmental Affairs, Governor Patrick established Sustainable Development Principles. Among the principles are: (1) supporting the revitalization of city centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources, and integrates uses; (2) encouraging reuse of existing sites, structures and infrastructure; and (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes. The Siting Board notes that the Project is designed to enhance the reliability of electricity delivery in the towns of Hampden, East Longmeadow, Wilbraham, Monson, and Palmer. The Project replaces an existing 69 kV line and is located within an existing ROW. In addition, local officials and community groups have provided input concerning mitigation plans. In Section V.A, above, the Siting Board reviewed the process by which the Company sited the Project. Finally, the Siting Board found in Section V.B.4, above, that the Project is unlikely to impact water, protected species or historic resources.

Subject to the specified mitigation and the conditions set forth in this Decision, the Siting Board finds that the Company's plans for construction of the Project are consistent with the current resource use and development policies of the Commonwealth.

## VI. ANALYSIS UNDER G.L. C. 40A, § 3 - ZONING EXEMPTIONS

Pursuant to G.L. c. 40A, § 3, the Company requests individual zoning exemptions from the Town of Palmer Zoning Ordinance ("Palmer Zoning Ordinance"), the Town of Monson Zoning Bylaw ("Monson Zoning Bylaw"), and the Town of Hampden Zoning Bylaw ("Hampden Zoning Bylaw") for the proposed transmission line and related substation improvements. The Company also seeks a comprehensive zoning exemption from each municipality's zoning bylaw or ordinance.

### A. Individual Zoning Exemptions

#### 1. Standard of Review

G.L. c. 40A, § 3 provides, in relevant part, that:

> Land or structures used, or to be used by a public service corporation may be exempted in particular respects from the operation of a zoning ordinance or by-law if, upon petition of the corporation, the [Department] shall, after notice given pursuant to section eleven and public hearing in the town or city, determine the exemptions required and find that the present or proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public . . .

Thus, a petitioner seeking exemption from a local zoning by-law under G.L. c. 40A, § 3 must meet three criteria.[43] First, the petitioner must qualify as a public service corporation.

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[43] G.L. c. 40A, § 3 applies to the Department. The Department refers zoning exemption cases to the Siting Board for hearing and decision pursuant to G.L. c. 25, § 4. When deciding cases under a Department statute, the Siting Board has the power and the duty:

> to accept for review and approval or rejection any application, petition or matter related to the need for, construction of, or siting of facilities referred by the chairman of the department . . . provided, however, that in reviewing such application, petition or matter, the board shall apply department and board standards in a consistent manner.

G.L. c. 164, § 69H.

Save the Bay, Inc. v. Department of Public Utilities, 366 Mass. 667 (1975) ("Save the Bay"). Second, the petitioner must establish that it requires exemption from the zoning ordinance or by-law. Boston Gas Company, D.T.E. 00-24, at 3 (2001) ("Boston Gas Decision"). Finally, the petitioner must demonstrate that its present or proposed use of the land or structure is reasonably necessary for the public convenience or welfare. Massachusetts Electric Company, D.T.E. 01-77, at 4 (2002) ("MECo/Westford"; Tennessee Gas Pipeline Company, D.T.E. 01-57, at 3-4 (2002) ("Tennessee/Agawam").

2. Public Service Corporation

a. Standard of Review

In determining whether a petitioner qualifies as a "public service corporation" ("PSC") for the purposes of G.L. c. 40A, § 3, the Massachusetts Supreme Judicial Court has stated:

> among the pertinent considerations are whether the corporation is organized pursuant to an appropriate franchise from the State to provide for a necessity or convenience to the general public which could not be furnished through the ordinary channels of private business; whether the corporation is subject to the requisite degree of governmental control and regulation; and the nature of the public benefit to be derived from the service provided.

Save the Bay at 680. See also, Boston Gas Decision, D.T.E. 00-24, at 3-4; Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997) ("Berkshire Power").[44]

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[44] The Department interprets this list not as a test, but rather as guidance to ensure that the intent of G.L. c. 40A, § 3 would be realized, i.e., that a present or proposed use of land or structure that is determined by the Department to be "reasonably necessary for the convenience or welfare of the public" not be foreclosed due to local opposition. See Berkshire Power, D.P.U. 96-104, at 30; Save the Bay at 685-686; Town of Truro v. Department of Public Utilities, 365 Mass. 407 (1974) ("Town of Truro"). The Department has interpreted the "pertinent considerations" as a "flexible set of criteria which allow the Department to respond to changes in the environment in which the industries it regulates operate and still provide for the public welfare." Berkshire Power, D.P.U. 96-104, at 30; see also Dispatch Communications of New England d/b/a Nextel Communications, Inc., D.P.U./D.T.E. 95-59-B/95-80/95-112/96-113, at 6 (1998). The Department has determined that it is not necessary for a petitioner to demonstrate the existence of "an appropriate franchise" in order to establish PSC status. See Berkshire Power, D.P.U. 96-104, at 31.

b. Analysis and Conclusion

The Company is an electric company as defined by G.L. c. 164, § 1 and, as such, qualifies as a public service corporation. Worcester Decision at 7. Accordingly, the Siting Board finds that the Company is a public service corporation for the purposes of G.L. c. 40A, § 3.

3. Public Convenience or Welfare

a. Standard of Review

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. Save the Bay at 680; Town of Truro at 407. Specifically, the Department is empowered and required to undertake "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964) ("New York Central Railroad"). When reviewing a petition for a zoning exemption under G.L. c. 40A, § 3, the Department is empowered and required to consider the public effects of the requested exemption in the State as a whole and upon the territory served by the applicant. Save the Bay at 685; New York Central Railroad at 592.

