COMMONWEALTH OF MASSACHUSETTS
Energy Facilities Siting Board

In the Matter of the Petition of Boston Edison Company, d/b/a NSTAR Electric, for Approval to Construct a Three-Circuit 345 kV Transmission Line and Ancillary Facilities in the City of Boston and the Towns of Stoughton, Canton and Milton	EFSB 04-1
The Petition of Boston Edison Company, d/b/a NSTAR Electric, for a Determination that the Proposed 345 kV Transmission Line Project is Necessary and Will Serve the Public Convenience and be Consistent with the Public Interest	D.T.E. 04-5
The Petition of Boston Edison Company, d/b/a NSTAR Electric, for an Exemption from the Zoning By-Laws of the Town of Stoughton and the Zoning Code of the City of Boston in Connection with the Construction and Operation of the Proposed 345 kV Transmission Line	D.T.E. 04-7

FINAL DECISION

Selma Urman
Presiding Officer
January 14, 2005

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ABBREVIATIONS

1997 BECo Decision	Boston Edison Company, 6 DOMSB 208 (1997)
1997 Restructuring Act	"the 1997 Electric Restructuring Act" (Chapter 164 of the Acts of 1997)
1998 NEPCo Decision	New England Power Company, 7 DOMSB 333 (1998)
ACEC	Area of Critical Environmental Concern
ACOE	Army Corps of Engineers
Algonquin	Algonquin Gas Transmission Company
ANP Bellingham	ANP Bellingham Energy Company, EFSB 97-1 (1998), 7 DOMSB 39
ANP Blackstone	ANP Blackstone Energy Company, EFSB 97-2/98-2 (1999), 8 DOMSB 1
BECO	Boston Edison Company, d/b/a NSTAR Electric
Boston	City of Boston
Berkshire Power	Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997)
Boston Gas	Boston Gas Company, D.T.E. 00-24 (2001)
Boston Surrounding Area	Area of communities surrounding downtown Boston
BRA	Boston Redevelopment Authority
CELCo Decision	Cambridge Electric Light Company, 12 DOMSB 305 (2001)
CELT	Capacity, Energy, Loads, & Transmission (yearly reports provided by NEPOOL)
City	City of Boston
cm	centimeter
ComElec Decision	Commonwealth Electric Company, 5 DOMSB 273 (1997)
Company	Boston Edison Company d/b/a NSTAR Electric
Conroy	Conroy Development Company
consolidated proceeding	EFSB 04-1; D.T.E. 04-5; D.T.E 04-7
CZM	Massachusetts Office of Coastal Zone Management
dB	decibels, unweighted

dBA	A-weighted decibels
DCR	Department of Conservation and Recreation
DEM	Massachusetts Department of Environmental Management
Department	Department of Telecommunications and Energy
DG	Distributed Generation
DOMSB	Decisions and Orders of Massachusetts Energy Facilities Siting Board
DOMSC	Decisions and Orders of Massachusetts Energy Facilities Siting Council
DRP	Independent System Operator of New England, Inc. Demand Response Program
DSM	Demand-Side Management
D.T.E.	Department of Telecommunications and Energy
ECMP	Environmental Construction Management Plan
EFSC	Energy Facilities Siting Council
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMF	electromagnetic field
EOEA	Executive Office of Environmental Affairs
EPA	U.S. Environmental Protection Agency
Epsilon	Epsilon Associates, Inc.
GIS	Gas-insulated switchgear
GWh	gigawatt-hours
HDD	horizontal directional drill
Hz	hertz (cycles per second)
I&M	installation and maintenance
ICAP	Installed Capacity
IPOD	South Boston Waterfront Interim Planning Overlay District
ISO-NE	Independent System Operator of New England, Inc.
kV	kilovolts

L_{90}	sound level exceeded 90% of time
L_{dn}	day night sound levels
L_{eq}	time-averaged sound levels
L_{max}	maximum sound levels
LOLE	a one-day-in-ten-years loss-of-load expectation
LOS	level of service
LSP	Licensed Site Professional
LTE	Long-Term Emergency Ratings
Mass GIS	Massachusetts Geographic Information System
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MDEP	Massachusetts Department of Environmental Protection
MDMF	Massachusetts Division of Marine Fisheries
MDOER	Massachusetts Division of Energy Resources
MDRP	Massachusetts Diesel Retrofit Program
MECo/NEPCo Decision	Massachusetts Electric Company/New England Power Company, 18 DOMSC 383 (1989)
MEPA	Massachusetts Environmental Protection Act
mG	milligauss
MHC	Massachusetts Historical Commission
MHD	Massachusetts Highway Department
MMWEC Decision	Massachusetts Municipal Wholesale Electric Company, EFSB 12 DOMSB 18 (2001)
Motion	Town of Stoughton Motion to Withdraw from proceeding filed 9/24/04
MPO	Boston Metropolitan Planning Organization
MVA	mega-volt-amperes
MVAR	mega-volt-amperes-reactive
MW	megawatts

MWRA	Massachusetts Water Resources Authority
NEA Decision	Northeast Energy Associates, 16 DOMSC 335 (1987)
NEP	New England Power Company
NEPOOL	New England Power Pool
New York Central Railroad	New York Central Railroad v. Department of Public Utilities, 365 Mass. 586 (1964)
Nextel	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)
NHESP	Massachusetts National Heritage Endangered Species Program
1996 NEPCo Decision	New England Power Company, 5 DOMSB 1 (1996)
NML	Noise Monitoring Location
Norwood Decision	Norwood Municipal Light Department, 5 DOMSB 109 (1997)
NPCC	Northeast Power Coordinating Council
NSTAR	Boston Edison Company, d/b/a NSTAR Electric
NSTAR Service Center	Service Center located at the southern boundary of the Hyde Park Substation
Phase I	Installation of cable for one circuit to K Street Substation and one circuit to Hyde Park Substation
Phase II	Installation of cable for second circuit to K Street Substation
PL	Property Line
PSC	Public Service Corporation
PTC	Pipe-type cable
PTI	Power Technologies, Inc.
RAO	Response Action Outcome
RMR	Reliability Must Run
Route 138 switching station	Switching station located at intersection of Route 138 and York St.
ROW	Right of way
RTEP	Regional Transmission Expansion Plan
RTN	Release Tracking Number

Save the Bay	Save the Bay, Inc. v. Department of Public Utilities, 366 Mass.667 (1975)
Section 72	G.L. c. 164, § 72
SEIR	Single Environmental Impact Report
SF_6	Sulfur hexaflouride gas
Siting Board	Energy Facilities Siting Board
SCADA	Supervisory Control and Data Acquisition
SJC	Massachusetts Supreme Judicial Court
SRA	Stoughton Redevelopment Authority
SRA switching station	Alternative switching station site at Stoughton Technology Center
SWPPP	Stormwater Pollution Prevention Plan
Stoughton	Town of Stoughton
Tennessee Gas (2002)	Tennessee Gas Pipeline Company, D.T.E. 01-57 (2002)
TDR	Time-domain reflectography
TMP	Traffic Management Plan
URAM	Utility Release Abatement Measure
USFW	United States Fish and Wildlife
USGen NE	USGen New England, Inc.
USGS	United States Geological Service

TABLE OF CONTENTS

Pursuant to G.L. c. 164, § 69J, the Energy Facilities Siting Board hereby approves, subject to the conditions set forth below, the petition of Boston Edison Company, d/b/a NSTAR Electric, for approval to construct a new three-circuit 345 kilovolt electric transmission line, approximately 17.5 miles in length, and ancillary facilities, for the purpose of connecting the existing 345 kilovolt transmission system located south of Boston with two substations in the City of Boston. Pursuant to G.L. c. 164, § 72, the Energy Facilities Siting Board hereby approves the petition of Boston Edison Company, d/b/a NSTAR Electric, for a determination that the proposed three-circuit 345 kilovolt electric transmission line is necessary, serves the public convenience and is consistent with the public interest. Pursuant to G.L. c. 40A, § 3, and Section 6 of Chapter 665 of the Acts of 1956, the Energy Facilities Siting Board hereby approves, in part, and denies, in part, the petition of Boston Edison Company, d/b/a NSTAR Electric, for exemption from the Zoning By-laws of the Town of Stoughton and the Boston Zoning Code in connection with the proposed transmission project.

I. INTRODUCTION

A. Summary of the Proposed Transmission Project

Boston Edison Company d/b/a NSTAR Electric ("NSTAR" or "Company") is an electric company pursuant to G.L. c. 164, § 1. NSTAR proposes to construct an approximately 17.5 mile, three-circuit 345 kilovolt ("kV") underground pipe-type transmission line, which will connect the existing 345 kV system located south of Route 128 with two key substations in the City of Boston ("Boston" or "City") (Exhs. BECO-1, at 1-1; EFSB-G-1, at 2-4 to 2-7, Fig. 2.2-2). The proposed transmission line will originate at a new switching station to be constructed in the Town of Stoughton ("Stoughton") adjacent to an existing 345 kV transmission line that runs from Walpole to Holbrook (id. at 1-1, 1-2). One of the three circuits will terminate at NSTAR's existing Hyde Park Substation, while the remaining two circuits will terminate at NSTAR's K Street Substation in South Boston (id. at 1-1). To support the new transmission line, NSTAR also proposes to expand facilities at the Hyde Park and K Street Substations and to install a new heat exchanger at the Baker Street Substation in West Roxbury (Exh. EFSB-G-1, at 2-1).

NSTAR stated that it would construct the proposed transmission project in two phases (Exh. BECO-1, at 13). The Company explained that it would complete the construction of the three underground steel pipes to house the transmission circuits in 2005 (id.). The Company would install one circuit of the two-circuit transmission line that terminates at the K Street Substation, and the single-circuit cable to the Hyde Park Substation, by June 2006 ("Phase I") (id. at 1-3). The Company would install the second circuit to the K Street Substation in 2007 ("Phase II") (id.).

NSTAR has noticed two routes for the proposed transmission project. The switching station for the primary route would be located at the intersection of Route 138 and York Street in Stoughton ("Route 138 switching station") (Exh. BECO-1, at 1-2). The purpose of the switching station is to split the existing overhead 345kV transmission circuit between Walpole and Holbrook into two 345 kV transmission circuits and link them to the three proposed underground transmission circuits (Exh. EFSB-G-1, at 2-17). From the Route 138 switching station, the three circuits would travel north in a common trench along Route 138 through the Towns of Stoughton, Canton, and Milton, and then in Boston along Cummins Highway to American Legion Highway (id. at 2-11, Fig. 2-2.1). At this point the circuits would diverge, with a single circuit traveling less than 1 mile to the Hyde Park Substation and the two remaining circuits traveling, in one trench, approximately 6 miles to the K Street Substation (id. at Figs. 2.2-1, 2.2-2 and 2.2-3).

The switching station for the alternative route would be located south of Reebok Drive in the Stoughton Technology Center, at a site owned by the Stoughton Redevelopment Authority ("SRA") ("SRA switching station") (Exh. BECO-1, at 1-3). From the SRA switching station, the three-circuit transmission line would travel north in a common trench, along Technology Center Drive, West Street, Lafayette Street, High Street, Scanlon Drive, and Route 28 through Stoughton, Randolph, and Quincy into Milton (Exh. EFSB-1, at 1-3). At the intersection of Central Avenue and Reedsdale Avenue in Milton, the circuits would diverge and follow different routes into Boston, with a single circuit traveling approximately 3.2 miles to the Hyde Park Substation and the two remaining circuits traveling, in one trench, approximately 7.2 miles to the K Street Substation (Exh. BECO-1, at 1-10).

B. Procedural History

On January 16, 2004, NSTAR filed a petition with the Energy Facilities Siting Board ("Siting Board") seeking approval, pursuant to G.L. c. 164, § 69J, to construct the proposed transmission project. This petition was docketed as EFSB 04-1 ("Siting Board petition"). In addition, the Company filed two related petitions with the Department of Telecommunications and Energy ("DTE" or "Department"): (1i) a petition pursuant to G.L. c. 164, § 72, seeking a determination that the proposed transmission lines are 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 and for an exemption from the Zoning By-laws of the Towns of Stoughton and Canton and pursuant to Section 6 of Chapter 665 of the Acts of 1956 for an exemption from the Zoning Code of the City of Boston ("Zoning Exemption petition").[1] The Section 72 petition was docketed as D.T.E. 04-5; the Zoning Exemption petition was docketed as D.T.E. 04-7.

On February 2 , 2004, 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 04-1/D.T.E. 04-5/ D.T.E. 04-7. The Siting Board conducted a single adjudicatory proceeding and developed a single evidentiary record for the consolidated proceeding.

The Siting Board initially conducted public comment hearings on the consolidated petitions on March 1, 2004 in Boston, Massachusetts and on March 3, 2004 in Canton, Massachusetts. On March 23, 2004, the Company submitted a supplemental filing that described and evaluated three additional route variations for the primary route, all located within Boston. On May 6, 2004, the Siting Board conducted a public comment hearing on the supplemental filing in Boston, Massachusetts.

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[1] By letter dated March 24, 2004, NSTAR notified the Siting Board that the Company is no longer pursuing its earlier proposal to site the switching station at the Canton Industrial Park; accordingly, the Company withdrew its original request for an exemption from the Zoning By-laws of the Town of Canton.

In accordance with the direction of the Presiding Officer, the Company provided notice of the three public comment hearings and adjudication. The Siting Board received timely petitions to intervene from Boston and Independent System Operator-New England, Inc. ("ISO-NE"). Timely petitions to participate as limited participants were received from USGen New England ("USGen NE"), New England Power Company ("NEP"), The Marr Companies, Corkery Tractor and Trailer and Sons, Ruth M. Slocum, and George V. Mileris.[2] The Siting Board received late-filed petitions to intervene from the Town of Stoughton ("Stoughton") and Nancy Munroe. The Presiding Officer granted the petitions to intervene filed by Boston, ISO-NE and Stoughton and the petitions for limited participant status filed by USGen NE[3], NEP, the Marr Companies, Corkery Tractor and Trailer and Sons, Ruth M. Slocum, and George V. Mileris.

The Company presented the testimony of the following witnesses: Henry V. Oheim, Jr., Project Director for NSTAR, who testified concerning project overview, need, project alternatives, route selection, § 72 issues, and comparison of the preferred and noticed alternative routes; Charles P. Salamone, Director of System Planning for NSTAR, who testified concerning need, project alternatives and § 72 issues; Paul F. Barry, Lead Engineer, Transmission Lines Department for NSTAR, who testified concerning route selection, construction, cost and comparison of the preferred and noticed alternative routes; John Zicko, Principal Engineer, Substation Design for NSTAR, who testified concerning switching station design, construction, cost, and comparison of the preferred and alternative switching station sites and the zoning exemption petition; Stephen Carroll, Real Estate Manager for NSTAR, who testified concerning real estate and land acquisition, route selection cost, comparison of the preferred and alternative routes and the zoning exemption petition; Theodore A. Barten, P.E., Managing Principal of

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[2] The following residents of Canton, Massachusetts also submitted timely petitions to participate as limited participants: Richard J. Dawson, William and Jean Gefteas, George E. Kalem, Jr., Jean Lambourne, and James Moran. However, based on NSTAR's withdrawal of its alternative proposal to site a switching station at Canton Industrial Park, the aforementioned individuals withdrew their petitions for limited participant status in the proceeding.

[3] On January 7, 2005, the Presiding Officer granted the motion of Dominion Energy Salem Harbor, LLC to substitute for USGen NE as a limited participant in the proceeding.

Epsilon Associates, Inc. ("Epsilon"), who testified concerning project overview, project alternatives, route selection, cost, construction, environmental impacts, comparison of the preferred and alternative routes and the zoning exemption petition; Robert O'Neal, CCM, Principal at Epsilon, who testified concerning noise impacts; John K. Downing, Lead Senior Scientist at Shaw Group/Shaw Environmental, Inc., who testified concerning route selection, environmental impacts, traffic, hazardous materials and comparison of the preferred and alternative routes; Peter A. Valberg, Ph.D., Principal at Gradient Corporation, who testified concerning electric and magnetic fields ("EMF"); and Susan K. Haselhorst, Senior Analyst in NSTAR's Policy and Evaluation Group, who testified concerning the Company's energy efficiency programs.

ISO-NE presented the testimony of two witnesses: Stephen G. Whitley, Senior Vice President and Chief Operating Officer of ISO-NE, who testified concerning the need for the proposed transmission upgrades; and Richard Kowalski, Manager of Transmission Planning for ISO-NE, who testified concerning regional transmission planning.

The Town of Stoughton presented the testimony of two witnesses: James Byerley, a Principal Engineer with R. W. Beck, Inc.,who testified concerning the Company's site selection process; and Ivan Clark, Principal and Senior Director of R.W. Beck, Inc., who testified concerning certain environmental impacts of the primary route and alternative routes.

The Siting Board held seventeen days of evidentiary hearings, beginning on July 7, 2004, and concluding on September 4, 2004. Approximately 500 exhibits were entered into the evidentiary record. On September 24, 2004, Stoughton filed a motion to withdraw from the proceeding and to withdraw certain exhibits ("Motion").[4] On October 1, 2004, the Presiding Officer granted, in part, and denied, in part, the Motion, allowing Stoughton to withdraw from the case, but preserving all of the evidence in the record. Boston Edison Company, d/b/a NSTAR Electric, EFSB 04-1/ D.T.E. 04-5/ D.T.E. 04-7, Procedural Order at 1-2 (October 1, 2004)). On October 5, 2004, the Company, ISO-NE and Boston filed briefs. On October 12, 2004, the Company and USGen NE filed reply briefs. The evidentiary record was closed on

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[4] On September 27, 2004, Stoughton amended its Motion, seeking to withdraw additional exhibits.

December 22, 2004.

C. Jurisdiction and Scope of Review

The Company filed its Siting Board petition to construct the proposed transmission project in accordance with G.L. c. 164, § 69H, which requires the Siting Board to implement the energy policies in its statute to provide a reliable energy supply for the 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.

As a new electric transmission line with a design rating of 69 kV or greater and a length in excess of one mile, the Company's proposed transmission project falls within the definition of "facility" set forth in G.L. c. 164, § G, which provides that a "facility" includes:

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

In addition, the structures that the Company proposes to construct and operate at the Route 138 switching station, and the Baker Street, K Street and Hyde Park Substations fall within the definition of "facility" set forth in G.L.c. 164, § G, which provides that "facility" also includes:

> an ancillary structure which is an integral part of the operation of any transmission line which is a facility.

In accordance with G.L. c. 164, § 69J, before approving a petition to construct facilities, the Siting Board requires an applicant to justify its proposal in three phases. First, the Siting Board requires the applicant to show that additional energy resources are needed (see Section II.A, below). Next, the Siting Board requires the applicant to establish, on balance, its proposed transmission project is superior to alternative approaches in terms of cost, environmental impact, reliability, and ability to address the identified need (see Section II.B, below). Finally, the Board requires the applicant to show that it has considered a reasonable range of practical facility siting alternatives and that the proposed site for the facility is superior to a noticed alternative site in

terms of cost, environmental impact, and reliability of supply (see Section III.A, below).

II. ANALYSIS OF THE PROPOSED PROJECT

A. Need Analysis

1. Standard of Review

In accordance with G.L. c. 164, § 69J, the Siting Board is charged with the responsibility for implementing the energy policies in its statute to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. In carrying out its statutory mandate with respect to the construction of energy facilities such as NSTAR Electric's proposed transmission line, the Siting Board first evaluates whether there is a need for additional energy resources to meet reliability, economic efficiency, or environmental objectives. The Siting Board must find that additional energy resources are needed as a prerequisite to approving a proposed energy facility.[5]

In this instance, NSTAR has offered a need analysis that focuses on system reliability. In assessing reliability, the Siting Board first examines the reasonableness of the Company's system reliability criteria. The Siting Board then evaluates: (1) whether the Company uses reviewable and appropriate methods for assessing system reliability based on load flow analyses or other valid reliability indicators; (2) whether the transmission system meets these reliability criteria; under normal conditions and under certain contingencies, given existing and projected loads; and (3) whether acceleration of conservation and load management programs could eliminate the

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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 NSTAR, 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.

need for such additional energy resources.[6]

In cases where the Company's assessment of system reliability is driven by load projections, the Siting Board also 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. To ensure that this standard has been met, the Siting Board has consistently required forecasts to be reviewable, appropriate and reliable. Boston Edison Company, 6 DOMSB 208, at 232 (1997). A forecast is reviewable if it contains enough information to allow full understanding of the forecasting method. A forecast is appropriate if the method used to produce the forecast is technically suitable to the size and nature of the company that produced it. A forecast is reliable if the method provides a measure of confidence that its data, assumptions, and judgments produce a forecast of what is most likely to occur. Boston Edison Company, 6 DOMSB 208, at 232 (1997); Boston Edison Company, 24 DOMSC 125, 146 (1992); Commonwealth Electric Company/Cambridge Electric Company, 12 DOMSC 39, 42 (1985).

2. Description of the Existing System

NSTAR explained that the bulk power system serving customer load in the Greater Boston Area[7] is composed of both generation and transmission elements (Exh. BECO-1, at 2-11).

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[6] The Siting Board notes that, 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, §69 J. However, c. 249 is not applicable here because it was enacted subsequent to the filing of NSTAR's petition. In future cases, the Siting Board may consider in its need analysis whether projections of the demand for electric power include an adequate consideration of conservation and load management. In addition, the Siting Board may consider load management as an alternative approach to meeting the demand for the proposed facility, if such consideration is appropriate in the context of the particular case.

[7] According to NSTAR, the "Greater Boston Area," also known as the "Boston Import (continued...)

The generation elements in the Greater Boston Area range in size from 10 MW to 800 MW (id.). The principal generators are Mystic Blocks 7, 8, and 9; New Boston 1; Salem Harbor Units 1-4; and Kendall Station (id.).[8] These large generators are supplemented by many small units that total approximately 250 MW (id.). NSTAR stated that the generation facilities collectively provide a total of 3,546 MW of generation (id.).

NSTAR explained that 345 kV overhead lines form a nearly complete ring around the periphery of the Greater Boston Area (Exh. BECO-1, at 4-3). The Company stated that several 345 kV overhead circuits connect this ring to the regional New England transmission system through the Ward Hill, Tewksbury, and Golden Hills Substations to the north, and through substations in West Medway, Medway, Walpole, Ayer and Millbury to the south and west (id. at 2-12, 4-3, and Figs. 1-2, 2-3). NSTAR explained that existing 345 kV lines move bulk power from the northern part of the ring into the interior of the Greater Boston load center, but that from the southern portion of the ring, power must flow over a limited number of 115 kV and 230 kV circuits (Exh. BECO-1, at 4-3 and Fig. 1-2).[9] The Company stated that the Greater Boston Area has an import capability of 3,600 to 3,800 MW (id. at 2-25; Tr. 1, at 21; Tr. 2, at 161).

NSTAR indicated that it has 38 substations within the Greater Boston Area (Exh. BECO-1, Table 2-2). These substations serve peak loads ranging from 10 MW to over 200 MW each (Exh. BECO-1, at Table 2-2). Ten of these substations are located in the Downtown Boston

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7 (...continued)
Area," is defined by constraints on transmission (Tr. 1, at 20); it consists of the area roughly bounded by Salisbury, Amesbury, Merrimac, Haverhill, Salem (NH), Methuen, Lawrence, Andover, Tewksbury, Wilmington, Burlington, Bedford, Carlisle, Acton, Maynard, Sudbury, Framingham, Ashland, Holliston, Sherborn, Medfield, Dover, Westwood, Dedham and Milton (Exh. EFSB-N-4).

8 According to the Company, the New Boston 1 generator is due to be retired prior to 2006 (Exh. BECO-1, at 2-18). According to ISO-NE, the owner of Kendall Station (170 MW) requested permission to deactivate in October, 2004; as of September 2, 2004, ISO-NE had not acted upon this request (id. at 2-19; Tr. 15, at 2047).

9 Within the Greater Boston Area, the transmission elements include 355 miles of 115 kV transmission lines, 59 miles of 230 kV lines and 91 miles of 345 kV lines (Exh. BECO-1, at 2-11). Of these, approximately 300 miles are overhead lines and 200 miles are underground (id.).

sub-area, ten in the "Surrounding Boston" sub-area,[10] and the remainder in further outlying parts of Greater Boston (Exh. BECO-1, at Table 2-2). Additional substations within the Greater Boston Area are owned by other entities (id. at Fig. 1-2).

