COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD

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

FINAL DECISION

M. Kathryn Sedor
Presiding Officer
March 11, 2011

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

I. INTRODUCTION

A. Summary of the Project

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

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

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

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

B. Procedural History

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

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

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

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

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

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

A. Jurisdiction and Scope of Review

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

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

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

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

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

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

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

B. Need

1. Standard of Review

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

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

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

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

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

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

2. Description of the Existing System

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

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

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

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

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

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

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

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

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

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

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

3. Reliability of Supply

a. Criteria and Methods for Reliability Analysis

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

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

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

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

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

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

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

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

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

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

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

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

b. Reliability Analysis

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

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

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

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

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

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

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

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

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

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

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

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

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

4. Conclusions on Need

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

C. Alternative Approaches to Meeting the Identified Need

1. Standard of Review

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

2. Identification of Project Approaches for Analysis

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

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

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

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

a. 115 kV Direct Single Line Alternatives

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

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

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

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

b. 115 kV Radial Transmission Alternatives

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

c. Distribution Upgrade Alternative

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

d. Distributed Generation

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

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

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

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

e. Demand-Side Solutions

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

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

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

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

f. 69 kV Transmission Alternative

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

3. Reliability

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

4. Environmental Impacts

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

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

5. Cost

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

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

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

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

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

6. Conclusions on Project Approaches

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

D. Analysis of the Proposed and Other Site Locations

1. Standard of Review

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

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

2. The Company's Route Selection Process

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

i. Description of the Initial Universe of Routes

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

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

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

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

ii. The Company's Initial Route Segment Screening Process

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

iii. The Company's Route Segment Analysis

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

For each candidate route segment, the following table depicts the length of route segment, the environmental score (raw score, weighted score and rank) and the conceptual costs (amount and ranking):

Table 3: Environmental and Cost Scoring of Candidate Route Segments

Candidate Routes	Length (feet)	Environmental Score			Total Conceptual Cost (millions)	Cost Ranking
		Score	Weighted	Rank		
Sub-Area 1-Vernon Hill Substation to Grafton Street						
Segment 1A Vernon St/Arlington St	9,400	16	27	2	$11.5	2
Segment 1B Existing Providence St duct bank	8,500	9	15	1	$4.3	1
Sub-Area 2-Grafton Street to Brown Square						
Segment 2B Franklin St/Norfolk St	7,000	16	28	1	$11.4	1
Segment 2C Grafton St/Orient St	8,300	25	43	2	$14.6	2
Sub-Area 3-Brown Square to Bloomingdale Substation						
Segment 3A Plantation St/ Route 9/Frank St	4,800	18	32	4	$8.5	4
Segment 3B Plantation St/Wells St/ Frank St	3,200	15	26	3	$5.9	2*
Segment 3C Plantation St/ Northboro St/Frank St	3,200	13	22	2	$5.5	1
Segment 3D Franklin St/Pollock St/ Frank St	3,400	10	17	1	$5.8	3*

*Cost estimates for Segments 3B and 3D are essentially the same. However, because Segment 3D requires property rights from eight property owners, while Segment 3B requires property rights from three property owners, the Company ranked Segment 3B second and Segment 3D third.

Sources: Exhs. NG-2, at 4-31; NG-2, at Table 4.5-2

The Company next performed an overall route analysis to ascertain the Primary and Alternative Routes, combining route segments that were advantageous based on low potential for human environmental impact and low estimated circuit costs, as well as considerations of constructability and number of easements (Exh. NG-2, at 4-34). The Company's route comparison analysis determined that the Primary Route would consist of Segments 1B, 2B and 3C[33] and the Alternative Route would consist of Segments 1A, 2C and 3D[34] (Exhs. NG-2, at 4-34; NG-2, at 4-37; NG-2, at Table 4.7-1).[35]

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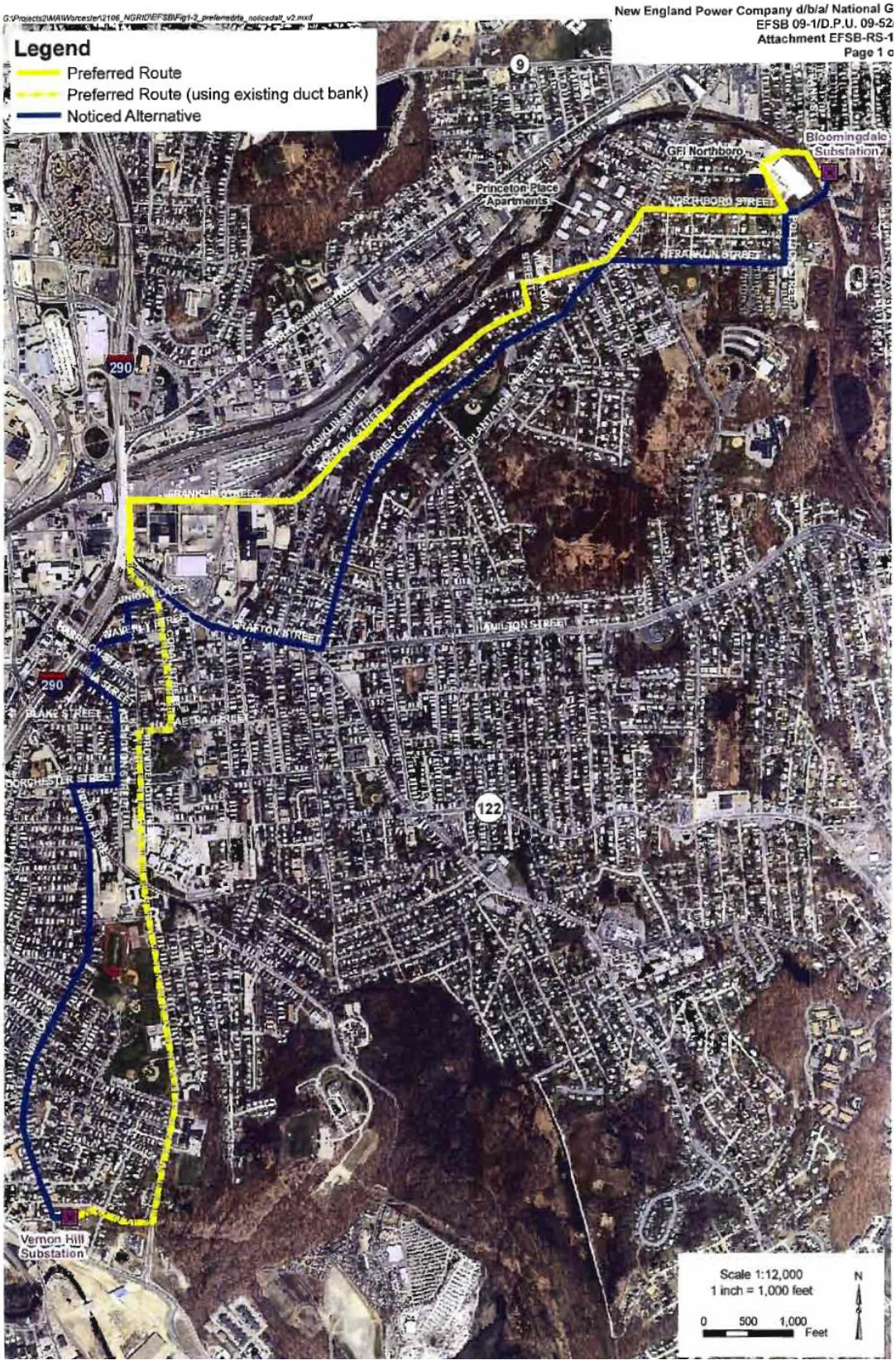
[33] Segment 3D scored slightly better than Segment 3C in terms of environmental impact due to the additional distance on Plantation Street, however, Segment 3C cost less and required half as many easements. The Company determined that potential Segment 3C traffic impacts could be controlled through the implementation of traffic management measures (Exh. NG-2, at 4-37).

[34] In comparing Segments 3B and 3D, the Company determined Segment 3D should be included as part of the Alternative Route because it is geographically distinct from Segment 3C (incorporated in the Primary Route) while portions of 3B and 3C overlap (Exh. NG-2, at 4-37).

[35] The Company proposed a Primary Route variation for Foche Avenue in the event of excessive utility congestion in Brown Square, but this option was subsequently eliminated (Exhs. NG-2, at 4-7; EFSB-RS-1). The Company also proposed a Primary Route variation to cross the GFI property and CSX railroad tracks (Exh. NG-2, at 4-9). Subsequent to filing the Petition, the Company performed surveys and geotechnical investigations along both sides of the GFI property and determined that there would be increased construction complexity and cost crossing on the east side of the GFI property because of a significant grade change and preexisting foundations that would have to be removed (Exh. EFSB-RV-2). The Company thus incorporated the Western CSX crossing with the northwest crossing of the GFI property into the Primary Route (id.).


New England Power Company d/b/a/ National G
EFSB 09-1/D.P.U. 09-52
Attachment EFSB-RS-1
Page 1 o
Legend
Preferred Route
Preferred Route (using existing duct bank)
Noticed Alternative
Bloomingdale Substation
GFI Northboro
Princeton Place Apartments
NORTHBORO STREET
FRANKLIN STREET
PLANTATION STREET
ORIENT STREET
HAMILTON STREET
WARREN STREET
BLAKE STREET
DORCHESTER STREET
VERNON STREET
Vernon Hill Substation
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1 inch = 1,000 feet
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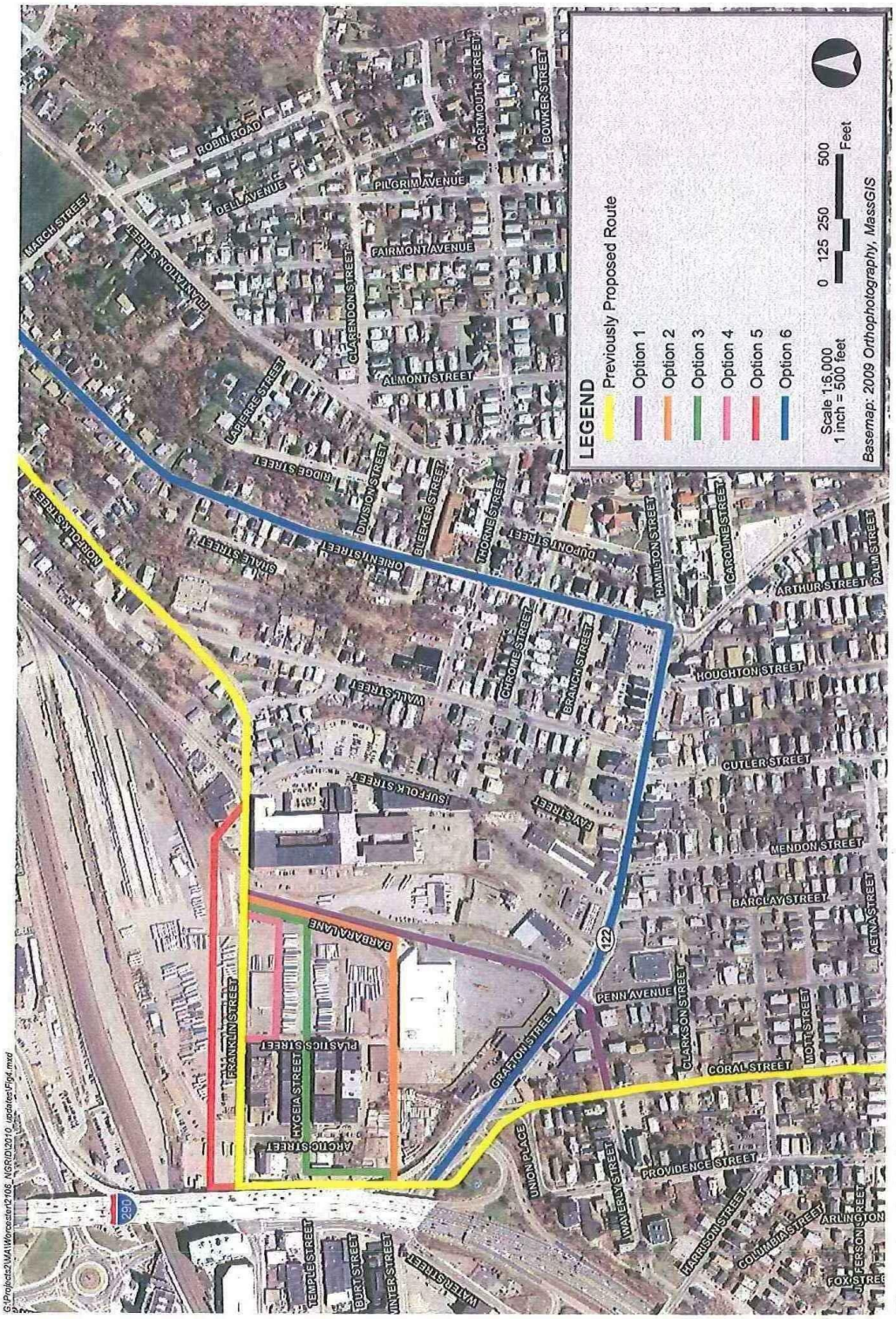
iv. CSX Work-Around

After the Siting Board's May 13, 2010 Meeting, the Company became aware of CSX's intention to expand its intermodal rail terminal in Worcester (Exh. NG-6, at 1). A component of CSX's terminal expansion involves raising the grade of Franklin Street and constructing a below-grade crossing to connect CSX's existing freight yard north of Franklin Street with a new proposed freight area on the south side of Franklin Street (id. at 2). CSX's proposed realignment of Franklin Street and relocation of existing utilities would affect approximately 800 linear feet of National Grid's proposed 115 kV cable along the Primary Route (id.). Initially, the Company considered maintaining the Project along the Primary Route, but was concerned that CSX's plans could adversely affect the construction and operation of the underground 115 kV line.[36] The Company therefore concluded that it should consider a work-around to reroute the cable away from CSX's proposed tunnel (Exh. NG-6, at 3). Accordingly, the Company analyzed six work-around options in the vicinity of Franklin Street as illustrated on the next page (id.).[37]

[36] To avoid interference with CSX's tunnel and elevation of Franklin Street, portions of the Company's facilities would have to be buried in excess of 20-25 feet (by comparison elsewhere on the route the cable would be buried approximately five to eight feet) (Exh. NG-6, at 2). The Company dismissed this option because: (1) the greater depth of burial would expose the line to increased soil thermal resistivity, which may have a negative impact on the underground cable system's capacity and may necessitate installing a larger conductor size to achieve the desired circuit capacity which would increase costs; and (2) any future need to access the duct bank under the tunnel would be difficult and would restrict CSX's operation to use the tunnel to move freight (id. at 6).