Therefore, when making a determination as to whether a petitioner's present or proposed use is reasonably necessary for the public convenience or welfare, the Department examines: (1) the need for, or public benefits of, the present or proposed use; (2) the present or proposed use and any alternatives or alternative sites identified;[45] and (3) the environmental impacts or any

[45] With respect to the particular site chosen by a petitioner, G.L. c. 40A, § 3 does not require the petitioner to demonstrate that its primary site is the best possible alternative, nor does the statute require the Department to consider and reject every possible alternative site presented. Rather, the availability of alternative sites, the efforts necessary to secure them, and the relative advantages and disadvantages of those sites are matters of fact bearing solely upon the main issue of whether the primary site is reasonably necessary for the convenience or welfare of the public. Martarano v. Department of Public Utilities, 401 Mass. 257, 265 (1987); New York Central Railroad at 591.

other impacts of the present or proposed use. The Department then balances the interests of the general public against the local interest and determines whether the present or proposed use of the land or structures is reasonably necessary for the convenience or welfare of the public. Boston Gas Decision, D.T.E. 00-24, at 2-6; MECo/Westford at 5-6; Tennessee/Agawam at 5-6; Tennessee Gas Company, D.T.E. 98-33, at 4-5 (1998).

b. Analysis

With respect to need for, or public benefits of, the Project, the Siting Board found in Section III, above, that (1) additional energy resources are needed for reliability; and (2) the Project would address these reliability issues.

Regarding alternatives, in Section IV, the Siting Board analyzed a number of different project approaches other than the Company's proposed 115 kV transmission line alternative that the Company might use to meet the reliability need (such as step-down substation, 345 kV transformer, SVC, and DSM) and concludes that the proposed approach is preferable to other approaches. The Siting Board also reviewed the Company's route selection process in Section V.A, and determined that the Company applied a reasonable set of criteria for identifying and evaluating routes to ensure that no clearly superior route was missed. The Siting Board also compared the benefits of the Primary and Alternative Routes and concluded that the Primary Route is preferable to the Alternative Route in providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Finally, regarding Project impacts, in Section V.B, the Siting Board reviewed the environmental impacts of the Project and found that, while the Project may result in some local adverse impacts, generally, with the implementation of certain mitigation and conditions, the impacts of the proposed Project would be minimized. The Siting Board also found that area residents would benefit from the Project as it would improve the reliability of electricity delivery.

Based on the foregoing, the Siting Board finds that the general public interest in constructing the Project outweighs any adverse local impacts. Accordingly, the Siting Board finds that the proposed Project is reasonably necessary for the convenience or welfare of the public.

4. Individual Exemptions Required

a. Standard of Review

In determining whether exemption from a particular provision of a zoning bylaw is "required" for purposes of G.L. c. 40A, § 3, the Department looks to whether the exemption is necessary to allow construction or operation of the petitioner's Project. See MECo/Westford at 4-5; Tennessee/Agawam at 5; Western Massachusetts Electric Company, D.P.U./ D.T.E. 99-35, at 4, 6-8 (1999); Tennessee Gas Company, D.P.U. 92-261, at 20-21 (1993).[46]

b. List of Exemptions Sought

The Company seeks exemption from the following provisions of the Palmer Zoning Ordinance, the Monson Zoning Bylaw, and the Hampden Zoning Bylaw in order to construct and operate the Project:

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[46] It is the petitioner's burden to identify the individual zoning provisions applicable to the Project and then to establish that exemption from each of those provisions is required:

> The Company is both in a better position to identify its needs, and has the responsibility to fully plead its own case . . . The Department fully expects that, henceforth, all public service corporations seeking exemptions under c. 40A, § 3 would identify fully and in a timely manner all exemptions that are necessary for the corporation to proceed with its proposed activities, so that the Department is provided ample opportunity to investigate the need for the required exemptions.

New York Cellular Geographic Service Area, Inc., D.P.U. 94-44, at 18 (1995).

**Table 10: Palmer Individual Exemptions Sought**

| Description | Article |
|---|---|
| Expansion or Extension of Pre-existing or Nonconforming Use | Article XV, § 171-83 |
| Landscape and Buffer Strip | Article XII, § 171-67G; Article XVI |
| Water Supply Protection District | Article XIV, § 171-69J and/or § 171-69K |
| Flood Plain District | Article XIII, § 171-68E |
| Height and Yard Setbacks | Article XV, § 171-35 |
| Lot Requirements | Article XV, § 171-83K |
| Earth Removal –Water Supply Protection District | Article XIV, § 171-69E and § 171-69G |
| Filling of Land | Article XV, § 171-75 |
| Site Plan | Article XII, § 171-67B and Article V, § 171-29 |

Source: Exh. LPM-PFT, Table 1

**Table 11: Monson Individual Exemptions Sought**

| Description | Section |
|---|---|
| Expansion or Extension of Pre-existing or Nonconforming Use | Section 3.3.2 |
| Use Restrictions | Sections 2.3; 3.0 |
| Flood Plain District | Section 4.1 |
| Water Supply Protection District | Section 4.2 |
| Prohibits Access to Business or Industrial use | Section 3.4.2 |
| Excavation and Structures in a Floodplain District | Sections 4.1.5; 4.1.7 |
| Alteration of Existing Use in a Water Supply Protection District | Section 4.2.6.C |
| Height | Section 3.4 |
| Yard Setbacks | Section 3.4.3 |
| Site Plan | Section 7.4 |
| Earth Removal and Fill | Section 6.6 |
| Landscaping | Section 5.1.10 |
| Parking | Section 5.4 |

Source: Exh. LPM-PFT, Table 2

**Table 12: Hampden Individual Exemptions Sought**

| Description | Section |
|---|---|
| Extension of Pre-existing or Nonconforming Use | Section 4.2 |
| Extension of Pre-existing or Nonconforming Use Water Supply Protection District | Section 6.118 |
| Use Restrictions | Section 6 |
| Underground Utilities, Development and Performance Standards | Sections 6.83; 6.107; 7.72.11 |
| Non-Profit Educational and Recreation District Design Standards | Section 6.82 |
| Earth Removal in Wetlands District | Section 6.924.2 |
| Earth Excavation in Water Supply Protection District | Sections 6.114; 6.117 |
| Ridgeline and Hillside Overlay District | Sections 6.106; 6.107; 6.109 |
| Dimensional – Height and Yard Setbacks | Section 7, Table 7.2 |
| Earth Removal | Section 7.8 |
| Landscaping Performance Standards | Sections 7.10; 7.72.3 |
| Parking | Section 7.5 |