3. Reliability of Supply

The Company asserted that the proposed project is needed to maintain its transmission system in compliance with reliability standards of the Northeast Power Coordinating Council ("NPCC"), the New England Power Pool ("NEPOOL"), and ISO-NE (Exh. BECO-1, at 2-1). More specifically, NSTAR asserted that the 345 kV transmission line will alleviate transmission capacity constraints in critical load centers within its service territory (id.). The Company based this conclusion primarily on analyses of transmission overloads under single-contingency conditions (id. at 2-1, 2-16 to 2-22). The Company also asserted that the proposed facilities, in conjunction with other new facilities, are needed to mitigate voltage concerns in the Greater Boston Area (id. at 2-22 to 2-25; Tr. 1, at 44-45). In addition, ISO-NE asserted that the project is needed to address adequate reserve margins during contingencies (Exh. ISO-SGW at 3, 15).

a. Criteria and Methods for Reliability Analysis

NSTAR explained that it must adhere to reliability standards and criteria established by the NPCC and NEPOOL/ISO-NE, as well as to the Company's own reliability standards (Exh. BECO-1, at 2-5). The standards and criteria describe a set of operating scenarios under which system performance should be analyzed, and the characteristics of that performance that are considered acceptable (id. at 2-5 to 2-9). A key test of the transmission system is a thermal analysis, i.e., the determination of whether transmission elements become loaded beyond their capacity ratings under the load-flow conditions that would result from normal system operations

[10] The "Surrounding Boston" sub-area appears to refer to the area roughly bounded by Chelsea, Everett, Somerville, Arlington, Belmont, Waltham, Weston, Wellesley, Needham, Dedham, and Milton (Exh. EFSB-N-8, Att.).

and various "N-1" contingency situations (id. at 2-8; ISO-SGW-3; ISO-SGW-4, at 7).[11] In addition, the Company analyzes the system's voltage performance, stability, ability to respond to short circuits, and transfer capability (Exh. BECO-1, at 2-8 to 2-9).

NSTAR stated that, consistent with its own and NEPOOL/ISO-NE standards, it analyzed system performance for extreme weather conditions, i.e., performance under peak demand that corresponds to an extreme-weather forecast (Tr. 1, at 94).[12] The Company stated that it used simulation software by Power Technologies, Inc. ("PTI") to develop an analytical model that represents the Company's physical system, then used the model to test the system under different operating scenarios (Exh. BECO-1, at 2-4, 2-7). The operating scenarios included a base case, in which all transmission elements are in service and the generating units exhibit a "typical" level of unavailability, as well as various contingency situations in which transmission elements are out of service, with or without the loss of additional generation (id. at 2-5 to 2-6).

With regard to generation unavailability, NSTAR stated that ISO-NE projected a typical level of generation unavailability of 279 MW for the Boston Import Area for the years 2005 and beyond, based on historical forced outage rates (Exhs. EFSB-N-2(a), at 24; EFSB-N-9; Tr. 1, at 24-25). However, NSTAR assumed an unavailability level of 350 MW, which is approximately equivalent to the output of one of the two Mystic Block 9 gas turbines plus the associated output from its steam turbine (Exh. EFSB-N-9; Tr. 1, at 27). The Company indicated that, given the sizes of the generators within the Greater Boston Area, this outage is the smallest single-unit outage that is at least as large as ISO-NE's projected typical unavailability level (Exh. BECO-1, at 2-19). According to the Company, Mystic 9 would represent the worst location within the Greater Boston Area where a generator unavailability of this magnitude could occur (Tr. 1,

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[11] According to the Company, an "N-1" contingency can be either the loss of one transmission element, or the loss of a transmission element in conjunction with the loss of a major generating unit (beyond the typical level of generator unavailability established by ISO-NE for the area) (Exh. BECO-1, at 2-6; Tr. 1, at 15-18).

[12] The 2003 Greater Boston peak demand forecast for extreme weather conditions was higher than the peak demand forecast for normal weather conditions by 325 MW or 5.9% for the Greater Boston Area, 148 MW or 5.9% for the Surrounding Boston Area, and 60 MW or 5.8% for the Downtown Boston Area (Exh. EFSB-RR-3).

at 27). To analyze those N-1 contingencies in which generation outages beyond the typical unavailability level are a factor, NSTAR explained that it developed generation dispatch scenarios to reflect the unavailability of additional generators (Exh. BECO-1, at 2-18).

In addition to the thermal analysis, the Company assessed voltage levels in the Greater Boston Area under projected peak-load condition (id. at 2-22 to 2-25). The Company stated that the criteria for voltage levels allow no more than a 5% deviation from the transmission element's voltage rating (id. at 2-23).

b. Load Forecasts

In conjunction with a model of the transmission system, a forecast of load levels is needed to conduct a reliability analysis. NSTAR explained that its process of forecasting load for its Greater Boston Area substations is linked to ISO-NE's forecasting process (Exh. BECO-1, at 2-13 to 2-16; Tr. 1, at 91-102). According to the Company and ISO-NE, ISO-NE uses regression models to relate historical electricity use to economic factors, electricity prices, weather, and other factors (Exhs. BECO-1, at 2-13; ISO-SWG at 22). NSTAR stated that ISO-NE develops long-term energy forecasts for each New England state from these models (Exhs. BECO-1, at 2-13; RR-EFSB-22). From the energy forecasts, ISO-NE then derives peak load projections for each state by applying "load factors" (ratios of historic peak loads to total energy use) (Exh. BECO-1, at 2-13; Tr. 1, at 92).[13]

The Company stated that ISO-NE apportions its statewide peak-load forecast to sub-areas within the state by considering forecasts of peak load developed by individual distribution companies for their territories, and allocating the statewide peak proportionately (Exh. RR-EFSB-22; Tr.1, at 101). NSTAR explained that the peak load forecasts it submits to ISO-NE for its Boston Edison and Cambridge Electric service territories are derived by applying load factors to the energy forecasts it develops for those subsidiaries (Exh. RR-EFSB-22). NSTAR stated that its underlying energy forecasts are prepared based upon econometric models for each sector

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[13] Energy forecasts pertain to total energy use over a period of time, expressed in units such as megawatt-hours; *peak load* forecasts address power consumption at a point in time, and are expressed in units such as megawatts.

(e.g., residential, commercial, industrial, Massachusetts Bay Transportation Authority ("MBTA"), Massachusetts Water Resources Authority (" MWRA")), and that the models regress historical sales against economic, demographic and weather variables (id.; Exh. RR-EFSB-22 (S)). The Company explained that it evaluates the validity of each regression model through the use of statistical tests, data plots, and comparison of recent actual values with predicted values (Exh. RR-EFSB-22 (S); Tr. 17, at 2277-2278). The Company stated that it used forecasts by Global Insight/Data Resources, Inc. for future values of the driving variables (Exh. RR-EFSB-22; Tr. 17, at 2276).

Once ISO-NE allocates a share of the statewide peak load to NSTAR's territories, NSTAR allocates that load to its own substations (Exh. BECO-1, at 2-14; Tr. 1, at 101). The Company explained that its allocation method employs software that identifies growth potential in the service areas of each of its substations (Exh. BECO-1, at 2-15). The Company stated that the software uses historical peak load data for the substations, as well as demographic data and information about zoning, land use, and infrastructure, to develop factors for allocating the ISO-NE area forecast to the individual substations (id.). NSTAR explained that it also takes into account peak loads for large customers that are expected to join or leave the system (Exh. EFSB-6; Tr. 1, at 104). The Company stated that the resultant substation peak load forecasts reflect extreme weather ("90/10") assumptions, as opposed to normal weather ("50/50") (Tr. 1, at 96).

The Company provided the following projections of peak load, including losses associated with transmission and substation elements, for Downtown Boston, the Surrounding Boston Area, and the Greater Boston Area:

Table 1: Greater Boston Sub-Area Load Forecast (Extreme Summer Peak in MW)

	2002	**2006**	**2008**
Greater Boston Area	5725	5861	6017
Surrounding Area	2611	3002	3141
Downtown Boston	1067	1294	1359

Note: 2002 figures reflect actual data expressed in extreme weather terms. "Surrounding Area" figures include "Downtown Boston" figures; "Greater Boston" figures include "Surrounding Area" figures.
Sources: Exhs. BECO-1, at 2-16; EFSB-N-8; RR-EFSB-3.

The projections show average annual growth rates from 2002 to 2006 of 4.94% in Downtown Boston, 3.55% in the Surrounding Boston Area (inclusive of Downtown), and 0.6% in Greater Boston overall. The Company noted that, when modeling the reliability of particular transmission elements, it used projections of peak load at its individual substations within the Greater Boston Area for the years 2006, 2008, and 2013 (Exh. BECO-1, at 2-14; Table 2-2; Tr. 1, at 95,101).

NSTAR indicated that it administers two demand-side management initiatives within its service territory: a series of energy efficiency programs, and an ISO-NE demand response program ("DRP") (Exh. BECO-1, at 3-5 to 3-8). The Company stated that approximately 5% of its customers participated in its energy efficiency programs in 2002, resulting in a reduction in peak-load summer demand of approximately 21 MW (id. at 3-5).

As a "demand response service provider" for the ISO-NE DRP, NSTAR reported that by the end of 2003 it had approximately 110 participants with a total response capacity of 45 MW, although not all the participants are located within the Boston Import Area (id. at 3-7; Tr. 3, at 323). The Company noted that the total 2003 DRP enrollment for the Greater Boston Area amounts to 80 MW of response capacity (Exh. BECO-1, at 3-7; Tr. 3, at 322). NSTAR stated that it is actively engaged in marketing the DRP program (Tr. 3, at 325). The Company stated that it does not include any demand reduction achieved through the ISO-NE demand response program in its forecasted peak-load demands because the ISO-NE program is designed to address regional capacity constraints and is not generally available to address local area concerns (Exh. RR-EFSB-9).[14]

c. Equipment Loading and Voltage Analysis

Using the system model, load forecasts, and reliability criteria described above, NSTAR performed thermal analyses for 2006, 2008, and 2013, and voltage analyses for 2008. The results are presented below.

i. Thermal Analysis Results: 2006, No Project

The Company's thermal analysis indicated that by 2006, without the Project, several

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[14] However, ISO-NE states that its forecasts "are adjusted to consider the moderating effect of demand-side management efforts" (Exh. ISO-NE-SWG at 23).

system elements would be loaded above their long-term emergency ratings ("LTEs") during various contingencies (Exh. BECO-1, at 2-19 to 2-22). Losses of Kendall Unit 4, Mystic Block 8, or the remaining 50% of Mystic Block 9 would cause the worst thermal overloads (id. at 2-18 to 2-19). NSTAR's model indicated that the most significant overloads within the Downtown Boston Area would occur on two 345 kV cables between the Mystic and Kingston Street Substations, two 345/115 kV transformers at the Kingston Street Substation, a 345/115 kV transformer at the Mystic Substation, two 115 kV cables between the Kingston Street and K Street Substations, and two 115 kV cables between the Mystic and K Street Substations (id. at 2-19 to 2-20). The model projected that these facilities would experience loadings at 108 to 130 % of their LTEs (id. at 2-20). For the Surrounding Boston Area, the Company identified additional elements, including the 115 kV cables between the Waltham and Watertown Substations, between the North Cambridge and Brighton Substations, between the Mystic and Brighton Substations and between the Baker Street and Brighton Substations among the facilities of greatest concern (id. at 2-20 to 2-21). These cables would experience loadings at 102 to 155 % of their LTEs (id. at 2-21). Finally, in the southern portion of the Greater Boston Area, the Company's model indicated that 115 kV cables between the West Walpole and Baker Street Substations, a 115 kV line between Framingham and Baker Street, and two 345 to 115 kV transformers in Medway and Walpole would experience overloads of between 101 and 112 % of their LTEs (id.).

NSTAR stated that the overloads in the Downtown Boston and Hyde Park/West Roxbury areas are of the greatest concern due to the load requirements and system constraints in these areas (Exh. BECO-1, at 2-22). The Company explained that it currently uses various operational adjustments, including load transfers, system reconfigurations, phase-angle regulator adjustments and fast-response unit dispatch, to keep some facilities within normal ratings during non-contingency conditions, but that as loads increase such adjustments will become increasingly difficult to make without aggravating post-contingency conditions (id. at 3-4; Tr. 1, at 48-54).

The Company's modeling assumed that generator New Boston 1 would be retired prior to 2006 (Exh. BECO-1, at 2-11, 2-18). In response to Siting Board inquiries, NSTAR re-ran its thermal analysis using the assumption that 350 MW from New Boston 1 would be available in

2006. The results indicated that this would alleviate many of the 2006 Downtown Boston overloads, but that significant overloads would persist in the remainder of Greater Boston Area (Exh. RR-EFSB-2, at 4).

ii. Thermal Analysis Results: 2006, Two Circuits

The Company's analysis of the transmission system with the addition of one 345 kV cable from Stoughton to the Hyde Park Substation and one 345 kV cable from Stoughton to the K Street Substation indicated that all the post-contingency loadings previously identified as exceeding elements' LTEs would be brought down to the LTE or lower (Exh. BECO-1, at 2-28). However, several of these loadings would remain above 95% of the LTE (id.).

iii. Thermal Analysis Results: 2008, Two Circuits

According to NSTAR's analysis, by 2008 overloads would re-emerge in the Downtown Boston and Waltham/Watertown areas, even with the first two cables in place (Exh. BECO-1, at 2-29). These overloads would range from 101% of LTE to 106% of LTE (id.).

iv. Thermal Analysis Results: 2008, Three Circuits

The Company stated that the installation of an additional circuit from Stoughton to the K Street Substation would successfully mitigate the contingency overloads that would emerge in 2008 with two circuits installed in 2006 (Exh. BECO-1, at 2-29). With this third circuit in place, the Company's analysis shows that no previously overloaded transmission element would be loaded higher than 95% of its LTE (id.).[15] NSTAR states that these results indicate that three circuits are needed and that the third circuit should be in service for summer 2008 peak load conditions (id.).

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[15] According to the Company, within the 2006-2013 timeframe, there would be additional overloads in the Downtown Boston Area that are not mitigated by the proposed project (Tr. 2, at 191-192).

v. Thermal Analysis Results: 2013, Three Circuits

NSTAR stated that it carried its modeling through 2013 and found that even with all three circuits in place, contingency overloads would again emerge (Exh. BECO-1, at 2-30). The Company presented results of its analysis that show Downtown Boston transmission elements at 96 to 105% of their LTEs, and surrounding community area elements at 104 to 114% of their LTEs (id.). The Company attributed these overloads to projected load growth in the area (id.).[16]

vi. Voltage Analysis Results

The Company stated that it identified low voltage problems on the 115 kV system serving Downtown Boston and other parts of the Greater Boston Area on a pre-contingency basis by 2008 (Exh. BECO-1, at 2-23). The Company stated that based on these findings, it modified its model to assume the addition of several capacitor banks when analyzing contingencies in 2008 and 2013 (id.). NSTAR then provided results for 2008 showing several instances of voltage more than 5 % above or below the desired levels under the dispatch scenario in which all of Mystic Block 9 is out of service, but without the failure of any transmission elements (id. at 2-23 to 2-24). According to the Company, further analysis showed that without the proposed 345 kV transmission lines, contingency conditions would necessitate the installation of additional capacitor banks to mitigate low-voltage concerns, but that with the proposed project, these capacitors would not be needed (id. at 2-23). However, the Company noted that, under lower-than-projected load conditions, the capacitance provided by the new 345 kV lines would have the potential to cause high voltage conditions (id.). To regulate the voltage effects of the new transmission circuits, the Company stated that it would install shunt reactors at both the proposed Stoughton switching station and the K Street Substation (Exh. BECO-1, at 1-13 and 1-16).

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[16] The Company acknowledged that increased energy efficiency, demand response, and distributed generation in its system might defer the need for future upgrades to a time period beyond 2013 (Tr. 3, at 347-349). To do so, however, the Company asserted that the measures would need to target the load in the subareas served by the specific facilities that are expected to experience overloads (id.). For this reason, the Company stated that it is unable to speculate how these measures might affect reliability issues (Exh. COB-R-5).

d. Analysis

The Siting Board consistently has found that if the loss of any single major component of a supply system would cause thermal overloads on other system components, unacceptable voltage levels, or significant customer outages, then additional resources to maintain system reliability are justified. Boston Edison Company, 6 DOMSB 208, at 233 (1997); Norwood Municipal Light Department, 5 DOMSB 109, at 120-121 (1997); 1996 NEPCo Decision, 5 DOMSB 1, at 10 (1996). Here, the Company has shown that it has based the analysis of its system on widely applied standards established by NPCC and ISO-NE to ensure that the electric power systems serving New England and the NSTAR Electric service territory are designed to provide an adequate and reliable electric power delivery system. These standards include criteria pertaining to thermal loads and voltage levels during normal and contingency operations. Accordingly, the Siting Board finds that NSTAR's reliability criteria regarding equipment loadings and voltage levels are reasonable.

With regard to NSTAR's methods for assessing system reliability, the Siting Board examined the Company's assumptions regarding extreme versus normal weather loads and generator unavailability, and its use of modeling. With respect to weather-related load assumptions, the Siting Board has relied on analyses of need based on the use of a high load forecast, in order to reflect uncertainties inherent in system-coincident and peak-day weather. New England Power Company, 5 DOMSB 1, at 17 (1996); New England Power Company, 4 DOMSB 109, at 125 (1995). Similar to past transmission reviews, the Company based its system load assumptions on extreme weather conditions. The Siting Board notes that in this case, the supply area in which need is expected to arise encompasses much of the Greater Boston Area – an area supplied by generation as well as transmission. Although applied in a different context than in past Siting Board reviews, the Siting Board accepts as reasonable the Company's use of extreme weather load assumptions for determining the need for additional resources.[17]

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[17] For the Boston Surrounding Area, the difference between the 2003 extreme forecast and the 2003 normal forecast is 148 MW (Exh. RR-EFSB-3). This is comparable to the 139 MW of growth in extreme load forecast for the two years from 2006 to 2008 (Exh. BECO-1, at 2-16).

With regard to its assumptions about generation resources, the Siting Board notes that the Company's base-case level of "typical" generator unavailability was greater than that projected by ISO-NE for the years in question. Specifically, the Company represented ISO-NE's projected average unavailability of 279 MW of generation as the outage of 50% of Mystic Block 9, which has a capacity of approximately 350 MW. Thus, the output of this generator unit is 71 MW greater than ISO-NE's projected average unavailability level. The Siting Board notes that, compared to the projected 2006-2008 growth of 139 MW for the Boston Surrounding Area, the extra 71 MW of assumed unavailability of generation is equivalent to one year's worth of growth. The Company also stated that the Mystic Block 9 represents the most critical generation location with the Greater Boston Area, apparently compounding a conservative assumption about generator unavailability. On the other hand, 50% of Mystic Block 9 is the smallest unit in the Greater Boston Area that is at least as large as ISO-NE's projected unavailability level. Moreover, ISO-NE's projected level of generator unavailability does not account for the possible retirement of Kendall Station. On balance, the Siting Board accepts the Company's assumption concerning generator unavailability.

In addition to detailing its load and generation assumptions, NSTAR has explained how it uses a simulation program to model its system, and has shown how it uses load flow analyses to identify where thermal overloads would occur on the system under contingency conditions. Thus, in considering its assumptions about weather-related load levels and generator unavailability, and its use of modeling to simulate and test its system under a variety of scenarios, the Siting Board finds that the Company used reviewable, appropriate and reliable methods for assessing system reliability.

The record indicates that NSTAR's load forecasting method is a three-step process consisting of (1) an econometric-based system-level projection of energy use across its service areas; (2) an aggregated peak load forecast developed by ISO-NE for Massachusetts; and (3) a substation-level forecast derived by allocating ISO-NE's Massachusetts forecast to NSTAR's individual substations in accordance with local growth potential. The Company has provided enough information to permit a general understanding of its forecasting method and has provided evidence that it uses appropriate historical data, independent variables, and quantitative methods.

The Company also has provided evidence of close coordination with ISO-NE in the development of its forecast. Therefore, the Siting Board finds that NSTAR's load forecast is reviewable, appropriate, and reliable.

The Company has shown that its contingency load flow analyses project thermal overloads on various transmission elements in Downtown Boston and elsewhere in the Greater Boston Area as early as 2006. The Company has used the same approach to demonstrate that thermal problems would re-emerge in 2008 if only two of the proposed three 345 kV circuits were installed. Thus, the Company has demonstrated need for the proposed project to address violations of thermal criteria.

With respect to voltage levels, the Company described its additional assumptions regarding system upgrades and provided analyses that showed violations of its voltage criteria in 2008. However, the Company identified other means of addressing low-voltage problems that could be implemented without the proposed project. The record does not contain sufficient information to determine whether the project is needed to address voltage concerns alone. Consequently, the Siting Board does not rely on the Company's arguments regarding voltage problems in considering the need for this project. However, based on the violations of thermal criteria, discussed above, the Siting Board finds that additional energy resources are needed.

e. Conclusions on Reliability of Supply

The Siting Board has found that the Company used reasonable criteria and reviewable, appropriate, and reliable methods for evaluating system reliability. The Siting Board has also found that the Company used a reviewable, appropriate and reliable load forecast. Further, the Siting Board has found that the Company has demonstrated need for additional energy resources to address violations of thermal criteria. Finally, as further discussed in Section II.B, below, the Siting Board finds that acceleration of conservation and load management programs would not eliminate the need for additional energy resources.

Based on the foregoing, the Siting Board finds that NSTAR has demonstrated that the existing electric transmission system is inadequate to reliably serve projected loads in the Greater Boston Area under certain contingencies. Accordingly, the Siting Board finds that additional

energy resources are needed for reliability in the Greater Boston Area.

B. Comparison of the Proposed Project and Alternative Approaches

1. Standard of Review

G.L. c. 164, § 69H requires the Siting Board to evaluate proposed projects in terms of their consistency with providing a reliable energy supply to the Commonwealth with a minimum impact on the environment at the lowest possible cost. In addition, G.L. c. 164, § 69J requires a project proponent to present "alternatives to planned action" which may include: (a) other methods of generating, manufacturing, or storing electricity or natural gas; (b) other sources of electrical power or natural gas; and (c) no additional electric power or natural gas.[18]

In implementing this part of 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. CELCo Decision, 12 DOMSB 305, at 321; Boston Edison Company, 6 DOMSB 208, at 252 (1997) ("1997 BECo Decision"); Boston Edison Company, 13 DOMSC 63, at 67-68, 73-74 (1985). 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. 1997 BECo Decision, 6 DOMSB 208, at 262-263; Commonwealth Electric Company, 5 DOMSB 273, at 300 (1997) ("ComElec Decision"); Massachusetts Electric Company, 18 DOMSC 383, at 404-405 (1989).

2. Identification of Project Approaches for Analysis

The Company considered seven approaches for meeting the identified needs in the Greater Boston Area, including: (1) the proposed underground 345 kV project; (2) a 115 kV transmission alternative; (3) a full or partial overhead 345 kV transmission alternative; (4) a transmission improvements alternative made up of a series of limited, localized reconductoring and expansion projects ("bundled improvements alternative"); (5) a new generation alternative;

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[18] G.L. c. 164, § 69J also requires a petitioner to provide a description of "other site locations." The Siting Board reviews the Company's primary route, as well as other possible routes, in Section III.A, below.

(6) a demand-side management alternative; and (7) a distributed generation alternative (Exh. BECO-1, at 3-2 to 3-17).[19]

a. Underground 345 kV Project

The proposed underground 345 kV project consists of installing three underground circuits, each extending from south of Boston to one of two Boston area delivery points (Exh. BECO-1, at 3-2 to 3-3). Under the Company's proposal, new underground circuits would originate from a point along the existing West Walpole-Holbrook 345 kV transmission line and supply additional power to the Hyde Park Substation in the Surrounding Boston Area and K Street Substation in downtown Boston (id. at 3-3). The Company confirmed that, with one new circuit on-line to each of these substations in 2006 and a second new circuit on-line to K Street Substation in 2008, the Greater Boston Area would receive reliable supplies consistent with applicable standards relating to thermal ratings and system voltages for 2006 to 2008 and beyond (id. at 2-27 to 2-31, 3-3). For purposes of project comparison, the Company estimated the cost of the underground 345 kV project at $177 million (id. at 3-24).

b. 115 kV Transmission Alternative

The Company indicated the 115 kV transmission alternative would include installing eight or nine underground 115 kV transmission circuits, each extending from south of Boston to one of two Boston area delivery points (Exh. BECO-1, at 3-11). The Company stated that the capacity of this number of 115 kV underground circuits could match the capacity of the proposed 345 kV project (id. at 3-11). The Company noted that, to avoid overheating, no more than three circuits could be placed in the same trench; therefore, the trench miles of construction potentially would be three times greater than with implementation of the proposed underground 345 kV project, and routing of transmission lines could be required along more streets (id. at 3-11). The

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[19] The Company also considered a no-build alternative. The Company determined that this approach would prevent it from providing uninterrupted service to the Boston area consistent with its service obligation (Exh. BECO-1, at 3-4). Therefore, this approach was not considered further (id.).