[37] The work-around options analyzed by the Company include Waverly Street to Barbara Lane via private property (Option 1); cut-through from Grafton Street to Barbara Lane (Keese Street) (Option 2); cut-through from Grafton Street to Barbara Lane (a private driveway) (Option 3); a route south of the overpass (Option 4); a route north of the overpass (Option 5); and the Alternative Route (Option 6) (Exh. NG-6, at 3-4).



Worcester Cable Project Worcester, MA

Epsilon

Figure 4
Work-Around Alternatives

The Company's analysis included meetings and discussions with CSX representatives and consultants, and took into account environmental considerations, cost, reliability, property acquisition requirements and zoning factors (id. at 1). The Company concluded that the Waverly Street to Barbara Lane option (i.e., Option 1) would be the best work-around because it (1) responds effectively to the changed circumstances resulting from the CSX terminal expansion and allows both projects to move forward expeditiously; (2) shortens the total cable length by approximately 900-1,000 feet,[38] (3) requires the acquisition of property rights solely from CSX, which has a mutual interest in coming to an agreement;[39] (4) avoids a sensitive abutter (the fire station on Franklin Street); (5) reduces the Project cost by $70,000,[40] (6) will not require any more zoning relief than the Company initially requested in its Zoning Petition; and (7) may provide a reliability benefit by allowing the Project to be completed in a timely manner (Exh. NG-6, at 4,5,9).

3. Conclusions on Site Selection

a. Reasonable Set of Criteria

The Company examined the environmental and human impacts of the construction and operation of the proposed transmission line, which are the types of criteria that the Siting Board previously has found to be appropriate for the siting of energy facilities. See NSTAR Gas Company, 13 DOMSB 143 at 177; MMWEC Decision, 12 DOMSB 18, at 125. As part of its multi-step route selection process, National Grid also considered criteria including project cost, reliability, ease of permitting, construction complexity (including utility congestion and subsurface conditions), impacts on local businesses and residents, ability to mitigate construction

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38 This option requires several hundred feet of additional duct bank construction through property owned by CSX (Exh. NG-6, at 3-4).

39 CSX confirmed that it acquired all property within the CSX work-around as of December, 2010 (Exh. EFSB-LU-6). CSX and the Company are negotiating the terms for the rights to install and maintain the Company's proposed transmission line (Exh. EFSB-LU-7).

40 This reduction is modest compared to the Company's estimate of the overall cost of the original Primary Route which is approximately $33.6 million (Exh. NG-6, at 6).

impacts and the number of easements required, as well as input from municipal officials and community groups, which are also appropriate criteria to consider in selecting a route consistent with G.L. c. 164, § 69H and 69J. Therefore, the Siting Board finds that the Company developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes that, on balance, are clearly superior to the proposed route.

b. Geographic Diversity

The Company identified a study area that would encompass all viable siting options, given the limitations imposed by an interconnection between the Vernon Hill and Bloomingdale substations. Although various segments of the routes analyzed were within blocks of each other, given the urban setting and relatively short distance between the substations, each route offers a unique set of environmental and cost advantages and disadvantages within the area designated by the Company as encompassing viable siting options for its proposed transmission line. The Siting Board finds that the Company established two routes (the Primary and the Alternative Routes) for the Project with some measure of geographic diversity.

c. Conclusion on Site Selection

The Company has demonstrated that it has considered a reasonable range of practical siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts.

E. Analysis of Primary and Alternative Routes

1. Standard of Review

In implementing its statutory mandate under G.L.c. 164, § 69H, the Siting Board requires a petitioner to show that its proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply. To determine whether such a showing is made, the Siting Board requires a petitioner to demonstrate that the proposed route for the facility is superior to the alternative route on the basis of balancing cost, environmental impact, and reliability of supply. CELCo Decision, 12 DOMSB 305, at 334; MMWEC Decision, 12 DOMSB 18, at 127.

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

2. Description of the Primary Route and Alternative Route

a. Primary Route

The Primary Route is approximately 3.5 miles extending from the Vernon Hill substation to the Bloomingdale substation (Exhs. NG-2, at 1-8; EFSB-G-13). From the Vernon Hill substation, the Primary Route entails use of the Providence Street duct bank for the first 1.5-mile segment (id.; EFSB-G-13). The second segment of the Primary Route is two miles long. It exits the Providence Street duct bank approximately 100 feet south of the corner of Waverly and Coral Streets, travels in a new duct bank north on Coral Street, east on Waverly Street, crosses Grafton Street and enters CSX's property along a driveway to the former Shaw's supermarket property, continues to Barbara Lane, proceeds east on Franklin Street to Norfolk Street to Villa Nova Street for a short distance then to Franklin Street and to Brown Square (intersection of Franklin and Plantation Streets) (Exhs. NG-2, at 1-9; NG-6, at 5). From Brown Square, the Primary Route extends northeasterly on Plantation Street, turns east to the end of Northboro Street, travels northwest across the GFI property to a railroad right-of-way owned by CSX, crosses beneath the CSX railroad tracks to a driveway owned by Eastview Apartment Associates, and then enters the Bloomingdale substation (Exhs. NG-2, at 1-9; EFSB-RS-1).

b. Alternative Route

The Alternative Route is approximately four miles long and begins at the Vernon Hill substation and travels north along Vernon Street, turns east on Dorchester Street and continues to Arlington Street (Exh. NG-2, at 1-9). The Alternative Route then zigzags for a short distance on

a number of streets: Columbia Street, Blake Street, Harrison Street, Waverly Street, Providence Street, Union Place and Coral Street (Exh. NG-2, at 1-10). At the intersection of Coral Street and Grafton Street, the Alternative Route travels east on Grafton Street to Orient Street, proceeds on Plantation Street to Brown Square, turns east on Franklin Street, then turns north on Pollock Street (id.). At this point, the route travels east across the GFI property to the CSX ROW, crosses under the CSX railroad tracks to the driveway owned by the Eastview Apartment Associates, then enters the Bloomingdale substation (id.).

3. Environmental Impacts

The Project will have temporary (i.e., from construction) and permanent environmental impacts. The Siting Board addresses temporary impacts in Section 3.a and permanent impacts in Section 3.b, below.

a. Temporary Environmental Impacts

In this section, the Siting Board reviews the temporary environmental impacts associated with the construction of the proposed transmission line and substation improvements. First, the Siting Board describes the construction methodology and sequencing that the Company will utilize for either the Primary or Alternative Route. Then, the Board describes and compares the environmental impacts of the Primary and Alternative Routes. As addressed below, the Siting Board finds that (1) the Primary and Alternative Routes have comparable temporary impacts on water resources, endangered species and hazardous materials; (2) the Primary Route has less adverse temporary environmental impacts on land use and historical resources, air emissions, traffic and noise; and (3) subject to specified mitigation and certain conditions, temporary environmental impacts along the Primary Route would be minimized.

i. Construction Methodologies and Sequencing Applicable to Either Route

(A) Substation Upgrades

The Project includes upgrades to four substations, Vernon Hill, Bloomingdale, Millbury and Rolfe Avenue substations (Exh. NG-2, at 1-11 to 1-18). To accommodate the 115 k V line, the following equipment will be installed at the existing Vernon Hill substation: one 115 kV gas

circuit breaker; two motorized disconnects; three circuit switchers; six 115 kV coupling capacitor voltage transformers; one 115 kV cable termination riser structure and associated equipment; one 115 kV dead-end structure for the M-165 overhead line; 115 kV tubular aluminum bus and support structures; and associated 115 kV relaying and controls (Exh. NG-2, at 1-11). The following equipment will be installed at the Bloomingdale substation to accommodate the 115 kV line: one 115 kV gas circuit breaker; two motorized disconnects; two circuit switchers; six 115 kV coupling capacitor voltage transformers; one 115 kV cable termination riser structure; 115 kV tubular aluminum bus and support structures; control house extension with additional relay; and control panels and associated bus work and equipment (Exh. NG-2, at 1-15).

The Millbury substation is geographically separate from the proposed transmission line (Exh. NG-2, at 1-15). The Project necessitates the installation of two 115 kV gas circuit breakers in an existing bay to separate the existing 115 kV M-165 and E-157 overhead lines at the Millbury substation (id.; Exh NG-2, at 1-15; 1-18).[41] The Millbury substation upgrades also include two 115 kV coupling capacitor voltage transformers; 15 gang-operated disconnect switches; associated equipment relaying and controls; and 115 kV tubular aluminum bus and support structures (Exh. NG-2, at 1-18). Finally, the Rolfe Avenue substation (which is also geographically separate from the proposed transmission line) will require new protection and control equipment to support the upgrades at the Blooomingdale substation, including a new line trap and capacitor voltage transformers (Exh. NG-2, at 1-18). Most of the work at the Rolfe Avenue substation will be within the existing control house with the exception of one coupling capacitor voltage transformer which will be located outside the control house (id.).

(B) Transmission Line

The proposed transmission line will consist of three solid dielectric insulated cables in individual polyvinyl chloride ("PVC") conduits (Exh. NG-2, at 1-23). The duct bank will consist of four six-inch diameter PVC conduits, one four-inch diameter PVC conduit for fiber-optic communication to protect the transmission lines, two two-inch diameter PVC conduits for fiber-

[41] The substation upgrades at the Millbury substation provide a second transmission source to the Bloomingdale substation (Exh. NG-2, at 3-6).

optic cables for temperature monitoring and a ground cable (id.). The PVC conduits will be encased in a common concrete envelope (id.).

The Company's construction of the underground transmission line will proceed in several phases conducted in sequence at each particular location so that construction can progress simultaneously along different portions of the route (Exhs. NG-2, at 5-6; EFSB-T-8). The five principal phases of construction consist of: (1) manhole installation; (2) trench excavation; (3) duct bank installation and pavement patching; (4) cable pulling, splicing and testing; and (5) final pavement restoration (Exh. NG-2, at 5-6). The Company estimates a construction period for the transmission line of approximately nine months from the date that the Company obtains all permits (Exh. EFSB-G-9).

The Company plans to start construction with the installation of manholes and duct bank (Exh. NG-2, at 5-6). Pre-fabricated concrete manholes approximately eight feet wide by 20 feet long will be installed every 1,500 to 2,000 feet (id.). The basic method for constructing the underground duct bank will be by open-cut trenching. To mitigate any sedimentation or nuisance dust and to minimize traffic impacts, the Company will employ a "clean trench" method of excavation whereby the excavated soil is loaded directly into a dump truck for off-site recycling or disposal (Exh. NG-2, at 5-9). To further reduce the impacts of dust during excavation, the Company will require the contractor to cover truck loads containing excavated soils and to wet down the project site, if necessary (Exh. EFSB-T-1; Tr. at 165). The Company asserts that implementing the "clean trench" approach is itself a dust suppression methodology as it results in substantially reduced fugitive dust emissions compared to other construction techniques (Exh. EFSB-T-1).

In terms of the CSX ROW near the Bloomingdale substation, a trenchless boring technique known as "pipe-jacking" or "jack and bore" will be utilized (Exh. NG-2, at 5-9).[42] The results of the Company's soil boring testing on both sides of the proposed crossing location determined that the casing should be above the bedrock (RR-EFSB-8). The estimated duration

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[42] This technique involves creating a tunnel for the conduit: a casing equipped with a tunneling shield is pushed forward incrementally by hydraulic jacks located at the jacking pit (Exh. NG-2, at 5-9).

of the pipe jacking procedure is eight to eleven weeks (id).[43] Once the trench is excavated, PVC conduit will be assembled and lowered into the trench and the area around the conduit will be filled with a high-strength, thermal concrete (Exh. NG-2, at 5-9). The trench will then be backfilled and the site restored (id.). Once the manholes and duct bank are complete, the cable will be installed, spliced, tested and energized (Exh. NG-2, at 5-10).

ii. Pavement Restoration

After construction of the duct bank is complete, the pavement will be temporarily patched. Thereafter the pavement will be repaired or replaced upon request of the Worcester Public Works Department ("PWD") (Exh. NG-2, at 1-23). A DPU standard and a Worcester municipal ordinance govern the restoration of the streets for utility projects.[44] The DPU Street Restoration Standards state at § 9.16 that "The Municipality shall have jurisdiction to determine the pavement repair method to be utilized on all pavements which have been installed for less than five years."

Furthermore, the City of Worcester Revised Ordinances, Part 1, Chapter 12, §118, Replacing Disturbed Portion of Street provide that:

(a) Whenever any person…shall remove or disturb any portion of a street, way, pavement or sidewalk for any purpose whatsoever, such street, way, pavement or sidewalk shall be replaced in a safe and suitable condition for the public travel as may be directed by the commissioner, it shall be so replaced by the commissioner at the expense of the person so disturbing or removing the same….

The Company has had several discussions with the City concerning pavement restoration (Exh. EFSB-C-13). The City recognizes that based on the Company's proposal to start construction in the spring of 2011, some of the streets previously identified as "new" would be

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[43] If the ledge elevations are consistent with the results of the soil borings, the construction time frame should be between eight to eleven weeks, but if substantial ledge or bedrock is encountered pipe jacking construction may be extended an extra six weeks and may require special tooling (RR-EFSB-8).

[44] The DPU standard is the Street Restoration Standard (D.T.E. 98-22, Standards to be Employed by Public Utility Operators When Restoring Any of the Streets, Lanes and Highways in Municipalities) and the municipal standard is City of Worcester Revised Ordinances of 2008 (Exh. EFSB-C-13).

more than five years old (id.). However, the PWD noted that the abutters along these routes would still expect full curb-to-curb repaving based on their initial understanding of the Project's requirements (id.). While there are currently no formal agreements in place between the City and the Company regarding pavement restoration, the Company has agreed to work cooperatively with the City to assess the condition of each street prior to the start of construction and come to an agreement as to whether the Company would repave each street curb-to-curb, provide a full depth patch along the trench only or contribute funds for full repaving to be performed by the City (id.). The Siting Board finds that pavement restoration is necessary to mitigate the Project's construction impacts. Thus, the Siting Board directs the Company to continue to collaborate with City officials to assess the condition of each roadway and reach an agreement regarding pavement restoration for each roadway affected by the Project prior to the commencement of construction of the Project.

iii. Asian Long Horn Beetle

Both the Primary and Alternative Routes are within an area currently being regulated by the Massachusetts Department of Conservation and Recreation ("DCR") for an infestation by Asian Long Horn Beetles (Exh. NG-2, at 5-26). The Company will require contractors to review the DCR requirements and consult with the DCR and the City of Worcester regarding proper disposal techniques (id.). To ensure that tree removal for the Project does not impact the area affected by the infestation by Asian Long Horn Beetles, the Siting Board directs the Company and its contractors to comply with the regulations and requirements of DCR and the City of Worcester regarding the proper disposal of trees, limbs and debris from regulated Project areas.

iv. Water Resources and Endangered Species

There are no wetland resource areas and no surface waters along the Primary or Alternative Routes or at substations to be upgraded (Exh. NG-2, at 5-23). The Worcester Conservation Commission has determined that there are no jurisdictional storm drains leading to wetland resources and wetlands will not be impacted by the Project (Exhs. EFSB-G-3; EFSB-G-3(a)). There is a low potential for erosion and sedimentation resulting from construction within City streets along both the Primary and Alternative Routes (Exh. NG-2, at 5-23). However, the

Company will prepare a Storm Water Pollution Plan ("SWPP") that will specify measures to be implemented, including the installation and maintenance of filter fabric barriers to prevent sedimentation to the storm drain system (id.). In addition, the trench spoils will be loaded into dump trucks and promptly removed, which limits the potential for soils to be transported into nearby storm drains (id.).

