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

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Presiding Officer
September 28, 2010

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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:

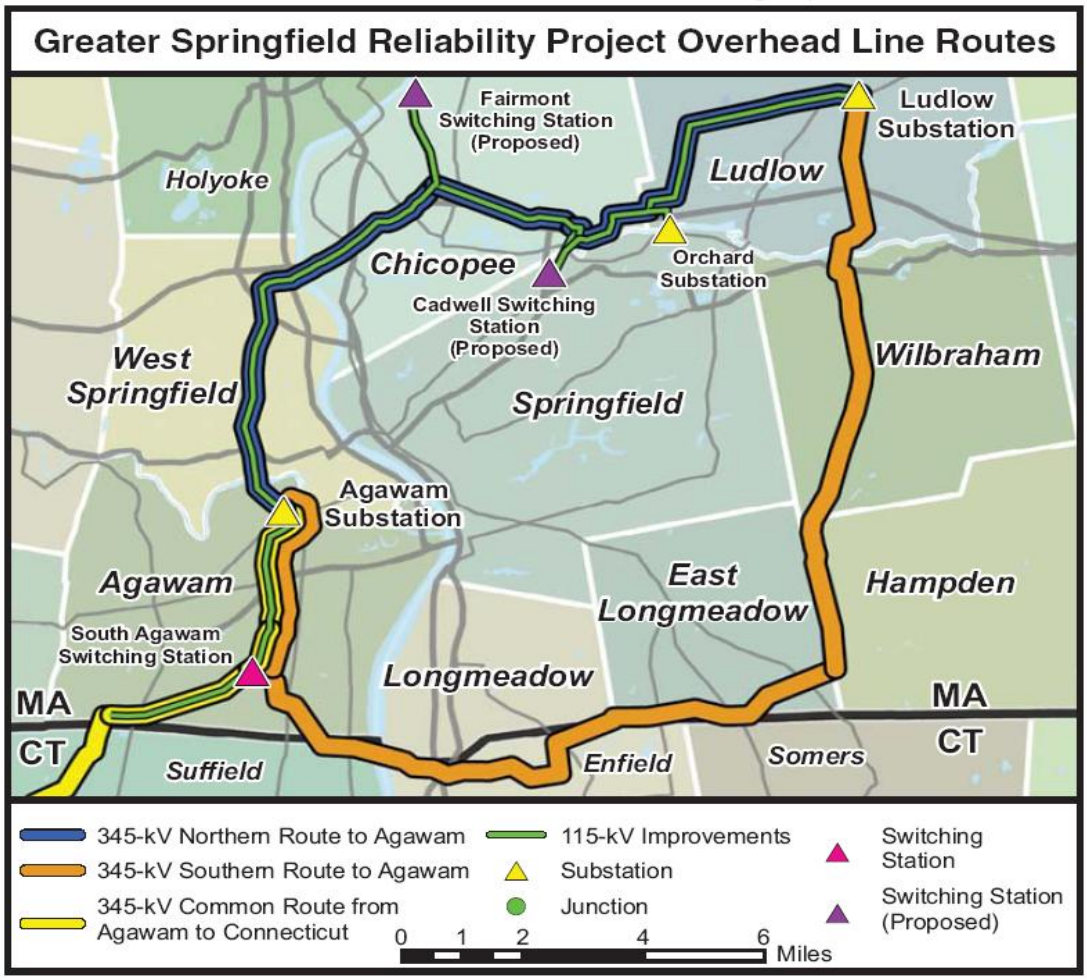
Northern Alternative: Under this alternative, the 115 kV and 345 kV transmission lines would be placed in the Northern Corridor, described above. The total project length (including spurs and the 12-mile portion in Connecticut) would be 39 miles.

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.