Company concluded that the 115 kV transmission alternative could provide sufficient new capacity to meet identified needs (id. at 3-11). The Company estimated the cost of the 115 kV transmission alternative at $270 million (id. at 3-29).

c. Overhead Transmission Alternative

The Company indicated that the overhead transmission alternative would involve either installing two overhead circuits extending in succession to two Boston area delivery points, or installing two overhead circuits to the first delivery point, then installing underground circuits from there to the second delivery point (Exh. BECO-1, at 3-10; Exh. EFSB-PA-4). The Company stated that the capacity of one overhead 345 kV circuit could match the capacity of three underground 345 kV circuits (Exh. BECo 1, at 3-10). The Company indicated, however, that the project would require at least two overhead circuits to provide mutual backup consistent with applicable reliability criteria (id. at 3-20).[20]

The Company stated that it identified only two existing rights-of-way originating south of Boston that could accommodate overhead 345 kV transmission lines directly supplying Boston area delivery points from which identified needs could be met: (1) a railroad ROW extending to the Hyde Park Substation; and (2) a railroad ROW extending to the Baker Street Substation in West Roxbury (id. at 3-10 to 3-11). However, the Company rejected these routes on feasibility grounds, explaining that both rail corridors are too narrow and would entail other feasibility concerns, such as traversing densely developed areas, crossing extensive wetlands, or being subject to extensive work restrictions due to frequent train passage (id. at 3-11). The Company stated that the nearest ROW capable of feasibly accommodating 345 kV overhead transmission was a power line corridor which comes to within four miles of the most westerly possible

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[20] While agreeing that this requirement would have the additional unintended result of generally providing added transmission capacity into the Boston area, relative to other alternatives, the Company maintained that such a capacity margin would provide no reliability advantage (Exh. EFSB-PA-4). The Company explained that no need for the higher capacity has been identified at project delivery points, and further, that the project already has been designed to maximize the amount of power delivery that can be absorbed by the Boston area 115 kV system (id.).

delivery point, Baker Street Substation (id.). The Company rejected this option on cost and practicality grounds, after determining that ROW acquisition needs to reach Baker Street Substation would amount to nearly 100 acres, and would involve areas of high property value, areas containing open space reservations, and areas of wetlands and flood plains associated with the Charles River (id.). Finally, the Company stated that even if overhead transmission could reasonably be extended to an initial delivery point in the Surrounding Boston Area, no potential overhead rights-of-way are available to continue to a second required delivery point in downtown Boston (id.).

d. Bundled Improvements Alternative

As part of the bundled improvements alternative, the Company identified a series of transmission system upgrade projects, including reconductorings of existing transmission lines, new transmission lines, and substation expansions, designed to alleviate thermal overloads at all system locations requiring additional capacity beginning in 2006 (Exh. BECO-1, at 3-12 to 3-16). The Company indicated that this alternative would include: (1) several underground transmission projects within the Surrounding Boston Area, including approximately 6-7 miles of new two-circuit 345 kV transmission, 9 miles of new two-circuit 115 kV transmission, 3 miles of new single-circuit 115 kV transmission, and 2.5 miles of reconductored single-circuit 115 kV transmission, together with associated substation improvements; (2) a new 10.5-mile single-circuit 115 kV transmission line traversing the southwest portion of the Greater Boston Area, parallel to an existing line, along a partial underground-overhead route from Walpole to Needham, together with associated substation improvements; and (3) 6 miles of reconductored two-circuit underground 345 kV transmission traversing the northern portion of the Greater Boston Area from Woburn to Mystic Station, together with added heat exchanger equipment at Mystic and Saugus Substations (id. at 3-12 to 3-17, 3-23 to 3-24, 3-29 to 3-30). While designed to meet the identified need, the Company asserted that the multiple projects would require a series of siting applications and approvals, and that given the lead times for such filings it was doubtful the Company could complete the siting process and construct all of the needed projects by 2006, or even 2008 (id. at 3-16 to 3-17). The Company estimated a cost of $192 million for

the bundled improvements alternative (id. at 3-29).

e. New Generation Alternative

The Company stated that the transmission system in Downtown Boston has been configured around generation provided in the past by New Boston Unit 1, and stated that new generation consistent with this system has the potential to alleviate reliability concerns (id. at 3-10). However, citing its need analysis showing contingency transmission overloads by 2006 in two distinct areas – Downtown Boston and the Hyde Park/Baker Street area – the Company asserted that new generation would need to be installed in both of these areas to meet the identified need (id.). The Company stated that new generation takes approximately five years to permit and construct; given this lead time, and the need to add new generation facilities in two locations, it determined that new generation was not a viable alternative to meet the identified need in 2006 (id.).

f. Demand-side Management Alternative

To identify the demand-side management ("DSM") alternative, the Company considered the ability of "maximum potential" implementation of energy efficiency programs and demand response programs in the Boston area to meet the identified need (Exh. BECO-1, at 3-5 to 3-7). The Company indicated that the identified need for added capacity amounts to 800 MW by 2006, and that of this amount 478 MW is to meet needs centered in the Hyde Park and Baker Street area and 327 MW is to meet needs centered in downtown Boston (id. at 3-5; Tr. 2, at 194-195). Addressing energy efficiency measures first, the Company indicated the Massachusetts Division of Energy Resources ("MDOER") has estimated that the maximum potential cost-effective reduction in energy use in Massachusetts is 4% per year; however, netting out the projected annual load growth of 1.5%, NSTAR estimated that the maximum rate of reduction in the Boston area net of load growth is 2.5% per year (Exh. BECO-1, at 3-6; Tr. 2, at 205-206). The Company noted that currently funded energy efficiency program levels capture about one-third the maximum cost-effective implementation rate of 4% (Exh. BECO-1, at 3-6).

Turning to demand response programs, NSTAR cited a 2003 assessment it conducted

concluding that there is a demand response potential of approximately 200 MW in its service territory (id. at 3-7). The Company noted that reductions of 45 MW in NSTAR's service territory and 80 MW in the Greater Boston Area already were enrolled in ISO-NE's ongoing Demand Response Program as of October 2003 (id.). Taking together the maximum potential levels of implementation for energy efficiency programs and demand response programs, the Company concluded that it would take 7-8 years, or until 2011 or 2012, to meet the identified need (Exh. EFSB-PA-3). Therefore, the Company determined that it would not be feasible to rely on DSM to meet the identified need (Exh. BECO-1, at 3-6, 3-8).

The City of Boston argued that a balanced approach to system planning that includes a sustained and aggressive program of energy and load reduction through DSM is required to address both environmental and reliability concerns (Boston Brief at 4).

g. Distributed Generation Alternative

The Company indicated that the identified need theoretically could be met by the addition of distributed generation ("DG") capacity in the Boston area, but stated that hundreds of DG sites in a geographically confined area would be required for this purpose (id. at 3-9; Tr. 2, at 247-248). In support, the Company indicated that the need for added capacity amounts to 800 MW by 2006, and that with currently available technologies the largest DG units produce a maximum of 20 MW each (Exh. BECO-1, at 3-9). The Company noted that larger-sized units such as reciprocating engines and combustion turbines could be considered, reducing the number of units needed to produce the target capacity, but many units still would be required (id.). Addressing constraints for reliance on DG, the Company stated capacity requirements to supply the Boston area could not be satisfied by intermittent sources, such as solar and wind, and that for most other forms of DG, allowances for outage rates would be a factor in determining the required capacity for meeting the overall Boston-area need (Exh. BECO-1, at 3-9, 3-19). Further, the Company asserted that because DG capacity would need to be sited at specific locations to address identified Boston-area needs, siting and permitting constraints would be a potential difficulty for successfully implementing an appropriately configured DG alternative (id. at 3-19 to 3-20; Exh. EFSB-PA-5). Therefore, the Company determined that it would not be feasible to rely on DG to

meet the identified need (Exh. BECO-1, at 3-9, 3-20).

h. Analysis

The Company claimed that, with the exception of the 115 kV transmission alternative, all of the project approaches identified as alternatives to the proposed underground 345 kV project would fail to meet the identified need or be an impractical way to meet that need. The Siting Board agrees that, based on the likely lead time requirements for permitting and implementation, the new generation alternative and the overhead alternative would fail to meet the identified need. Based on requirements for new or expanded ROW in built-up and environmentally sensitive areas, with high land cost, the record reasonably establishes that the overhead alternative also would be an impractical approach based on both cost and environmental considerations.

The Siting Board further agrees with the Company that, in this case, the DSM alternative and the DG alternative do not provide reliable means of meeting the identified need. The Company's analysis establishes that maximum potential implementation of cost-effective DSM would provide net load reductions in the affected area falling well short of the target of 800 MW by 2006. The Company established that DG would pose substantial uncertainties for meeting that same 800 MW target by 2006, given that the approach would entail implementing multiple, relatively small DG projects, would require ensuring backup arrangements for the varied outage characteristics of those projects, would require ensuring a locational distribution of DG suitable to meet the wide array of system contingencies underlying the Company's Boston area need, and would require that the foregoing be accomplished for a set of prospective DG resources outside the Company's control.[21]

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[21] The Siting Board notes that, although the identified need in this case could not be met by DSM or DG either separately of in combination, it is important to acknowledge the benefits of incorporating DSM and DG into system planning. The Department has recognized the importance of DG as a resource option in the restructured electric industry. Investigation re: Distributed Generation, D.T.E. 02-38-B, at 40 (2004); Distributed Generation NOI, D.T.E. 02-38, at 1 (2002); Competitive Market Initiatives, D.T.E 01-54, at 11 (2001). Here, the record indicates that even with the construction of the three-

(continued...)

The Company has claimed that the bundled improvements alternative, like the overhead alternative and the new generation alternative, could not meet the identified need due to the lead time needed to permit and construct the many separate transmission projects that make up this approach. The Siting Board notes that, while the simultaneous permitting of the many elements of the bundled approach would be difficult, that difficulty should not preclude a further examination of a distinct alternative within NSTAR's control.

Accordingly, the Siting Board further reviews the proposed underground 345 kV project, the 115 kV transmission alternative and the bundled improvements alternative.

3. Reliability

The Company stated that, with the lower voltage alternative, the installation of a greater number of lines compared to the underground 345 kV project would lead to a higher level of exposure to contingency outages (Exh. EFSB-PA-6). At the same time, this presence of more lines would result in a smaller percentage of transmission capacity being unavailable under a given contingency, such as the loss of a single line (Exh. BECO-1, at 3-20).

With respect to the bundled improvements alternative, the Company asserted that the approach violates its "basic engineering construct" – to pursue transmission system upgrades and additions that address the greatest possible number of system requirements with a single project in order to minimize risks and disruptions associated with project construction (Exh. BECO-1, at 3-16). The Company further noted that, to construct two to four of the specific projects under this alternative, the Company would need to remove existing lines from service for extended periods of time, posing greater risk that overloads may occur during contingencies or that customers may lose service (id. at 3-17). Finally, the Company noted that the bundled improvements alternative would provide an increase in the Boston area import capability of only

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[21] (...continued)
circuit 345 kV transmission line, contingency overloads in the Greater Boston Area will recur in 2013. Given the long planning horizon between this Decision and 2013, it is conceivable that implementation of DSM programs combined with third-party efforts to develop DG could have an effect on the nature or timing of future transmission and distribution upgrades in the Greater Boston Area.

200 MW, compared to an increase of 800-1000 MW with the proposed 345 kV project (id.).

The record demonstrates that the proposed underground 345 kV project and the 115 kV transmission alternative would provide generally similar reliability. The lower voltage alternative has the potential to experience more contingency outages, but as an offsetting factor it would provide higher availability under certain such outages.

The record demonstrates that the bundled improvements alternative would provide sufficient capacity to meet identified needs related to thermal and voltage capabilities, and provide some increase in import capability. However, compared to the underground 345 kV project, the bundled improvements alternative has the disadvantages of requiring numerous regulatory filings that could complicate timely implementation, and requiring that some existing circuits be taken out of service during construction. In addition, although providing added import capability, the amount of increase under the bundled improvements alternative would be a quarter of that available with use of the underground 345 kV project.

Accordingly, the Siting Board finds that the 115 kV transmission alternative is comparable to the underground 345 kV project, and the underground 345 kV project is preferable to the bundled improvements alternative, with respect to reliability.

4. Environmental Impacts

The Company asserted that, compared to the underground 345 kV project, the 115 kV transmission alternative would require triple the miles of street excavation (Exh. BECO-1, at 3-23). The Company asserted that there is little difference in the short-term impacts of constructing 115 kV lines and 345 kV lines underground along streets, and concluded that there is no environmental reason to favor use of the 115 kV transmission alternative (id.).

Regarding the bundled improvements alternative, the Company first noted that the extent of new underground transmission construction required as part of the multiple projects included under that approach within the Greater Boston Area, and the associated environmental impact, would equal or exceed that of the new underground transmission construction required for the proposed underground 345 kV project (Exh. BECO-1, at 3-23 to 3-24). The Company then asserted that since the bundled improvements alternative would also include a new 10.5-mile

partial overhead-underground Walpole-Needham line and 8.5 miles of reconductoring of existing two-circuit lines, the overall project scale and associated environmental impact of the bundled improvements alternative would be greater than that of the proposed 345 kV project (id. at 3-24).

The record demonstrates that the 115 kV transmission alternative would entail substantially more lengthy in-street construction than the underground 345 kV project; additionally, this alternative would require siting lines along several routes, rather than one route, to each delivery point, and would require additional equipment at substations to accommodate additional circuits. Thus, while not addressing other possible differences such as the relative size or depth of underground transmission facilities, the record establishes that the overall scale of construction impact clearly would be greater with use of the 115 kV transmission alternative than the 345 kV underground project.

The Company has demonstrated that the scale of transmission construction impacts would be somewhat greater with the bundled improvements alternative as well, compared to the underground 345 kV project, although not to the same degree as with the 115 kV transmission alternative. The bundled improvements alternative also would entail more extensive installation of associated equipment at substations, since it would involve a greater number of transmission projects. As an offsetting consideration, there appears to be no need under the bundled improvements alternative to install a substation or similar facility at a new site, comparable to the new switching station facility required as part of most of the routing options for the underground 345 kV project. On balance, however, the incremental environmental impacts of a 10.5-mile partial overhead-underground transmission line, required as part of the bundled improvements alternative, outweigh the offsetting consideration of using a new switching station site under the 345 kV underground project.

Accordingly, the Siting Board finds that the underground 345 kV project is preferable to the 115 kV transmission alternative and the bundled improvements alternative with respect to environmental impacts.

5. Cost

The Company estimated that the total capital cost of the transmission project would be

$177 million[22] if the underground 345 kV project is used, $270 million if the 115 kV transmission alternative is used, and $192 million if the bundled improvements alternative is used (Exh. BECO-1, at 3-24 to 3-25, 3-28 to 3-30).

The record demonstrates that the capital cost of the underground 345 kV project would be $93 million less than that of the 115 kV transmission alternative and $15 million less than that of the bundled improvements alternative. In addition, because the bundled improvements alternative would provide a significantly smaller increase in import capability, some of the potential savings in generation costs that is anticipated with use of the underground 345 kV project would be foregone with use of the bundled improvements alternative (see Section III.C.5.b, below).

Accordingly, the Siting Board finds that the underground 345 kV project is preferable to the 115 kV transmission alternative and the bundled improvements alternative with respect to cost.

6. Conclusions: Weighing Need, Reliability, Environmental Impacts, and Cost

The Siting Board has found that the underground 345 kV project, the 115 kV transmission alternative and the bundled improvements alternative could meet the identified need for thermal and voltage capability. The Siting Board also has found that the 115 kV transmission alternative is comparable to the underground 345 kV project, and the underground 345 kV project is preferable to the bundled improvements alternative, with respect to reliability; and further found that the underground 345 kV project is preferable to the 115 kV transmission alternative and the bundled improvements alternative with respect to environmental impacts and cost. Accordingly, the Siting Board finds that the underground 345 kV project is preferable to both the 115 kV transmission alternative and the bundled improvements alternative with respect to providing a reliable energy supply for the Commonwealth, with a minimum impact on the

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[22] The Company's comparison of project approaches was based on initial cost estimates developed for the proposed underground 345 kV project. In Section III.C.5.a, below, the Siting Board reviews updated cost estimates for that approach, based on more detailed analysis of likely project cost.

environment at the lowest possible cost.

III. ANALYSIS OF THE PRIMARY, ALTERNATIVE AND HYBRID ROUTES

The Siting Board has a statutory mandate to implement the policies of G.L. c. 164, §§ 69J-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 and 69J. Further, G.L. c. 164, § 69J requires the Siting Board to review alternatives to planned projects, including "other site locations." In implementing this statutory mandate, the Siting Board requires a petitioner to demonstrate that it examined a reasonable range of practical siting alternatives, and that its proposed facilities are sited at locations that minimize costs and environmental impacts while ensuring supply reliability. CELCo Decision, 12 DOMSB 305, at 326; MMWEC Decision, 12 DOMSB 18, at 89; New England Power Company, 21 DOMSC 325, at 376 (1991).

A. Route Selection

1. Standard of Review

G.L. c. 164, § 69J provides that a petition to construct a proposed facility must include "a description of alternatives to [the applicant's] planned action" including "other site locations." G.L. c. 164, § 69J. In past reviews of alternative site locations identified by an applicant, the Siting Board has required the applicant to demonstrate that it examined a reasonable range of practical siting alternatives. See CELCo Decision, 12 DOMSB at 323; MMWEC Decision, 12 DOMSB at 119; 1998 NEPCo Decision, 7 DOMSB 333, at 374. In order to determine whether an applicant has considered a reasonable range of practical alternatives, the Siting Board has required the applicant to meet a two-pronged test. First, the applicant must establish that it developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner which ensures that it has not overlooked or eliminated any routes which, on balance, are clearly superior to the proposed route. CELCo Decision, 12 DOMSB at 323; MMWEC Decision, 12 DOMSB at 119; 1998 NEPCo Decision, 7 DOMSB 333, at 374. 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 at 323; MMWEC Decision, 12

DOMSB at 119; 1998 NEPCo Decision, 7 DOMSB 333, at 374.

2. Route Selection Process

NSTAR stated that it conducted a systematic route selection study to select two potential transmission line routes that: (1) balanced impacts on the human and natural environment and cost; (2) provided a reliable technical solution to the identified needs; and (3) could be permitted, constructed, and placed into service by the summer of 2006 (Exh. BECO-1, at 4-1). In addition, after the route selection study was completed, NSTAR worked with affected communities to refine its primary and alternative routes. The route selection study and these consultations, which together make up the route selection process for this project, are discussed below.

a. Southern Terminus to Everett/Andrew Square

NSTAR began its route selection study by identifying a "study area" within which all potential routes would be located (Exh. BECO-1, at 4-2). The Company stated that the transmission project was designed to improve the reliability of the regional power grid by moving bulk power from the existing 345 kV transmission system into both NSTAR's K Street Substation in South Boston, and the Hyde Park/West Roxbury area; consequently, the project would have termination points at the K Street Substation and at either the Hyde Park or West Roxbury Substations (id. at 4-2 to 4-3). The Company also stated that, while existing 345 kV lines serve the Greater Boston Area from the north via Tewksbury, there are no 345 kV lines serving Boston from the 345 kV system to the south of the city (id. at 4-3). The Company therefore concluded that the proposed 345 kV transmission project should originate from the existing 345 kV transmission system between NSTAR's existing Holbrook and West Walpole Substations (id.). Given these points of origination and termination, the Company identified an approximately 235 square mile study area bounded on the south by the existing 345 kV line between Holbrook and Walpole, on the west by an existing 115 kV transmission line running from Walpole to Westwood, and on the north by a line extending roughly along Route 9 to the K Street Substation (id. at 4-4).

NSTAR stated that it next identified an "initial universe" of approximately 30 potential

routes and route variations within the study area (id.). The Company began by identifying potential switching station sites along the existing 345 kV line between the West Walpole and Holbrook Substations, seeking sites located at or near the intersection of the 345 kV line and other transmission rights-of-way, rail lines, highways, or streets (Exh. EFSB-SS-38, at 1). The Company stated that an ideal switching station site would be immediately adjacent to the existing 345 kV right-of-way; at least six acres; relatively level; without significant mapped wetlands or streams; vacant or currently in use for commercial or industrial purposes; zoned industrial; located in an area of compatible land use; and well-buffered from residential areas (id. at 2; Tr. 4, at 392). The Company also considered the existing Holbrook and West Walpole Substations as potential starting points for the transmission line (Exh. BECO-1, at 4-2). From the potential switching station sites, the Company developed potential routes north to Boston, using the following route selection guidelines:

* Select direct, rather than more circuitous routes;
* Use existing rights-of-way and easements where possible;
* Avoid crossing cemeteries, war memorials, and similar lands;
* Where possible, avoid crossing public land dedicated to wildlife conservation, public recreation, or other Article 97 uses;[23]
* Where possible, avoid significant residential and densely developed mixed-use areas;
* Avoid roads or streets known to have a high density of underground utilities;
* Where possible, avoid crossing mapped wetlands and disrupting significant water resources;
* Where possible, avoid crossing mapped rare or endangered species habitats (id. at 4-4 to 4-5).

NSTAR grouped its initial universe of routes into ten basic route options, including eight underground routes, a partial submarine route, and a partial overhead route (id. at 4-5). The Company reviewed these ten routes to select a smaller number for detailed study and evaluation

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[23] Lands acquired by the Commonwealth and protected under Article 97 of the Commonwealth's constitution may not be used for other purposes except by two-thirds vote of both houses of the state legislature. MA Const. art. 97.

(id. at 4-9). At this stage of its process, NSTAR consulted with right-of-way owners, including the Massachusetts Highway Department ("MHD"), Transit Realty/MBTA, and the Algonquin Gas Transmission Company ("Algonquin"), and with officials from Stoughton, Canton, Milton, Randolph, Quincy, and Boston (id.; Exh. EFSB-SS-3). The Company stated that the MHD strongly discouraged the use of Routes I-95 and 24, and indicated that it preferred the primary route, Route 138 to Route 28, in part because portions of Route 28 had recently been reconstructed (Exh. BECO-1, at 4-9). The Company learned that, in order to avoid interference with rail operations, Transit Realty/MBTA would permit NSTAR to construct along railroad ROWs between 1:00 a.m. and 4:00 a.m. only (id. at 4-9 to 4-10). Algonquin informed NSTAR that the terms of its pipeline easements did not permit the collocation of electric transmission lines within the ROW; based on this information, and the relatively narrow width of the pipeline ROW, NSTAR concluded that construction of the transmission line along an Algonquin ROW would require the negotiation of new or widened easements with many landowners, which would considerably extend the project timeline (id. at 4-10). Based on this information, NSTAR eliminated: (1) a route following Interstate 95 through Sharon, Norwood and Canton; (2) a route following the Red Line right-of-way through Braintree, Quincy, North Quincy, and Dorchester; (3) a route following the Amtrak Main Line through Canton, Dedham, Hyde Park, Roslindale, and Jamaica Plain; and (4) variations to the Route 28 alternative involving the use of Route 24 and the Algonquin ROW (id.). The Company also eliminated: (1) a partial submarine route running underground from the Holbrook Substation to the Weymouth Fore River, then for 11.5 miles in the Fore River, Quincy Bay, Boston Harbor, and the Reserved Channel, due primarily to permitting complexity and high initial cost estimates; and (2) a route following Route 37 through Braintree, Quincy and Dorchester, because it was comparable in length to two other highway-based options, but had significant disadvantages, including a minimum six-mile single-circuit run to the Hyde Park Substation, use of the main southeast commuting corridor to Boston, and space limitations at the existing Holbrook Substation (id. at 4-10 to 4-11).