The Natural Heritage and Endangered Species Program ("NHESP") has determined that there are no mapped habitats in the vicinity of the Primary or Alternative Routes or the substations (id. at 5-24).

Based on the record information noted above, the Siting Board finds that impacts to endangered species and, with the implementation of the SWPP and clean trench method of excavation, impacts to water resources along the Primary Route would be minimized. The Siting Board further finds that the Primary and Alternative Routes are comparable with respect to impacts on water resources and endangered species.

v. Land Use and Historical Resources

(A) Primary Route

With few exceptions, the alignment for the Primary Route is within public roadways (Exh. NG-2, 5-16, 5-17). The Primary Route utilizes the Providence Street duct bank for the first 1.5 miles of the route (Exh. EFSB-G-13). Providence Street contains a mix of land uses, including high density residential development, the Worcester Senior Center Campus, medical office buildings, small businesses and two educational institutions: the Worcester Academy, a private co-ed day and boarding school for grades 6-12 and postgraduates, and the Vernon Hills School, which is a public elementary school (id.). Also on Providence Street is the Worcester Academy Community Park which includes athletic areas (Exh. NG-2, at 5-16, 5-17). From Providence Street, the duct bank travels onto Aetna and Coral Streets, which consist of residential development (Exh. NG-2, at 5-17).

The portion of the Primary Route requiring new duct bank construction first traverses Waverly Street, which consists of multi-family residences and proceeds via a driveway into CSX's property, which will have an industrial use as an intermodal rail terminal (Exh. NG-6, at 5). From Norfolk Street to Brown Square, the Primary Route is mostly comprised of single and

multi-family homes, and on Plantation Street between Brown Square and Northboro Street, the route also is mostly residential with a small dry cleaner (Exh. NG-2, at 5-17). The route continues on the northwestern side of the GFI property, which has several commercial buildings, and then travels under the CSX tracks to the driveway serving the Eastview Apartment complex into the Bloomingdale substation (id.).

There are 15 historic resources along the Primary Route, more than half along the Providence Street duct bank. These include four properties on the Inventory of Historic and Archaeological Assets of the Commonwealth and three National Register properties as well as two Districts listed with National Register of Historic Places (Exhs. NG-2, at 5-28 to 5-29; NG-2, at Figure 5-7).[45] Along the new duct bank portion, there are three properties on the Inventory of Historic and Archaeological Assets of the Commonwealth (Exh. NG-2, at 5-28). In addition, the Bloomingdale Fire House is listed on the State and National Registers of Historic Places and the Worcester Multiple Resource Area (id.).[46] The Company will submit a Project Notification Form to the Massachusetts Historical Commission ("MHC") in compliance with M.G.L. c. 9, §§ 26-27C as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00) (Exh. NG-2, at 5-26).

Regarding mitigation measures, the Company will implement a variety of measures to reduce the short-term impacts of construction, including implementing the clean trench method of excavation, suppressing dust by covering dump trucks and wetting down the site, if required (Exhs. NG-2, at 5-13; EFSB-T-1; Tr. at 165). Additionally, the Company will develop a Construction Communication Plan ("CCP") which will be implemented in advance of and during construction of the Project (Exh. EFSB-C-1). The CCP will describe the outreach activities to inform abutters and stakeholders of the construction of the Project as well as the Company's plans to coordinate construction activities so that impacts are minimized (id.). The Project's

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45 The noted 15 historic buildings abutting the Primary Route exclude the Worcester Cold Storage Company Warehouse at 256-268 Franklin Street because it was burned down and the Boston & Albany Freight Station at 271 Franklin Street because it was demolished (Exh. NG-2, at 5-28).

46 The Bloomingdale Fire House is also adjacent to the Alternative Route (Exh. NG-2, at 5-28).

Community Outreach Coordinator will also contact the operations directors at institutions, hospitals and medical offices to inform them of the Project, its location and the expected duration of construction activities, and will respond to inquiries (id.). The Community Outreach Coordinator also will remain available to discuss any potential concerns throughout the course of construction (id.). The Company also will distribute flyers and maintain a website informing abutters in advance of construction activities and parking restrictions specific to the Project (Exh. EFSB-T-11).

In sum, because the Project is underground primarily under public roadways, any impacts on land use and historical resources will be temporary. Such impacts will be further minimized because using the Providence Street duct bank will not require excavation (i.e., cables simply will be installed and spliced within the existing duct bank). The Siting Board finds that subject to the mitigation discussed above, including implementation of the Company's dust suppression methods, its outreach efforts including the CCP informing abutters of construction activities with Company contact information, flyers distributed to abutters in advance of construction activities, and the Company's website describing construction progression, the impacts on land use and historical resources along the Primary Route would be minimized.

(B) Alternative Route

In lieu of the Providence Street duct bank segment of the Primary Route, the Alternative Route will require new duct bank construction along Vernon Street, which has large multi-family homes, several small businesses and an outpatient medical center (Exh. NG-2, at 5-17). Land use along the remainder of this route segment extending from Dorchester Street to Coral Street is residential (id.). In lieu of the new duct bank portion of the Primary Route, the Alternative Route traverses Grafton Street between Route I-290 and Billings Square, which is a dense commercial business district with an elementary school (id.). Beyond Billings Square, the Alternative Route is predominantly residential, but includes a nursing home and a park containing playground equipment and sports areas (id.). The Alternative and Primary Routes are similar from the end of Northboro Street to the Bloomingdale substation (id.).

There are 18 historic resources along the Alternative Route, including 15 properties listed on the Inventory of Historic Archaeological Assets of the Commonwealth and 3 properties listed

on both the National and State Registers of Historic Places (Exh. NG-2 at 5-28). The Alternative Route historic resources are similar in type and number to the 15 resources along the Primary Route (id.). The Company asserts that there is little potential to impact these historic resources as the Project will consist of temporary alteration and restoration of the public roadways (Exh. NG-2, at 5-26; 5-29).

Community receptors and historical resources are compared for the Primary and Alternative Routes in the table below:

Table 4: Community Receptors and Historic Resources Along the Primary and Alternative Routes

Community Receptor	Primary Route		Alternative Route
	Entire route	Portion of route requiring new duct bank	
Residences	384	216	403
Businesses	25	18	45
Schools	2	0	3
Parks	1	0	2
Other	Senior Center Medical Offices	0	Senior Center, Nursing Home Medical Offices
Historic Resources	15	6	18

Source: Exhs. NG-2, at 5-28; EFSB-LU-12; RR-EFSB-5

In sum, for both the Primary and Alternative Routes, transmission facilities are to be located under streets, and have temporary construction impacts to land use and historical resources. However, compared to both the existing and new duct bank portions of the Primary Route, the Alternative Route's temporary impacts will be greater because installation of new duct bank along the Alternative Route entails a longer, more disruptive construction process – a clear land use impact disadvantage. For the remainder of its length, where use of either route requires new duct bank installation, the Alternative Route passes more residences, businesses and schools than the Primary Route and thus has more land use impacts as well. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to temporary construction impacts on land use and historic resources.

vi. Construction Equipment Air Emissions

(A) Background

As a transmission facility, the Project generally will not negatively impact air quality. However, the EFSB has concerns regarding emissions from construction vehicles. Diesel engines produce significant amounts of particulate matter ("PM"), which are small solid and liquid particles composed primarily of carbon that can be easily inhaled and that pose a significant health risk to humans (Exh. EFSB-1, at 1). Reducing PM pollution from all sources, including construction equipment, is important for the health of workers and communities (id.). Because construction equipment emits such a significant portion (27 percent) of the state's diesel $PM_{2.5}$, the Massachusetts Department of Environmental Protection ("MADEP") established the Massachusetts Diesel Retrofit Program ("MDRP") (id. at 4). The program involves using contract specifications to require contractors working on state-funded projects to install retrofit pollution controls on their construction equipment engines to reduce PM, volatile organic compounds ("VOCs"), and carbon monoxide ("CO") (id.).[47] In a recent case, the Siting Board imposed a condition requiring the applicant to retrofit certain diesel powered construction equipment. (See Western Massachusetts Electric Company, EFSB 08-2/D.P.U. 08-105/106, at 80 (September 28, 2010) ("GSRP Decision")).

(B) Substation Upgrades

For the substation upgrades, which will be the same whether the Primary or Alternative Route is used, the Company will be using in-house construction crews (Exh. EFSB-C-16; Tr. at 154). The duration of construction is estimated to be nine months for the Vernon Hill substation; eight months each for the Bloomingdale and Rolfe Avenue substations; and seven months for the Millbury substation (Exh. EFSB-G-9). The Company set forth the following non-road construction equipment to be used for the upgrades: excavators to dig foundations, cranes to set and offload equipment, and lifts (Tr. at 159). The Company indicates that the construction

[47] Other strategies include (1) reducing idling; (2) replacing/repowering/rebuilding older engines; and (3) using cleaner diesel fuels (Exh. EFSB-1, at 4).

equipment would be operated on an as-needed basis and used for short durations to install the equipment at the substations (id.).

(C) Underground Transmission Line

The underground transmission line portion of the Project will use a similar construction methodology whether the Primary or Alternative Route is used. The Company estimates the duration of construction for the Primary Route to be nine months, whereas for the Alternative Route, the construction period would be 17.5 months due to two more miles of duct bank construction and a restriction on excavation between mid-November and mid-April imposed by the City of Worcester (Exhs. EFSB-C-15; EFSB-G-9). Construction of the underground line will be comprised of civil and electrical construction activities to be performed by a contractor hired by the Company using the following non-road construction equipment: grinders to remove existing pavement; excavators to do trenching, cranes to set manholes, and pavers to lay final pavement (Exh. EFSB-C-6; Tr. at 155). The Company is assuming an average progression of 100 feet per day for the pipe-laying portion of the Project (Exh. EFSB-T-1; Tr. at 156-158).

(D) Company's Position

The Company argues that it has not had the opportunity to thoroughly evaluate and offer evidence on project-specific issues that could affect either the appropriateness of retrofitting certain equipment or the Company's ability to comply with a retrofit condition while maintaining the construction schedule (Company Brief at 76). The Company further argues that it has not had an opportunity to discuss retrofitting construction equipment with prospective bidders, nor has it had the opportunity to work through the logistics of retrofitting certain equipment and then ensuring that those specific pieces of equipment are available for this Project (id. at 76, 77).

(E) Mitigation

The Company requires that contractors' equipment be in good working order, which the Company asserts helps to reduce emissions (Exh. EFSB-C-11). The Company indicated that it would encourage contractors invited to bid on this Project to consider engine retrofits and review this factor as part of the overall contractor selection process, noting that many large contractors already employ retrofits on their construction equipment (Exh. EFSB-10). With respect to its

own fleet, the Company proposes minimizing air quality impacts by using ultra-low sulfur diesel fuel (Exhs. EFSB-C-11; EFSB-C-12; EFSB-RR-9). The Company also requires that all construction vehicles (whether operated by the Company or by a construction contractor) comply with state law (G.L. c. 90, §16A) and DEP regulations (310 CMR 7.11(1)(b)) limiting vehicle idling to no more than five minutes in most cases (Exhs. EFSB-C-11; EFSB-C-12).

Because of the Siting Board's concern for air emissions caused by the Project's construction equipment and the dense urban environment in which the Project will occur, the Board concludes that additional mitigation is warranted. Thus, in addition to the mitigation specified by the Company, the Siting Board directs that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available), installed on the exhaust system side of the diesel combustion engine.[48] Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition and a list of retrofitted equipment, including type of equipment, make/model, model year, engine horsepower, and the type of emission control technology installed. The Siting Board finds that with the Company's specified mitigation, in conjunction with the implementation of the preceding diesel retrofit condition, the environmental impacts related to air emissions from construction equipment along the Primary Route would be minimized. Construction equipment air emissions would be less for the Primary Route due to its shorter construction schedule. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to the construction equipment air emissions.

vii. Traffic

(A) Overview of Construction Impacts

Both the Primary and Alternative Routes are densely populated and urban in nature and use portions of well-traveled local arterial roadways (Exh. NG-2, at 5-13). The typical width of

[48] In imposing this condition, the Siting Board notes that during this proceeding the Company had ample opportunity to submit evidence regarding diesel retrofits.

the construction corridor will be one traffic lane or approximately ten to twelve feet. If construction barriers (e.g. cones or jersey barriers) are used, an additional two to three feet would be added to the construction corridor (Exh. EFSB-C-9). Approximately 100 linear feet of trench will be excavated each day based on trench dimensions of 2.5 feet wide and five feet deep (Exh. EFSB-T-7). There will be approximately 50 cubic yards of material excavated from the trench daily which will necessitate approximately five to six truck trips per day for soil removal purposes and three truck trips per day for back filling (id.). The trench will be sheeted and shored, mitigating traffic impacts by allowing the trench to be covered during non-working hours so that traffic can pass over it and access to businesses and residences can be maintained (Exhs. NG-2, at 5-9; EFSB-T-7; EFSB-T-9).

For either route, the Company anticipates that traffic control by a detail officer will be necessary during the periodic delivery of construction material and equipment (Exh. EFSB-T-4). To the extent possible, all material for the underground transmission line will be delivered to one of several lay down areas and will be transported to the job site on an as-needed basis (id.).[49] Delivery of the materials or trucks exiting the work zone to transport soil and rock may create periodic, short-term traffic impacts. The contractor will work with the on-site detail officer to manage traffic flow during these temporary operations (Exh. EFSB-T-4). Additionally, some materials such as manholes and concrete will be site-delivered, which may require temporary traffic restrictions during offloading, expected to be of short duration (id.). The equipment deliveries for the substation construction will not require any special traffic control measures because there is sufficient space at each of the substations to allow offloading of material out of the public way (id.).

(B) Primary Route

The Primary Route utilizes the Providence Street duct bank for 1.5 miles, which will substantially reduce and mitigate traffic impacts because work in this area will be limited to

[49] The Company has not finalized its plans for staging and lay down areas but has identified potential locations including, National Grid's office in Worcester, the Bloomingdale substation, the Vernon Hill substation and area under the Interstate 290 overpass next to the Grafton Street substation (Exh. EFSB-C-7).

cable pulling and splicing activities at existing manholes (Exhs. NG-2, at 5-14; EFSB-G-9). For the remainder of the route, the Company estimates from geotechnical borings where new duct bank will be installed, that approximately 18 percent of the trench spoils will be ledge (Exh. EFSB-NO-3). Considering the length of new duct bank and the extent of ledge, the Company estimates that the Primary Route construction period will be nine months (Exh. EFSB-G-13).