Source: Exh. LPM-PFT, Table 3

c. Consultation with the Municipalities

The Siting Board favors the resolution of local issues on the local level whenever possible to reduce local concern regarding any intrusion on home rule authority. Thus, the Siting Board encourages zoning exemption applicants to consult with local officials, and in some circumstances, to apply for local zoning permits, prior to seeking zoning exemptions from the Department under G.L. c. 40A, § 3. Worcester Decision at 75-77; GSRP at 132-133; Russell Biomass LLC, 17 DOMSB 1, at 60-63 (2009) ("Russell").

The Company in this case did not apply to the towns for any local zoning relief before filing its Zoning Petition with the Department. However, the Siting Board has held that applying for local zoning permits in advance of filing a zoning exemption petition is not required where to do so would likely be futile, or where the Company has met the spirit and intent of Russell by engaging in outreach with the affected municipalities regarding the Company's plan to seek zoning relief from the Department. Other factors supporting a finding that the spirit and intent of Russell have been met are that the affected municipalities do not object to the Company seeking such relief; and that the Company has made a good faith effort to abide by the reasonable

recommendations of the municipalities with respect to the Project. Worcester Decision at 76-77; see also, GSRP at132-133.[47]

With respect to outreach to local authorities, the Company states that it has engaged in substantial and good faith consultations with numerous officials of the towns of Palmer, Monson and Hampden regarding the applicability of the respective zoning bylaws and ordinances to the Project and its intention to seek the necessary zoning exemptions (Exh. NEP-3, at 4).[48] Outreach activities began in February 2009 and have continued on a regular basis through the course of the Project (Exh. EFSB-G-17). Palmer and Hampden offered their general support for the Company's determination to seek zoning exemptions; the Town of Monson noted that it did not object to the grant of zoning exemptions; and none of the towns elected to participate in this proceeding (Exhs. NEP-3, LPM-2; EFSB-Z-15).

d. Reasons Why Exemptions are Required

The Company has identified the above-described provisions of the Hampden and Monson Zoning Bylaws and the Palmer Zoning Ordinance from which it seeks exemption to minimize Project delay in the construction and ultimate operation of the Project.

The proposed Project is not an allowable use under the Monson and Hampden Bylaws (Exh. LPM-PFT at tables 1, 2, and 3). Use variances are not allowed under the Monson and Hampden Bylaws (id.). In addition, as use variances are not allowed under the Monson Bylaws, the Floodplain District, and Water Supply Protection District provisions would not be allowed and would require an exemption (id. at table 2). Finally, there is no available relief from the

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47 The Department has adopted and clarified the Russell principle in subsequent Department zoning exemption decisions: e.g., Tennessee Gas Pipeline Company, D.P.U. 11-26, at 26 (2012); New England Power Company, D.P.U. 09-136/09-137, at 34-37 (2011); New England Power Company, D.P.U. 09-27/09-28, at 47 (2010); Western Massachusetts Electric Company, D.P.U. 09-24/09-25, at 33 (2010).

48 The Company conducted zoning meetings with (1) the Palmer Town Planner, Building Inspector, and Chairman of the Planning Board; (2) the Monson Building Inspector and an Administrative Assistant; and (3) the Hampden Building Inspector and the Planning Board (Exhs. NG-LPM-2 at 5; EFSB-Z-2; EFSB-Z-3; EFSB-Z-15). Further, the Company met with the Hampden Building Inspector, Fire Chief and a representative of the planning board to review plans for the West Hampden Substation (Tr. 4, at 432-433).

general pre-existing or non-conforming use provision and the pre-existing or non-conforming use provision for the Water Supply Protection District of the Hampden Bylaw (id. at table 3).

With regard to provisions that require variances, the Company states that variances are a disfavored form of relief and are subject to appeal (Exh. LPM-PFT at 8). Further, the Company points out that the variance process could take up to 100 days for a decision to be issued and in the event a variance is granted, it would lapse within one year if it is not exercised (Exh. EFSB-Z-2). While variances are not prohibited under any of the zoning bylaws or ordinances, the Siting Board concurs that obtaining a variance can cause undue delays and subject a project to a difficult legal standard to meet and uphold in court. Therefore, the Siting Board concludes that the following provisions require an exemption: height and yard setbacks, lot requirements, and earth removal in Palmer; access to business or industrial use, excavation and structures in a Floodplain District; height, yard setbacks, and parking in Monson; and Non-Profit Education and Recreation District design standards, earth removal in Wetlands District, earth excavation in Water Supply Protection District, height, yard setback, and parking in Hampden (Exh. LMP-PFT, tables 1, 2, and 3).

With regard to the provisions relating to site plan review and issuance of special permits, the Company submits that the subjective and ambiguous nature of the criteria and the issuance of conditions could lead to uncertainty relative to construction of the Project (Exhs. EFSB-Z-6; LPM-PFT at 9). Specifically, the Company maintains that the discretionary nature of site plan review and special permits can result in burdensome or restrictive conditions that may interfere with state and industry established utility standards (Exh. LPM-PFT at 10; Tr. 4, at 435). The Siting Board acknowledges that while these provisions do not on their face prevent the development of the Project, there is some likelihood that these provisions could result in an adverse outcome, a burdensome requirement, or an unnecessary delay as part of zoning review. Therefore, the Siting Board concludes that the following provisions require an exemption: site plan, Water Supply and Protection District, Floodplain District, and filling of land in Palmer; pre-existing or non-conforming use, alteration of existing use in a Water Supply Protection District; site plan, earth removal and fill, and earth removal in Monson; and earth removal in Hampden (Exh. LPM-PFT, tables 1, 2, and 3).