NSTAR next assessed the environmental attributes and construction costs of the five

remaining candidate routes.[24] These routes included:

(1) the Route 28 Alternative, which begins at a new 6.25 acre switchyard in Stoughton, runs along streets in Stoughton and Randolph to Route 28, continues in Route 28 through Randolph, Quincy and Milton, then runs in streets through parts of Milton and Dorchester to Everett Square;

(2) the Route 138 Alternative, which begins at a new switchyard in Stoughton, runs along Route 138 in Canton and Milton, then along Blue Hill Avenue in Milton and Boston to Mattapan Square, then along Blue Hill Avenue and Columbia Road to Everett Square;

(3) the Route 1 Alternative, which begins at a new switchyard off Route 1 in Sharon, runs along Route 1 through Sharon, Walpole, Norwood, Westwood and Dedham, then along Washington Street through West Roxbury, Roslindale, Jamaica Plain and Roxbury, then in streets to Andrew Square;

(4) the Route 1A Alternative, which begins at NSTAR's existing West Walpole Substation, then runs along Route 1A through Walpole, Norwood, Westwood and Dedham, then along Route 109 into Boston, then in streets to Andrew Square; and

(5) the Partial Overhead Alternative, which begins at NSTAR's existing West Walpole Substation, then follows an existing transmission corridor above-ground for 9.5 miles through Walpole, Medfield, Norwood, Dover, and Westwood, then proceeds underground in streets to Andrew Square (id. at 4-11 to 4-15).

NSTAR evaluated the potential environmental impacts of the five candidate routes using sixteen environmental criteria divided into two categories: human environment and natural environment (id. at 4-16). The human environment criteria included residential land use, commercial/industrial land use, sensitive land uses, historic resources, traffic volume, traffic congestion potential, public transportation facilities, and visual impacts (id. at 4-16 to 4-17). The

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[24] The Company noted that each of these route options reaches either Everett Square or Andrew Square in Boston, and then proceeds across South Boston to the K Street Substation (Exh. BECO-1, at 4-11). The Company therefore compared the five candidate routes from the originating switchyard to Everett/Andrew Square, and separately evaluated potential routes across South Boston (id.). The Company's development of the Everett/Andrew Square to K Street route is described in Section III.A.2.c, below.

natural environment criteria included wetlands, protected habitat, surface waters, stream crossings, drinking water supply, Areas of Critical Environmental Concern ("ACEC"), potential subsurface contamination, and tree clearing/disturbance (id. at 4-17). The Company divided each of the potential routes into either three or four segments of roughly comparable land use[25], and rated each of the segments on each of the environmental criteria using a scale of 1 to 3, where 1 represented the lowest potential impact, and 3 represented the highest potential impact (id. at 4-17, 4-22).[26] The Company then "length-weighted" the score for each route segment by multiplying the score by the length of the route segment in miles (id. at 4-22).[27] The total route scores were the sums of the length-weighted segment scores (id.). The resulting scores are shown in Table 2, below.

The Company stated that it incorporated environmental impacts at the originating switching station site into its analysis of the first segment of each route alternative (Tr. 4, at 450,

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[25] The Route 28 and Route 138 Alternatives each were divided into four segments, including one single-circuit segment running from Mattapan Square to the Hyde Park Substation (Exh. BECO-1, at Tables 4-2 and 4-3). The Route 1, Route 1A, and Partial Overhead Alternatives each were divided into three segments, including one single-circuit segment running from Mattapan Square to the Hyde Park Substation (id. at Tables 4-4, 4-5 and 4-6). The Company argued that the segmentation was necessary because it could not assign meaningful scores on criteria such as residential land use or commercial/industrial land use for the routes as a whole, since each route ran through both suburban and urban areas (Tr. 4, at 444-445).

[26] The Company stated that the team developing the rankings consulted three principle resources: a set of large-scale aerial photographs with geographic information system overlays, notes from on-ground observations of the routes, and a compilation of quantitative data such as traffic counts, linear footage of wetlands crossed, and information on historic districts (Tr. 4, at 432-433).

[27] The Company argued that length-weighting was needed to capture the distance and duration over which human and environmental impacts would be experienced (Company Brief at 51). The Company asserted that the length-weighting helped to compensate for the fact that some routes were divided into three segments, while others were divided into four segments (Tr. 4, at 488-489). The Company argued that length weighting was appropriate for the most important criteria being evaluated (id. at 502). It stated that, when evaluating other types of criteria, the team considered density per mile, so that a five-mile segment with three or four stream crossings would receive the same score as a ten-mile segment with ten stream crossings (id. at 501-502).

457-458). The Company indicated that certain types of switching station impacts (e.g., visual, wetlands and habitat impacts) were picked up explicitly by the relevant criteria (id. at 449). The Company also argued that its standards for selecting potential switching station sites, combined with appropriate facility design, would ensure that any impacts from switching station operation would be confined to the site and its very immediate surroundings (id. at 450-454).[28] The Company therefore concluded that a separate analysis of switching station impacts was not a necessary part of the route study, and that it was appropriate to focus the study primarily on the effects of transmission line construction (id. at 455, 465).[29]

To evaluate the potential construction costs for the five candidate routes, NSTAR engineers developed conceptual level cost estimates for each route using unit pricing for standard pipe-type cable installation in streets and roads (id. at 4-23).[30] The Company indicated that costs common to all five routes (including construction of new switching facilities at the starting point of each route, new facilities at either Hyde Park or West Roxbury, and new facilities at the K Street Substation) were not included in the cost comparison (id.). The conceptual cost estimates also are included in Table 2, below.

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[28] The Company noted that all four switching station sites under consideration at that time were zoned industrial, and that three of the four sites were proximate to residential areas (Exh. EFSB-SS-38, at 4).

[29] To test the sensitivity of the environmental scores to differing value judgements about the importance of certain criteria, the Company conducted two sensitivity analyses (Exh. BECO-1, at 4-26). In the first analysis, it assigned a double weight to three criteria: residential land use, traffic volume, and traffic congestion (id.). In the second analysis, it assigned a double weight to all of the human environment criteria (id. at 4-27). The rank ordering of the route scores did not change in either analysis (id. at 4-26 to 4-27).

[30] The Company used unit costs of $7,130,00 per mile for those portions of the underground route where three electrical circuits would be installed; $5,280,000 per mile for two circuits; and $3,300,000 for a single circuit (Exh. BECO-1, at 4-23). It used a unit cost of $2,700,000 per mile for the overhead portions of the Partial Overhead Alternative (id.). The resulting costs were adjusted to reflect incremental land acquisition costs for the switchyards (id. at Table 4-14).

Table 2: Environmental and Cost Scoring of Candidate Routes

Route Alternative	Length (miles)	Environmental Score	Conceptual Cost (millions)
Route 138	15.57	352	$108.9
Route 28	17.02	377	$110.3
Route 1	19.82	514	$128.7
Route 1A	19.95	546	$133.9
Partial Overhead	24.24	690	$137.2

Sources: Exh. BECO-1, Tables 4-2 to 4-6, 4-14, 4-21, 4-28.

The Company noted that two of the five candidate routes – the Route 28 Alternative and the Route 138 Alternative – had considerably lower (better) environmental scores than the other three routes, as well as considerably lower conceptual costs (Exh. BECO-1, at 4-24 to 4-26). The Company therefore selected these two routes as the primary and alternative routes presented in the initial petition (id. at 4-26). The Company stated that it also considered whether there were any differences with respect to the reliability of the five candidate routes (id. at 4-28). It concluded that the Route 28 and Route 138 Alternatives might have a small reliability advantage over the Route 1 and 1A Alternatives, due simply to their shorter length (id.). The Company stated that the partial Overhead route would be marginally less reliable than the underground routes, both because it involved some above-ground line, and because it required a second transition facility; however, the Company noted that this minor difference in reliability was less important that the Partial Overhead route's higher costs and environmental impacts (Tr. 4, at 486).

The Company stated that, while its route selection study was sufficient to establish the two best routes, further environmental analysis was done to determine which of the two route alternatives should be the primary route (id. at 504). These more detailed analyses are discussed in Section III.C, below.

NSTAR indicated that, after filing its petition, it had a number of meetings with City of Boston officials regarding routing issues. These discussions resulted in certain amendments to

the Petition.[31] In particular, officials expressed concern that the disruption caused by construction along Blue Hill Avenue could harm financially struggling businesses; the City suggested that by using American Legion Highway instead, the Company could minimize the disruption and avoid existing underground utilities in Blue Hill Avenue (id. at 674-675). Therefore, on March 24, 2004, the Company filed a supplement to the Siting Board Petition identifying a variation to the primary route that would avoid the 2.5 mile stretch of Blue Hill Avenue between the Boston city line and its intersection with Columbia Road (Exh. BECO-1, at E-1). Instead of using this portion of Blue Hill Avenue, the Company proposed to run all three circuits of the proposed transmission line west along Cummins Highway to American Legion Highway (id.). From this point, a single circuit would run south on American Legion Highway to the Hyde Park Substation, as originally proposed; the remaining two circuits would continue northeasterly along American Legion Highway to its intersection with Blue Hill Avenue, then return to the primary route as originally filed (id.). The Company stated that the cost of this route variation would be higher than the cost of constructing directly up Blue Hill Avenue from Mattapan Square, primarily because it requires the construction of an additional 7400 feet of circuit length (id. at E-11). However, the Company indicated that, given American Legion Highway's moderate level of traffic and the nature of adjoining land uses (primarily parkland, cemeteries, and municipal land), construction along American Legion Highway is likely to be less disruptive than construction along the more heavily traveled and populated Blue Hill Avenue (id. at E-4). Overall, the Company concluded that the primary route up to Everett Square, using the American Legion Highway alternative, was best able to provide a reliable supply of energy at the least cost, while minimizing environmental impacts (Company Brief at 76).

b. Everett/Andrew Square to K Street Substation

NSTAR stated that it used the methods described in Section III.A.2.a, above, to develop

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[31] The first set of amendments pertains to the primary route between its southern terminus and Everett/Andrew Square, and is discussed here. The second set pertains to the route between Everett/Andrew Square and the K Street Substation, and is discussed in Section III.A.2.b, below.

environmental scores and circuit cost estimates for three possible routes through South Boston: (1) Alternative 1, which runs along Boston Street north to Andrew Square, then along Dorchester Street, East 4th Street, I Street, East 3rd Street and K Street to the K Street Substation; (2) Alternative 2, which runs along Boston Street north to Andrew Square, then along Preeble Street, Columbia Road, I Street, East 3rd Street and K Street to the substation; and (3) Alternative 3, which runs east from Everett Square along Cottage Street, Crescent Avenue, Day Boulevard, I Street, East 3rd Street and K Street to the substation (Exh. BECO-1, at 4-16, 4-22, 4-23). The environmental scores and costs are shown in Table 3, below. Based on these scores and costs, the Company selected Alternative 1 as its primary route through South Boston to K Street. The Company noticed Alternatives 2 and 3 as alternative routes through South Boston, and additionally noticed sections of Columbia Road, Dorchester Street, and Old Colony Road as workarounds in South Boston (id. at Fig. B).

Table 3: Environmental and Cost Scoring of Boston Routes

Boston Route	Length (miles)	Environmental Score	Conceptual Cost (millions)
Alternative 1	2.03	51	$10.760
Alternative 2	2.24	54	$11.870
Alternative 3	2.36	57	$12.510

Source: Exh. BECO-1, Tables 4-7, 4-13.

As noted previously, NSTAR had discussions with the City of Boston over routing issues after filing its Petition, and, on March 24, 2004, it filed a supplement to the Siting Board Petition identifying two additional route segments that could be used as part of the routing through South Boston: one along Columbia Road between Dorchester Avenue and Kosciuszko Circle, and another within Moakley Park parallel to Day Boulevard (Exh. BECO-1, at E-2 to E-3). These two route segments, combined with already-noticed route segments, created a fourth possible route through South Boston: from Everett Square along Columbia Road to Kosciuszko Circle, then north within Moakley Park paralleling Day Boulevard, then along I Street, East 3rd Street and K Street to the substation (id.). The Company indicated that use of the Moakley Park

variation would allow it to follow Day Boulevard while avoiding traffic disruptions associated with in-street work, and that if this route segment were used, construction would take place in the late fall or winter months (id. at E-3, E-4).

c. Other Potential Routes

During the proceeding, Siting Board staff and the parties examined two routing options that combined the use of the alternative route's switching station site with elements of the primary route. At staff's request, the Company analyzed a "hybrid route", which combines the southern portion of the alternative route and its single-circuit component (from the SRA switching station to Mattapan Square in Boston) with the northern portion of the primary route (from Mattapan Square to the Hyde Park and K Street Substations). Specifically, the hybrid route would begin at the SRA switching station site, run in Stoughton and Randolph streets to Route 28, then proceed along Route 28/Randolph Road/Randolph Street to Reedsdale Street, Brook Street, and Blue Hill Parkway, then follow Blue Hill Parkway to the Neponset River crossing in Mattapan Square (Exh. RR-EFSB-20, at 1). From this point, the hybrid and primary routes would be the same (id.). The Company indicated that the southern portion of the primary route is 9.1 miles long, while the southern portion of the hybrid route is 9.76 miles long (id.). The Company scored the southern portions of the primary and hybrid routes as described in Section III.A.2.a, above, using information available at the time of the evidentiary hearings; the southern portion of the primary route received a raw score of 43 and a length-weighted score of 196, while the hybrid route received a raw score of 47 and a length-weighted score of 230 (Exhs. RR-EFSB-20(a); Att.; RR-EFSB-20(b) Att.). The Company asserted that the key differences between the primary and hybrid routes included: fewer residences along the southern portion of the primary route; fewer sensitive land uses along the primary route; greater potential for nighttime construction along the primary route; and support for the primary route from the Town of Canton Selectmen, the Town of Milton Selectmen, and the Canton Association of Industries (Exh. EFSB-RR-20, at 3). The Company also stated that it preferred to construct on a major road, such as Route 138, rather than on the residential streets that make up a significant portion of the southern part of the hybrid route (Tr. 5, at 583-584). The Company indicated that the

hybrid route would cost approximately $6.0 million more to construct than the primary route; this difference would be partially offset by the lower acquisition cost for the SRA switching station site, resulting in a net additional cost of $2.4 million for the hybrid route (Exh. RR-EFSB-16, at 1).

In addition, the Company analyzed the "Monroe Route", which would begin at the SRA switching station site in Stoughton and run along Technology Center Drive, Page Street, York Street and Randolph Streets, ultimately joining the primary route at the intersection of Randolph Street and Route 138 (Exh. EFSB-SS-25). The Company indicated the Monroe Route would be approximately 4.3 miles long, while the corresponding segment of the primary route is approximately 2.9 miles long, and that use of the Monroe route would add approximately $6,860,000 to the cost of the transmission project (id.; Exh. EFSB-SS-27, at 1-2). The Company also noted that the Monroe Route would travel on narrow roads through a residential area, and stated that, because of the area road layout and the width of the streets, people living on cul-de-sacs off the route might experience eight-to-ten mile detours during construction (Tr. 4, at 540-543).

d. Analysis

NSTAR has described a complex, multi-step route selection process designed to identify two potential transmission line routes (including substation sites and transmission corridors) that provide a reliable technical solution to the needs it has identified, balance environmental and human impacts and cost, and can be permitted, constructed, and placed into service by the summer of 2006. The criteria explicitly examined in the Company's formal environmental assessment address the environmental and human impacts of the construction and operation of the proposed transmission lines. These are types of criteria that the Siting Board previously has found to be appropriate for the siting of energy facilities. See NSTAR Decision, 13 DOMSB at 177; MMWEC Decision, 12 DOMSB at 125; 9 DOMSB at 43-44; New England Power Company, 4 DOMSB 109, at 167 (1995). In addition, at other stages of its route selection process, NSTAR has explicitly or implicitly considered criteria including project cost, reliability, proximity to a viable switching station site, ease of permitting, ease of construction (including

presence of underground utilities), impacts on local businesses, ability to mitigate construction impacts, and the preferences of right-of-way owners, affected state agencies, and municipal officials. These are also appropriate criteria to consider in selecting a route for a project that must provide "a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost."

In identifying potential routes into Boston, NSTAR initially cast a broad net, considering the major transportation and utility corridors that intersected the existing 345 kV line between the West Walpole and Holbrook Substations. The Company also considered a partial submarine route that approached the K Street Substation via Boston Harbor. This methodical approach, focused on existing corridors, ensured that the Company did not overlook any clearly superior route into Boston. The Company narrowed its initial universe of potential routes down to five candidate routes based in large part on proximity to viable switching station sites and on input from the right-of-way owners (including MHD, Algonquin, and the MBTA) regarding the desirability and ease of construction along potential routes. The partial submarine route was eliminated due to permitting complexities and high projected costs, and a route along Route 37 was eliminated because it appeared similar to two other highway-based options, but had significant disadvantages which those routes did not have. The record indicates that the Company did not eliminate any clearly superior routes in narrowing its initial universe of routes down to the five candidate routes into Boston.

NSTAR next developed environmental rankings and cost estimates for the five candidate routes, and qualitatively assessed any reliability differences among the routes. Based on these analyses, the Company divided the five candidate routes into three clusters: the Route 28 and Route 138 alternatives, which had relatively low costs and environmental impact scores; the Route 1 and Route 1A alternatives, which had somewhat higher costs and environmental impact scores; and the partial overhead alternative, which had the highest costs and environmental impact scores, and marginally lower reliability than the underground lines. The Company stated that it considered the cost estimates and environmental scores for the Route 138 and Route 28 alternatives to be indistinguishable at this level of analysis; it therefore carried both alternatives forward, one as the primary route and one as the alternative route.

During the proceeding, concerns were raised about two aspects of the Company's environmental assessment: the use of segmentation and length-weighting, and the level of consideration given to permanent impacts at the new switching station site. The Company has stated that it evaluated the routes in segments because it could not meaningfully rank the routes as a whole on most criteria, as the routes ran for considerable distances through diverse suburban and urban areas. The Siting Board agrees that it would be difficult to assign a single, meaningful score on a criterion such as residential land use to a 15 to 25 mile route that runs through both densely and sparsely developed residential and commercial areas. The decision to segment the routes was a thoughtful response to this problem. However, the division of the routes into a different number of segments of different lengths necessitated the use of length-weighting. Length-weighting is appropriate for certain of the criteria evaluated in the environmental assessment – for example, a five-mile stretch of right-of-way with a high potential for traffic congestion clearly has greater impacts than a similar three-mile stretch of right-of-way. However, many environmental criteria are best evaluated as a single number: total acres of disturbed wetlands, total number of streams crossed, total square footage of tree clearing or disturbance. Length-weighting the raw scores for these types of criteria could bias the environmental assessment in favor of the shorter routes. The Company stated that it attempted to compensate for this possibility by assigning scores based on density of impacts, so that a shorter segment with two or three stream crossings might get the same stream crossing score as a longer segment with five or six stream crossings. To the extent that the Company was able to accomplish this, the potential for bias in favor of the shorter routes might be reduced, but not eliminated. Given the potential for bias inherent in length-weighting, and additional analytical complexity that would be needed to fully overcome this bias, the Siting Board recommends that future applicants avoid this approach and seek a different means of comparing lengthy routes.

The record shows that the two shortest routes did indeed receive the lowest environmental scores, and that the longest route received by far the highest score. This is, on its face, a logical result – the construction of a longer route is likely to cause greater disruption than construction of a similar, shorter route. Moreover, the Partial Overhead route, which received the worst environmental score, also is the only route with a potential for extensive permanent

visual impacts resulting from the construction of a long stretch of overhead transmission line. There is no indication in the record that the Route 1, Route 1A, or Partial Overhead alternatives have significant environmental advantages that went unrecognized in the route selection process. The Siting Board therefore concludes that, while the use of length-weighting likely biased the environmental assessment toward shorter routes, it did not lead the Company to eliminate a clearly superior transmission line route.

Questions were also raised during the proceeding as to whether the Company should have separately evaluated environmental impacts at each of the substations and switching stations associated with the candidate routes. The Company has argued that impacts at the existing K Street, Hyde Park, and West Roxbury Substations are identical for all routes, and that each of the four potential switching station sites (one existing, three new) is sufficiently large and well-buffered to ensure that offsite impacts would be minimal. The Company also has argued that the visual, wetlands, and tree-clearing impacts associated with construction at each of the switching station sites were explicitly incorporated in the ranking of the first segment of each route alternative. Finally, the Company has noted that three of the four switching station sites associated with the five candidate routes had proximate residential areas.

The Siting Board is not persuaded by the Company's a priori assumption that the offsite impacts of the switching station would be minimal at all locations. This is a question that receives further analysis in Section III.C, below. However, the record does not suggest that the Company's decision to evaluate the switching station site as part of the first route segment led it to eliminate a clearly superior transmission line route. The record indicates that all of the switching station sites under consideration are industrially zoned, and that the switching station sites associated with the Route 1, Route 1A, and Partial Overhead alternatives are located in proximity to residential areas. Thus, in eliminating the Route 1, Route 1A, and Partial Overhead alternatives, the Company did not eliminate a clearly superior switching station site. The Siting Board concludes that the Company's decision not to separately rank the switching stations sites did not lead the Company to eliminate a clearly superior transmission line route.

With respect to the portions of the primary and alternative routes within Boston, the Siting Board notes that the potential paths through Boston to the Hyde Park and K Street

Substations are very numerous. Here, NSTAR has worked closely with the City, and after consultation has selected a route that, while somewhat longer and costlier than that originally proposed, minimizes the use of the heavily trafficked Blue Hill Avenue in favor of a wider, less developed road with fewer existing utilities. Similarly, after consultation with the City, NSTAR has offered a route through South Boston that minimizes work in congested streets.

Overall, the Siting Board finds that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner which ensures that it has not overlooked or eliminated any routes which, on balance, are clearly superior to the proposed route. In making this finding, the Siting Board notes that the Company, throughout its route selection process, placed considerable emphasis on selecting a route that could be permitted, constructed, and placed in service by June 2006. The Company does not appear to have sacrificed a clearly superior routing option to reach this goal. However, it is apparent from the record that the Company did not allow sufficient time to complete its route selection process before filing with the Siting Board, as is evidenced by the continuing negotiations with the City of Boston over routing options during the proceeding. In fact, the Company had not identified major elements of its final primary route through Boston at the time it filed its Siting Board petition. As a consequence, this proceeding was renoticed several months after the Company's initial filing. The Siting Board urges NSTAR and other utilities to identify their approaching infrastructure needs and begin developing routing options well in advance of the date of need, so that similar situations can be avoided in the future.

3. Geographic Diversity

NSTAR began its site selection process by identifying an initial universe of approximately 30 potential routes and route variations within a 235 square mile study area encompassing all or part of 21 municipalities (Exh. BECO-1, at Fig. 4-1). This initial universe of route options was grouped into ten basic routes, ranging from a partial overhead route located in Walpole, Medfield, Dover, Needham, Dedham and Boston in the west, to a partial underwater route located in Braintree, Weymouth, the Fore River, Quincy Bay, Boston Harbor, and the Reserved Channel in the east (id. at Fig. 4-2). Potential southern switching station locations were

considered in Walpole, Sharon, Canton, Stoughton, Randolph, and Holbrook (id.).

From these ten basic routes, the Company has selected two practical routes which are geographically distinct from their beginning until they meet in Everett Square in Boston. The Company also has identified four distinct routes from Everett Square to the K Street Substation; while there is some overlap between the four routes, the only route segment common to all four is a short stretch along I Street, East 3rd Street and K Street leading to the K Street Substation. Consequently, the Siting Board finds that NSTAR has identified a range of practical transmission line routes with a considerable measure of geographic diversity.

4. Conclusions on Site Selection

The Siting Board has found that (1) NSTAR developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes that are clearly superior to the proposed route; and (2) NSTAR has identified a range of practical transmission line routes with a considerable measure of geographic diversity. Consequently, the Siting Board finds that NSTAR examined a reasonable range of practical siting alternatives.

In reaching this finding, the Siting Board notes that the Company has brought forward as its alternative route the Route 28 alternative, which received an environmental ranking very close to that of the primary route, and which has similar cost and reliability attributes. In addition, the Siting Board notes that elements of the Company's primary and alternative routes can be combined to create a "hybrid route" that combines certain positive aspects of both routes. Therefore, in Section III.C, below, the Siting Board reviews the environmental impacts, costs, and reliability of the primary, alternative, and hybrid routes to determine which route best meets the Siting Board's mandate to provide for a reliable energy supply for the Commonwealth, with a minimum impact on the environment, at the lowest possible cost.