The Company noted that, in aligning the new duct bank, proposed locations were not limited to travel and parking lanes but included sidewalks and other public portions (e.g. shoulders) of the roadway (id.). The total length of sidewalks that will be impacted by construction on the Primary Route is approximately 1,620 feet (0.31 miles) (Exh. EFSB-T-10). There will be some short-term parking prohibitions along the Primary Route during construction, primarily during the trenching and duct bank installation, which will be done in a continuous progression with the roadway being returned to service as the progression passes (Exh. EFSB-T-11). However, there may be limited areas where parking restrictions will be applied only during construction hours (id.). In general, if approved by the City, parking restrictions will be in place for the duration of construction at any given location along the route for a relatively short duration (typically one to two weeks). The Company has made several outreach efforts to make residents and abutters aware of the potential construction issues, including short-term parking restrictions (id.). The Company will continue its outreach efforts and notify abutters of intended dates of construction in their area. Further, the Company will attempt to identify nearby parking alternatives in areas of the route where on-street parking restrictions would cause particular hardship (id.).

The Company expects it will be possible to maintain two lanes of traffic for 85 percent of the length of the Primary Route (16,160 feet) (Exh. EFSB-T-7). The Company estimates that the crossing of Grafton Street will take between three to four days (Exh. NG-6 at 6). The Company consulted with the Worcester PWD concerning possible night construction at the Grafton Street crossing for the CSX work-around (Exh. EFSB-NO-6). There is, however, a high probability that construction could be performed during regular hours and the Company would be successful

in maintaining two lanes of travel during construction activities (id.).[50] The City has directed the Company to provide sufficient prior warning in the form of message boards in advance of construction activities in this area (id.). The Siting Board directs the Company to continue working with the City of Worcester regarding the Grafton Street crossing.

The remaining portions of the route will require temporary lane closures with alternating traffic patterns managed by police details (Exh. EFSB-T-7). Less than two percent of the Primary Route will require temporary road closures (id.). Most likely 360 feet of Villa Nova Street will require a full road closure because it is narrow but the length of the proposed duct bank along this street is relatively short and construction activities should be completed in one to two weeks (id.). Local and emergency access will be maintained for any road closures approved by the Worcester PWD (id.).

The Company completed its initial Traffic Management Plan, which was presented at a meeting with various City agencies and officials, including the PWD and School Department on June 2, 2010 (Exh. EFSB-T-13). The Company will continue its working relationship with City Departments throughout the planning stages and construction of the Project (Exh. EFSB-T-12).

Traffic impacts associated with the Project will be temporary in nature and subject to the Company's proposed mitigation measures to minimize traffic impacts, including utilizing detail officers, implementing a Traffic Management Plan and CCP, delivering flyers with pertinent construction and traffic information, and maintaining a website specific to the Project, traffic impacts will be minimized along the Primary Route. The Siting Board anticipates that the Company will make every effort to avoid night construction. Should nighttime construction be required, however, the Siting Board directs the Company to provide the Siting Board with the Company's nighttime construction mitigation plan prior to the commencement of nighttime construction, encompassing any and all impacts and associated mitigation, including but not limited to, impacts to neighboring land uses, illumination spill-over and glare, noise and traffic impacts.

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50 The PWD anticipated that night work would not be necessary at the Grafton Street crossing location, but indicated that its Traffic Engineering Department would advise the Company if on-going review of the Project revealed new concerns (Exh. EFSB-NO-6).

(C) Alternative Route

The Alternative Route entails four miles of new duct bank, which is two more miles than the Primary Route. Further, the Company estimates that 30 percent of the Alternative Route would involve construction through ledge, approximately three times as much as the Primary Route (Exh. EFSB-NO-3). The Alternative Route, while traversing some local residential streets, also includes more heavily traveled urban arteries and a dense commercial business district with an elementary school on Grafton Street (Exh. NG-2, at 5-17). Additionally, there are three Worcester Regional Transit Authority bus routes along Grafton Street (id.). Input from the City of Worcester and neighborhood groups attending initial outreach meetings expressed concern regarding construction impacts and restrictions on traffic flow along Grafton Street (Exhs. NG-2, at 5-15; EFSB-C-8). Another challenge expressed by City officials concerning the Alternative Route is significant traffic volumes along Plantation Street (id.).

Based on the additional two mile duct bank construction required and the likely presence of more ledge on the Alternative Route, as well as local concern about traffic impacts on Grafton and Plantation Streets, the Siting Board finds that the Primary Route would be preferable to the Alternative Route with respect to temporary traffic impacts associated with construction.

viii. Noise

(A) Substations Upgrades

The new equipment and other improvements proposed at the Bloomingdale, Vernon Hill, Millbury and Rolfe Avenue substations are not expected to contribute to a significant increase in the noise levels experienced by surrounding receptors (Exh. NG-2, at 5-21). The proposed scope of the upgrades to the substations does not differ between the Primary and Alternative Routes (id.). Sources of noise would be limited to construction (i.e., excavating and installing equipment) (Exh. NG-2, at 5-21). The associated temporary construction noise will occur between 7:00 a.m. to 6:00 p.m. daily, Monday through Friday (Exh. EFSB-C-14). Work outside those hours may occur during planned outages to energize the new substation equipment but the Company will seek permission from the City of Worcester prior to any such work (id.). The duration of construction is estimated to be nine months for the Vernon Hill substation, eight months each for the Bloomingdale and Rolfe Avenue substations and seven months for the

Millbury substation (Exh. EFSB-G-9). Because any noise impacts will be temporary and will primarily occur during regular working hours, the Siting Board finds that the noise impacts associated with the construction at the substations will be minimized and that the noise impacts would be comparable for the Primary and Alternative Routes.

(B) Underground Cable Installation

(1) Primary Route

All phases of project construction will involve some noise. However, due to the progressive nature of the Project, at an average rate of approximately 100 feet per day, the duration of construction at any given location under normal trenching conditions will be about seven days (Exhs. NG-2, at 5-6; NG-2, at 5-19; NG-2, at 5-20 to 5-21; EFSB-T-1) (See Section II.D.3.a.i). The manhole installation and trench excavation phases utilize more substantial construction equipment, creating more noise than cable pulling and cable splicing, which does not generate significant noise (Exh. NG-2, at 5-20).[51] Typical sound levels from construction equipment at a reference distance of 50 feet would range between 60 dBA for the air conditioner to be used for cable splicing to 90 dBA for the pavement saw to be used for trench excavation (Exh. NG-2, at 5-19).[52] The excavation of ledge will be another source of noise because geotechnical boring tests completed by the Company indicate that approximately 18 percent of the Primary Route trench spoils will be rock (Exh. EFSB-NO-3). The Company will require that the contractor use mufflers and equipment with low noise levels where practical (Exh. NG-2, at 5-20).

The cables will be spliced inside connecting manholes which typically requires four to five work days per manhole to complete the splicing of all three cables (Exh. NG-2, at 5-10). The splicing operation requires the use of vehicles that contain all of the equipment and materials

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51 The typical construction equipment to be used for the project include the following: mobile crane, pavement saw, asphalt paver, concrete batch truck, pneumatic hammer, mounted impact hammer, backhoe, dump truck, generator and air conditioner (Exh. NG-2, at 5-19).

52 These estimates are conservative and based on maximum sound levels for each piece of construction equipment to be used on the Project (Exh. NG-2, at 5-20).

and a generator to provide electrical power for both the splicing van and an air conditioning unit often necessary to control moisture (id.). Cable splicing is a relatively quiet activity because the work takes place in the manhole, but there will be some noise created by the electric generator and ventilation fans while the manholes are occupied (id.). The Company will minimize noise from cable splicing by requiring the use of sound attenuated generators, which in the Company's experience will approximate a 25 percent reduction in noise levels at a 23 foot setback, which is consistent with the urban environment of the Project area (Exhs. EFSB-NO-2; RR-EFSB-7).[53]

Construction activities will typically occur between 7:00 a.m. and 6:00 p.m. Monday through Friday.[54] The Company indicated the possibility that it may seek approval from the City to work at night or on weekends to minimize disruption or if requested by the PWD. The Company expects this approach would be applicable principally for the commercial-industrial area near Route I-290 and on part of Franklin Street, rather than areas of residential use (Exh. NG-2, at 5-12; Tr. at 109-110). As noted above, the Company consulted with the City concerning the possibility of performing construction for the Grafton Street crossing at night to minimize traffic impacts.[55] While nighttime work is unlikely, should it be required, the Company indicated that the work would likely occur between 7:00 p.m. and 5:00 a.m. for three to four weekday nights (Exhs. EFSB-NO-5; NG-6, at 6). Construction activities would involve

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53 The industry standard is to reference the noise level at seven meters (approximately 23 feet) (RR-EFSB-7). This reduction estimate is based on the WhisperWatt™ manufactured by MultiQuip as a comparison of noise levels for generators with and without attenuation equipment compared to the U.S. Department of Transportation Federal Highway Administration published values for maximum construction equipment noise levels for generators (id.).

54 These hours comply with Chapter 8 and Chapter 9 of the City of Worcester's Ordinance, which limit the hours of construction to weekdays from 7:00 a.m. to 9:00 p.m. (Exhs. EFSB-NO-1; EFSB-NO-7; NG-2, at 5-12).

55 During the Company's consultation with the City regarding the possibility of nighttime construction for the Grafton Street crossing, the Worcester PWD observed that the land use was primarily commercial and that businesses would be closed at night (Exh. EFSB-NO-6). However, there are three multifamily residences on Waverly Street approximately 160-205 feet from the nearest Project location in the Grafton Street vicinity (Exh. EFSB-NO-9).

use of backhoes, dump trucks, a pneumatic hammer and generators, which would result in typical noise levels in the 80-90 dBA range (id.). If nighttime construction were to occur, the Company proposes the following mitigation measures: additional notice and community outreach in the Grafton Street crossing area, including message boards to alert abutters; measures to address and minimize the use of vehicles' back-up alarm noises; tasks having the highest sound levels (e.g., pavement cutting) scheduled in the early evening hours; use of exhaust systems and mufflers with the lowest associated noise levels and truck cleanout staging areas remote from work site to minimize slamming tailgates (Exh. EFSB-NO-8). The Company will continue to communicate with local officials and any sensitive receptors along the construction route to coordinate construction logistics and scheduling (Tr. at 106). The Company will also comply with Condition (e) in Section VI regarding nighttime construction.

Give the progressive nature of the Project, the use of mufflers and equipment with low noise levels and sound-attenuated generators, and the fact that construction will occur primarily on weekdays during daytime hours, the Siting Board finds, subject to compliance with Condition (e) in Section VI, that the noise impacts resulting from the construction of the Project along the Primary Route will be minimized.

(2) Alternative Route

The Company will use essentially the same equipment and construction techniques along either the Primary or the Alternative Route, resulting in essentially the same sound levels along either route. However, given that the Alternative Route requires an additional two miles of duct bank construction with a greater number of receptors and may have a greater amount of ledge (in which work generates slightly more noise and takes longer than excavation of fill or soft soils), the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to noise impacts associated with construction.

ix. Hazardous Materials

Some excavated materials may have the potential to be contaminated from historical releases or former land development practices in the vicinity of both the Primary and Alternative Routes (Exh. NG-2, at 5-24). According to DEP's database of Reportable Releases, for the

Primary Route and Alternative Route there are approximately 16 and 12 subsurface contamination sites respectively (Exh. NG-2, at App. 5-1). In addition, for the CSX work-around, DEP records indicate that previous soil characterization efforts, conducted by others, (DEP Site Tracking Numbers 2-0014903 and 2-0014943) resulted in reportable levels of subsurface contamination attributed to the quality of the urban fill that underlies the site and releases to soil from a former petroleum underground storage tank (Exh. EFSB-S-5).[56] In the area of the CSX work-around, construction will proceed pursuant to 310 CMR 40 and in accordance with the Activity and Use Limitation ("AUL") recorded in 2007 (id.).[57] Of the 16 sites on the Primary Route, 13 have been classified as Response Action Outcome ("RAO") indicating that the sources of contamination had been abated and that a condition of no significant risk had been achieved. For the Alternative Route, of the 12 sites, four have been classified as RAO and four have been closed (id.).

The Company has not yet conducted a pre-construction soil sampling effort. However, prior to the commencement of construction the Company will conduct sampling within the cable route trench which will provide soil management characterization data (Exh. EFSB-S-2). Should the route appear to be contaminated, the Company will submit either a Release Abatement Measure Plan ("RAMP") or a Utility-Related Abatement Measure Plan ("URAM"), pursuant to the Massachusetts Contingency Plan ("MCP"), 310 CMR 40 (id.). If contamination is found, the Company will contract with a Licensed Site Professional as necessitated by conditions encountered along the cable route trench, consistent with the MCP (Exh. NG-2, at 5-25).

The Company is also preparing a Health and Safety Plan to prevent worker and public receptor exposures to contaminated soils (Exh. EFSB-S-5). These plans provide assurance that contaminated soils or groundwater encountered during construction will be handled appropriately, regardless of the number of instances of contamination. Thus, the Siting Board

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56 The DEP records are available online at http://db.state.ma.us/dep/cleanup/sites/search.asp (Exh. EFSB-S-5).

57 The AUL prohibits uses such as single or multifamily residences, schools, day care facilities, recreational fields or playgrounds; and use of site soils for cultivation of fruits and vegetables (Exh. EFSB-S-5).

finds that subject to the Company's mitigation discussed above, impacts pertaining to hazardous material along the Primary Route would be minimized. The Siting Board notes that the record is unclear regarding the precise degree and extent of contaminated soils the Primary and Alternative Routes would traverse. However, the mitigation set forth above ensures the Company will identify and fully manage contaminated sites. The Siting Board finds that the Primary and Alternative Routes are comparable with respect to hazardous materials impacts associated with construction.

x. Conclusions on Temporary Impacts

The chart below summarizes the comparison between the Primary and Alternative Routes in terms of temporary environmental impacts due to construction of the Project.