All of the landscaping provisions in each town require relief from standards required in connection with local permits, which could involve site plan review or special permits (Exh. LPM-PFT, tables 1, 2, and 3). The Company stated that landscaping along the transmission line would be undertaken on a case-by-case basis (Exh. NG-LPM-2, at 42). In addition, the Company asserted that the existing vegetative conditions at the West Hampden and Palmer Substations should meet the spirit and intent of the towns' landscaping bylaws (Exh. EFSB-Z-7). As discussed above in Section V.B.4.e, the Siting Board has imposed conditions to implement off-site landscaping along the ROW. Further, the Siting Board acknowledges that while these provisions do not on their face prevent the development of the proposed project, there is some likelihood that these provisions could result in an adverse outcome, a burdensome requirement, or an unnecessary delay as part of zoning review. Therefore, the Siting Board concludes that the following provisions require an exemption: landscape and buffer strip in Palmer; landscaping in Monson; and landscaping and performance standards in Hampden.

As to the requirements of use as they relate to Palmer's Zoning Ordinance, it has not been determined with certainty whether the project constitutes a pre-existing non-conforming use, which would require a finding by the Planning Board (Exhs. LPM-2, at 9; EFSB-Z-2, at 2). In addition, if the Project is not regulated as a pre-existing non-conforming use, then it would require site plan approval (id. at 9-10). The Company also requested an exemption from the Ridgeline and Hillside Overlay District in Hampden, as the transmission line is located in this district, but the substation is not (Exh. NG-LMP-2, at 26). The Company indicated that there is uncertainty as to whether this provision would apply, and if it does, whether the linear nature and conformance to established utility standards precludes the transmission line from being moved outside the overlay districts (Exh. EFSB-Z-10). Finally, the Company requested exemptions from provisions relating to locating utility lines underground, and given uncertainty as to whether these provisions apply only to subdivisions (Exh. NG-LMP-2). The Siting Board acknowledges that while these provisions do not on their face prevent the development of the proposed project, there is some likelihood that these provisions could result in an adverse outcome, a burdensome requirement, or an unnecessary delay as part of zoning review. Therefore, the Siting Board concludes that the following provisions require an exemption:

pre-existing or nonconforming use in Palmer, and Ridgeline and Hillside Overlay District in Hampden.

The Siting Board finds that the substantive sections of the Monson and Hampden Zoning Bylaws and the Palmer Zoning Ordinance included in Tables 10 through 12 above, would or could affect the Company's ability to implement the project as proposed. Accordingly, the Siting Board finds that NEP has demonstrated that the requested zoning exemptions are required pursuant to G.L. c. 40A, § 3.

5. Conclusion on Request for Individual Zoning Exemptions

As described above, the Siting Board finds that (1) the Company is a public service corporation; (2) the proposed use is reasonably necessary for the public convenience or welfare; and (3) the specifically named zoning exemptions set forth in Tables 10 through 12, are required for construction of the Project, under the circumstances of this case, within the meaning of G.L. c. 40A, § 3. Accordingly, the Siting Board grants the Company's request for the individual zoning exemptions listed above in Tables 10, 11, and 12.

B. Comprehensive Zoning Exemptions

1. Standard of Review

The Company has requested a comprehensive exemption from the Monson Zoning Bylaw, the Hampden Zoning Bylaw, and the Palmer Zoning Ordinance. The Siting Board will grant such requests on a case-by-case basis and only where the applicant demonstrates that issuance of a comprehensive exemption could avoid substantial public harm by serving to prevent a delay in the construction and operation of the proposed use. Worcester Decision, at 81; GSRP, at 135.

In order to make a determination regarding substantial public harm, the Department and the Siting Board have articulated relevant factors, including, but not limited to, whether: (1) the Project is time sensitive; (2) the Project involves multiple municipalities that could have conflicting zoning provisions that might hinder the uniform development of a large project spanning these communities; (3) the proponent of the project has actively engaged the communities and responsible officials to discuss applicability of local zoning provisions of the Project and address local concerns; and (4) the affected communities do not oppose the issuance

of the comprehensive exemption. NSTAR Electric Company, EFSB 10-2/D.P.U. 10-131/10-132, at 111 (2012); Worcester Decision, at 82; GSRP, at 136-137.

2. Company Position

The Company asserts that the Project is needed immediately to avoid substantial public harm associated with potential transmission system voltage violations it has identified in the Study Area and the resulting potential for widespread voltage collapse and loss of loads in the event of the system contingencies evaluated in this proceeding (Company Brief at 158). As a transmission provider, NEP asserts that it must maintain its system consistent with NPCC and ISO-NE reliability standards and criteria and that it is required to take action at this time, and without delay (Exh. NEP-1, at 2-1 to 2-5). The Company also noted that five severe weather events occurred in the Study Area in 2011 and it contends that each resulted in significant transmission-related customer outages that would have been avoided had the Project been in service (Exhs. DML-PFT(S) at 11; DML-PFT(S2)(1)).

NEP asserts that the Project is time sensitive and that its successful completion depends on avoiding delays, maintaining a demanding schedule, and preventing complications that could arise when complex, interdependent tasks are undertaken (Company Brief at 160). For example, given that the Project includes taking the O-15S line out of service, the Company maintains that it is of particular importance that once construction commences on the transmission line, it continue uninterrupted until the new R-170 is completed and energized (Exh. EFSB-G-16; Tr. 4, at 466). Further, the complex coordination between NEP and WMECo in this Project, the Company asserts, poses additional time-sensitive challenges and Project vulnerabilities to unanticipated delays that could arise at the municipal level – even if the Siting Board grants the individual requested zoning exemptions (Company Comments on Issues Memo at 4 (March 5, 2012)).