B. Description of the Primary, Alternative, and Hybrid Routes

1. Primary Route

The primary route begins at a new switching station to be constructed on a 14-acre,

industrially-zoned parcel located at the intersection of Route 138 and York Street in Stoughton (Exh. BECO-1, at 4-28, Fig. 4-15). From the switching station, the primary route proceeds north for approximately 4.5 miles on Route 138 into Canton (Exh. EFSB-G-1, at 2-4). The primary route then crosses Route 128 using the existing bridge, and continues on Route 138 through the western portion of the Blue Hills Reservation and through Milton (Exhs. BECO-1, at 1-2; EFSB-G-1, at 2-5). The primary route then crosses the Neponset River Bridge to Mattapan Square in Boston, and then travels west from Mattapan Square along Cummins Highway to its intersection with American Legion Highway (Exh. BECO-1, at E-1). From this point, a single circuit runs south for approximately 0.65 miles on American Legion Highway to terminate at the Hyde Park Substation, while the remaining two circuits continue northeasterly along American Legion Highway for approximately 2.11 miles to its intersection with Blue Hill Avenue (id.). The primary route then continues north on Blue Hill Avenue to Old Road and the intersection with Columbia Road; it then follows Columbia Road northeast through Everett Square to Kosicuszko Circle (id. at E-11). From Kosicuszko Circle, the primary route travels along Day Boulevard, I Street, East 3rd Street, and K Street to the K Street Substation (Exhs. EFSB-G-1, at 4-60; BECO-1, at E-2).

The Company identified a number of variations to the primary route. First, as discussed in Section III.A, above, the Company originally proposed to travel north through Mattapan Square to Columbia Road on Blue Hill Avenue, rather than on Cummins Highway and American Legion Highway (Exh. BECO-1, at 1-2).[32] In addition, north of American Legion Highway, the Company proposed a workaround that would use Glenway Street and Old Road to avoid the intersection of Blue Hill Avenue and Columbia Road (id. at 4-30 and Fig. 4-22). Near the Hyde Park Substation, the Company proposed a workaround that would avoid a hairpin intersection of Cummins Highway and American Legion Highway either by crossing an existing NSTAR distribution facility or by taking a short easement through a shopping center parcel (id. at 4-30

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[32] To avoid traffic and business impacts associated with the original routing through the Mattapan Square area, the Company also noticed "workarounds" using Cummins Highway and Woodhaven Road, and using River Street and Fremont Street (Exh. BECO-1, at 4-30 and Fig. 4-21).

and Fig. 4-23).

In South Boston, the Company initially proposed to travel from Everett Square to I Street along Boston Street and Dorchester Avenue, rather than along Columbia Road and Day Boulevard (Exh. BECO-1, at 1-2). In addition, the Company noticed segments of East Cottage Street, Crescent Avenue, Columbia Road, Dorchester Avenue, Day Boulevard, and Columbia Road as possible paths from Everett Square to the K Street Substation (id. at 4-26).

2. Alternative Route

The alternative route begins at a new switching station to be constructed on 6.25 acres of a former municipal landfill owned by the SRA, located off Route 24 and Technology Park Drive in Stoughton (Exh. BECO-1, at 4-28, Fig. 4-16). From the switching station, the alternative route travels north along Technology Center Drive and Kay Way in Stoughton, then along West Street and Lafayette Street to High Street in Randolph (id. at 1-3). The alternative route then proceeds north on High Street, east on Scanlon Drive, and north on Route 28 (id.). The alternative route passes immediately under the Route 128 bridges, then continues north on Route 28 through the Blue Hills Reservation in Quincy, and into Milton (id. at 1-3, 4-12). The alternative route continues on Route 28/Randolph Avenue and along Reedsdale Road until its intersection with Central Avenue and Brook Road (id. at 1-3). The length of the alternative route from the SRA switching station site to this intersection is 8.7 miles (id. at 1-10).

At the intersection of Reedsdale Road, Brook Road and Central Avenue, the alternative route splits into a single-circuit line and a double-circuit line. The single-circuit line travels northwest for approximately 3.2 miles along Brook Road, Blue Hill Parkway, Blue Hill Avenue, Cummins Highway, and American Legion Highway, to terminate at the Hyde Park Substation (Exh. BECO-1, at 1-3). The double-circuit line proceeds north on Central Avenue, crossing the Neponset River into Boston on the Central Avenue Bridge (id..) It turns east onto a short stretch of River Street, then proceeds generally north on Washington Street, Bowdoin Street, Hancock Street, Pleasant Street, and East Cottage Street to Everett Square (id.). From Everett Square, it follows the same path as the primary route to the K Street Substation (id.). The length of the

alternative route between the Reedsdale Road/Brook Road/Central Avenue intersection and the K Street Substation is approximately 7.2 miles (id. at 1-10).

3. Hybrid Route

At the request of Siting Board staff, the Company analyzed a hybrid route that combines the southern elements of the alternative route with the northern elements of the primary route ("hybrid route"). Specifically, the hybrid route would begin at the SRA Substation site and follow the path of the alternative route through Stoughton, Randolph and Milton to the Reedsdale Road/Brook Road/Central Avenue intersection. At this point, all three circuits would continue along Brook Road and Blue Hill Parkway, joining the primary route on Blue Hill Avenue just south of the Neponset River crossing. The hybrid route would then follow the path of the primary route within Boston.[33]

C. Comparison of the Primary, Alternative and Hybrid Routes

1. Standard of Review

In implementing its statutory mandate to ensure a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost, 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 site for the facility is superior to the noticed alternatives on the basis of balancing cost, environmental impact, and reliability of supply. CELCo Decision, 12 DOMSB 305, at 334; MMWEC Decision, 12 DOMSB 1, at 127; 1997 BECo Decision,

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[33] The Company also identified two other paths that could be used to connect the alternative route to the primary route south of Everett Square, to allow consideration of hybrid routing options: (1) from Central Avenue in Milton, following Standish Road to Hinkley Road to Brook Street to Blue Hill Avenue; and (2) from Washington Street in Boston, continuing north along that street to Columbia Road (Exh. BECO-1, at 4-30, Figs. 4-24, 4-25). While each of these paths could be used as a basis for a different hybrid route, the Siting Board considers in this decision only the hybrid route as described above.

6 DOMSB 208, at 287.

An assessment of all impacts of a proposed facility is necessary to determine whether an appropriate balance is achieved both among conflicting environmental concerns as well as among environmental impacts, cost, and reliability. A facility which achieves that appropriate balance thereby meets the Siting Board's statutory requirement to minimize environmental impacts at the lowest possible cost. CELCo Decision, 12 DOMSB 305, at 335; MMWEC Decision, 12 DOMSB 1, at 128; 1997 BECo Decision, 6 DOMSB 208, at 287.

The Siting Board recognizes that an evaluation of the environmental, cost and reliability trade-offs associated with a particular proposal must be clearly described and consistently applied from one case to the next. Therefore, in order to determine if a petitioner has achieved the proper balance among various environmental impacts and among environmental impacts, cost and reliability, the Siting Board must first determine if the petitioner has provided sufficient information regarding environmental impacts and potential mitigation measures to enable the Siting Board to make such a determination. The Siting Board then can determine whether environmental impacts would be minimized. Similarly, the Siting Board must find that the petitioner has provided sufficient cost and reliability information in order to determine if the appropriate balance among environmental impacts, cost, and reliability would be achieved. CELCo Decision, 12 DOMSB 305, at 336; MMWEC Decision, 12 DOMSB 1, at 128; Commonwealth Electric Company, 5 DOMSB 273, at 337 (1997) ("ComElec Decision").

Accordingly, in the sections below, the Siting Board examines the environmental impacts, reliability, and cost of the proposed facilities along NSTAR's primary, alternative and hybrid 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. Construction Impacts

In this section, the Siting Board reviews the temporary environmental impacts associated with the construction of the proposed transmission line, switching station and substations, including land use and water resource impacts, traffic impacts, noise impacts, and impacts associated with hazardous materials.

In addition to these four categories of construction impacts, the Company noted that transmission line construction could result in temporary ambient air quality impacts arising from fugitive dust and emissions from generators and heavy-duty vehicles (Exh. EFSB-G-1, at 5-8). NSTAR stated that it would employ the following measures to control fugitive dust and its impacts: (1) loading excavated materials directly into trucks, rather than stockpiling it; (2) using covered trucks; (3) providing daily street cleaning during active excavation; (4) monitoring construction practices to minimize unnecessary transfer and mechanical disturbance of loose materials; and (5) conducting periodic street and sidewalk cleaning to minimize dust accumulation (id.). NSTAR also stated that it would participate in the Massachusetts Diesel Retrofit Program ("MDRP") developed by MDEP, by requiring that backhoes and cranes be retrofitted (id.). The program consists of retrofitting diesel construction equipment with particulate filters and an oxidation catalyst (id.). In addition, contractors would be required to use low-sulfur diesel fuel in their off-road construction equipment and in the generators used during cable splicing (id. at 5-8 to 5-9).

NSTAR stated that it would use the same techniques to mitigate fugitive dust and equipment emissions at switching station and substation construction sites, except that soils would be stockpiled on-site, and the fugitive dust would be minimized through watering and temporary seeding of the stockpiled soils (Exhs. RR-EFSB-61; RR-EFSB-61(S)). In addition, street sweeping would be confined to the vicinity of the construction site entrance (Exhs. RR-EFSB-61; RR-EFSB-61(S)).

a. Land Use and Water Resources

In this section, the Siting Board considers the land use and water resource impacts associated with the construction of the proposed transmission project.

i. Primary Route

NSTAR stated that with, few exceptions, the proposed alignments for the primary route and the associated variations are within public highways, roads and streets (Exh. EFSB-L-8).[34] NSTAR asserted that since the transmission line would be located underground, and the disturbed areas along the route would be returned to pre-existing conditions, construction of the transmission line would not negatively affect or change the character or appearance of the land uses along the route (id.).

Traveling from the switching station, the primary route proceeds north on Route 138 into Canton, through approximately 2.5 miles of commercial and industrial development, followed by approximately 2 miles of light density residential areas and open space (Exh. EFSB-G-1, at 2-4). The primary route then crosses Route 128 and continues along Route 138, traveling through the western portion of the Blue Hills Reservation, and passing into Milton; at this point, the area surrounding Route 138 becomes residential, with the density of residential development increasing as the route travels north (id. at 2-5). The primary route crosses the Neponset River into Boston and then at Mattapan Square turns onto Cummins Highway; the first 0.3 miles of Cummins Highway is heavily developed with commercial and residential uses, but is less dense than the originally-proposed route along Blue Hill Avenue (Exh. EFSB-G-1, at 2-5 and 2-6, 4-59).[35] The primary route then splits at the approach to American Legion Highway, with a single

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[34] The Company indicated that it would be required to obtain easements for the following areas: (1) the crossing of a corner of the Boston Police VFW parking lot off American Legion Highway at Morton Street; and (2) the crossing of the corner of a shopping center parking lot at the intersection of Cummins Highway and American Legion Highway (Exh. EFSB-L-8). Further, the Company may require construction permits for: (1) a Department of Conservation and Recreation ("DCR") controlled parking lot along the west side of American Legion Highway south of the Morton Street bridge; and (2) a DCR-controlled grassed area north of Day Boulevard and Columbia Road, between Moakley Park and I Street (id.).

[35] The Company originally proposed that the primary route continue along Blue Hill Avenue (Exh. BECO-1, at 1-9). The Mattapan Square portion of Blue Hill Avenue is densely developed with commercial and residential properties, consisting of areas of street level store fronts with upper level residences, as well as areas that are either

(continued...)

circuit running south to the Hyde Park Substation, and the remaining two circuits traveling north on American Legion Highway (id.). American Legion Highway begins with a mix of residential and commercial development; however, most of the road passes through a mix of open space and municipal uses, finally approaching a small area of densely developed residential uses before rejoining Blue Hill Avenue (id. at 4-59). The primary route travels briefly along Blue Hill Avenue, passing Franklin Park, the Franklin Park Zoo, and an area of urban residential development, then passes through the predominantly commercial Columbia Road area, and arrives at Everett Square (id.).

From Everett Square, the primary route travels along Columbia Road to Kosicuszko Circle, along Day Boulevard, then north on I Street through a densely residential area of South Boston to the K Street Substation (Exhs. EFSB-G-1, at 4-60; BECO-1, at E-2). The Company stated that it preferred this routing alternative to the original routing along Boston Street/ Dorchester Street (Exh. EFSB-G-1, at 4-60; Company Brief at 79).[36] NSTAR explained that the advantage of using the Day Boulevard Alternative is that the route would pass under the Southeast Expressway, thereby avoiding a bridge crossing over the Southeast Expressway (Tr. 5, at 676). Boston asserted that, in addition to avoiding the bridge crossing, this route meets the concerns of the residents of South Boston (Boston Brief at 4).

There are 63 homes along the route from the Route 138 switching station site to

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[35] (...continued)
exclusively commercial or residential (Exh. EFSB-G-1, at 4-60). The Company explained that it undertook an examination of the American Legion Highway variation based on discussions with City of Boston officials, who noted that transmission line construction would have a severe impact on the Mattapan Square area's businesses (Tr. 5, at 674). The Company explained that the use of American Legion Highway would avoid work along 2.2 miles of Blue Hill Avenue between Mattapan Square and the intersection of American Legion Highway and Blue Hill Avenue (Exh. EFSB-G-1, at 2-1).

[36] The original routing along Boston Street/Dorchester Street travels from Everett Square to Boston Street, which is a densely developed residential area to Andrew Square, a predominantly commercial area, and then to Dorchester Avenue, a mix of commercial and residential uses (Exh. EFSB-G-1, at 4-60). The route then turns north onto I Street through to densely developed South Boston residential streets to the K Street Substation (id.).

Route 128, and 150 homes from Route 128 to Mattapan Square (Exh. RR-EFSB-33).

The Company indicated that it did not anticipate that tree clearing would be necessary during construction along the primary route (Exh. EFSB-L-1). In the event that tree branches are located in the work area, tree trimming will be conducted by an arborist, or if practical, the branches will be tied back or avoided in the course of construction (id.). The Company noted that while the transmission line may cross the median of American Legion Highway, the crossing will be situated to avoid any existing trees located in the median (Exh. EFSB-L-20).

The primary route is proximate to a number of designated habitat and critical environmental areas, including the Fowl Meadow and Ponkapoag Bog ACECs in Canton, Massachusetts Natural Heritage Priority Habitat in the Blue Hills Reservation, and Massachusetts Natural Heritage Priority and Estimated Habitat between mileposts 1 and 2 in Canton (Exhs. BECO-1, at Fig. 5-7; EFSB-G-1, at 4-16). NSTAR stated that it would restrict all construction activities through the Fowl Meadow and Ponkapoag Bog ACECs to the paved area of Route 138 (Exh. EFSB-G-1, at 9-13). According to the Massachusetts National Heritage Endangered Species Program ("NHESP"), only one state-protected species, the spotted turtle, is located within or in the vicinity of the primary route (Exhs. EFSB-L-12-d; RR-EFSB-29). According to the US Fish and Wildlife Service, there are no federally-listed or proposed, threatened or endangered species or critical habitat in the project area (Exh. EFSB-L-12-c). The Company stated that there would be no removal of any rare species or disturbance to its habitat since the proposed transmission line route is located entirely within paved road surfaces (Exh. EFSB-L-12). NSTAR noted that it would review construction plans with Mass Audubon, the manager of the Blue Hills Trailside Museum, since the primary route passes the museum's parking areas (Exhs. EFSB-G-1, at 9-13).

NSTAR stated that construction of the proposed transmission lines would not result in any direct impacts to stream channels, as all stream channel crossings would go over or under existing culverts (Exh. EFSB-L-17). NSTAR noted that it has developed a detailed erosion and sedimentation control plan to confine sediments to the construction site, thereby preventing construction sediment from entering the streams (id.; Exh. BECO-1, at 5-41)

The primary route will cross the Neponset River via a narrow trench in the sidewalk of

the Neponset River Bridge (Exh. EFSB-G-1, at 8-15). The Neponset River Bridge is a National Register-listed stone faced concrete arch bridge constructed in 1901 and widened in 1946 (id.; Exh. EFSB-L-24). The Company indicated that construction of the proposed transmission line should not affect the structural integrity of the bridge, as the work would be done in the sidewalk and not in the concrete arch (Exh. EFSB-G-1, at 8-15). The Company stated that the Neponset River will be protected from the impacts of construction by appropriate construction and sedimentation controls, and that excavation in the vicinity of the river will be halted on windy days when fugitive dust cannot be controlled (id. at 9-33). In addition, NSTAR pointed out that the Neponset River Bridge has a four foot granite wall along the sidewalk, which will prevent soil from falling directly into the river during excavation (id.).

The Company asserted that impacts to historic resources would be limited to temporary alteration and restoration of the roadways and bridges (Exh. EFSB-L-24). Based on Geographic Information System mapping, the primary route passes by seven Massachusetts Historic Commission ("MHC") listed historic sites, of which three are on the Everett Square to K Street portion, but does not pass any MHC historic districts (Exh. BECO-1, at 5-50). With regard to National Register listed properties and districts, the Company explained that in a few locations, the boundaries of historic districts include the roadway ROW, but the majority of the locations of the listed properties and districts abut the roadway or are set back from the road (Exh. EFSB-L-24).[37]

The Company stated that it will submit filings under the Massachusetts Wetlands Protection Act to conservation commissions in the municipalities along the route (Exhs. EFSB-L-13; EFSB-G-1, at 1-8). The Company noted that the five small drainage ponds on the switching station site are associated with the present active gravel pit, and as such are not considered ponds under the Wetlands Protection Act (Exh. BECO-1, at 5-25).

The Company noted that a portion of the transmission line route along Day Boulevard and the K Street Substation site are in formerly filled tidelands; however, the Company indicated

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[37] The National Register-listed properties that fall within the primary route ROW are the Blue Hills Reservation Multiple Resource Area and the Blue Hills Reservation District, and the Neponset River Bridge (Exh. EFSB-L-24).

the proposed project would cause no impact to flowed tidelands and no change in the existing non-water dependent use of the tidelands (Exh. EFSB-G-1, at 4-12). NSTAR will be required to obtain a Chapter 91 permit from MDEP with regard to the alterations to filled tidelands (id.; Tr. 13, at 1817). NSTAR submitted a draft Environmental Construction Management Plan ("ECMP") which details the provisions of the sediment and control activities to be followed throughout the construction of the transmission project (Exh. EFSB-L-17). The Company indicated that all construction work will be subject to the NSTAR ECMP and to any further requirements set forth in MDEP or conservation commission permits (Exh. EFSB-G-1, at 5-25).

ii. Alternative and Hybrid Routes

The Company asserted that the primary, alternative, and hybrid routes are similar in land use character and traverse commercial, residential, and densely developed urban areas to a similar extent (Exh. EFSB-G-11). NSTAR stated that with few exceptions, the proposed alignments for all of the routes and their associated variations are within public highways, roads and streets (Exh. EFSB-L-8). NSTAR asserted that since the transmission lines would be located underground, and the disturbed areas along the route would be returned to pre-existing conditions, none of the routes would negatively affect or change the character or appearance of the land use (id.). The Company indicated that it did not anticipate that tree clearing would be necessary during construction along the alternative or hybrid route (Exh. EFSB-L-1).

The alternative route begins at the SRA switching station site and travels north into Milton (Exh. BECO-1, at 1-10). The first mile of the route travels along Technology Drive, passing a mixture of commercial, retail, warehouse, and office uses (id. at 5-20). The alternative route then travels for three miles in Randolph through predominantly residential areas; it then passes to the east of the southern portion of the Blue Hills Reservation, and passes through commercial uses on Route 28 (id.). The alternative route crosses Route 128, travels for approximately one mile through the Blue Hills Reservation, and then passes into Milton; at this point, the area surrounding Route 28 becomes single-family residential, with the density of residential development increasing as the alternative route travels north to the intersection of Route 28 and Reedsdale Road (id. at 5-21). Along Reedsdale Road, the alternative route passes

Milton Hospital and the Milton Center Historic District; the three-circuit segment of the alternative route ends at the residential area of Reedsdale Road, Brook Road and Central Avenue (id. at 5-21; Fig. 5-5).

From this intersection, the two-circuit segment of the alternative route travels north on Central Avenue, through a primarily single-family residential area, and crosses the Neponset River into Boston, where the uses are transportation and commercial (Exh. BECO-1, at 5-21). Continuing along Central Avenue, the alternative route traverses a densely developed commercial district; the alternative route then turns onto River Street, which has a combination of single-family and multi-family residential and commercial uses (id.). The alternative route then follows Washington Street through a densely developed mix of commercial and residential uses, and passes through Codman Square, which is entirely commercial (id.). The remaining portion of the route to Everett Square is densely developed, with residential uses along Bowdoin Street and Hancock Street, commercial uses at Bowdoin and Hancock Streets, and residential uses along Pleasant and East Cottage Streets (id. at Fig. 5-4).

The single-circuit segment of the alternative route continues west on Brook Road, a residential area of Milton, crosses the Blue Hill Parkway, and joins Route 138, crossing the Neponset River into Boston (Exh. BECO-1, at 5-21). The single-circuit segment of the alternative route passes Milton High School (id. at Fig. 5-5).

There are 157 homes along the route between the SRA site and Route 128 (Exh. RR-EFSB-33).

The hybrid route starts at the SRA switching station site and travels along the alternative route until it joins the primary route in Mattapan Square. Under the hybrid route, the three circuits extend northward to Reedsdale Road at Central Avenue in Milton, then proceed in common with the one-circuit segment of the alternative route to Route 138 where they join the primary route (Exh. EFSB-G-11). Specifically, from Reedsdale Road, the hybrid route would travels northwesterly for 1.1 miles on Brook Road/Route 28 and Blue Hill Parkway to join Route 138 south of Mattapan Square (Exhs. EFSB-G-11; RR-EFSB-20).

The alternative and hybrid routes are proximate to a number of designated habitat and critical environmental areas, including Massachusetts Natural Heritage Priority Habitat in the

Blue Hills Reservation, and Massachusetts Natural Heritage Priority and Estimated Habitat approximately 1/4 mile north of the SRA site to milepost 1 (Exhs. BECO-1, at Fig 5-7; EFSB-G-1, at 4-16). According to NHESP, a number of state-protected species, including the spotted turtle, the marbled salamander and the eastern box turtle, are located within or in the vicinity of the alternative and hybrid routes (Exhs. EFSB-L-12-d; EFSB-RR-29). NHESP noted that the alternative and hybrid routes have far greater ecological significance than the primary route, since they pass more recorded rare species observations along the alternative route, more areas of state-listed sightings on both sides of the road, and sensitive habitat found on the portion of the route that runs through the Blue Hills (Exhs. EFSB-L-29; EFSB-RR-29). However, the Company stated that there would be no removal of any rare species or disturbance to their habitat, since the transmission lines would be located entirely within paved road surfaces (Exhs. EFSB-L-12; EFSB-L-29).

The two-circuit segment of the alternative route crosses the Neponset River via the Central Avenue Bridge, where construction of the proposed transmission lines would involve hanging the pipe from the bridge and around the concrete abutments for the bridge (Exh. EFSB-L-18). The Company explained that installation would be accomplished by using barges in the Neponset River, and that NSTAR would submit detailed construction procedures to the Army Corps of Engineers ("ACOE") for approval prior to construction (id.). NSTAR asserted that construction on the Central Avenue Bridge would have no direct effect on anadromous fish populations in the Neponset River (id.).

With regard to historic resources along the alternative and hybrid routes, the Company asserted that impacts would be limited to temporary alteration and restoration of the roadways and bridges (Exh. EFSB-L-24). Based on Geographic Information System mapping, the three- and two-circuit segments of the alternative route, south of Everett Square, pass by or through four MHC historic districts, but no specific historic sites; the single-circuit segment passes by no historic districts or sites (Exh. BECO-1, at 5-50, Fig. 5-5). The hybrid route includes the same four MHC historic districts prior to Everett Square as the alternative route (Exh. EFSB-G-11, at 8). Like the primary route, the alternative and hybrid routes pass through three MHC historic sites on the Everett Square to K Street portion (id. at 5-51). The Company asserted that, based on

the currently available information, there would be no difference in the level of impact on historic resources among the primary, alternative and hybrid routes (id. at 5-50).