Table 6: Summary of the Temporary Construction Impacts for the Primary and Alternative Routes

Type of Impact	Less Adverse Impact if the Primary Route Is Selected	Less Adverse Impact if the Alternative Route Is Selected	Comparable Impacts
Water Resources			X
Endangered Species			X
Land Use and Historical Resources	X		
Construction Equipment Air Emissions	X		
Traffic	X		
Noise	X		
Hazardous Materials			X

The Siting Board finds that the information provided by the Company regarding temporary environmental impacts of Project construction is substantially accurate and complete. In addition, the Siting Board finds that with the implementation of specified conditions and mitigation, and compliance with all local, state and federal requirements, the environmental impacts arising from the construction of the Project would be minimized. In comparing construction impacts along the two routes, the Siting Board finds that the Primary Route is preferable to the Alternative Route primarily because the Primary Route uses the Providence

Street duct bank for 1.5 miles of the 3.5 mile route, which significantly reduces the duration of construction (nine months for the Primary Route compared to 17.5 months for the Alternative Route). However, even discounting the obvious benefits of using the Providence Street duct bank for the Primary Route, if one were to compare the temporary construction impacts from where the Providence Street duct bank ends to the Bloomingdale substation with the corresponding segments of the Alternative Route, the Primary Route would still be superior because there would be (1) less traffic impacts to the dense business district on Grafton Street on the Alternative Route; and (2) less noise and traffic impacts because the Company estimates there will be more ledge along the Alternative Route. Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to temporary construction impacts.

b. Permanent Environmental Impacts

Due to the lack of natural resources along the Primary and Alternative Routes,[58] the permanent environmental impacts associated with the Project are limited to visual, hazardous materials and magnetic fields.[59] As addressed below, the Siting Board finds that (1) the Primary and Alternative Routes have comparable permanent environmental impacts; and (2) with implementation of certain mitigation measures and conditions, permanent environmental impacts along the Primary Route would be minimized.

i. Visual Impacts

Because the transmission line primarily will be located underground within public streets along either the Primary or Alternative Route, any visual impacts would be limited to the substations and the GFI property.

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58 There are no wetlands, vernal pools, surface waters, wellhead protection areas or protected species that would be permanently impacted by the Project using either the Primary or Alternative Route (Exh. NG-2, at 5-23, 5-24).

59 Because the proposed transmission circuit will be installed underground, no above-ground electric fields will be produced and no changes in ambient electric field strengths will result from the Project (Exh. NG-2, at App. 5-2). Accordingly, the Company evaluated only magnetic fields along the Primary and Alternative Routes.

(A) Substations

The existing Vernon Hill substation is bordered by residential uses on Vernon Street to the west, Gloucester Road to the north, Grammont Road to the east, and commercial/industrial uses to the south (Exh. NG-2, at 1-11; 5-21). The tallest existing 115 kV equipment at the Vernon Hill substation is a dead-end structure which is 45 feet in height and an airbreak switch tower which is approximately 40 feet in height; both of which will be removed (Exh. EFSB-V-1). The proposed new layout at the Vernon Hill substation will involve the installation of a new steel dead-end structure that will be 30 feet-6 inches in height and a breaker, switches, 115 kV bus and the UG cable termination structure, which will be less than 25 feet tall (id.). To provide space for the necessary upgrades, the fenced area on the east side of the site will be expanded by approximately 4,100 square feet within an existing grassed area along Grammont Road (Exh. NG-2, at 5-22). Thus, the highest proposed equipment will be shorter than the existing equipment being replaced but the area occupied by equipment will be expanded.

The vegetative buffering at the Vernon Hill substation currently is minimal and consists of a limited number of evergreen plantings screening the view from Vernon Street (Exh. NG-2, at Figure 1-4). As visual mitigation, the Company submitted a landscape plan for the Vernon Hill substation dated March 25, 2010 that was accepted by the City (Exhs. RR-EFSB-6(b); RR-EFSB-6(c)). The landscape plan provides Atlantic White cedar trees and pink azaleas along two sides of the facility on Vernon Street and Grammont Road, which appear to provide sufficient vegetative screening. Along Gloucester Road, however, only limited buffering has been proposed, consisting of three pink azalea bushes at the northwestern corner of the property.

The Siting Board is concerned about the lack of facility buffer along Gloucester Road, where homes across the street are at a higher elevation and look down into the Vernon Hill substation. To ensure that visual impacts at the substations are minimized, the Siting Board directs the Company to enhance the proposed landscape plan for the Vernon Hill substation dated March 25, 2010 to add additional vegetation in both the northwest and northeast corners on the Gloucester Road side of the substation. The Company is also directed to provide to the Siting Board a copy of its final landscape plans for the Vernon Hill substation for the Board's information prior to the commencement of construction. Furthermore, the Company shall

provide care for all plantings to ensure that landscaping at the Vernon Hill substation becomes established and is maintained.

The Bloomingdale substation is on a 3.3 acre parcel which is accessed by a private driveway owned by the Eastview Apartment Associates (Exh. NG-2, at 1-11). Abutting land uses consist of single-family residences to the north on Wigwam Avenue, a parking lot for the Eastview Apartments to the east and south (the Eastview Apartment complex is further south across the parking lot), and the driveway to the Eastview Apartments that is parallel to CSX railroad ROW to the west (Exh. NG-2, at 4-15). To accommodate the additional equipment, the Company is proposing to expand the existing fence line by adding a total of approximately 11,000 square feet within an existing vegetated area to the west adjacent to the driveway for the Eastview Apartments and to the north towards abutting single-family residences along Wigwam Avenue (Exh. NG-2, at 1-15). The tallest existing equipment at the Bloomingdale substation includes two transmission structures that are 75 feet and 80 feet tall and two dead-end structures inside the substation fence line that are approximately 38 feet tall (Exh. EFSB-V-1). The proposed new layout at the Bloomingdale substation will involve the removal of these structures and the installation of a single new dead-end structure that will be 64 feet in height (id.). Additional new equipment will be 25 feet or less in height, comparable to existing equipment (id.).

The Company expects to remove one large oak, several crab apple trees and a pine tree to the north and west for substation expansion or site security reasons (id.). In addition, a small section of the screening vegetation between the substation and apartment complex to the south may be removed to provide adequate electrical clearance for the 115 kV transmission line entering the substation (id.). The Company asserts that the fence extension was designed to minimize vegetation impacts by avoiding trees and other vegetation that currently provide screening from residential properties to the east and north of the substation (Exh. EFSB-V-3). In sum, the proposed equipment will be shorter than the existing equipment being replaced. However, there will be visual impacts as a result of clearing vegetation for the substation upgrades.

As part of this proceeding, the Company created a landscape plan for the Bloomingdale substation dated March 25, 2010 that has been accepted by the City (Exhs. RR-EFSB-6(b); RR-EFSB-6(c)). The Company will provide replacement and added landscaping along the north and west sides of the facility. The Siting Board directs the Company to implement the landscaping plan dated March 25, 2010 for the Bloomingdale substation and provide care for the plantings to ensure that the landscaping becomes established and is maintained.

There will be minimal upgrades at the Millbury substation and the fence line will be expanded by approximately 4,500 square feet in a vegetated area to the west towards Cross Street (id.; Exh. NG-2, at 1-18; NG-2, at Figure 1-8). The land use around the Millbury substation is largely undeveloped, with the nearest residence located about 400 feet to the northwest (id.). Due to the minimal upgrades being proposed and the largely undeveloped character of the abutting properties, the Company asserts that the upgrades will not have a significant visual impact relative to the current visual conditions at the site and no mitigation is proposed by the Company (Exh. NG-2, at 5-23).

At the Rolfe Avenue substation, proposed equipment will be mostly within the existing control house, with one coupling capacitor voltage transformer to be located outside the control house but within the existing substation footprint (id.). The Company asserts that the additional equipment will not alter the appearance of the existing substation and thus, there is no potential for any incremental visual impact resulting from the work proposed at this substation and no mitigation is proposed by the Company (Exh. NG-2, at 5-23).

The Siting Board finds that with the Company's implementation of the above condition of enhancing the Vernon Hill substation landscape plan to include mature plantings along Gloucester Road and the implementation of the landscape plan for the Bloomingdale substation as well as the provision of care for the plantings at both substations to ensure the landscaping becomes established and is maintained, the visual impacts of the substation upgrades would be minimized. The Siting Board further finds that the visual impacts of the upgrades to the substations would be comparable for the Primary and Alternative Routes.

(B) Transmission Line

With respect to tree removal overall, the Project should impact very few trees since most of the route is proposed under paved roadways (Exh. NG-2, at 5-25). With respect to the number of trees within 15 feet of the edge of the trench along the Primary Route that could potentially be affected during Project construction, the Company indicates that there are approximately 85 trees, including ten trees on the GFI property (northwestern side crossing) (Exh. EFSB-LU-4). [60] The Company has not identified a proposed trench location along the Alternative Route, however, there are 360 trees within 15 feet from the edge of pavement on either side of the Alternative Route, as well as another 30 trees at the GFI property (eastern side crossing) (Exhs. NG-2, at 4-9; EFSB-LU-2).

The Company is prepared to protect trees that may be vulnerable to harm due to their proximity to trench work for the Project. For example, the record shows that the canopies of trees along Norfolk and Northboro Streets along the Primary Route and Orient, Franklin, Pollock and Northboro Streets along the Alternative Route extend out over the streets (Exh. NG-2, at 5-25). To minimize construction damage to trees, when trees are encountered within 15 feet of the trench edges, the Company will protect trees from bark and limb damage by surrounding the trees with wire-bound two by four lumber to a height of eight feet (id.). When tree roots are encountered during excavation, the Company will cease mechanical excavation and expose the roots by hand and keep them moist with wet burlap or plastic throughout the exposure period (id.). The Company will place thermal backfill in the trench so as to avoid impacting tree roots (id.).

Some tree clearing is likely, however, in conjunction with construction in non-paved areas at the end of Northboro Street using either the Primary or Alternative Route, where the routes traverse the GFI property (Exh. NG-2, at 5-25). For the Primary Route, the Company's proposal to cross the GFI property on the northwest side (Variation 3C-1) would require clearing approximately 4,000 square feet of vegetation (id.). For the Alternative Route, the Company

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60 In addition, the CSX work-around on the Primary Route may involve removal of up to three coniferous trees (Exh. EFSB-LU-13). The fact that these trees do not appear on the CSX terminal expansion plans, however, suggests that they may be slated for removal with or without the Project (Exh. NG-6, at 7).

proposes to cross the GFI property on the east side of the property, which would require clearing approximately 15,000 square feet of vegetation (Exhs. NG-2, at 4-9; EFSB-LU-2). The area in question, the GFI property, is characterized as forested upland, with a dense shrub layer and scattered mature trees throughout (Exh. NG-2, at 5-25).

The transmission line would be installed almost entirely underground along either the Primary or Alternative Route, which limits the visual impacts of the Project to those at the GFI property. The Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to visual impacts of the transmission line due to the extent of tree clearing. Overall, the Siting Board finds that, with the Company's implementation of the landscaping screening plans at the Vernon Hill substation, with enhanced screening along Gloucester Road and the landscaping plan for Bloomingdale substation, the visual impacts of the proposed facilities would be minimized, and that the Primary Route is preferable to the Alternative Route.

ii. Air Impacts

The Project requires the long-term use of sulfur hexafluoride (SF_6) for the circuit breakers proposed to be installed at the Bloomingdale, Millbury and Vernon Hill substations (Exh. EFSB-S-3). The use of this material would occur regardless of route. SF_6 gas has been identified as a non-toxic greenhouse gas ("GHG"). In this regard, the Company developed plans to:

1) monitor and report on the use and loss of SF_6 gas on a system-wide basis;
2) recover and reuse SF_6 whenever possible;
3) identify leaking equipment for repair or replacement;
4) purchase and use equipment that minimizes the possibility of SF_6 emissions;
5) report SF_6 losses to National Grid corporate on a quarterly basis; and
6) report SF_6 losses to the Environmental Protection Agency ("EPA") annually (Exh. EFSB-S-3).

The Siting Board finds that with the implementation of the above SF_6 mitigation plan, the permanent air impacts of the Project along the Primary Route would be minimized.[61] Given that the long-term impacts from SF_6 are not route-dependent, the Siting Board finds that the Primary and Alternative Routes would be comparable with respect to permanent air impacts.

iii. Magnetic Fields

(A) Substations

Implementation of the Project will generally decrease magnetic fields at the Vernon Hill substation, both directly under the overhead lines and at locations along the fence line (with the exception of the eastern side of the substation, which increases 0.10 milligauss ("mG") (id.). For the Bloomingdale substation, the overhead currents flowing into the Bloomingdale substation will increase magnetic fields from about 25 mG to about 50 mG directly under the overhead lines. However, for the majority of the fence line perimeter the magnetic field levels will remain below 5 mG (id.). The fence line will be extended on the west side, which abuts the driveway and a row of parking spaces for the Eastview Apartment complex (Exh. NG-2, at Figure 1-6). The fence line also will be extended on the north side, which abuts the rear property line of the single family residences on Wigwam Avenue. The closest house to the fence line, however, is approximately 125 feet away (id.).

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61 The Siting Board notes that after the final public hearing in this case the Secretary of Energy and Environmental Affairs issued the Massachusetts Clean Energy and Climate Plan for 2020 (dated December 29, 2010). See G.L. c. 21N. This Plan adopts a 2020 statewide GHG emissions limit of 25 percent below 1990 emissions levels and sets forth an integrated portfolio of policies to reach the Commonwealth's clean energy and climate goals. One of the policies set forth in the Plan is reducing SF_6 emissions to achieve the warming reduction equivalent to that associated with 0.2 million metric tons of CO_2 relative to 1990 levels by 2020. In future cases, as part of the Siting Board's mandate to ensure that new energy facilities are consistent with the Commonwealth's current health, environmental protection, and resource use and development policies, the Siting Board will be reviewing petitioners' proposed use of SF_6 to ensure that SF_6 emissions are being reduced to the maximum extent possible.

With respect to the Millbury substation, magnetic field levels will remain unchanged because the only modification will be to separate two incoming 115 kV circuits (the M-165 and the E-157) (id.). Moreover, the fence line will be extended an additional 20 to 50 feet, resulting in lower magnetic field levels compared to current levels along the fence line (Exh. EFSB-E-1). The area surrounding the Millbury substation is largely undeveloped, with the nearest residence located about 400 feet to the northwest (id.). The Rolfe Avenue substation upgrades include new protection and control equipment to support the upgrades at the Bloomingdale substation, which will not require expansion of the existing substation footprint (Exh. NG-2, at 1-18).

Because magnetic field levels at the substations will decrease, stay the same or only slightly increase, the Siting Board finds that the magnetic field impacts as a result of the upgrades to the substations will be minimized. The magnetic field impacts resulting from the substation upgrades are comparable for the Primary and Alternative Routes.

(B) Transmission Line

(1) Primary Route

The Primary Route utilizes the existing Providence Street duct bank for the first 1.5 miles extending from the Vernon Hill substation to Coral Street (Exh. NG-6, at 5). The Providence Street duct bank consists of a three by three arrangement with nine cable conduits, of which three conduits currently contain distribution circuits (id.). Each of the three-phase conductors of the proposed transmission line will be installed in separate conduits in a vertical configuration on the right side of the Providence Street duct bank (Exh. EFSB-E-2). A fourth conduit (the center conduit of the center row of the three by three duct bank) is reserved for the ground continuity conductor and as a spare conduit should one of the phase conductors fail (Exhs. NG-2, at 5-29; EFSB-E-7). The remainder of the Providence Street duct bank is reserved for distribution circuits (Exh. NG-2, at 5-29; Exh. EFSB-E-7).