With regard to community outreach, the Company met with Palmer, Monson, and Hampden officials about the applicability of municipal zoning regulations to the Project, and town officials memorialized these discussions in subsequent correspondence with the Company (Exhs. NEP-3, LPM-2, at 6; EFSB-Z-15(c)). As noted in Section VI.A.4.c, Palmer and Hampden offered their general support for the Company's determination to seek zoning

exemptions; the Town of Monson noted that it did not object to the grant of zoning exemptions; and none of the towns elected to participate in this proceeding (Exhs. NEP-3, LPM-2; EFSB-Z-15). There appears not to have been any explicit discussion of comprehensive zoning exemptions.

According to NEP, absent comprehensive zoning exemptions, the Project could be delayed for numerous reasons including project changes during construction or differing interpretations of zoning requirements by local officials, either of which could require further zoning review and subsequent court appeals (Tr. 9, at 454). The Company noted that a comprehensive zoning exemption would protect the Company from future, unanticipated zoning amendments that might occur during the permitting process or construction (id. at 458).

In sum, the Company argues that there is ample evidence on the record for the Siting Board to find that a comprehensive zoning exemption is warranted to avoid substantial public harm by allowing construction to begin in a timely fashion, and to avoid unanticipated municipal zoning delays from occurring. In addition, the Company contends that it has properly addressed other supporting requirements articulated by the Department and the Siting Board in recent grants of comprehensive zoning exemptions. These factors include extensive community outreach to the affected municipalities; an apparent absence of municipal opposition to the grant of comprehensive zoning exemptions; and that the Project would involve "minimal adverse impacts" (Company Brief at 159).

3. Analysis and Conclusions

The granting of a comprehensive zoning exemption falls under a stricter standard of review than the granting of individual zoning exemptions. It is not enough to be required for construction of the Project; the granting of a comprehensive exemption must also avoid the potential for substantial public harm. As compared to the granting of individual zoning exemptions, which are tailored to meet the construction and operational requirements of a particular project, the granting of a comprehensive exemption serves to nullify a municipality's zoning code -- and future amendments to the code -- in its entirety with respect to the project under review. Thus, compared to the granting of individual zoning exemptions, which entail specific demonstrations that an exemption is required, a comprehensive zoning exemption

constitutes a broader incursion upon municipal home rule authority. In the absence of a showing that substantial public harm may be avoided by granting a comprehensive exemption, the granting of such extraordinary relief is not justified. Tennessee Gas Pipeline Company, D.P.U. 11-26, at 31 (2012); NSTAR Electric Company, D.P.U. 08-1, at 36-37 (2009); Russell, EFSB 07-4/D.P.U. 07-35/07-36, at 71-72; Massachusetts Electric Company, D.T.E. 04-81, at 24 (2009); Tennessee Gas Pipeline Company, D.T.E. 01-57, at 11 (2002).

In this proceeding, the Company has made a strong showing that the Project is needed immediately to meet reliability requirements that would be severely compromised by the voltage violations, leading to voltage collapse, identified in the Study area under system contingencies. The Company also provided information showing that the additional transmission system infrastructure would provide benefits to the Study Area in the event of disruptions such as those the Company experienced in 2011 when, on five separate occasions, extreme weather events affected the Study Area and caused significant transmission-related outages. Thus, substantial public harm may result if construction of the Project is delayed. Furthermore, project-specific engineering challenges, such as having to take the O-15S line out of service for an extended time and ensuring the close coordination between the NEP and WMECo systems, make it critical that construction not be interrupted once it has begun. The Siting Board finds that the record in this case demonstrates a substantial public harm could result from the delay in the construction or operation of the Project.

In prior decisions, the Department and the Siting Board have also placed considerable importance on the process of engagement and consultation between project applicants and affected municipalities whose zoning ordinances and bylaws give rise to the requested exemptions. In this case, the affected communities have indicated in writing that they either support (Hampden and Palmer) or do not oppose (Monson) the issuance of zoning exemptions, although none of the letters states whether the support or lack of opposition applies to the individual exemptions or the comprehensive exemption for the Project. We strongly encourage future applicants to seek greater clarity in such municipal correspondence as to whether the comments pertain to the grant of comprehensive as well as individual zoning exemptions. It should be noted, however, that such correspondence is just one factor in the Department's determination of substantial public harm.

Finally, the Development and Performance Standards of the Hampden Zoning Bylaw, Section 7.7 and Performance Standards for General and Central Commercial and Industrial Uses of the Monson Zoning Bylaw, Section 5.1 regulate not only the nature and characteristics of the facility to be constructed, but also the on-going operation of the proposed facility. Were the Siting Board to grant a comprehensive zoning exemption from the Hampden and Monson Zoning Bylaws, local zoning control over relevant environmental considerations listed in Section 7.7 and Section 5.1, respectively, would no longer be applicable to the ongoing operation of the proposed facility. See Braintree Electric Light Department, 16 DOMSB 78, at 186-187 (2008). The Company has testified that it is able to meet the bulk of these requirements, and that generally, the requirements do not apply to construction impacts. However, with regard to the Hampden Bylaws, the Company asserted that it is not clear whether parking, and compatibility with architectural design would apply to the substation, and that the Project could not comply with access and traffic requirements due to the width of the curb cut (Sections 7.72 (1), 7.72 (2), and 7.72 (4) (Exhs. NG-LPM-7, at 81; EFSB-Z-11). Further, with regard to the Monson Performance Standards, the Company asserted that most are not applicable to the Project and that the Company would comply with the standards.

The Siting Board finds that the Company has met the burden of demonstrating that there is substantial public harm that could result from delays in commencement and completion of the Project as affected by municipal zoning provisions in Monson, Palmer, and Hampden. Accordingly, the Siting Board approves the Company's request for a comprehensive exemption from the Palmer Zoning Ordinance, the Monson Zoning Bylaw, and the Hampden Zoning Bylaw, with the exception related to the enforcement of Section 5.1 of the Monson Zoning Bylaw and Sections 7.72 (1), 7.72 (2), and 7.72 (4) of the Hampden Zoning Bylaw. These comprehensive exemptions shall apply to the construction and operation of the proposed facility as described herein, to the extent applicable. See Planning Bd. of Braintree v. Department of Public Utilities, 420 Mass. 22, at 29 (1995).