With respect to switching station construction impacts, the Company noted that there is a possible wetland resource, consisting of a small, isolated depression, on the east side of the SRA site near one of the existing transmission towers; however, there is little evidence of standing water in the depression (Exh. BECO-1, at 5-29). NSTAR stated that the proposed facilities and all construction would be limited to the buffer zone of this potential resource (id.; Exh. RR-EFSB-50).

iii. Analysis

The record indicates that the primary route would run through suburban and densely populated urban areas, and would pass through the Blue Hills Reservation and other open spaces, such as the Fowl Meadow and Ponkapoag Bog ACEC. Since the proposed transmission lines would be located under streets, there would be no permanent impacts on the use of recreational areas and other open space, species or their habitats, wetlands, or historic resources. In addition, at all stream channel crossings, the transmission lines would pass over or under the existing culverts. Further, the transmission lines would cross the Neponset River in an existing sidewalk, and construction and sedimentation controls would be implemented to avoid impacts to the river and culverted streams. Roadway construction may have temporary impacts to historic resources, although most of the historic sites abut the road or are set back from the road.

In Boston, the proposed use of the American Legion Highway variation in lieu of the originally proposed routing along Blue Hill Avenue would avoid construction impacts to most of the commercial area of Mattapan Square. The City of Boston has identified the Mattapan Square area as a commercial area that would be especially susceptible to the effect of construction on its ability to support successful small businesses. Further, the commercial and residential land uses along the American Legion Highway variation are less dense than those along the 2.2-mile stretch of Blue Hill Avenue contained in the primary route as originally proposed. Similarly, the Day Boulevard variation would bypass the originally proposed routing through the Andrew Square commercial area and dense residential development on Boston Street and Dorchester

Avenue, while also eliminating the need for a bridge crossing over the Southeast Expressway. However, with or without the use of the Day Boulevard variation, the primary route extends along narrow residential streets in South Boston that lead directly to the K Street Substation. Expansion of the K Street Substation, which is the terminus of all three routes, will be subject to further review under Chapter 91 because it would occur in historically filled tidelands.

The land use and water resource impacts associated with the proposed transmission lines, excluding the switching stations and substations, would be limited to temporary and minor impacts associated with construction activities. The record indicates that NSTAR will take appropriate measures to mitigate any temporary impacts. Accordingly, the Siting Board finds that the land use and water resource impacts associated with construction of the proposed transmission project along the primary route would be minimized.

As with the primary route, the record indicates that the alternative and hybrid routes would run through suburban and densely populated urban areas, and would pass through Blue Hills Reservation; however, it would not pass through any ACECs. Since the proposed transmission lines would be located under streets, there would be no permanent impacts on the use of recreational areas and other open space, species or their habitats, wetlands, or historic resources. In addition, at all stream channel crossings, the transmission lines will pass over or under the existing culverts. The crossing of the Neponset River would entail barge work in the Neponset River, subject to review by the ACOE. Construction and sedimentation controls would be used to avoid impacts to the river and to culverted streams. As with the primary route, although most of the historic sites abut the road or are near the road, any impacts to historic resources due to construction in the roadway would be temporary.

Accordingly, the Siting Board finds that the primary route would be comparable to the alternative and hybrid routes with respect to land use and water resource impacts associated with construction.

b. Traffic

i. Overview

NSTAR stated that installation of the proposed transmission lines would involve

constructing manholes, opening a trench, installing steel pipe, filling the trench back in with low-strength concrete and then repaving the street (Exh. BECO-1, at 5-4 to 5-7). Construction crews will pull the transmission cables through the buried steel pipes using the manholes, which are spaced 3,000 feet apart (id.).[38] The Company explained that roadway trenches typically would be confined to either a travel lane or a parking lane (Exh. EFSB-T-1). The Company noted that it expects to place trenches within a foot or two of the curb, except where existing utilities occupy that location (Exh. EFSB-T-5). NSTAR stated that it would do curb-to-curb repaving of all roads along the route, except on roads where there is a median strip; on these roads, repaving would be confined to the side of the road where construction has occurred (Tr. 10, at 1315).

NSTAR stated that the typical width of its construction corridor, including traffic barriers, would be 18 to 20 feet (Exh. EFSB-G-1, at 4-24). However, the Company stated that in constrained areas the construction corridor could be reduced to 16 feet (Tr. 7, at 980). The Company stated that the length of the work zone for pipe installation would vary from 500 feet to 750 feet, and that work within the zone would progress at an average rate of 100 feet per day (Exh. BECO-1, at 5-7; Tr. 6, at 901). However, the rate of progress at each location would depend on the density of underground utilities, number of circuits in the trench, and the work restrictions needed to maintain traffic flow (Exh. BECO-1, at 5-7).[39] NSTAR noted that construction crews would work simultaneously in different areas along the route, but be spaced apart in order to minimize construction impacts and maintain traffic flow (id. at 5-9, 5-52). NSTAR stated that to maintain traffic flow through a work area, the ideal width of a high speed traffic lane is 12 feet, whereas 10 feet is sufficient for slow-moving traffic (Tr. 7, at 974, 984).[40]

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[38] The Company stated that the primary route would have approximately 31 manholes (Exh. EFSB-G-1, at Fig. 2.5-1).

[39] The Company's rate of 100 feet per day is an average based on the standard eight-hour day; the Company noted that construction could progress as much as 150 feet per day in some sections, while in congested areas progress might average 75 feet per day (Tr. 10, at 1341).

[40] The Company stated that, in order to maintain through traffic, the MHD typically requires an 11-foot minimum width lane and Boston typically requires a 10-foot minimum width

(continued...)

NSTAR stated that parking prohibitions in work areas would be limited to the actual hours of construction in order to minimize disruption to residential and business parking (Exh. EFSB-T-6). This would be accomplished by covering the trench with steel plates and removing the construction equipment at the end of the construction shift (id.). The Company noted that, where necessary, alternative parking arrangements for residents could include paid reimbursement for the use of parking garages or parking lots (Exh. RR-EFSB-37; Tr. 14, at 1835-36).

NSTAR stated that construction would be scheduled to minimize disruptions to the extent possible; therefore, construction in residential areas would generally occur during the day (Exh. EFSB-T-14) The Company stated that nighttime construction would be proposed for all areas that are entirely commercial, so daytime businesses would not be affected (Exh. EFSB-T-6). The Company indicated that it would seek approval for a 12-hour workday from Boston and other affected municipalities; however, it acknowledged that such approval was uncertain, given municipal preferences to avoid construction during peak traffic hours (Tr. 10, at 1342). The Company stated that the minimum productive work day would be six hours, noting that it takes approximately an hour to set up a work area, and another hour to break down the work area and plate it (id. at 1346). NSTAR also acknowledged that if the work window at night were reduced to fewer hours than a municipality's standard daytime window,[41] it would likely work the daytime hours (id. at 1433). In addition, NSTAR noted that the City of Boston has a moratorium on road construction in the winter; the Company stated that it would avoid the moratorium period to the extent possible, but acknowledged that it would seek a waiver allowing it to perform some winter construction (Exh. EFSB-NO-8; Tr. 10, at 1342, 1380).[42]

NSTAR stated that it would develop a Traffic Management Plan ("TMP") as part of its

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[40] (...continued)
lane (Exh. EFSB-G-1, at 5-6).

[41] The Company noted that the standard City of Boston hours for work in streets are 9:00 a.m. to 4:00 p.m. (Tr. 10, at 1435).

[42] The Company indicated that the moratorium was developed due to the potential for snowplows to hit and dislodge the metal plates in the streets (Tr. 10, at 1380).

request for the municipal street opening permits needed to construct the proposed transmission project (Exhs. ST-66; EFSB-G-1, at 5-1). NSTAR stated that it will prepare a draft TMP once it has selected a contractor, the construction corridor width has been identified, and a final set of drawings has been prepared detailing the location of the traffic lanes in which the corridor would be located (Exh. ST-66; Tr. 10, at 1378). The Company stated that the TMP is intended to ensure the safety of the public and construction workers in the vicinity of the work zone, and would detail how traffic would be handled during the course of construction (Tr. 10, at 1387). The TMP would be updated during construction whenever a need for changes in construction location, timing, or method was identified; any revision would be subject to approval by the appropriate authorities (Exh. EFSB-G-1, at 5-4). The Company identified 27 provisions that would be the governing principles of the TMP, including provisions for notification, access, allowable construction methods, traffic detours, mitigation, and restoration (id. at 5-4 to 5-7).[43]

NSTAR indicated it is preparing a community relations plan that should be completed at the end of 2004, that would be shared with affected communities (Tr. 17, at 2322). The Company stated that it would provide a construction liaison who would notify all residents, businesses, and other special groups of the construction project schedule and when it would be located in a specific area (Exh. EFSB-T-3). The liaison would be the general public contact throughout the project (id.; Exh. EFSB-G-1, at 26). NSTAR stated that it would also have a dedicated phone line that would be staffed 24 hours a day; all residents and businesses would have direct contact with NSTAR through this line, and questions or complaints would be directed to the NSTAR staff responsible for investigating the matter (Exh. EFSB-G-1, at 26; Tr. 7, at 1024-1025).

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[43] The 27 provisions are: authority and signature; field adjustments; compliance with standards; traffic detours; length of open trench; days and hours of construction; removal of striping; traffic control devices; pedestrian circulation; suspension of activities; notification to MBTA; notification to MA Commission for the Blind; notification to area businesses; minimum width of lanes; street closures; restoration of serviceable conditions; work, site clean-up; driveway access; interim lighting; restoration of sidewalks, trees, and vegetation, lighting and public conveniences; restoration of wire induction loops; worker and passer-by safety; jersey barriers; plating; transition between work crews; ombudsman; and prohibition on permanent barriers (Exh. EFSB-G-1, at 5-7.

ii. Primary Route

As discussed in Section II.B, above, the primary route begins at the proposed Route 138 switching station site, runs for approximately 9.1 miles along Route 138 to the Boston municipal boundary at the Neponset River in Mattapan Square, and continues for approximately 7.7 miles in Boston streets to the K Street Substation (single circuit is an additional .65 mile) (Exhs. BECO-1, at 1-9, Fig. 1-5; EFSB-G-1, at Figs. 2.2-2 and 2.2–4). Route 138 between Stoughton and the Neponset Bridge is a straight, two-lane roadway consisting of a paved travel surface, generally 35 to 44 feet wide, with no parking lanes, located within a ROW approximately 50 to 60 feet wide (Exh. EFSB-G-1, at 4-24, Fig. 4.6-1).[44] The route through Boston is generally wider, including Cummins Highway, which has a paved area and a ROW of 60 feet close to Mattapan Square, but which expands in a short distance to 60 to 70 feet of paved surface within an 80 foot ROW; American Legion Highway, which has four paved travel lanes with full parking lanes on each side separated from the travel lanes by a grassed median; and Columbia Road from Franklin Park north to Everett Square,[45] which has four paved travel lanes with full parking lanes on each side, a paved street width of over 80 feet, and a ROW width of over 100 feet (Exhs. EFSB-BECO-1, at 1-10; EFSB-G-1, at 4-24 and 4-26; BECO-1, at E-4).

After consulting with MHD and the City of Boston, NSTAR determined that full traffic flow must be maintained along Route 138 from Stoughton into Boston during the morning and evening peak traffic hours (approximately 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.) (Exh. EFSB-G-1, at 5-3). After the close of hearings, the Company provided updated construction mitigation plans indicating that: (1) construction along Route 138 may continue during peak-hour periods if construction is occurring opposite the predominant flow of traffic

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[44] The Company explained that the road ROW is the entire width of the road, and includes sidewalks, planting strips, medians, parking lanes and travel lanes; the paved width is the portion of the road that has been designated for vehicular traffic, including the travel and parking lanes and any paved shoulder (Tr. 7, at 965). The ROW of Route 138 is the land owned in fee by MHD, including the grassed or un-sidewalked area and unpaved areas, as well as the paved roadway (id. at 966).

[45] Columbia Road from Everett Square to Kosciusko Circle ranges from four to six travel lanes (Exh. BECO-1, App. E, Fig. S-8).

and adequate traffic flow can be maintained; and (2) construction in Boston may continue during evening peak hour traffic periods along much of the primary route (Exh. RR-EFSB-61S(2)).

The Company characterized existing traffic volumes from Stoughton to Everett Square in Boston as heavy, especially during morning and afternoon peak hours (Exh. EFSB-G-1, at 4-26). NSTAR collected hourly traffic count data at one location in Stoughton, three locations each in Canton and Milton, and thirteen locations in Boston (id.; Exh. EFSB-T-2).[46] NSTAR reported that the data generally show a morning and afternoon peak at most locations during the weekdays, and a single, prolonged peak on the weekends (Exh. EFSB-G-1, at 4-26).

Based on these data, NSTAR developed a level of service ("LOS") analysis which characterized traffic flow as good (LOS of A, B, or C), intermediate (LOS of D) or poor (LOS of E or F) (Exh. EFSB-G-1, at 4-27). The analysis indicates that Route 138 currently experiences poor traffic conditions in both directions from York Street to Royal Street during the 2:00 p.m. to 4:00 p.m. period, and from York Street to Brush Hill Road during the 4:00 p.m. to 7:00 p.m. period (id., Table 4.6-5). The analysis indicated that: (1) for the 6:00 a.m. to 9:00 a.m. period, poor conditions exist from York Street to Dan Road, and from Randolph Street to Brush Hill Road; and (2) three of the five route segments along Route 138 between York Street and Brush Hill Road experience poor traffic conditions from 6:00 a.m. to 7:00 p.m.; and (3) along the remainder of the primary route, the only area with poor existing traffic conditions is along Blue Hill Avenue directly south of Columbia Road (id.; EFSB-RR-38).

The Company stated that it generally would seek to work when traffic conditions are good to intermediate (Exh. EFSB-G-1, at 27; Tr. 10, at 1318, 1320). The Company indicated that, if it were necessary to construct in the time periods where the LOS was poor, it would ensure that the impacts to the travel lanes were kept to a minimum, in terms of the width of the

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[46] The Company indicated that it collected traffic counts along Route 138 in the following order, traveling north: north of York Street (Stoughton); north of Dan Road (Canton); north of Randolph Street (Canton); south of Royal Street (Canton); south of Brush Hill Road (Milton); south of Brook Street (Milton); and south of Mattapan Square (Milton) (Exh. EFSB-G-1, at 4-27). The Company reported the average weekday traffic counts including: Route 138 in Canton, 37,900; Blue Hill Avenue, 24,000; American Legion Highway 8,000 to 12,000; and Columbia Road, 20,000 to 24,000 (Exh. EFSB-SS-18A).

roadway affected and the duration of work (Tr. 10, at 1317). The Company indicated that it would work with the MHD, the City of Boston, and the Towns of Stoughton, Canton, and Milton to ascertain the preferred time of day for construction (id. at 1336).[47] The Company noted that these communities, through the issuance of street opening and access permits, have significant control over when construction would occur (id. at 1336). The Company also stated that it would work with local officials to ensure that appropriate traffic management measures, including warning signs, turn restrictions, speed restrictions, and police details, are arranged within the construction zone along Route 138 to ensure that existing congested travel conditions are not worsened during construction (Exh. EFSB-T-23).

NSTAR asserted that it could maintain two lanes of traffic on all portions of Route 138 during construction (Tr. 7, at 986). The Company indicated that, where the roadway ROW is 60 feet wide, 15 to 25 feet of unpaved land exists on one or both sides of the paved road (id. at 966). The Company noted that, in some areas, the unpaved land is not useable, due to the presence of wetlands, trees, drainage ditches, or side slopes (id. at 970). The Company stated that where the paved roadway is 35 feet wide and use of the unpaved area is constrained, it would narrow the construction corridor and use stovepipe[48] construction if necessary, which could slow down the construction process (id. at 972, 978-979).[49]

In order to mitigate construction traffic impacts along Route 138, NSTAR proposed to use nighttime construction for the first 5.7 miles of the primary route (from the Route 138 switching station site to a point slightly north of the Blue Hills Trailside Museum in Milton), and stated that it was giving serious consideration to using nighttime construction for an additional 1.8 miles (from milepost 5.7 to 7.5, in the vicinity of Delphi Academy) (Exhs. EFSB-NO-10;

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47 NSTAR noted that the Town of Canton has expressed a preference for a longer work day in order to minimize the number of days of construction work in Canton (Tr. 10, at 1346-1347).

48 The Company explained that stovepipe construction would involve opening a limited length of trench, and welding and laying one piece of pipe at a time into the open trench (Tr. 7, at 967).

49 The Company noted that the areas along Route 138 that would be the most constrained fall between milepost 1.5 and milepost 3.0 (Tr. 7, at 974).

EFSB-T-14). The Company stated that, within these lengths of Route 138, there is an area of light-density residential development in Canton from approximately mileposts 2.6 to 4, and another one in Milton between mileposts 5.7 and 7.5 (Exh. RR-EFSB-40). The Canton area has approximately 58 residences within 100 feet of Route 138, and the Milton area has 24 residences within 100 feet (id.). After the close of hearings, the Company provided updated construction mitigation plans indicating that nighttime construction would end by 9:00 p.m. in these residential areas (Exh. RR-EFSB-61S(2)).

NSTAR also proposed limited use of nighttime construction within Boston, initially identifying the following as expected locations: Mattapan Square, Uphams Corner, Everett Square, and Columbia Road from the Route 93 ramp to Kosciusko Circle (Exh. EFSB-NO-8).[50] After the close of hearings, the Company provided updated construction mitigation plans indicating: (1) it would work a 12-hour day, from 9:00 a.m. to 9:00 p.m., for much of the primary route, including from Mattapan Square to the crossing of Route 93 on Columbia Road, except for Uphams Corner, and from the intersection of I Street and East Third Street in South Boston to the terminus at K Street Substation;[51] and (2) it would work a 20 or 21 hour day, excluding morning peak traffic hours, along commercial portions of Cummins Highway and American Legion Highway, and along Day Boulevard (Exh. RR-EFSB-61S(2)). The Company also indicated that, along narrow roads in South Boston north of Day Boulevard, it may close the roads to traffic on a block-by-block basis and detour traffic (Tr. 7, at 981). The Company also indicated that it may use tight construction practices in South Boston, and for a small area on Cummins Highway approaching Mattapan Square (id. at 980-982).

NSTAR provided information showing there are 15 schools along the primary route, including public schools, Curry College and the Blue Hill School of Technology (Exh. EFSB-

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[50] The Company indicated that land use in Mattapan Square, Uphams Corner and Everett Square is primarily commercial, with some second or third floor residential uses (Tr. 10, at 1430-1432). The Company did not identify any residences along Columbia Road between Route 93 and Kosciusko Circle (id. at 1432-1433).

[51] On weekends, the Company would work this 12-hour day through Uphams Corner and from Route 93 to the intersection of Columbia Road and Day Boulevard, as well (Exh. RR-EFSB-61S(2)).

NO-28).[52] NSTAR stated that, in order to minimize impacts on school activities and school bus schedules, it would prefer to complete all construction near each school either during the summer, or outside of the start and end of the school day (Exh. EFSB-T-8). The Company noted that, in the event that construction occurs when schools are in session, work at any one location would be in place for only one week (id.; Exh. EFSB-T-19). NSTAR stated that it would work with school administrations to establish work protocols (Exh. EFSB-T-19).

The Company stated that it would notify the MBTA on a weekly basis of the location of the construction crews for the following week (Tr. 10, at 1373). When construction approaches bus stops, the bus stops would be temporarily relocated outside of the 100 foot construction zone (id. at 1374). NSTAR noted that the primary route passes by the Mattapan MBTA station, but asserted that construction would not affect pedestrian or bus access, as the station is located to the east of the proposed construction (id. at 1371).

NSTAR noted that the Boston Public Works Department's "Rules and Specifications for Street Openings" protects newly paved streets for five years, and that the MHD has a policy which discourages excavation in any road that has been reconstructed in the last seven years (Exhs. EFSB-T-21; T-13). However, the Company noted that exceptions are made routinely for unplanned repairs and for construction of unplanned but necessary underground utility upgrades (Exh. EFSB-T-21; Tr. 10, at 1329-1330). The Company noted that there has been no recent road repair or construction along Route 138 in Stoughton or Milton, and that recent road work in Canton has been limited to the repaving of 2,000 feet of Route 138 just south of the Route 128 cloverleaf (Exh. EFSB-T-21). In Boston, Hyde Park Avenue has been completely reconstructed and portions of I Street, East 3rd Street, and K Street have been repaved within the last five years (Exhs. EFSB-T-13; EFSB-T-21).

The Company indicated that construction of the proposed transmission lines along the

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[52] The Company stated that the 15 schools include one school along the American Legion Highway variation segment and three schools along the Day Boulevard variation segment (Exh. EFSB-NO-28). By comparison, the Blue Hill Avenue variation has one school, and the Boston Street/Dorchester Street variation has six schools (id.). The Company indicated that the setbacks of the schools, as measured from the roadway centerline, range from 25 feet to 200 feet (id.).

primary route would be coordinated with the MHD, Canton, Milton, Stoughton, and the Boston Metropolitan Planning Organization ("MPO") with regard to the Route 138 Corridor Planning Study (Exhs. EFSB-T-12; EFSB-T-25; Tr. 10 at 1324-1325).[53] In particular, the Company noted that the Town of Canton has plans for three projects along Route 138 – the reconstruction of the intersections of Route 138 with Randolph Road and Washington Street, and the reconstruction of Route 138 from Route 128 south to Dan Road, a distance of approximately 2.8 miles (Exh. EFSB-T-18; Tr. 10, at 1325). NSTAR explained that the Town of Canton would prefer that the construction and road improvement projects be addressed at the same time, so that Route 138 is under construction only once (Tr. 10, at 1369). The Company indicated that it has agreed to coordinate construction with the Town of Canton and its traffic consultants (id.).

The Company indicated that materials used for the construction of the Route 138 switching station would be delivered to the site via Route 138, and would not travel on York Street, Charles Avenue, or Ewing Drive (Exh. RR-EFSB-61). NSTAR indicated that it could place temporary signage on Route 138 notifying drivers that construction vehicles are entering the road, and place other visible markers and a police detail during periods of frequent deliveries or when large equipment is delivered (Exh. EFSB-T-23; Tr. 10, at 1370-1371). The Company stated that it would work with the Stoughton Police to ensure that construction traffic safely enters and exits the site (Tr. 10, at 1371).

iii. Alternative and Hybrid Routes

Beginning at the proposed SRA switching station site, the alternative and hybrid routes follow two narrow roadways: Kay Way, which is located approximately one mile into the route, and is a two-lane road 25 feet across with no marked shoulders or sidewalks; and West Street, a two-lane road approximately 22 feet across, including a narrow shoulder of one foot or less, and sidewalks (Exh. RR-EFSB-25). Kay Way and West Street account for approximately one-half

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[53] The Route 138 Corridor Planning Study (July 2001) was prepared by the MPO's Central Transportation Planning Staff, directed by the Boston Metropolitan Planning Organization for the MHD (Exh. EFSB-T-12, Bulk Att.). It identifies flaws in current road design and the traffic capacity of Route 138 (Exhs. EFSB-T-12, Bulk Att.; EFSB-T-25).

mile of the routes (Exh. RR-EFSB-25, Fig.(a)). The route continues for approximately ¾ of a mile along Lafayette Street, a two-lane road with a narrow shoulder, before heading north onto High Street, a two-lane road with a full shoulder, for a distance of approximately 2 miles (Exh. BECO-1, at 1-11, Fig. 1-7, Fig. 5-4). The alternative and hybrid routes then travel for approximately 3 miles on Route 28, which varies from a two-lane road with a wide shoulder to a four-lane road with a narrow shoulder (id. at 1-11, Fig. 5-4; Tr. 7, at 991-992). The route then turns onto Reedsdale Road, a four-lane road, and heads north onto Central Avenue, a two-lane road with a full shoulder (Exh. BECO-1, at Fig. 5-4). The Company asserted that the roads which make up the first 8 miles of the alternative and hybrid routes are slightly narrower than those which make up the primary route, and accordingly, that options for traffic mitigation may be limited by the narrower roads, and that fewer unoccupied spaces may be available for utilities (id. at 5-18).