The Company's expert calculated the peak magnetic field from the existing distribution circuits measured at a point three feet above grade directly over the Providence Street duct bank to be in the range of 25 to 32 mG at the centerline (Exh. NG-2, at 5-29). By adding the proposed 115 kV transmission line to the Providence Street duct bank, the peak magnetic field from the circuits would increase to the range of 45 to 50 mG at the centerline under normal loading (id.).

Given that magnetic fields fall off rapidly with distance from the centerline of the source, the magnetic fields would decrease on either side of the circuit centerline, to approximately 15 mG at a distance of ten feet to approximately five mG at a distance of 20 feet (id.). According to the Company, levels within any house or business would be "below ambient magnetic fields and likely undetectable" (Exh. RR-EFSB-3). The distance from the nearest edge of the public way to the transmission centerline along the Providence Street duct bank ranges from three feet (at the corner of Coral Street and Clarkson Street) to 30 feet (on Providence Street south of Ames Street) (Exh. EFSB-E-6).

For the remainder of the Primary Route, where the transmission line would be installed alone in a new duct bank, the Company calculated the peak magnetic field measured at a point three feet above grade directly over the proposed new duct bank to be in the range of 17 to 20 mG (Exh. NG-2, at 5-30). The magnetic field would decrease to approximately seven mG at a distance of approximately ten feet to either side of the circuit centerline and about five mG at a distance of 20 feet (id.).

Consistent with the Siting Board's cases directing Companies to use practical and cost-effective designs to minimize magnetic fields, EFSB staff requested that the Company examine an alternative cable configuration. The purpose of the request was to determine whether the alternative configuration would increase cancellation effects, thereby reducing magnetic fields. The requested alternative configuration involved arranging the conductors in triangular configuration, moving the top 115 kV phase conductor from the upper-right conduit of the duct bank (as proposed) to the center conduit of the duct bank.

The Company's analysis indicated that the alternative configuration would reduce magnetic field levels: with the alternative configuration, magnetic fields above the duct bank centerline would decrease from 45.2 mG to 33.6 mG based on 2013 normal loading levels (Exhs. EFSB-E-2; RR-EFSB-3). At 20 feet from either side of the duct bank centerline, the magnetic field would decrease from 4.6 mG to 3.5 mG (id.). Thus, the reduction in magnetic field levels offered by the alternative configuration would range from 11.6 mG at the centerline to 1.1 mG at 20 feet from the centerline (id.). However, while the alternative cable arrangement would reduce calculated magnetic fields, the greatest reduction would occur directly over the duct bank,

physically located in the public way. In addition, the Company demonstrated that the alternative cable arrangement would make cable installation and maintenance more difficult (Exh. EFSB-E-2; RR-EFSB-3).

The Siting Board notes the reliability concerns associated with the alternative cable arrangement and the evidence that magnetic fields will decline rapidly with distance from the transmission cable centerline and will therefore not be above background levels in occupied structures. The Siting Board therefore does not require that the Company utilize the alternative cable configuration and finds that the environmental impacts with respect to magnetic fields for the Primary Route will be minimized.

(2) Alternative Route

For the Alternative Route, the Company proposes to have the transmission circuit installed alone in a new duct bank for the entire four miles (Exh. NG-2, at 5-30). The Company calculated the peak magnetic field measured at a point three feet above grade directly over the proposed new duct bank to be identical to the new duct portion of the Primary Route, in the range of 17 to 20 mG (id.).

Because the Primary Route utilizes the Providence Street duct bank, which already contains distribution circuits, the magnetic fields would be higher within the existing duct bank and magnetic fields would be the same for the new duct bank portion of the Primary Route and the Alternative Route (Exh. NG-2, Table 5.4-5). Accordingly, the Siting Board finds that the Alternative Route is preferable to the Primary Route with respect to magnetic field impacts related to the transmission line.

c. Conclusions on Analysis of the Primary and Alternative Routes

The chart below summarizes the comparison between the Primary and Alternative Routes in terms of permanent environmental impacts.

Table 7: Summary of the Permanent Environmental Impacts for the Primary and Alternative Routes

Type of Impact	Less Adverse Impact if the Primary Route is Selected	Less Adverse Impact if the Alternative Route is Selected	Comparable Impacts
Visual	X		
Air Impacts			X
Magnetic Fields		X	

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

Permanent visual impacts at the substations and permanent air impacts would not be route dependent as they are limited to the upgrades to the substations. In comparing the permanent impacts along the two routes, the Siting Board finds that the Primary Route would have less visual impacts than the Alternative Route due to less tree clearing at the GFI property. As for magnetic field impacts, the Alternative Route would be preferable to the Primary Route because the magnetic field levels are higher in the Providence Street duct bank due to the existing distribution circuits.

On balance, the Siting Board finds that the Primary and Alternative Routes are comparable with respect to permanent environmental impacts. The Siting Board also finds that with the implementation of specified conditions and mitigation, and compliance with all local, state and federal requirements, the permanent environmental impacts of the Project along the Primary Route would be minimized.

4. Cost

The Company developed refined cost estimates for both the Primary and Alternative Routes based on pricing obtained from manufacturers and recent underground projects (Exhs. NG-2, at 5-32; EFSB-PA-5). The cost estimates for the routes are summarized in the table below:

Table 8: Route Cost Comparison

	Circuit Costs (millions)	Substation Improvements[62] (millions)	Total (millions)
Primary Route	$25.13	$8.4	$33.53
Alternative Route	$31.9	$8.4	$40.3

Source: Exhs. NG-2, at 5-32; NG-6, at 5

The Company notes that the estimates do not include the cost of obtaining easements, which are required for both routes over the GFI property and on Frank Street (Exh. NG-2, at 5-32). The Company estimates total easement costs for the Primary Route are $156,900 plus a $4,000 annual fee for the CSX ROW and $24,900 for the Alternative Route plus the $4,000 annual fee for the CSX ROW (Exh. EFSB-LU-1(a)).[63] Thus, the easement costs for the Alternative Route are $132,000 less than for the Primary Route. However, the Company's estimate of the cost of the Project along the Primary Route ($33.53 million) excluding easement costs is $6.77 million less than that of the Alternative Route ($40.3 million). Accordingly, the Siting Board finds that the Primary Route is preferable to the Alternative Route with respect to cost.

5. Reliability

Construction of the Project along either the Primary or the Alternative Routes provides similar levels of reliability (Exh. NG-2, at 5-33; Tr. at 132-133). The length, physical environment and construction methodology for both the Primary and the Alternative Routes are very similar (id.). Thus, the Siting Board finds there is no material difference between the two routes in terms of reliability.

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62 The cost estimates for the substation improvements do not vary depending on whether the Primary or the Alternative Route is ultimately selected. As such, the Company did not use the substation cost estimates as a factor in differentiating between the Primary and Alternative Routes (Exh. NG-2, at 4-33 to 4-34).

63 The Company's estimated cost of easements for the Primary Route excludes the easement costs for the CSX work-around near Franklin Street because the easement costs are currently under negotiation by the parties (Exh. EFSB-LU-8).

6. Conclusions on Route Comparison

Based on review of the record, the Siting Board finds that the Company provided sufficient information regarding cost, reliability, and environmental impacts to allow the Siting Board to determine whether the Project has achieved a proper balance among cost, reliability and environmental impacts.

The Primary Route uses the existing Providence Street duct bank, which reduces construction time and temporary environmental impacts. On balance, use of the Primary Route provides the greatest assurance that the Project can be put in place in a timely, environmentally sensitive manner. The Primary Route also costs less than the Alternative Route, with comparable reliability benefits. Moreover, the Siting Board notes that the City of Worcester prefers the Primary Route (Exh. NG-2, at App. 1-1). Thus, the Siting Board finds that the Primary Route is superior to the Alternative Route on the basis of balancing cost, environmental impact, and reliability of supply.

Based on the information presented in Section II.E, above, the Siting Board finds that with the implementation of the specified mitigation and conditions, and compliance with all local, state and federal requirements, the temporary and permanent environmental impacts of the Project along the Primary Route would be minimized. The Siting Board also finds that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost. The Siting Board thus finds that the proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply.

F. Consistency with Policies of the Commonwealth

1. Standard of Review

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

2. Analysis and Conclusions

a. Health Policies

In Section 1 of the Electric Utility Restructuring Act of 1997, the Legislature declared that "electricity service is essential to the health and well-being of all residents of the Commonwealth . . ." and that "reliable electric service is of utmost importance to the safety, health, and welfare of the Commonwealth's citizens . . . ." See c. 164 of the Acts of 1997, Section 1(a) and (h). In Section II.B. above, the Siting Board finds that the Project will improve the reliability of electric service in the Worcester area. In addition, in Section II.E.3.a, the Siting Board requires the Company to use only retrofitted off-road construction vehicles to limit emissions of PM during Project construction. This condition is consistent with DEP's Diesel Retrofit Program designed to address health concerns related to diesel emissions. In Section II.E.3, the Siting Board finds that the Project's magnetic fields, hazardous materials and air impacts have been minimized. Accordingly, subject to the specified mitigation and the Siting Board's conditions set forth below, the Siting Board finds that the Company's plans for construction of the Project are consistent with the current health policies of the Commonwealth.

b. Environmental Protection Policies

In Section II.E.3, above, the Siting Board reviews how the Project will meet various state environmental protection requirements. The Siting Board also (1) considers the Project's environmental impacts, including those related to water, endangered species, land use, historical resources, air emissions, noise and visual impacts; and (2) concludes that subject to the specified mitigation and conditions set forth below, the Project's environmental impacts have been minimized.

The Siting Board also recognizes the Commonwealth's policies relating to GHG emissions, including G.L. c. 30, § 61 and the Executive Office of Energy and Environmental Affairs' Greenhouse Gas Emission Policy and Protocol. While the Siting Board in its review under G.L. c. 164, § 69J is not subject to G.L. c. 30, § 61[64] (see G.L. c. 164, § 69I), the Siting

[64] Findings under G.L. c. 30, § 61 also are not required here for the Company's Section 72 or Zoning Exemption Petitions because an Environmental Impact Report is not required for the Project (Exh. EFSB-NG-4, Att. C). See 301 CMR 11.01(3).

Board notes that this Project will have minimal GHG emissions as it is an underground transmission line under existing paved roadways. The Siting Board addresses emissions from off-road construction vehicles and equipment as well as SF_6 emissions[65] in Sections II.E.3.a and II.E.3.b.ii., above.

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

c. Resource Use and Development Polices

In 2007, pursuant to the Commonwealth's Smart Growth/Smart Energy policy produced by the Executive Office of Energy and Environmental Affairs, Governor Patrick established Sustainable Development Principles. Among the principles are (1) supporting the revitalization of city centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources and integrates uses; (2) encouraging reuse of existing sites, structures and infrastructure; and (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes. The Siting Board notes that the Project is designed to improve the reliability of the City of Worcester's electric system and support the expansion of this formerly industrial City, including expansion of the CSX intermodal terminal. The Project is located underground, in existing roadways with a portion within an existing duct bank. In addition, local officials and community groups have played a significant role in developing the route for the Project as well as construction mitigation plans. In Section II.D., above, the Siting Board reviews the process by which the Company sited and designed the Project. Finally, the Siting Board finds in Section II.E, above, that there is no mapped habitat in the Project vicinity and the Project is unlikely to impact water or historic resources.

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[65] See footnote 61 for further discussion regarding the Commonwealth's Policy on reducing SF_6 emissions.

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

G. Decision on G.L. c. 164, § 69J

The Siting Board's enabling statute directs the Siting Board to implement the energy policies contained in G.L. c. 164, §§ 69H to 69Q, to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G. L. c. 164, § 69H. Thus, an applicant must obtain Siting Board approval under G.L. c. 164, § 69J, prior to construction of a proposed energy facility.

In Section II.B, above, the Siting Board finds that the existing electric transmission system is inadequate to reliably serve current and projected loads in the Worcester area under certain contingencies, and thus additional energy resources are needed in the Worcester area.

In Section II.C, above, the Siting Board finds that the proposed transmission Project, on balance, is superior to the alternative project approaches in terms of cost and environmental impact and with respect to the ability to reliably meet the identified need. The Siting Board thus finds that the Project is superior to the identified project alternatives with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section II.D, above, the Siting Board finds that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternatives to the proposed Project in a manner that ensures that the Company has not overlooked or eliminated any routes that, on balance, are clearly superior to the proposed Project. The Siting Board also finds that the Company has identified a range of practical transmission line routes with some measure of geographic diversity. Consequently, the Siting Board finds that National Grid has demonstrated that it examined a reasonable range of practical siting alternatives

In Section II.E, above, the Siting Board reviews environmental impacts of the proposed transmission Project and finds that with the implementation of the specified mitigation and conditions, and compliance with all applicable local, state and federal requirements, the temporary and permanent environmental impacts of the Project along the Primary Route would

be minimized. The Siting Board also finds that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost.

In Section II.E, above, the Siting Board finds that the proposed facilities along the Primary Route would be superior to the proposed facilities along the Alternative Route on the basis of balancing cost, environmental impact and reliability of supply. The Siting Board thus finds that the proposed facilities along the Primary Route would be superior to the proposed facilities along the Alternative Route with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section II.F, above, the Siting Board finds that with the implementation of specified mitigation and conditions, the Project is consistent with the health, environmental and resource use and development policies of the Commonwealth.

Accordingly, the Siting Board APPROVES the Company's petition to construct the three-circuit 3.5 mile, 115 kV underground transmission line in Worcester, Massachusetts using the Primary Route, and to upgrade the Bloomingdale, Vernon Hill, Millbury, and Rolfe Avenue substations, subject to the conditions set forth in Section VI.

III. ANALYSIS UNDER G.L. C. 40A, § 3 - ZONING EXEMPTIONS

Pursuant to G.L. c. 40A, § 3, the Company requests an individual zoning exemption from the City of Worcester Zoning Ordinance ("Worcester Zoning Ordinance") for the proposed transmission line, as well as several individual zoning exemptions from the Worcester Zoning Ordinance and the Town of Millbury Zoning Bylaw ("Millbury Zoning Bylaw") for the proposed substation upgrades. The Company also seeks a comprehensive zoning exemption from each municipality's zoning ordinance.

A. Individual Zoning Exemptions

1. Standard of Review

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

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

Thus, a petitioner seeking exemption from a local zoning by-law under G.L. c. 40A, § 3 must meet three criteria.[66] First, the petitioner must qualify as a public service corporation. Save the Bay, Inc. v. Department of Public Utilities, 366 Mass. 667 (1975) ("Save the Bay"). Second, the petitioner must establish that it requires exemption from the zoning ordinance or by-law. Boston Gas Company, D.T.E. 00-24, at 3 (2001) ("Boston Gas Decision"). Finally, the petitioner must demonstrate that its present or proposed use of the land or structure is reasonably necessary

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[66] G.L. c. 40A, § 3 applies to the Department. The Department refers zoning exemption cases to the Siting Board for hearing and decision pursuant to G.L. c. 25, § 4. When deciding cases under a Department statute, the Siting Board has the power and the duty:

> to accept for review and approval or rejection any application, petition or matter related to the need for, construction of, or siting of facilities referred by the chairman of the department . . . provided, however, that in reviewing such application, petition or matter, the board shall apply department and board standards in a consistent manner.