C. Decision on G.L. c. 40A, § 3

The Siting Board finds pursuant to G.L. c. 40A, § 3 that construction and operation of the Company's Project is reasonably necessary for the public convenience or welfare of the public.

Accordingly, subject to the conditions set forth in this decision, the Siting Board approves the Company's petition for an exemption from the provisions of the Palmer Zoning Ordinance, the Monson Zoning Bylaw, and the Hampden Zoning Bylaw set forth in Tables 10, 11, and 12 subject to the conditions set forth in Section IX. The Siting Board further approves the Company's petition for comprehensive exemptions from the Palmer Zoning Ordinance, the Monson Zoning Bylaw, and the Hampden Zoning Bylaw, with the exception related to the enforcement of Section 5.1 of the Monson Zoning Bylaw and Sections 7.72 (1), 7.72 (2), and 7.72 (4) of the Hampden Zoning Bylaw, subject to the conditions set forth in Section IX.

## VII. ANALYSIS UNDER G.L. c. 164, § 72

### A. Standard of Review

G. L. c. 164, § 72, requires, in relevant part, that an electric company seeking approval to construct a transmission line must file with the Department a petition for "authority to construct and use . . . a line for the transmission of electricity for distribution in some definite area or for supplying electricity to itself or to another electric company or to a municipal lighting plant for distribution and sale ... and shall represent that such line would or does serve the public convenience and is consistent with the public interest. . . . The [D]epartment, after notice and a public hearing in one or more of the towns affected, may determine that said line is necessary for the purpose alleged, and would serve the public convenience and is consistent with the public interest."[49]

The Department, in making a determination under G.L. c. 164, § 72, is to consider all aspects of the public interest. Boston Edison Company v. Town of Sudbury, 356 Mass. 406, 419 (1969). Section 72, for example, permits the Department to prescribe reasonable conditions for the protection of the public safety. Id. at 419-420. All factors affecting any phase of the public interest and public convenience must be weighed fairly by the Department in a determination under G.L. c. 164, § 72. Town of Sudbury v. Department of Public Utilities, 343 Mass. 428, 430

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[49] Pursuant to G.L. c. 164, § 72, the electric company must file with its petition a general description of the transmission line, a map or plan showing its general location, an estimate showing in reasonable detail the cost of the line, and such additional maps and information as the [Siting Board] requires.

(1962). In evaluating petitions filed pursuant to G.L. c. 164, § 72, the Department relies on the standard of review established for G.L. c. 164, c. 40A, § 3 for determining whether the proposed Project is reasonably necessary for the convenience or welfare of the public.

B. Analysis and Decision

Based on the record in this proceeding and the above analyses in Sections I through V, and with implementation of the specified mitigation measures proposed by the Company and conditions set forth by the Siting Board in Section IX, below, the Siting Board finds pursuant to G.L. c. 164, § 72 that the proposed transmission line and ancillary substation construction and substation upgrades are necessary for the purpose alleged, would serve the public convenience, and are consistent with the public interest. Thus, the Siting Board approves the Section 72 Petition.

## VIII. SECTION 61 FINDINGS

MEPA provides that "[a]ny determination made by an agency of the Commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." G.L. c. 30, § 61. Pursuant to 301 C.M.R. § 11.01 (3), these findings are necessary when an Environmental Impact Report ("EIR") is submitted by a petitioner to the Secretary of Environmental Affairs, and should be based on such EIR. Where an EIR is not required, G.L. c. 30, § 61 findings are not necessary. 301 C.M.R. § 11.01 (3). In the instant case, the record indicates that a Draft EIR and Final EIR were required for the Project and ancillary facilities. Therefore, a finding under G.L. c. 30, § 61 is necessary for the Company's Zoning Exemption Petition and its Section 72 Petition.[50]

The Siting Board recognizes the Commonwealth's policies relating to GHG emissions, including G.L. c. 30, § 61 and the Executive Office of Energy and Environmental Affairs Greenhouse Gas Emission Policy and Protocol. The Siting Board notes that the Project would

[50] The Siting Board is not required to make a G.L. c. 30, § 61 finding under G.L. c. 164, § 69J as the Siting Board is exempt from MEPA filing requirements.

have minimal GHG emissions as it is an overhead transmission line.[51] As such, the Project would not have direct emissions from a stationary source or indirect emissions from energy consumption. The Siting Board addresses indirect emissions from off-road construction vehicles and equipment and $SF_6$ emissions for the Hampden Substation in Section V.B.4.

In Section V.B.8, above, the Siting Board conducted a comprehensive analysis of the environmental impacts of the Project and finds that the impacts of the Project along the Primary Route would be minimized and that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost. Accordingly, the Siting Board finds that all feasible measures have been taken to avoid or minimize the environmental impacts of the Project.

A. Decision on G.L. c. 164, § 69J

The Siting Board's enabling statute directs the Siting Board to implement the energy policies contained in G.L. c. 164, §§ 69H to 69Q, to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G.L. c. 164, § 69H. Thus, an applicant must obtain Siting Board approval under G.L. c. 164, § 69J, prior to construction of a proposed energy facility.

In Section III.D, above, the Siting Board finds that the existing electric transmission system is inadequate to reliably serve current and projected loads in the Hampden area under certain contingencies, and thus additional energy resources are needed in the Hampden area.

In Section IV.F, above, the Siting Board finds that the Project, on balance, is superior to the alternative project approaches in terms of cost and environmental impact and with respect to the ability to reliably meet the identified need. The Siting Board thus finds that the Project is preferable to the identified project alternatives with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

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51 The Secretary's Certificate on the Environmental Notification Form issued on October 8, 2010 states, "Pursuant to the MEPA Greenhouse Gas (GHG) Emissions Policy and Protocol, which provides for a de minimis exception, a GHG analysis is not required for this project. The project involves replacement and upgrades of an existing transmission line and reliability improvements within an existing ROW, and would result in negligible new GHG emissions" (Exh. EFSB-3, at 2).