From the intersection of Central Avenue and Reedsdale Road, the two-circuit segment of the alternative route proceeds north into Boston and travel 7.2 miles to the K Street Substation, while the single-circuit segment of the alternative route, and the hybrid route, proceed west to and then along the primary route to reach the Hyde Park Substation (Exh. BECO-1, at 1-10). The Company stated that the Washington Street to Pleasant Street portion of the two-circuit segment of the alternative route is much more congested than the corresponding portions of the primary route (Tr. 10, at 1360). The Company explained that the congestion is due to the winding streets and complicated intersections with more than two intersecting streets (id. at 1362). For example, the NSTAR noted that the intersections of Bowdoin Street and Hancock Street and Hancock Street and Pleasant Street would require the proposed transmission line to make relatively sharp turns (Exh. BECO-1, at 5-18). In addition, NSTAR noted that Codman Square has more upper-story residential development than portions of the primary route through Mattapan Square and Uphams Corner, which would make it difficult to mitigate traffic impacts by using nighttime construction work through the Codman Square intersection (Tr. 10, at 1437-1438). Overall, NSTAR asserted that along the northen portion of the routes, traffic impacts would be worse along the alternative route than along the primary route, even though the traffic counts might be lower (id. at 1362).

For the single-circuit segment of the alternative route, and the hybrid route, the Company stated that Brook Road between Reedsdale Road and Blue Hill Parkway is a four-lane, two-way road with no marked shoulders, and Blue Hill Parkway between Brook Road and Blue Hill Avenue is a six-lane divided highway (Exh. RR-EFSB-25).

NSTAR did not collect full traffic count data or conduct an LOS analysis for the alternative route (Tr. 10, at 1352). However, the Company indicated that counts taken on Route 28 north of the Milton/Quincy line found traffic levels of 15,000 to 17,000 vehicles per day, and counts taken at Randolph Avenue in Milton found approximately 7000 vehicles per day (Exh. EFSB-SS-18A; Tr. 10, at 1353-1354).[54] NSTAR expected that the traffic counts on High Street in Randolph would be less than 7000 vehicles per day (Tr. 10, at 1356).

NSTAR proposed to mitigate traffic impacts along the alternative and hybrid routes by using nighttime construction in two areas: (1) for the first 1.25 miles of the route along Technology Drive, continuing the short distance on Kay Way; and (2) for approximately 1.5 miles along Route 28, beginning south of the Route 128 interchange (milepost 4.5) and ending approximately at the Quincy/Milton border (milepost 6) (Exhs. EFSB-NO-10; EFSB-NO-3). The Company indicated that a large portion of the alternative and hybrid routes through Randolph is located in residential areas along High Street and Lafayette Street; consequently, the Company stated it did not expect that the Town of Randolph would allow nighttime construction along these streets (Tr. 10, at 1349, 1353).

NSTAR noted that a lengthy portion of the alternative and hybrid routes in Milton is presently being repaved, including approximately 1.8 miles of Route 28 from the Milton/Quincy line north to its intersection with Reedsdale Road, and an additional portion of Reedsdale Road to its intersection with Central Street, as well as some sections of Brook Street (Tr. 10, at 1331). In addition, the Company stated a portion of High Street in Randolph was rebuilt in 2002, and another portion in 2001 (Exh.EFSB-T-13).

The Company stated that the public transportation resources along the alternative and hybrid routes are similar to those along the primary route, as both routes pass near the Mattapan

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[54] The distinction between the two traffic-count locations in Milton is unclear, as Randolph Avenue is Route 28 in Milton (Exh. EFSB-BECO, Fig. 1-8).

Square MBTA station and numerous bus routes; the alternative route includes one additional MBTA subway station, located on Central Avenue in Milton on the south side of the Neponset River (Exh. EFSB-T-16). NSTAR indicated that 12 schools are located along the alternative route (Exh. EFSB-NO-28).

iv. Analysis

The record demonstrates that construction of the proposed transmission lines would have temporary impacts on traffic traveling on the roads that make up the primary route. The degree of impact is related to three factors: (1) the existing level of traffic flow; (2) the number and width of travel lanes available during construction; and (3) the time of day that construction would occur.

The primary route first follows Route 138 from Stoughton to Mattapan Square, a predominantly two-lane roadway 35 to 40 feet wide with a paved shoulder, occupying a ROW 50 to 60 feet wide. The record shows that where possible, the Company would limit its work area to leave space for two 12-foot wide travel lanes on one side of the paved roadway. As its preferred work area in the ROW, the Company would use a 20-foot construction corridor made up of the remaining paved roadway, together with adjacent unpaved ROW. The Company's use of this corridor may be constrained in some areas by the location of utilities, or the presence of wetlands, slopes, ditches or other impediments in the adjoining unpaved ROW. In these locations, NSTAR would as feasible use stovepipe construction, or cross to the other side of the ROW and use the other shoulder. Due to the high volume of traffic on Route 138, LOS ratings in some areas are poor throughout the daytime periods, and in other areas are poor primarily during the morning and evening peaks. Thus, daytime construction work on portions of Route 138 has the potential to further degrade already poor traffic conditions, and may be unacceptable to local officials and the MHD.

In Boston, the primary route from Mattapan Square to Everett Square follows wider streets with more travel lanes and generally lower traffic volumes than Route 138. In South Boston the route is predominantly narrow, and the Company proposes to close portions of I Street, East 3rd Street, and K Street in segments and implement detours. Although existing traffic

conditions along the route in Boston do not show poor LOS ratings, the areas are heavily developed with both residential and commercial uses. In addition, public buses use the roads along the primary route, and there are numerous schools in close proximity to the route. Given the urban land use, the presence of a construction zone may pose safety issues for pedestrians and motorists.

To alleviate potential traffic impacts, the Company has proposed up to 7.5 miles of nighttime construction along Route 138, through Stoughton, Canton, and a portion of Milton. However, along residential portions of Route 138, including a 1.5-mile segment in Canton and a 2-mile segment in Milton, the Company's updated construction mitigation plans provide that any nighttime work would end by 9:00 p.m. The Company previously indicated that, in conducting nighttime construction, it expected it would need a continuous work period of at least six hours. Thus, to allow a six-hour shift, work hours on residential portions of Route 138 would need to overlap at least some daytime periods in which LOS ratings are poor. Further, while not precluding construction during the 4:00 to 6:00 p.m. peak traffic period, the Company's updated construction mitigation plans allow peak hour construction only if work is being conducted on the opposite side from the predominant traffic flow, and adequate traffic flow can be maintained.

In Boston, the Company's updated construction mitigation plans indicate that 12-hour or longer work days, overlapping evening peak hour traffic periods, will be used along much of the route, but that construction generally will not be conducted during morning peak hour traffic periods. Nighttime work would end by 9:00 p.m. along most of the route, generally including all areas with residential land use.

The record indicates that the Company would develop a TMP addressing issues such as the location of trenching and width of travel lanes, scheduled times and duration of work, arrangements for pedestrian traffic, mass transit operations, parking, and procedures for notifying residents and businesses of construction plans. The Siting Board notes that it is crucial that NSTAR, in consultation with the City of Boston and the Towns of Stoughton, Canton, and Milton, to develop a workable TMP in a time frame that allows for adequate notification to residents and businesses. Consequently, to ensure that all outstanding issues can be resolved in a timely fashion to the satisfaction of each community, the Siting Board directs NSTAR to submit

the draft TMP to appropriate officials in the City of Boston, and the Towns of Stoughton, Canton, and Milton, to school administrators in each of these communities, and to the MHD and the MBTA, at least two months prior to the commencement of construction affecting these entities.

The Siting Board notes that the Company has indicated that, as part of its TMP, it would address community outreach and notification to residents and business. Because the proposed transmission project requires approximately 18 miles of in-street construction through four communities, the TMP likely will be an extensive document. Community outreach and notification will be crucial to the success of this project. Consequently, the Siting Board directs NSTAR, in consultation with the City of Boston and the Towns of Stoughton, Canton, and Milton, to develop a comprehensive outreach plan for the proposed project. The outreach plan should lay out the procedures to be used to notify the public about: the scheduled start, duration, and hours of construction in particular areas; the methods of construction that will be used in particular areas (including any use of nighttime construction); and anticipated street closures and detours. The outreach plan also should include information on complaint and response procedures, contact information, the availability of web-based project information, and protocols for notifying the MBTA and schools of upcoming construction.

The Siting Board finds that, with the implementation of the above conditions, the traffic impacts associated with construction of the proposed transmission project along the primary route would be minimized.

The record indicates that the construction traffic impacts along the primary, alternative and hybrid routes would be temporary. Nonetheless, due to the configuration of the roadways used for each route, the traffic impacts would differ.

At the beginning of the alternative and hybrid routes, West Street and Lafayette Street are narrow roadways. While it appears that only one lane of traffic could remain open on each of these streets during construction, West Street is commercial and thus could accommodate nighttime construction. Further north, the alternative and hybrid routes follow Route 28 and Brook Road, which have four lanes each, rather than the two lanes with shoulders present on Route 138 along the primary route. In addition, the traffic counts along Route 28 are lower than

those of Route 138. However, there is less opportunity to mitigate traffic impacts through nighttime construction along Route 28 and Brook Road due to its more extensive residential development.

The hybrid route diverges from the alternative route just south of Boston, and joins the primary route. Within Boston, the alternative route is winding, with numerous turns, and a denser mix of residential development in commercial areas than along the primary route.

In summary, to the south of Boston, the primary route along Route 138 is shorter than the alternative and hybrid routes, and offers more opportunity to mitigate traffic impacts by using nighttime construction along Route 138. In Boston, the primary and hybrid routes follow wider streets than the alternative route, and provide the better opportunity for nighttime construction; therefore, they would better minimize traffic impacts. The Siting Board notes that, should the extent of nighttime construction along Route 138, or along the primary and hybrid routes in Boston, be significantly less than proposed as a result of possible additional reductions in its use, the route advantages identified above could be reduced or eliminated.

The routes also differ in terms of the degree to which construction is likely to be coordinated with other construction projects in the areas traversed. The record shows that the Route 138 segment of the primary route offers the possibility of coordinating construction with local improvement projects in the Town of Canton. In contrast, the record shows that several repaving and utility installation projects are ongoing or have been recently completed along the alternative route, including portions of Route 28 and Reedsdale Road in Milton.

Overall, the Siting Board finds that the primary route would be preferable to the alternative route and the hybrid route with respect to traffic impacts associated with construction.

c. Noise

i. Primary Route

(a) Transmission Lines

NSTAR explained that transmission line construction would take place in four distinct phases that would generate different levels of noise: manhole installation, trench

excavation/steel pipe installation, cable installation and cable splicing (Exh. EFSB-G-1, at 5-9).[55] The Company stated that the manhole installation and trench excavation/steel pipe installation phases would be the noisiest, while cable installation would be substantially quieter (Exhs. EFSB-G-1, at 5-13; EFSB-NO-4). NSTAR indicated that typical L_{10} sound levels from manhole installation, trenching, and pipe installation would range from 69 to 89 dBA at urban setbacks of 25 to 50 feet, and from 63 to 77 dBA at suburban setbacks of 100 feet; the Company noted that welding produces lower range sound levels and pavement sawing produces higher range sound levels (Exh. EFSB-G-1, at 5-13 to 5-14). NSTAR asserted that these estimates are conservative, based on the maximum, worst case scenarios (Tr. 10, at 1419).[56] The Company asserted that, due to the progressive nature of the construction project, no one activity would remain at any one location for very long (Exh. EFSB-G-1, at 5-12).

The Company indicated that certain construction activities would be conducted at night, including cable splicing and, perhaps, cable pulling in areas with manhole access constraints (Exhs. EFSB-G-1, at 5-12 to 5-13). The Company explained that, at any one manhole location, cable splicing would take 7 to 8 days, 24 hours a day (id. at 5-13). The noise associated with cable splicing would include contributions from the splicing van, air conditioner unit, and the generator (Exh. EFSB-NO-1). NSTAR estimated that the L_{10} sound levels from cable splicing would be 61 dBA at 50 feet, and 67 dBA at 25 feet (id.). The Company stated that it did not expect any residences to be closer than 25 feet to the source of the cable splicing noise (id.).

The Company conducted nighttime ambient short term sound level measurements during the spring at seven representative locations along the primary route, including two locations in Canton, one in Milton, and four in Boston (Exh. EFSB-G-1, at 4-41, 4-43 to 4-44). The Company conducted daytime ambient short term sound level measurements during the winter at

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[55] The typical equipment to be used during the four phases of construction includes: pavement saws, backhoes or excavators, flatbed trucks, dump trucks, cranes, concrete delivery trucks, asphalt pavement delivery trucks, welders, cable reels, cable pullers/winders, splicing vans, generators, and air conditioning units (Exh. EFSB-G-1, at 5-9 to 5-10).

[56] NSTAR explained that it used construction noise estimates developed for the Big Dig, which were the maximum sound levels expected to never be exceeded (Tr. 10, at 1447).

four representative locations along the primary route, including one location in Canton, one in Milton, and two in Boston (id. at 4-41 to 4-42). The nighttime measurements show L_{10} levels ranging from 51 to 71 dBA, L_{eq} levels ranging from 50 to 68 dBA, and L_{90} levels ranging from 38 to 55 dBA (Exh. EFSB-NO-11). The Company's daytime measurements showed L_{10} levels ranging from 69 to 74 dBA, L_{eq} levels ranging from 65 to 71 dBA, and L_{90} levels ranging from 51 to 67 dBA (Exh. EFSB-NO-12).

The Company provided maps depicting the location of residences within a 100-foot setback of each side of Route 138 in Canton and Milton (Exh. RR-EFSB-40, Figs. 1 and 2). In Canton, the Company identified 31 such residences on the west side of the roadway and 27 residences on the east side of the roadway, and added that the residences to the east are concentrated in two areas – in the vicinity of the intersection with Randolph Road, and in an area north of the entrance to Ponkapoag Golf Course opposite the intersection with Washington Street (Exh. RR-EFSB-40).[57] In Milton, the Company identified 6 residences on the west side and 18 residences on the east side of the roadway (id.).

Both Boston and Canton regulate construction noise, while Milton does not have any noise regulations or restrictions (Exh. EFSB-G-1, at 5-14 to 5-15; EFSB-NO-4). With respect to construction noise, the Company indicated that Boston regulates L_{10} sound levels as measured from the lot lines of the affected property, based on the zoning of the property (Exhs. EFSB-NO-4; EFSB-NO-27). The Boston bylaws limits construction noise impacts to: an L_{10} of 75 dBA and a maximum noise of 86 dBA at residential or institutional properties; an L_{10} of 80 dBA at business or recreational properties; and an L_{10} of 85 dBA at industrial properties (Exhs. EFSB-G-1, at 5-14; EFSB-NO-4; EFSB-NO-27; Tr. 10, at 1417). The Company asserted that it does not expect the construction sound levels to exceed the residential L_{10} limit beyond a radius of approximately 100 feet, or to exceed the industrial zone limit at any time (Exh. EFSB-G-1, at

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[57] The Company's map indicates that in these two areas, many of the residences on both sides of the roadway are located at less than the suburban setback of 100 feet (Exh. RR-EFSB-40, Fig. 1). The map indicates that, in the remainder of the Canton residential area, from northwest of the golf course to MP 4, and opposite the golf course south of Washington Street, residences are predominantly confined to the west side of the roadway and located at the full suburban setback of 100 feet (id.).

5-15). Canton prohibits the use of loud tools and machinery between the hours 10:00 p.m. to 7:00 a.m., except with written consent from the town (Exhs. EFSB-NO-4; EFSB-NO-27).[58] However, NSTAR indicated that if the Town of Canton agrees that the best solution to traffic impacts is to allow nighttime construction, it would seek such written consent (Tr. 10, at 1439).

The Company stated that it would mitigate construction noise impacts by ensuring that: (1) the diesel powered equipment has quality mufflers installed; (2) the equipment is well maintained; (3) properly sized equipment is used; (4) only the necessary equipment is operated at the job site; and (5) the idling time for construction vehicles is limited (Exh. EFSB-G-1, at 5-21). In addition, the Company asserted that diesel powered equipment would not be operated before 7:00 a.m. (Exh. RR-EFSB-61). Further, the welding of splice sleeves would be limited to daytime work hours in residential locations (Exh. EFSB-G-1, at 5-21). In areas where nighttime work is required, the Company suggested that it would try to concentrate the noisier work, such as pavement sawing and concrete pouring, toward the beginning of the shift, closer to the 7:00 p.m. or 8:00 p.m. time period, and lasting until no later than 11:00 p.m. (Tr. 10, at 1428). The Company also indicated that construction work in residential areas of Canton and Milton would end by 9:00 p.m. (Exh. EFSB-RR-61).

NSTAR asserted that the use of a sound attenuated generator that uses a well-built enclosure and muffler would minimize noise from the cable splicing operation (Exhs. EFSB-NO-1; EFSB-NO-2). The Company noted that it expects to use the quietest commercial portable generator available; the Company did not propose the use of noise barriers to mitigate noise from cable splicing, stating that it had conducted cable splicing in residential areas using the same quiet generator without creating noise problems (Exhs. EFSB-NO-2; RR-EFSB-39). NSTAR stated that portable noise barriers around the equipment could provide 5 to 10 dBA of sound level reduction when placed around all four sides of the noise generating equipment, with less

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[58] "During the hours from 10:00 p.m. to 7:00 a.m., the Permit Holder or Contractor shall not use, unless otherwise specifically permitted, in writing, by the Awarding Authority or Awarding Authority Representative, any tool, appliance or equipment producing noise of sufficient volume to disturb the sleep or repose of occupants of the neighboring property" (Town of Canton General Bylaws, Section 12, Subsection 10) (Exhs. EFSB-G-1, at 5-15; EFSB-NO-27).

reduction for an upper story residence than for a ground or second floor residence (Exhs. EFSB-NO-2; RR-EFSB-39). The Company explained that the typical noise barrier is a maximum of 14 feet high (Exh. RR-EFSB-39). The Company stated that the use of the portable noise barrier could add up to six to eight feet to the width of the roadway construction zone, but noted that if the barriers could be placed on the sidewalk, no added impacts would result, although pedestrian access might be limited (id.).

NSTAR stated it would seek to avoid construction immediately adjacent to schools when the schools are in session; however, if construction work was necessary while a school was in session, the Company would work with the school administration to establish work protocols to minimize noise impacts (Exh. EFSB-NO-28). For example, the Company stated that construction activities that create the most noise, such as pavement sawing, pipe welding and concrete backfilling, would be shifted to the late afternoon and early evening periods to avoid school hours (id.).

(b) Route 138 Switching Station

The Company provided a project schedule that indicated construction of the Route 138 Switching Station would begin in January 2005 and be completed in June 2006 (Exh. RR-ST-5). Site preparation work and the foundation work would occur over the first six months of the schedule (id.). The Company stated that construction work at the site would involve the use of heavy diesel-powered equipment for grading, excavation, and placement of foundations (Exh. EFSB-G-1, at 5-18). NSTAR asserted that the noise from the grading and excavation phases would be similar to current daytime noise from the existing sand and gravel operation (id.). The Company noted that the foundation placement, which involves the use of concrete mixers, would likely generate noticeable noise levels for the brief period it takes to empty the loads (id.).

NSTAR stated that construction would generally take place during a daytime shift, within specific hours set by town bylaws (Exh. RR-EFSB-61). However, the Company stated that if additional shifts are necessary to maintain the overall project schedule, the standard day shift may be extended, or Saturday daytime shifts may be used (id.). NSTAR has entered into a Host Community Agreement with the Town of Stoughton to resolve issues concerning the design,

mitigation and siting of the Route 138 switching station (Exh. RR-EFSB-62). The Company indicated that its Host Community Agreement permits NSTAR to schedule daily shifts of up to twelve hours, five days a week, at the switching station site, subject only to a requirement that construction-related activities which generate noise cannot be undertaken after 7:00 p.m. (Exh. RR-EFSB-62). NSTAR noted that the Host Community Agreement also permits limited weekend and holiday construction subject to prior notice to, and coordination with, the town (id.).

With regard to mitigation concerning equipment noise at the switching station site, the Company stated that it would ensure that: (1) the diesel powered equipment has quality mufflers installed; (2) the equipment is well maintained; (3) properly sized equipment is used; (4) only the necessary equipment is operated at the job site; and (5) the idling time for construction vehicles is limited (Exh. EFSB-G-1, at 5-21; Tr. 17, at 2323). In addition, diesel powered equipment would not be started before 7:00 a.m. (Exh. RR-EFSB-61).

NSTAR noted that, prior to the circuits being placed in service, the cables and voltage compensators must be filled with dielectric fluid (Exhs. EFSB-G-1, at 2-30; RR-EFSB-61). The Company stated that it would use quiet generators to power the fluid pumps, which it would stage at the proposed switching station and at the Hyde Park and K Street Substations (Exhs. EFSB-G-1, at 2-30; RR-EFSB-61). The Company stated that to fill each cable is a one-time, continuous operation that would take at least 15 hours (Exh. EFSB-G-1, at 2-30). The Company explained that although this operation may continue into nighttime hours, the sound levels associated with the activity would not be significant (Exhs. EFSB-NO-15; RR-EFSB-61). NSTAR indicated that at the Stoughton and K Street locations, the pumps would not be near residential areas, and that at Hyde Park, it would not pump fluid late at night (Exh. EFSB-NO-15).

ii. Alternative and Hybrid Routes

(a) Transmission Lines

NSTAR asserted that the noise associated with the construction of the transmission line would be the same for the primary and alternative routes (Company Brief at 130).

(b) SRA Switching Station

NSTAR stated that construction of the SRA switching station would generally take place during a daytime shift, with specific hours set by town bylaws (Exh. RR-EFSB-61(S)). However, the Company stated that if additional shifts are necessary to maintain the overall project schedule, the standard day shift might be extended and/or Saturday daytime shifts might be used (id.). The Company stated that the mitigation proposed would be the same at either switching station site (Exh. RR-EFSB-61; RR-EFSB-61(S); Tr. 17, at 2323). NSTAR also stated that cable filling is the same at either switching station site (Exhs. RR-EFSB-61; RR-EFSB-61(S); EFSB-G-1, at 5-21).

(c) Substations

NSTAR stated that at the Hyde Park, K Street, and Baker Street Substations construction generally would take place between 7:00 a.m. and 7:00 p.m., Monday through Friday, with limited construction work as needed on Saturdays (Exh. RR-EFSB-61-S(2)). The Company also that diesel powered equipment would not be started before 7:00 a.m. (Exh. RR-EFSB-61).

NSTAR stated that the only night construction work that would occur at the K Street Substation would be the filling of the two voltage compensators and the transformers with insulating fluid, which would take place over a 48-hour period for each voltage compensator and transformer (Exhs. EFSB-G-1, at 5-21; EFSB-NO-14). The Company stated that noise levels are not considered significant since the pumps are housed in a trailer, and the only appreciable noise may come from a portable generator used to power the pumps, if use of a generator is required (Exh. EFSB-NO-14). The work location for filling the cables at the K Street Substation would not be near residential areas (Exh. EFSB-NO-15). NSTAR stated that it would not conduct late night filling of the cables at the Hyde Park Substation, as there are residences in close proximity to that work location (Exh. EFSB-NO-15).

iii. Analysis

NSTAR provided estimates of the maximum noise levels that would be generated by

construction of the proposed transmission line. These estimates ranged from 60 to 89 dBA in urban setback areas and from 63 to 77 dBA in suburban setback locations. The Company maintained that its noise impact estimates, which are based on a different type of project (excavation associated with the Big Dig), are conservative. The Company also emphasized that, due to the linear nature of the construction process, construction noise should affect any one location for only a short period of time. The Siting Board notes that, based on the expected rate of progress of 100 feet a day, any one home or business could be affected by several days of construction noise.

NSTAR stated that it would mitigate construction noise by: (1) using proper muffling on equipment; (2) ensuring equipment is well maintained; (3) using only properly sized and necessary equipment; (4) imposing idling limitations; and (5) prohibiting the use of diesel equipment before 7:00 a.m. The Company also indicated that it would limit the welding of splice sleeves to daytime hours. The Siting Board notes that these noise mitigation measures are consistent with approaches to mitigation relating to equipment that the Siting Board has accepted in the past.

Generally, construction noise impacts also would be minimized by confining work to daytime hours. However, two components of the transmission line construction process involve the potential for nighttime construction – cable splicing, and construction in areas of traffic congestion.

NSTAR has indicated that the cable splicing process would require around-the-clock work for seven to eight days at each of 31 manholes to be spaced 3,000 feet apart along the primary route. The Company's construction noise estimates indicate that cable splicing would generate L_{10} sound levels of 61 dBA at 50 feet, and 67 dBA at 25 feet. Existing nighttime L_{10} levels range from 51 to 71 dBA along the primary route, with the lowest levels being recorded late at night. A comparison of existing noise levels with noise levels likely to be generated by the cable splicing operation suggests that nighttime cable splicing could be disruptive in those residential areas where operations are in particularly close proximity to homes. The Siting Board therefore directs NSTAR to use portable noise barriers in nighttime periods to mitigate the noise impact of cable splicing wherever cable splicing operations are staged within 50 feet of a

residential structure.