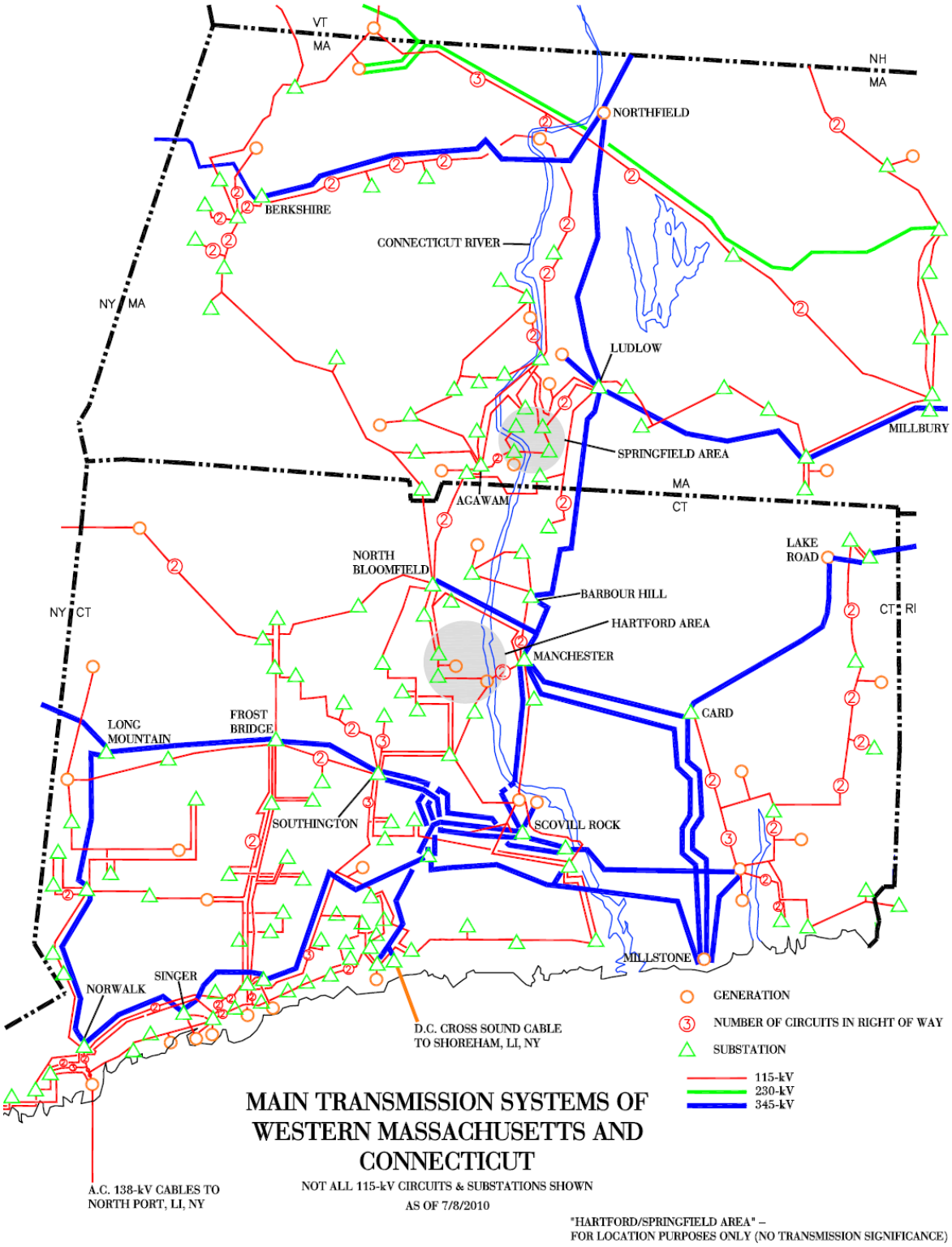
When a petitioner's assessment of system reliability and facility requirements are, in whole or in part, driven by load projections, the Siting Board reviews the underlying load forecast. The Siting Board requires that forecasts be based on substantially accurate historical information and reasonable 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



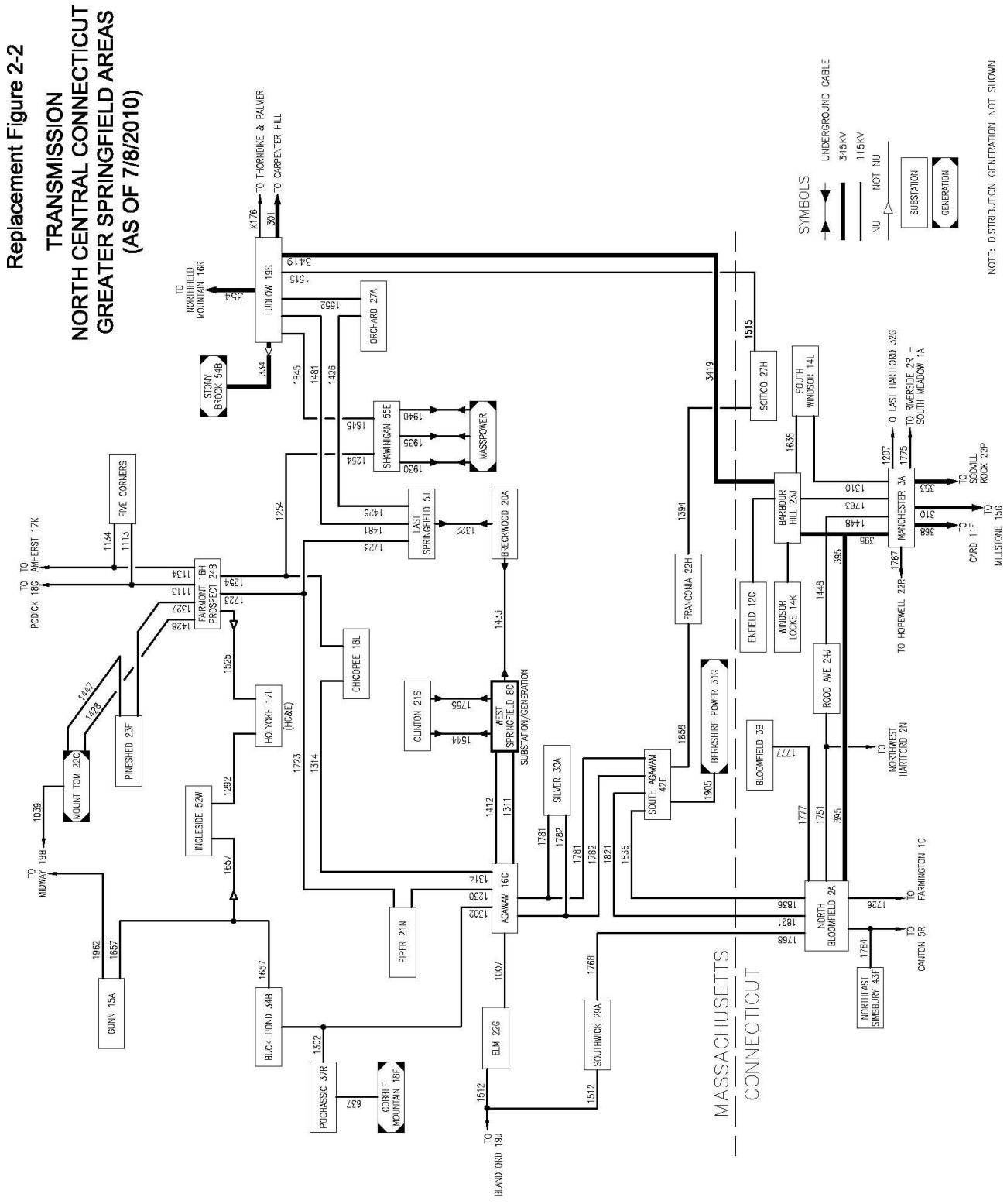
The 345 kV transmission grid, as shown in bold (blue) in Figure 2, is the backbone of the New England bulk power system, which transmits power from large central generating stations and power imported from neighboring regions throughout New England (Exh. WMECo-AWS-1, at 10). The 345 kV transmission system 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