In Section V.A.4, above, the Siting Board finds that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternatives to the Project in a manner that ensures that the Company has not overlooked or eliminated any routes that, on balance, are clearly superior to the Project. The Siting Board also finds that the Company has identified a range of practical transmission line routes with some measure of geographic diversity. Consequently, the Siting Board finds that NEP has demonstrated that it examined a reasonable range of practical siting alternatives.

In Section V.B.5, above, the Siting Board reviews environmental impacts of the Project and finds that with the implementation of the specified mitigation and conditions, and compliance with all applicable local, state and federal requirements, the environmental impacts of the Project along the Primary Route would be minimized. The Siting Board also finds that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost.

In Section V.B.8, above, the Siting Board finds that the proposed facilities along the Primary Route would be preferable to the proposed facilities along the Alternative Route on the basis of balancing cost, environmental impact and reliability of supply. The Siting Board thus finds that the proposed facilities along the Primary Route would be preferable to the proposed facilities along the Alternative Route with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section V.C, above, the Siting Board finds that with the implementation of specified mitigation and conditions, the Project is consistent with the health, environmental and resource use and development policies of the Commonwealth.

Accordingly, the Siting Board APPROVES the Company's petition to construct the ten mile, 115 kV overhead transmission line in the towns of Palmer, Monson and Hampden, Massachusetts using the Primary Route to be interconnected with an existing 1515 line owned by WMECo, and to construct the West Hampden Substation and upgrade the Palmer Substation, subject to the conditions set forth in Section XI.

## IX. CONDITIONS

The Siting Board APPROVES the Companies' Petition subject to the following conditions:

A. To facilitate site restoration related to this Project, the Siting Board directs NEP to notify affected property owners in writing of the description of the area of tree removal, the timely manner in which the woody debris would either be removed, handled in accordance with the affected property owner preference and/or relevant regulatory requirements, and include Company contact information.

B. To minimize visual impacts, the Siting Board directs the Company to implement an off-site screening program to include the following requirements:

(a) upon completion of construction the Company would notify in writing by first class mail all owners of property abutting the ROW of the option to request that the Company provide off-site screening. The off-site screening may include, but is not limited to, shrubs, trees, window awnings and fences, provided that the Company's operating and maintenance requirements for its right-of-way facilities are met;

(b) provide property owners with a selection of generic renderings of possible mitigation approaches. Such renderings shall be for guidance purposes only, and shall not limit a property owner's ability to request different mitigation;

(c) meet with each property owner who requests mitigation to determine the type of mitigation package the Company would provide, provided that the Company has received a response from the property owner within three months of receipt of the Company's written notification;

(d) honor all property owners' requests for reasonable and feasible mitigation/screening that are submitted within six months of a meeting with the Company and/or its consultants;

(e) provide a warranty to property owners to ensure that all plantings are established and replaced if needed at the end of one year from the date of planting, provided that the property owner reasonably maintains the plantings;

(f) submit to the Siting Board for its approval, at least three months before the conclusion of construction, a draft of the notification letter to property owners prior to mailing; and

(g) submit a compliance filing within 18 months of completion of construction detailing: (i) a list of all properties that were notified of the available off-site landscaping; (ii) the number of property owners that responded to the offer for off-site mitigation; (iii) a list of any property owners whose requests were not honored, and the

rationale therefore; (iv) a general description of the types of off-site landscaping provided; and (v) the average cost of landscaping per property, broken down by installation, material, and design costs.

C. To reduce visual impacts, the Siting Board directs NEP not to remove the existing screening of arborvitae shrubs along the northern and western substation fence line after the Hampden Substation is retired.

D. The Siting Board directs the Company to conduct all construction between the hours of 7:00 a.m. to 5:00 p.m. Monday through Saturday, excluding holidays. Where there are residences within 300 feet of the ROW, Saturday construction hours would be limited to 9:00 a.m. to 5:00 p.m. To the extent the Company finds that construction is necessary outside of these hours or on Sundays or holidays, the Company shall seek written permission from the relevant municipal authority prior to the commencement of such work, and provide the Siting Board with a copy of such permission. If the Company and municipal officials are not able to agree on any Company request to perform Sunday, holiday, or extended weekday construction, the Company may file a written request for authorization from the Siting Board prior to performing such construction, provided that it also notifies the relevant municipal authorities in writing of such request.

E. The Siting Board directs the Company in consultation with the Towns of Palmer, Monson and Hampden to develop a community outreach plan for construction of the Project. The outreach plan should, at a minimum, set forth procedures for providing prior notification to affected residents of: (a) the scheduled start, duration, and hours of construction; (b) any construction the Company intends to conduct, that due to unusual circumstances must take place outside of the hours detailed above; (c) the availability of web-based Project information; and (d) complaint and response procedures including the Company's contact information.

F. The Siting Board directs the Company, as the Company has agreed, that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction must have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine. Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition and a list of retrofitted equipment, including type of equipment, make/model, model year, engine horsepower, and the type of emission control technology installed.

G. The Siting Board directs the Company, within one year of operation of the West Hampden Substation, to provide a compliance filing detailing the actual leakage rate of $SF_6$ at the West Hampden Substation. If the Siting Board determines that

the $SF_6$ leakage rate is greater than anticipated, the Siting Board may require operating changes or additional measures to address such $SF_6$ emissions rate deviations.

H. The Siting Board directs the Company, prior to the commencement of construction, to provide to the Siting Board a construction recycling plan, and at the end of construction to report on the Company's the percentage of waste materials by waste type that were recycled.

I. The Siting Board directs the Company to submit to the Siting Board an updated and certified cost estimate for the Project prior to the commencement of construction. Additionally, the Siting Board directs NEP to file semi-annual compliance reports with the Siting Board starting within 60 days of the commencement of construction, that include projected and actual construction costs, and explanations for any discrepancies between projected and actual costs and completion dates, and an explanation of the Company's internal capital authorization approval process.