G.L. c. 164, § 69H.

for the public convenience or welfare. Massachusetts Electric Company, D.T.E. 01-77, at 4 (2002) ("MECo Decision (2002)"; Tennessee Gas Pipeline Company, D.T.E. 01-57, at 3-4 (2002) ("Tennessee Decision (2002)".

2. Public Service Corporation

a. Standard of Review

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

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

Save the Bay at 680. See also, Boston Gas Decision, D.T.E. 00-24, at 3-4; Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997) ("Berkshire Power").[67]

b. Analysis and Conclusion

The Company is an electric company as defined by G.L. c. 164, § 1 and, as such, qualifies as a public service corporation. New England Power Company, D.P.U. 09-27/09-28, at 7-8 (March 26, 2010). Accordingly, the Siting Board finds that the Company is a public service corporation for the purposes of G.L. c. 40A, § 3.

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[67] The Department interprets this list not as a test, but rather as guidance to ensure that the intent of G.L. c. 40A, § 3 will be realized, i.e., that a present or proposed use of land or structure that is determined by the Department to be "reasonably necessary for the convenience or welfare of the public" not be foreclosed due to local opposition. See Berkshire Power, D.P.U. 96-104, at 30; Save the Bay at 685-686; Town of Truro v. Department of Public Utilities, 365 Mass. 407 (1974) ("Town of Truro"). The Department has interpreted the "pertinent considerations" as a "flexible set of criteria which allow the Department to respond to changes in the environment in which the industries it regulates operate and still provide for the public welfare." Berkshire Power, D.P.U. 96-104, at 30; see also Dispatch Communications of New England d/b/a Nextel Communications, Inc., D.P.U./D.T.E. 95-59-B/95-80/95-112/96-113, at 6 (1998). The Department has determined that it is not necessary for a petitioner to demonstrate the existence of "an appropriate franchise" in order to establish PSC status. See Berkshire Power, D.P.U. 96-104, at 31.

3. Public Convenience or Welfare

a. Standard of Review

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. Save the Bay at 680; Town of Truro at 407. Specifically, the Department is empowered and required to undertake "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964) ("New York Central Railroad"). When reviewing a petition for a zoning exemption under G.L. c. 40A, § 3, the Department is empowered and required to consider the public effects of the requested exemption in the State as a whole and upon the territory served by the applicant. Save the Bay at 685; New York Central Railroad at 592.

Therefore, when making a determination as to whether a petitioner's present or proposed use is reasonably necessary for the public convenience or welfare, the Department examines: (1) the need for, or public benefits of, the present or proposed use; (2) the present or proposed use and any alternatives or alternative sites identified;[68] and (3) the environmental impacts or any other impacts of the present or proposed use. The Department then balances the interests of the general public against the local interest and determines whether the present or proposed use of the land or structures is reasonably necessary for the convenience or welfare of the public. Boston Gas Decision, D.T.E. 00-24, at 2-6; MECo Decision (2002) , D.T.E. 01-77, at 5-6; Tennessee Decision (2002), D.T.E. 01-57, at 5-6; Tennessee Gas Company, D.T.E. 98-33, at 4-5 (1998).

b. Analysis

With respect to need for, or public benefits of, the Project, the Siting Board finds, in Sections II.B and II.C, that (1) the existing electric system is inadequate under certain

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

circumstances to reliably serve current and projected loads in the Worcester sub-areas supplied by the Bloomingdale and Vernon Hill substations; and (2) the Project will address these reliability issues.

Regarding alternatives, in Section II.C, the Siting Board analyzes a number of different project approaches other than the Company's proposed direct single-line alternative that the Company might use to meet the reliability need (such as distributed generation, energy efficiency, and demand response) and concludes that the proposed approach is superior to other approaches. The Siting Board also reviews the Company's route selection process in Section II.D, and determines that the Company applied a reasonable set of criteria for identifying and evaluating routes to ensure that no clearly superior route was missed. The Siting Board also compares the benefits of the Primary and Alternative Routes and concludes that the Primary Route is superior to the Alternative Route in providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Finally, regarding Project impacts, in Section II.E.3, the Siting Board reviews the environmental impacts of the Project and finds, while the Project may result in some local adverse impacts (primarily during construction), generally, with the implementation of certain mitigation and conditions, the impacts of this underground line would be minimized. The Siting Board also finds that Worcester area residents will benefit from the Project as it will improve the reliability of electricity delivery.

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

4. Individual Exemptions Required

a. Standard of Review

In determining whether exemption from a particular provision of a zoning by-law is "required" for purposes of G.L. c. 40A, § 3, the Department looks to whether the exemption is necessary to allow construction or operation of the petitioner's Project. See MECo Decision (2002), D.T.E. 01-77, at 4-5; Tennessee Decision (2002), D.T.E. 01-57, at 5; Western

Massachusetts Electric Company, D.P.U./ D.T.E. 99-35, at 4, 6-8 (1999); Tennessee Gas Company, D.P.U. 92-261, at 20-21 (1993).[69]

b. List of Exemptions Sought

The Company seeks exemption from the following provisions of the Worcester Zoning Ordinance and Millbury Zoning Bylaw in order to construct and operate the Project (Exh. JP-2, at 10-18):[70]

Table 9: List of Individual Exemptions Sought

Municipality/Facility	Topic	Provision
Worcester - Bloomingdale substation	Special Permit: Frontage/Nonconforming Structure	Article XVI, § 4(D)1
Worcester - Bloomingdale and Vernon Hill substations	Site Plan Review: Earth Alteration/Landscaping	Article V, §§ 2 (A) and 5 (C)
Worcester - Bloomingdale and Vernon Hill substations	Erosion Control Approvals	Article IV, §§ 5 (A) and 5 (B)
Millbury – substation	Special Permit: Fence Height	Article 3, §35.7
Worcester - transmission line	Use Restrictions	Article IV

69 It is the petitioner's burden to identify the individual zoning provisions applicable to the proposed Project and then to establish that exemption from each of those provisions is required:

> The Company is both in a better position to identify its needs, and has the responsibility to fully plead its own case . . . The Department fully expects that, henceforth, all public service corporations seeking exemptions under c. 40A, § 3 will identify fully and in a timely manner all exemptions that are necessary for the corporation to proceed with its proposed activities, so that the Department is provided ample opportunity to investigate the need for the required exemptions.

New York Cellular Geographic Service Area, Inc., D.P.U. 94-44, at 18 (1995).

70 The Project includes upgrades to a substation in Shrewsbury, but the Company has not requested any exemptions from the Shrewsbury Zoning Bylaw.

c. Consultation with the Municipalities

i. Russell Decision

Before addressing the merits of the individual exemptions requested by the Company, the Siting Board first reviews the Company's compliance with the Siting Board's April 2009 decision in Russell Biomass LLC and Western Massachusetts Electric Company, EFSB 07-4/DPU 07-35/07-36 (2009) ("Russell"). In Russell, the Siting Board set forth the following approach to be used by applicants when seeking zoning exemptions:

> First, in cases where (1) a local zoning provision would on its face preclude construction and operation of a proposed energy facility, and (2) there is no provision in a local zoning by-law for a special permit, variance, or other relief, relief under G.L. c. 40A, § 3 could be considered without further consultation with the local zoning authority. Second, if relief appears to be available, but consultations with the local zoning authority demonstrate that a petitioner is unlikely to obtain that relief, relief under G.L. c. 40A, § 3 could be considered without further local efforts. Absent such circumstances, it is our expectation that a project proponent will make a good faith effort to consult with local zoning authorities and apply for necessary zoning approvals or other relevant relief, as appropriate.

Russell, EFSB 07-4/DPU 07-35/07-36, at 62.

ii. Post-Russell Zoning Exemption Cases

This is the Siting Board's first zoning exemption case to directly address and apply Russell.[71] However, the Department has issued three zoning exemption decisions since the issuance of Russell, each of which does address, although it does not strictly apply, the Russell approach.[72]

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[71] In September, 2010, the Siting Board granted zoning exemptions in the GSRP Decision. However, the Siting Board did not apply the Russell approach in the GSRP Decision because WMECo filed its EFSB petition before the issuance of Russell and was thus grandfathered from the application of Russell. See GSRP Decision at 133, n. 90.

[72] In its post-Russell Orders, the Department does not strictly apply the Russell approach because each of the three cases was initially filed with the Department prior to the issuance of Russell, and the Department determined that they were grandfathered from having to comply with Russell. However, as discussed below, in its post-Russell Orders, the Department does specifically describe applicants' duties to consult with municipalities prior to filing a Chapter 40A, § 3 case.

In the first case, the Department states:

> In applying Russell in the future, the Department will consider the relevant facts on a case-by-case basis. We recognize that there may be factual circumstances where it may not be appropriate for an applicant to apply for local zoning approvals or other relevant relief prior to filing a G.L. c. 40A, § 3 zoning exemption petition, even when such relief may theoretically be available.

NSTAR Electric Company, D.P.U. 08-1, at 34 (2009) ("NSTAR 2009 Decision").

In its next two cases, involving time-sensitive, reliability-based transmission projects in multiple municipalities, the Department notes that even though the applicants did not formally apply for any local zoning relief prior to filing their zoning exemption petitions, the applicants' actions with respect to communications with the municipalities before filing zoning exemption petitions were "consistent with the spirit and intent" of Russell. Western Massachusetts Electric Company, D.P.U. 09-24/09-25, at 33, n. 15 (March 19, 2010) ("WMECo"); New England Power Company, D.P.U. 09-27/09-28, at 48, n. 16 (March 26, 2010) ("NEP"). Specifically, in each case, prior to filing for zoning exemptions, the applicant engaged in extensive communications with the applicable towns about the proposed project and the needed zoning relief. In addition, in WMECo, the Department notes that the applicant's consultations included the applicant's making a good faith effort to abide by the reasonable recommendations of town officials with respect to the applicant's project. In both cases, the Department notes that none of the municipal officials expressed any objection to the Company seeking zoning relief from the DPU in the form of exemptions pursuant to G. L. c. 40A, § 3.[73]

iii. Analysis

We agree with the Department that the spirit and intent of Russell (1) is to favor the resolution of local issues on a local level whenever possible to reduce local concern regarding any intrusion on home rule; and (2) that the most effective approach for doing so is for applicants to consult with local officials regarding their projects before seeking zoning exemptions pursuant to

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[73] In the GSRP Decision, the Siting Board also notes that the Company's communications with the affected municipalities were consistent with the spirit and intent of Russell. In that case, the Company consulted with each municipality regarding the Company's intention to seek zoning exemptions, the communities along the preferred route wrote letters of support for the granting of the zoning exemptions and also signed MOUs with the Company that included agreements regarding zoning exemptions. GSRP Decision at 132-133, and n. 90.

G.L. c. 40A, § 3. We also agree that relevant facts should be considered on a case-by-case basis. See NSTAR 2009 Decision, D.P.U. 08-1, at 34.

Here, the applicant did not formally apply for any local zoning permits prior to filing its zoning exemption petition with the Department, even though local relief (at least in Millbury) was theoretically available. However, as in WMECo and NEP, before filing its G.L. c. 40A, § 3 petition, the Company had significant contact and consultation with the relevant municipalities regarding the Company's Project and the Company's intention to seek zoning exemptions under G.L. c. 40A, § 3, and neither municipality objected to the Company's plan (Exhs. LPM-1, Att. H; EFSB-Z-2).[74] Moreover, the Company made a good faith effort to meet the municipalities' reasonable requests regarding the Project (such as providing landscaping at the Bloomingdale and Vernon Hill substations in consultation with the City of Worcester) (id.). By doing so, the applicant complied with the spirit and intent of Russell. See WMECo, D.P.U. 09-24/09-25, at 33, n.15; NEP, D.P.U. 09-27/09-28, at 48, n.16. The Siting Board also notes that, as in WMECo and NEP, the Company seeks zoning exemptions for a time-sensitive, reliability-based transmission project to be located in more than one municipality and the applicable municipalities have not objected to the applicant seeking G.L. c. 40A, § 3 zoning exemptions. Thus, sending the applicant back to formally apply for local permits would be inconsistent with the municipalities' approach towards the permitting of this Project. Accordingly, based on the specific facts outlined above, the Siting Board finds that the Company has complied with the approach reflected in Russell.

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[74] With respect to Worcester, the Company began consultations regarding zoning exemptions in November 2007, meeting with the Deputy City Solicitor (Exh. EFSB-Z-4). In March 2009, the Company met with the Building Inspector and Town Planner regarding zoning matters (Exh. NG-2, at 1-24 to 1-25). In April, 2009, the Company met with the Acting Building Commissioner, the Assistant Commissioner of the Department of Public Works and the Deputy City Solicitor (id). In July 2009, in a letter signed by the Deputy City Solicitor, the City stated that it "does not object to the Company's efforts to secure a DPU exemption from the Worcester zoning ordinance" (Exh. EFSB-Z-4(a) at 1).

With respect to Millbury, the Company met with the Building Inspector and Town Planner in March 2009 and "encountered no objections" regarding its plan to seek zoning relief from the Department (Exh. NG-1, at 9). Millbury stated in a December 2009 letter signed by the Town Planner and the Building Inspector that the Town "supports the Company's determination to seek a DPU exemption from the Millbury Zoning By-law" for the project (Exh. EFSB-Z-2 (b)).

d. Reasons Why Exemptions are Required Here

i. Company's Position

The Company argues that it requires exemptions from the applicable zoning provisions for the following reasons:

Table 10: Reasons Exemptions are Required

Municipality/Facility	Exemption Sought by Company	Reason Exemption Sought
Worcester - transmission line	Use Restrictions: Article IV	Proposed use may not be allowed. Zoning Board has no authority to issue a use variance.
Worcester - Bloomingdale substation	Special Permit/Nonconforming Structure: Article XVI, Section 4(D)(1)	Substation frontage does not comply with existing frontage requirements. Substation is a prior non-conforming structure. A Special Permit is required to alter a prior non-conforming structure. Special Permits are discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of Special Permit would be time-consuming.
Worcester - Bloomingdale and Vernon Hill substations	Site Plan Approval/Earth Alteration and Landscaping: Article V, Sections 2(A) and 5(C)	Site plan review required from Planning Board. Site Plan approval is discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of site plan approval would be time-consuming.
Worcester - Bloomingdale and Vernon Hill substations	Erosion Control Approvals: Article IV, Sections 5(A) and 5(B)	Slope protection and erosion control methods must be approved by Director of Code Enforcement or the Director of Public Works. Such approvals are discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of local approvals would be time-consuming.
Millbury- substation	Special Permit/Fence Height: Article 3, Section 35.7	Special Permit required from Zoning Board for fencing in excess of six feet in height. Special Permit is discretionary and can result in burdensome or restrictive conditions that could impede the Company from ensuring consistency in the Project's design and complying with state and industry standards. Obtaining and potential appeal of Special Permit would be time-consuming.