[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.

(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

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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.	Pre-NEEWS	4.6	4.4	0.7	0.7
	XS-9/XS-S01	Post-NEEWS	16.3	57.0	53.2	15.1
	16 Homes	Change in mG	11.7	52.6	52.5	14.4
	Agawam to Piper	Pre-NEEWS	14.6	14.6	22.2	22.2
	XS-10/XS-S17	Post-NEEWS	42.7	14.3	66.6	1.5
	95 Homes	Change in mG	32.1	-0.3	44.4	-20.7
	Piper to Chicopee	Pre-NEEWS	7.6	7.6	3.6	3.6
	XS-11/XS-S16	Post-NEEWS	25.3	4.4	65.6	9.0
	87 Homes	Change in mG	17.7	- 3.2	62	5.4
	Shawinigan to Orchard	Pre-NEEWS	6.8	6.8	47.4	47.4
	XS-16/XS-S11	Post-NEEWS	24.1	17.5	12.5	9.1
	31 Homes	Change in mG	17.3	10.7	-34.9	-38.3
	Orchard to Ludlow	Pre-NEEWS	17.3	17.3	52.6	52.6
	XS-17/XS-S10	Post-NEEWS	51.5	17.1	18	19.3
	28 Homes	Change in mG	34.2	-0.2	-34.6	-33.3
	Fairmont Spur	Pre-NEEWS	8.9	same	24.3	same
	XS-18	Post-NEEWS	9.4	same	53.6	same
	38 Homes	Change in mG	.5	same	29.3	same
EMF Levels on Southern Corridor	South Agawam Jct. To Longmeadow	Pre-NEEWS		7.0		0.3
	27 Homes	Post-NEEWS		14.7		10.4
	XS-S04	Change in mG		7.7		10.1
	Hampden Junction to Ludlow	Pre-NEEWS		46.6		22.7
	XS-S09	Post-NEEWS		38.2		30.2
	45 Homes	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 East Edge 66.6 mG	West Edge 25.3 mG East Edge 65.6 mG	West Edge 9.4 mG East Edge 53.6 mG
Change from existing levels: Edge of ROW	West Edge +32.1 mG East Edge +44.4 mG	West Edge +17.7 mG East Edge +62.0 mG	West Edge +0.5 mG 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

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[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.

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[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

[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

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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 Article VI, §180-31;Article VII, §180-37 Article VIII, § 180-44;Article IX, §180-48 Article X, § 180-55;Article XI, §180-61
Height Regulations	Article II, § 180-17;Article III, § 180-23 Article VI, §180-31;Article VII, §180-37 Article VIII, § 180-44;Article IX, §180-48 Article X, § 180-55;Article XI, §180-61 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 Article IX, § 180-50
Landscaping Requirements	Article IX, § 180-53; Article X, § 180-60 Article XI, § 180-66
Lot Coverage	Article VIII, § 180-47 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 Section V, 5.32, Table 5-2 Section V, 5.34, Table 5-3 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 Article IV, §275-60; Article IV, § 275-61 Article IV, §275-62; Article IV, § 275-65
Height Regulations	Article IV, § 275-52;Article IV, § 275-53 Article IV, § 275-58;Article IV, § 275-59 Article IV, § 275-60;Article IV, § 275-61 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 Article IV, § 275-58;Article IV, § 275-59 Article IV, § 275-61;Article IV, § 275-62
Yards	Article IV, § 275-52 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 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 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]

[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.