Because issues addressed in this Decision relative to this facility are subject to change over time, construction of the Project must be commenced within three years of the date of the decision.

In addition, the Siting Board notes that the findings in this decision are based upon the record in this case. Project proponents have an absolute obligation to construct and operate the Project in conformance with all aspects of the proposal as presented to the Siting Board. Therefore, the Siting Board requires New England Power Company d/b/a National Grid and Western Massachusetts Electric Company or their successors in interest, to notify the Siting Board of any changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. New England Power Company d/b/a National Grid and Western Massachusetts Electric Company or their successors in interest are obligated to provide the Siting Board with sufficient information on changes to the proposed project to enable the Siting Board to make these determinations.

Stephen H. August

Stephen H. August
Presiding Officer

Dated this May 16, 2012.

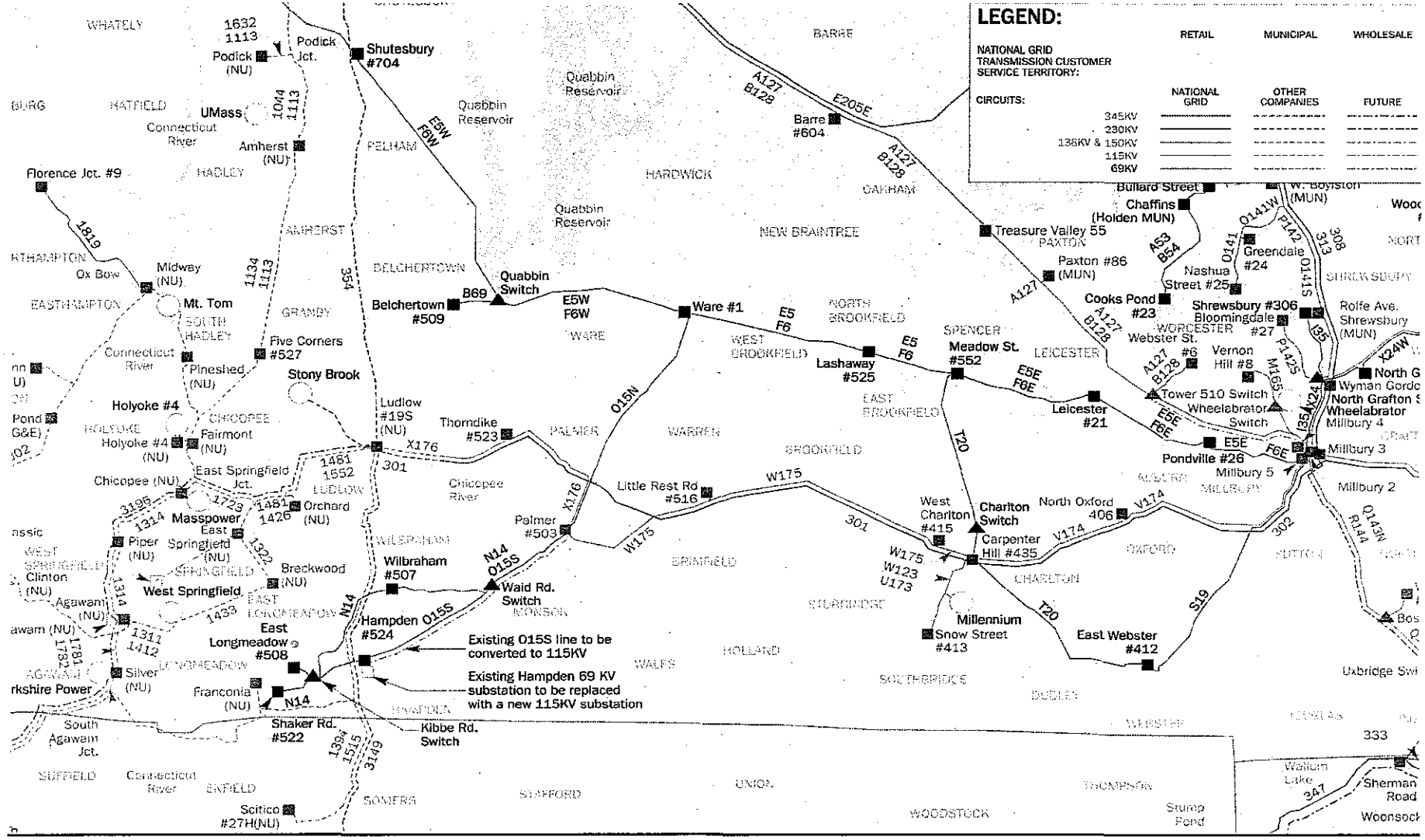
APPROVED by the Energy Facilities Siting Board at its meeting of May 10, 2012 by the members present and voting. Voting for approval of the Tentative Decision as amended: Steven Clarke, (Acting Energy Facilities Siting Board Chair/Designee for Richard Sullivan, Secretary, Executive Office of Energy and Environmental Affairs); Ann G. Berwick, Chair, Department of Public Utilities, Jolette A.Westbrook, Commissioner, Department of Public Utilities; Bram Claeys (Designee for Commissioner, Department of Energy Resources); Nancy Kaplan (Designee for Commissioner, Department of Environmental Protection); and Victoria Maguire (Designee for Secretary, Executive Office of Housing and Economic Development).

Steven Clarke, Acting Chair
Energy Facilities Siting Board

May 16, 2012

[433]

FIGURE 1
NEP'S PROPOSED PROJECT



Appeal as to matters of law from any final decision, order or ruling of the Siting Board may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the order of the Siting Board be modified or set aside in whole or in part. Such petition for appeal shall be filed with the Siting Board within twenty days after the date of service of the decision, order or ruling of the Siting Board, or within such further time as the Siting Board may allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the clerk of said court. (Massachusetts General Laws, Chapter 25, Sec. 5; Chapter 164, Sec. 69P).