Source: Exh. NG-4, at 10-18.

ii. Use

Those portions of the proposed transmission line on private or public property (outside of City Streets) are located in three zoning districts: BG-3 (General Business), MG-1.0 (General Manufacturing) and RL-7 (Limited Residence) (Exh. NG-5, at 13). The Worcester Zoning Ordinance classifies the proposed transmission line as an "Essential Service" (id. at 13-14), which is not a use expressly permitted in any zoning district, including the three districts in which the transmission line would be located (id. at 14). The Worcester Zoning Ordinance prohibits any use not specifically permitted (Exh. NG-5 at 14; see Exh. NG-5, App. D at 31, Sec. 1.A). The Zoning Board of Appeals does not have the express authority under the Zoning Ordinance to grant use variances (Exh. NG-5, at 14).

The Siting Board finds that without exemption from Article IV, the Project may be classified as an unpermitted use, without the possibility of a variance or other zoning relief. Accordingly the Siting Board finds that the exemption from Article IV of the Worcester Zoning Ordinance is required to allow construction of the proposed Project, within the meaning of G.L. c. 40A, § 3.

iii. Frontage and Fencing Special Permits

The Worcester Zoning Ordinance requires 65 feet of lot frontage in the RL-7 district where the Bloomingdale substation is located (id. at 15). The Bloomingdale substation has 50 feet of frontage and is a prior nonconforming lot (id.). Thus, pursuant to Article XVI, Section 4D(1) of the Zoning Ordinance, the Bloomingdale substation requires a Special Permit from the Zoning Board of Appeals.

Article 3, Section 35.7 of the Millbury Zoning Bylaw prohibits fences in excess of six feet in height (Exh. NG-5, App. A at 66). A fence in excess of six feet may, however, be allowed by Special Permit from the Millbury Zoning Board of Appeals, if the fence "will not endanger health or safety, or unreasonably impair vision or circulation of air" (id.; Exh. NG-5, at 12). The expanded Millbury substation fence will be seven feet tall with an additional one foot of barbed wire at the top (Exh. NG-5, at 12). Thus, the Company requires a Special Permit for the fence expansion (id. at 12-13).

The Siting Board recognizes the uncertainty that would result from requiring the Company to obtain these Special Permits, both in terms of obtaining the Special Permits through the local

zoning process and in terms of a potential appeal of the Special Permits. An adverse outcome, a burdensome requirement or unnecessary delay could result. The Siting Board also notes that the proposed fence height is based on an industry safety standard in the National Electric Safety Code and also is required by the Company's internal chain link fence engineering specifications (Exhs. EFSB-Z-3; Z-3(a); Z-3(b)). Moreover, this is a reliability-based project, and the record shows that it is time-sensitive. Accordingly, the Siting Board finds that exemption of the Project from the Special Permit requirement of Article XVI, Section 4(D) (1) of the Worcester Zoning Ordinance and Millbury Zoning Bylaw Article 3, Section 35.7, is required to allow timely construction of the Project.

iv. Site Plan Review, Landscaping and Erosion Control Approvals

Article V, Section 2 (A) of the Worcester Zoning Ordinance requires site plan review for "any structure and/or outdoor use and/or any substantial improvement . . . that requires a building permit and also involves earth moving or earth alteration in an area with a slope of 15 percent or greater" (Exh. NG-5, at 16). The control house expansion at Bloomingdale and possibly the fence expansions at both substations will require building permits, and the work at both substations will involve earth moving or earth alteration in an area that contains a slope of 15 percent or greater (Exh. NG-5, at 16 to 18). Accordingly, the Company will require site plan review and approval for the proposed improvements at both substations (id. at 16-17). The Company also will be required to meet the landscape design criteria set forth in Article V, Section 5(C) (id. at 17).

Article IV, Sections 5(A) and 5(B) of the Worcester Zoning Ordinance requires erosion control for areas disturbed by earth filling and excavation (id. at 17). The selected control methods must be approved by the Director of Code Enforcement or the Commissioner of the Department of Public Works and Facilities (id.). In addition, Sections 5(A)(3) and 5(B)(3) require some form of slope protection or retaining wall for any finished slopes greater than 2.5:1 (id. at 17-18), and any such measure must also receive the approval of the Director of Code Enforcement or the Commissioner of Public Works and Facilities (id. at 18).

The Siting Board recognizes the uncertainty that would result from requiring the Company to comply with the zoning provisions for site plan, landscaping and erosion control both in terms of obtaining the requisite reviews/approvals through the local zoning process and in a potential appeal thereafter. An adverse outcome, a burdensome requirement or unnecessary delay could

result. In addition, this is a reliability-based project, and the record shows that it is time-sensitive. Accordingly, the Siting Board finds that exemption of the Project from Article V, Sections 2(A) and 5(C) and Article IV, Sections 5(A), (B) of the Worcester Zoning Ordinance is required to allow timely construction of the Project, within the meaning of G.L. c. 40A, § 3.

5. Conclusion on Request for Individual Zoning Exemptions

As described above, the Siting Board finds that (1) the Company is a public service corporation; (2) the proposed use is reasonably necessary for the public convenience or welfare; and (3) the specifically named zoning exemptions set forth in Table 9 are required for construction of the Project within the meaning of G.L. c. 40A, § 3. Accordingly, the Siting Board grants the Company's request for the individual zoning exemptions listed above in Table 9.

B. Comprehensive Zoning Exemptions

1. Standard of Review

The Company has requested a comprehensive exemption from both the Worcester Zoning Ordinance and Millbury Zoning Bylaw. The Siting Board will grant such requests on a case-by-case basis and only where the applicant demonstrates that issuance of a comprehensive exemption could avoid substantial public harm by serving to prevent a delay in the construction and operation of the proposed use. GSRP Decision, EFSB 08-2/D.P.U. 08-105/106, at 135; Russell, EFSB 07-4/DPU 07-35/07-36, at 72; WMECo, D.P.U. 09-24/09-25, at 34; NEP, D.P.U. 09-27/09-28, at 48.

2. Company Position

The Company identifies several reasons for the granting of the requested comprehensive exemptions. The Company is concerned that the multiple zoning-related permits and reviews required under the Worcester Zoning Ordinance and Millbury Zoning Bylaw might result in requirements that are inconsistent with regulatory and industry standards applicable to transmission facilities (Exh. NG-4, at 19). The Company points out that the Project is reliability-based and time-sensitive, and that a comprehensive exemption would allow the Project to go forward on a timely basis should provisions of the existing Ordinance and Bylaw other than those specifically identified subsequently be deemed applicable to the Project, or if any new zoning exemptions are enacted in either municipality prior to completion of the Project (id.; Tr. at 111-114, 116-117). A comprehensive exemption also would enable the Company to implement any

necessary design changes that might otherwise require zoning relief as the Project goes forward, including changes designed to reduce Project impacts (Exh. NG-4, at 19). The Company concludes that a comprehensive exemption "will therefore help this important project to avoid delays, maintain its schedule, and remain in compliance" with applicable requirements and restrictions governing the construction and operation of transmission facilities (id.).

3. Analysis and Conclusions

As discussed in Section II.B, above, the record shows that the proposed Project is needed for reliability reasons and that the need is time-sensitive. Delay in construction of the Project could result in an area transmission system that does not meet applicable reliability standards, and could therefore cause significant public harm in the form of unacceptable service outages.

The record shows that the Project, which will bring a second source of electric supply to the Bloomingdale and Vernon Hill substations, is needed immediately to bring the Bloomingdale substation into compliance with the Company's established reliability supply standard. The Company has demonstrated that the supply standard currently would not be satisfied in the event of a single supply contingency (or N-1 condition) at the Bloomingdale substation, i.e., the loss of the existing 115 kV transmission supply to the substation, at loads already experienced in 2006 and 2008. This contingency would result in substantial public harm in the form of loss of electric service to numerous customers. Were the Project not completed by its anticipated 2012 on-line date or within a year thereafter, this contingency could result in the loss of service to thousands of existing commercial and industrial customers as well as the growing Route 20 and Route 126 corridors.[75] The granting of comprehensive zoning exemptions will help ensure that construction of the Project can proceed and be completed in a timely manner, i.e., that once begun, construction will not be interrupted due to unanticipated disputes over the application of local zoning requirements or unanticipated changes to such requirements during the pendency of the Project. Based on the facts of this case, the Siting Board accordingly grants the Company's request for a

[75] A similar contingency, i.e., the loss of the existing 115 kV supply at the Vernon Hill substation would result in significant load loss, and would result in the failure to meet the supply standard at that substation by the Project on-line date in 2013, or sometime thereafter.

comprehensive exemption from the Worcester Zoning Ordinance and the Millbury Zoning Bylaw.[76]

C. Decision on G.L. c. 40A, § 3

The Siting Board finds pursuant to G.L. c. 40A, § 3 that construction and operation of the Company's proposed facility is reasonably necessary for the public convenience or welfare of the public. Accordingly, subject to the conditions set forth in this decision, the Siting Board approves the Company's petition for an exemption from the provisions of the Worcester Zoning Ordinance and Millbury Zoning Bylaw set forth in Table 9 subject to the conditions set forth in Section VI. The Siting Board further approves the Company's petition for comprehensive exemptions from the Worcester Zoning Ordinance and Millbury Zoning Bylaw subject to the conditions set forth in Section VI.

IV. ANALYSIS UNDER G.L. c. 164, § 72

A. Standard of Review

G. L. c. 164, § 72, requires, in relevant part, that an electric company seeking approval to construct a transmission line must file with the Department a petition for "authority to construct and use . . . a line for the transmission of electricity for distribution in some definite area or for supplying electricity to itself or to another electric company or to a municipal lighting plant for distribution and sale … and shall represent that such line will or does serve the public convenience and is consistent with the public interest. . . . The [D]epartment, after notice and a public hearing in one or more of the towns affected, may determine that said line is necessary for the purpose alleged, and will serve the public convenience and is consistent with the public interest."[77]

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[76] Granting the requested comprehensive exemptions in this case is consistent with the Department's analysis and decisions in WMECo and NEP. See WMECo, D.P.U. 09-24/09-25, at 34-37; NEP, D.P.U. 09-27/09-28, at 48-53. Granting the comprehensive exemption also is consistent with the Siting Board's decision in the GSRP Decision at 136-137.

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

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

B. Analysis and Decision

Based on the record in this proceeding and the above analyses in Sections I through III, and with implementation of the specified mitigation measures proposed by the Company and conditions set forth by the Siting Board in Section VI, below, the Siting Board finds pursuant to G.L. c. 164, § 72 that the proposed transmission line and ancillary substation upgrades are necessary for the purpose alleged, will serve the public convenience, and are consistent with the public interest.[78] Thus, the Siting Board approves the Section 72 Petition.

V. SECTION 61 FINDINGS

The Massachusetts Environmental Policy Act ("MEPA") provides that "[a]ny determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact" ("Section 61 findings"). G.L. c. 30, § 61. Pursuant to 301 CMR 11.01 (3), Section 61 findings are necessary when an Environmental Impact Report ("EIR") is submitted to the Secretary of Energy and Environmental Affairs, and should be based on such EIR. Where an EIR is not required, Section 61 findings are not necessary. 301 CMR 11.01 (3). Based on an Advisory Opinion from the MEPA office, National Grid informed the Siting Board that the Project does not require MEPA review (Exh. NG-4, Att. A). Accordingly, Section 61

[78] See footnote 77, above. Section 61 findings are not necessary as part of Section 72 approval.

findings are not necessary in this case as part of any Chapter 40A, § 3 or G.L. c. 164, § 72 determination.

VI. CONDITIONS

The Siting Board APPROVES the Company's Petition subject to the following conditions:

(a) To ensure that visual impacts at the substations are minimized, the Siting Board directs the Company to enhance the proposed landscape plan for the Vernon Hill substation dated March 25, 2010 to add additional vegetation in both the northwest and northeast corners on the Gloucester Road side of the substation. The Company is also directed to provide to the Siting Board a copy of its final landscape plans for the Vernon Hill substation for the Board's information prior to the commencement of construction. Furthermore, the Company shall implement the final landscape plans for both the Vernon Hill and Bloomingdale substations and provide care for all plantings to ensure that landscaping at both substations becomes established and is maintained.

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

(c) To ensure that tree removal for the proposed transmission project does not impact the area affected by the infestation by Asian Long Horn Beetles, the Siting Board directs the Company and its contractors to comply with the regulations and requirements of the Massachusetts Department of Conservation and the City of Worcester regarding the proper disposal of trees, limbs and debris from regulated Project areas.

(d) The Siting Board directs the Company to continue to collaborate with the appropriate City of Worcester officials to assess the condition of each roadway to be affected by the Project and, prior to commencing Project construction, reach an agreement with the City as to whether the Company will repave each street curb-to-curb, provide a full depth patch along the trench only, or contribute funds for repaving to be performed by the City.

(e) The Siting Board directs the Company to prepare a nighttime construction mitigation plan in consultation with City of Worcester officials and to submit that Plan for Siting Board approval prior to the commencement of nighttime construction. The nighttime construction mitigation plan shall include, but not be limited to, mitigation of impacts to neighboring land uses, illumination spill-over and glare, noise and traffic impacts. Should nighttime construction be required, the Siting Board directs the Company to conduct that construction in accordance with the approved nighttime construction mitigation.

(f) The Company shall serve a copy of this decision on the City of Worcester City Council, the Worcester Zoning Board, the Worcester Planning Board, the Town of Millbury Board of Selectmen, Millbury Appeals Board, and Millbury Planning Board, within five days of its issuance. The Company shall certify to the Secretary of the Department within ten business days of its issuance that such service has been made.

Because issues addressed in this decision relative to the Project are subject to change over time, construction of the proposed Project must be commenced within three years of the date of the decision.

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

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M. Kathryn Sedor
Presiding Officer

Dated this 14th day of March, 2011

APPROVED by the Energy Facilities Siting Board at its meeting of March 10, 2011, by the members and designees present and voting. Voting for approval of the Tentative Decision, as amended: Ann G. Berwick, Chair, Department of Public Utilities; Jolette A.Westbrook, Commissioner, Department of Public Utilities; Robert Sydney (Designee for Commissioner, Department of Energy Resources); James Colman (Designee for Commissioner, Department of Environmental Protection); Robert Mitchell (Designee for Secretary, Executive Office of Housing and Economic Development); Kevin Galligan, Public Member; Dan Kuhs, Public Member; and Penn Loh, Public Member.

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Steven Clark, Acting Chair
Energy Facilities Siting Board

Dated this 14th day of March, 2011

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