NSTAR also is proposing nighttime construction for locations where daytime construction could result in traffic congestion, including much of Route 138 along the primary route and at discrete residential and commercial areas in Boston along all of the routes. Some of the nighttime construction would occur in commercial areas; however, the Company also has proposed evening (until 9:00 p.m.) construction in some areas of mixed or predominantly residential land use, including an approximately 1.5 mile route segment along Route 138 in Canton and an approximately 2.0 mile route segment along Route 138 in Milton. The estimated L_{10} sound levels resulting from construction activities – between 69 to 89 dBA at urban setbacks and 63 to 77 dBA at suburban setbacks – are slightly above evening and above late-night ambient late-night L_{10} levels measured along the primary route. The record also shows that setbacks of less than 100 feet are prevalent in some of the residential area along Route 138, including near the intersection with Randolph Road and the intersection with Washington Street, both in Canton. The record also shows that, while significant numbers of residences are located on both sides of Route 138 overall, residences are limited to the west side of the roadway along some segments of the route. The Company also intends to construct at night along portions of Cummins Highway, American Legion Highway, and Day Boulevard in Boston, and until 9:00 p.m. in a number of other commercial and residential areas within Boston.

NSTAR proposes to mitigate the noise impacts of nighttime construction by using low-noise equipment, by conducting noisier activities at the beginning of the night shift, and quieter activities later at night, and by ending construction by 9:00 p.m. in residential areas. The Company is not proposing to use physical mitigation, such as portable sound barriers, to reduce impacts of nighttime construction in residential areas.

The Siting Board recognizes that options for mitigating construction noise from a linear project such as a transmission line may be limited. However, the record shows that construction noise levels are likely to be significant at both urban and suburban setbacks. The record also shows that the Company may seek to install transmission lines using shifts extending into the evening along 3.5 miles of residential roadways – an effort that would involve approximately 180 standard work crew shifts. Further, the relationship of construction to residential receptors

would vary along the route, in that areas of residential development are located in different directions from the roadway, and at different setbacks. As a result of variation in the relationship of construction to residential development, the applicability of different mitigation approaches also could vary.

In Section III.C.2.b, above, the Siting Board directed NSTAR to develop an outreach program regarding traffic and property access for the entire route. Similarly, to address evening construction noise, the Company should develop noise mitigation plans in consultation with appropriate municipal officials and with the affected neighborhoods. Appropriate mitigation is likely to differ from neighborhood to neighborhood, based on residential density and setbacks and the level of background noise. However, if the Company's plans change, and late-night construction is scheduled in residential areas where other mitigation is infeasible or of limited effectiveness, possible measures could include:

* Using portable noise barriers along the ROW edge in areas where residences are confined to one side of the roadway and construction is along the same side, or
* Using portable noise barriers on both sides of the work area in locations where residences are on both sides of the roadway, and where less-than-suburban setbacks are prevalent (i.e., near the intersections of Route 138 with Randolph Road and Washington Street), if possible without undue interference with traffic; in the alternative, daytime construction could be used in these limited areas.
* Offering temporary accommodations for residents interested in relocation during construction.

Accordingly, the Siting Board directs NSTAR to develop a noise mitigation plan covering each residential area where nighttime construction would take place. In developing the plans, NSTAR should work with appropriate officials to develop an initial noise mitigation plan, conduct public outreach in that area, and then, based on public input, develop a final noise mitigation plan in consultation with appropriate officials. The plan also should include a description of the Company's outreach plan. NSTAR shall provide copies of the final noise mitigation plans to the Siting Board for its information.

The Siting Board notes that the Company's construction noise estimates may be

conservative, as they are based on construction noise estimates for the Big Dig. Further, in assessing existing ambient noise along the route, the Company measured noise only during the evening hours along the southern portion of the route, and only during late-night hours along the northern portion of the route. To develop an accurate basis for determining final evening noise mitigation plans, we recommend that the Company monitor the actual noise impacts of nighttime construction work undertaken early in the construction period in non-residential areas along the route. The Company should evaluate noise impacts for several representative setbacks – perhaps 25, 50, 75, 100, and 150 feet – for construction that involves use of the noisiest equipment and operations as well as construction that involves only quieter equipment and operations. The Company should share this information with the local officials with whom the Company is developing its noise mitigation plans.

The record indicates that, as a threshold matter, the Company plans to minimize the noise impacts of switching station and substation construction work by confining such work to daytime hours. However, the Host Community Agreement appears to allow the Company to schedule daily shifts of up to twelve hours, five days a week, at the Route 138 switching station site, subject only to a requirement that construction-related activities that generate noise cannot be undertaken after 7:00 p.m. Similarly, the most recent information from NSTAR suggests that it intends to undertake construction work from 7:00 a.m. to 7:00 p.m., Monday through Friday, at all substation sites. The Siting Board notes that regular, lengthy construction shifts that extend into the early evening hours may be disruptive to the surrounding neighborhoods, especially in seasons when outdoor activities extend to the evening. The Siting Board therefore directs NSTAR to develop construction outreach plans tailored to the neighborhoods surrounding the Hyde Park, Baker Street and K Street Substations, and the Route 138 switching station site, that provide the neighborhoods with regular updates on the timing and progress of work at these locations, provide advance notice when noisier activities are to be undertaken, and provide the neighborhoods with an opportunity to request changes in the scheduling of evening work activities if certain activities prove unduly burdensome.

The Siting Board finds that with the implementation of the above conditions, the noise impacts associated with construction of the proposed transmission project along the primary

route would be minimized.

The record indicates that the Company would 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. The record also indicates that the Company would employ the same mitigation measures (e.g. proper muffling, limited idling, proper sizing and equipment maintenance) for both routes. However, the routes differ in terms of the extent and distribution of residences and other sensitive land uses. In addition, as a result of differences in traffic volumes and congestion along the respective routes, the practicality and ease of construction during the day, the likely need for evening and nighttime construction, also differ.

Along its southern portion, up to the Boston line, the primary route passes fewer residences than either the alternative or the hybrid route - - an advantage for minimum construction noise impact. Over nearly 4 miles of this segment, the primary route passes no residences, compared to approximately 2.5 miles with no residences along the alternative and hybrid routes. However, because high traffic volumes and congestion are prevalent along much of Route 138, evening and possibly late-night construction may be undertaken along 5.7 miles in Canton and Milton and perhaps an additional 1.8 miles in Milton. Of this distance, 1.5 miles in Canton and 2 miles in Milton traverse primarily residential areas.

NSTAR also has proposed evening and nighttime construction in Boston affecting much of the in-common segments of the primary and hybrid routes. However, significant portions of the alternative route in Dorchester also are congested and traverse mixed use areas. Although not as long as the Boston portion of the primary and hybrid routes, the alternative route in Boston is disadvantageous for construction noise based on the prevalence of narrow streets and commercial segments, with the potential for conducting nighttime construction to minimize disruption to congested or commercial areas during the day.

As noted above, construction mitigation measures would be the same for both the SRA and Route 138 switching station sites. Construction at either switching station site is scheduled for approximately 18 months, although certain noisier phases of construction such as grading and foundation work would occur during the first six months. Because the SRA site is substantially smaller than the Route 138 site, construction noise levels at the site boundary would be higher for

the SRA site. However, the alternative switching station site is located in a commercial/industrial area, at a considerable distance from residences and sensitive receptors. Therefore, construction noise at the SRA site would affect fewer residents proximate to the site.

Overall, the primary route passes through fewer residential areas than either the alternative or the hybrid route, thus better minimizing noise impacts in residential areas. However, because of the existing traffic congestion along portions of Route 138, use of the primary route is likely to require evening construction in residential areas. In addition, construction of the new switching station at the Route 138 site is likely to be more disruptive than it would be at the SRA site. On balance, the Siting Board finds that the alternative and hybrid routes would be preferable to the primary route with respect to noise impacts associated with construction.

d. Hazardous Materials

i. Primary Route

(a) Transmission Lines

NSTAR noted that the transmission line would traverse areas in which natural soils are still present, but that much of the route would travel through areas where the soil consists primarily of urban fill and may contain oil or hazardous material (Exh. EFSB-G-1 at 4-3). The Company stated that it expects to remove all soil excavated from the cable trench from the site, most likely for use as landfill cover (Tr. 7, at 1043). The Company noted that a Licensed Site Professional ("LSP") will oversee construction, including soil handling and disposal (Exh. EFSB-G-1, App. G at 10; Tr. 7, at 1044). The Company indicated that if the construction superintendents notice signs of possible soil or groundwater contamination during construction, the LSP could arrange for additional testing and removal of the material as appropriate (Tr. 7, at 1045-1053). The Company noted that the types of soil contamination it would expect to find along the route would be associated with oil or gasoline spills, and that the soil would be suitable for use as landfill cover after treatment (id. at 1061). The Company stated that it would not stockpile any soil along the route, regardless of its characterization (id. at 1043).

NSTAR explained that under the Massachusetts Contingency Plan ("MCP"), it is required

to conduct pre-construction soil sampling and submit to MDEP a Utility Related Abatement Measures Plan ("URAM") for its proposed construction activities (Exh. EFSB-G-1, at 6-5 and App. G page 10). The Company indicated that the plan would include a review of existing conditions along the route, written plans for the handling and disposal of contaminated soil and/or groundwater, measures to limit the migration of any contamination, and provisions for the protection of construction workers and the public (id. at 6-5). The Company also noted that it has prepared a Construction Generated Soil Management Plan that details soil management procedures (Exh. EFSB-G-1, App. G, Att. G.3).

The Company stated that it reviewed MDEP records of "Tier Classified" oil or hazardous material sites[59] along the route and initially found 29 sites, including 3 from Everett Square to the K Street Substation (Exh. BECO-1, at 5-47, E-9). Upon more detailed investigation, however, the Company stated that within 100 feet of the proposed route, it found only 11 active hazardous waste sites north of the Neponset River, and none south of the river (Tr. 7, at 1040).[60] NSTAR explained that the remaining sites had either been closed or had been reclassified as Response Action Outcome, indicating that the sources of contamination had been abated and that a condition of no significant risk had been achieved (Exh. EFSB-G-1, at 4-7). Between Everett Square and the K Street Substation, the Company found three Tier-Classified sites (Exh. BECO-1, at 5-48).

The Company explained that it was further investigating the presence of contamination by collecting soil samples every 500 feet along the route in the approximate location where the trench will be built (Tr. 7, at 1040). NSTAR stated that the samples are being tested to determine whether the soil will meet standards for use as landfill cover material in Massachusetts (id. at 1040-1041).

(b) Route 138 Switching Station

The Company indicated that one Tier Classified site is located on the Route 138

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[59] "Tier Classified" refers to categories of sites contaminated with oil or hazardous materials as defined under the Massachusetts Contingency Plan. 310 CMR § 40.00.

[60] The Company stated that the American Legion Highway portion of the route contains five known contaminated sites (Exh. EFSB-1-G-S, Bulk Att. at 4-7).

switching station site (Exh. EFSB-HM-5). NSTAR stated that this designation resulted from a diesel fuel spill but that the current MCP status of the spill site indicates that it should not affect construction or the use of the Route 138 site as a switching station (id.; Tr. 7, at 1070). Through an environmental site assessment of the property, the Company's consultant identified a number of potential "environmental conditions" that indicated "an existing release, a past release, or a material threat of release" of hazardous substances or petroleum products; in each case, the consultant designated the impacts of these conditions as either unknown or unlikely to be significant (Exh. ST-29, at 7-1 to 7-2). The Company noted that some of the site preparation work, such as the removal of two underground storage tanks, would be overseen by an LSP (Tr. 7, at 1064, 1067-1068). The Company stated that soils on the site have been sampled, that some additional sampling would occur, and that the Company would accomplish any necessary remediation (id. at 1068).

ii Alternative and Hybrid Routes

(a) Transmission Lines

In its initial review of MDEP records of Tier Classified sites along the alternative route, the Company identified 16 sites, including three identified between Everett Square and K Street (Exh. BECO-1, at 5-47 to 5-48). Based on the information provided for the primary and alternative routes, the hybrid route passes 27-Tier Classified sites, including three between Everett Square and K Street (id. at 5-47, 5-48, E-9). However, NSTAR did not present any information regarding how many sites along the alternative or hybrid routes remained active, as it did for the primary route.

(b) SRA Switching Station

NSTAR stated that approximately 80,000 cubic yards of municipal solid waste would have to be moved from a portion of the SRA's former landfill site to accommodate the proposed switching station (Tr. 5, at 601; Tr. 13, at 1734). The Company indicated that it did not know whether any of the waste included hazardous materials, but expected that it would find some hazardous materials since the landfill had been in operation prior to the mid-1970s (Exh. EFSB-

HM-6 Att. at 4; Tr. 5, at 601). However, the Company noted that Conroy Development Corporation ("Conroy"), which is constructing a new recycling facility on another portion of the SRA property, has not found anything but municipal solid waste while removing landfill material from one portion of the site and repositioning it at the north end of the property (Exh. EFSB-HM-6; Tr. 7, at 997).

According to the Company, NSTAR and Conroy had been negotiating an agreement in which Conroy would bear all the costs of removing the landfill waste from 6.25 acres of the site, preparing a footprint for NSTAR's proposed switching station, and completing the associated permitting (Exh. ST-13; Tr 7, at 1002). The Company stated that the permitting necessary to excavate and move additional waste to accommodate the switching station would include the submission of a Notice of Project Change to MEPA and the modification of a permit from MDEP (Tr. 7, at 1005).[61] The Company estimated that these activities, including the removal of the waste, could take about seven or eight months (Tr. 7, at 998).[62]

iii. Analysis

The record is unclear regarding the precise number of contaminated soil locations the primary, alternative, or hybrid routes would traverse. However, the Company has detailed the

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[61] The Company stated that permits required from MDEP to prepare a portion of the site for the recycling facility included approval of a Corrective Action Design, an Authorization to Construct, and an Authorization to Operate (Exh. EFSB-HM-6 Att. at 5). In its comments on the Single Environmental Impact Report for the 345 kV transmission line project, MDEP stated that the landfill site "may not be used for non-landfill purposes (i.e., electrical substation) without the prior written approval of MDEP" (Exh. EFSB-G-1-S Bulk Att. at 9-8).

[62] The Company indicated that NSTAR and Conroy made little progress on their negotiations between late April and late July, 2004, but that as of August 19, 2004, negotiations were scheduled to resume (Tr. 13, at 1731-1732). The Company expressed concern that if an agreement has not been reached before the Siting Board directs NSTAR to use the SRA site, NSTAR would have to initiate eminent domain proceedings to acquire the portion of the site needed for the switching station (Exh. ST-13). The Company suggested that this could introduce site preparation and permitting difficulties, additional truck traffic for removal of the waste, and schedule delays (Tr. 7, at 1001, 1008, 1013-1014, 1087-1088; Tr. 13, at 1733).

measures it would take to identify contaminated sites before and during construction, and the procedures it would follow in those locations to minimize the migration of any hazardous materials encountered. The Company has indicated that such procedures would be performed under the supervision of an LSP. In addition, the record indicates that the project must be constructed in conformance with a URAM plan submitted to MDEP. These factors provide assurance that contaminated soils or groundwater encountered along the route would be handled appropriately, regardless of the number of instances of contamination. Thus, while there may be a cost differential associated with the number of contaminated sites encountered along each route, there does not appear to be a significant difference from an environmental standpoint.

Both potential switching station sites present possibilities that contamination will be encountered during site preparation. In neither case, however, does it appear that an appropriate level of remediation could not be achieved. As with the transmission lines, any differences in remediation necessary are more likely to translate into a cost differential, rather than environmental impacts associated with residual levels of contamination.

The Siting Board finds that the hazardous materials impacts associated with construction of the proposed transmission project along the primary route would be minimized. In addition, the Siting Board finds that the primary, alternative and hybrid routes are comparable with respect to hazardous materials impacts associated with construction.

e. Conclusions on Construction Impacts

The Siting Board has found that, with the implementation of certain conditions and mitigation, the land use, water resource, traffic, noise, and hazardous materials impacts arising from the construction of the proposed transmission project would be minimized. In comparing construction impacts along the three routes, the Siting Board has found that the primary route is preferable to the hybrid and alternative routes with respect to traffic impacts, that the hybrid and alternative routes are preferable to the primary route with respect to noise impacts, and that the three routes are comparable with respect to impacts to land use, water resources, and hazardous materials.

In comparing the three routes overall, the Siting Board notes that the noise impacts of construction along the primary route are amenable to mitigation, as evidenced by the conditions placed on this project in Section III.C.2.c, above. In contrast, the use of either the hybrid or the alternative route would require reopening significant stretches of Route 28 that have recently been rebuilt, while construction along the primary route could be coordinated with other planned road reconstruction projects along Route 138. The benefits of coordinated construction would be foregone if either the hybrid or the alternative route is chosen. Accordingly, the Siting Board finds that the primary route is preferable to the hybrid and alternative routes with respect to construction impacts.

3. Permanent Environmental Impacts

In this section, the Siting Board reviews the permanent environmental impacts associated with the proposed transmission lines, switching station and substations, including land use and water resource impacts, noise impacts, visual impacts, EMF impacts and impacts associated with hazardous materials.

a. Land Use and Water Resources

In this section, the Siting Board considers the permanent land use and water resource impacts of the proposed transmission project. Because the land use and water resource impacts of the transmission lines are limited to temporary construction impacts (see Section III.C.2.a, above), this analysis addresses only impacts at the proposed switching stations and substation sites associated with the project.

i. Primary Route - Route 138 Switching Station

As part of the proposed transmission project, NSTAR intends to construct a new switching station at a site along Route 138 in Stoughton that currently is occupied by a working sand and gravel operation, a mulching operation, and a retail nursery supply operation (Exh. BECO-1, at 5-18; Tr. 5, at 722). NSTAR stated that the switching station would occupy approximately four acres of the 14-acre parcel (Exh. BECO-1, at 1-12). The Route 138 site is

adjacent to and north of an existing 345 kV overhead line ROW (id.) A Town of Stoughton sewage pump station is located at the northeast portion of the site, at York Street (id. at 5-18).

The Company stated that the Route 138 site is zoned "Industrial", and that the proposed switching station is an allowed use at this site (Exh. BECO-3, at 9). The Company provided a map showing that the land to the west, northwest and southwest of the site is zoned "General Business", land to the south of the site is zoned "Residential Urban", and land to the southeast and northeast is zoned "Residential Suburban" (Exh. EFSB-G-8). A small wooded area to the east of the site (conservation land owned by the Town of Stoughton) is zoned "Industrial", and the area beyond the conservation land is Residential Suburban zoning (id.; Tr. 13, at 1706-1707).

NSTAR indicated that the nearest residence to the proposed facility, as measured from the southeast voltage compensator, is located 250 feet to the south of the voltage compensator, on Charles Avenue (Exh. EFSB-N-17).[63] The Company reported that there are approximately 175 to 180 residences within 1,700 feet of the fence line of the proposed facility, and noted that the majority are located south of the existing 345 kV transmission line ROW (Exh. ST-11). The Company identified as other sensitive receptors the New England Sinai Rehabilitation Hospital, located 790 feet from the closest substation equipment, and the Dawes Elementary School, located 2,230 feet away from the closest substation equipment (Exh. EFSB-L-32).

NSTAR described the Route 138 site as highly disturbed (Exh. BECO-1, at 5-18). The Company noted that the site currently is in industrial use, and that the Company's use also would qualify as industrial (Tr. 13, at 1745). The Company asserted that the switching station would have fewer impacts than the existing businesses at the site, which generate noise and fugitive dust from industrial and commercial traffic, and provide views of sand, gravel and mulching facilities (Tr. 5, at 713, 722-723).

NSTAR stated that the Route 138 site currently contains five centrally located drainage ponds, which are used as catch basins to wash gravel and move groundwater from the upland slope on the south side of the site to runoff basins on the north side (Exh. G-1, at 4-11). The

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63 The southeast voltage compensator is located in the southeast corner of the facility footprint, approximately 50 feet from the southern fence (Exh. EFSB-BECO-1, Fig. 1-10).

Company stated that it will develop and implement a drainage plan to control drainage and sedimentation on the site, and would install erosion controls to improve groundwater and sediment runoff (RR-EFSB-62).[64] The Company also indicated that it would construct a retaining wall south of the proposed facilities (Exh. EFSB-G-1, at 5-25). The Company noted that in addition to the drainage ponds, a small intermittent stream is located at the east end of the site (id. at 4-11). NSTAR stated that it would construct a new settling pond to slow the rate of flow from the stream and allow silt to settle before the stream exits the site (id. at 5-26).

The Route 138 site is located in the southeast corner of a Massachusetts Natural Heritage Priority Habitat area and Estimated Habitat area (Exh. BECO-1, at 5-34). NSTAR stated that, because the site and surrounding areas already are highly disturbed, the construction and operation of the switchyard would be unlikely to negatively affect the availability of any important species habitat (id.).

NSTAR stated that it will grant to the Town of Stoughton a conservation easement on a 1.9 acre parcel located on the eastern end of the site that would prohibit further development (Exh. RR-EFSB-62). The Company also agreed to convey to the Town of Stoughton a minimum of 10,000 square feet of property adjacent to the pump station (id.). NSTAR has agreed not to develop either an electric generating facility or a distribution substation on the site without prior Town approval (id.). However, NSTAR may expand the switching station facilities if a new transmission line is added to the site (id.).

ii Alternative and Hybrid Routes - SRA Switching Station

If the alternative or hybrid route for the transmission lines were used, NSTAR would construct a new switching station at the SRA site at the end of Technology Drive in Stoughton (Exh. BECO-1, at 5-20). NSTAR stated that the SRA site is adjacent to an existing 345 kV overhead line ROW off Technology Drive and near Route 24 (id. at 1-12). The SRA site was

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[64] The Stormwater Pollution Prevention Plan ("SWPPP") will govern all work that is undertaken at the site (Exh. EFSB-G-1, at 5-24). The Company indicated that the purpose of a SWPP is to demonstrate compliance with the requirements of the National Pollution Discharge Elimination System in consideration for the issuance of a Storm Water Construction General Permit (id. at App. G, att. G-1).

formerly operated as a municipal landfill and is being developed for other uses (Exhs. EFSB-L-23; BECO-1, at 5-20). The Company stated that the site is under a 99-year lease to Conroy (Exh. BECO-1, at 1-10, 1-12). The Company stated that construction is currently underway for a construction-debris recycling center on the parcel adjacent to the potential switching station site (Tr. 7, at 997)

The Company provided information showing that the SRA site is zoned Highway Business, and that the proposed switching station is an allowed use on the site (Exh. BECO-3, at 14). The area immediately surrounding the site also is zoned Highway Business, and that an extensive area of industrial zoning lies to the north and west (id. at App. A (att.)). NSTAR stated that the SRA site is surrounded by commercial and industrial land uses and that the site is in close proximity to commercial and retail uses, including a BJ's Wholesale Club and a Reebok Outlet (Exhs. BECO-1, at 5-23; EFSB-N-6; Tr. 5, at 616). Route 24, which is a heavily traveled divided highway, is approximately 450 feet west of the site, and the commercial and industrial development continues to the west of Route 24 (Exh. EFSB-N-6). NSTAR stated that the nearest residence is 1,700 feet away, located to the southeast on Paige Street in the Town of Avon (id.).

The Company stated that there are no ACEC's, estimated or priority habitat areas, or surface water bodies in the immediate vicinity of the SRA site (Exh. BECO-1, at 5-37; 5-42).

iii. Substations

(a) Hyde Park Substation

To accommodate the addition of the single-circuit 345 kV transmission line, NSTAR intends to add facilities to its existing Hyde Park Substation, and expand the substation site to the north using land currently owned by the MWRA as part of a pumping-station (Exh. BECO-1, at 1-15). The expansion of the Hyde Park Substation would increase the existing ⅔ acre substation development to 1 acre; the Company asserted that the new substation facilities would be generally consistent with existing facilities (Exh. EFSB-L-3). The Company indicated that the Hyde Park Substation site is industrially zoned; the surrounding zoning is industrial to the north and south, residential to the east along the opposite side of Hyde Park Avenue, and residential to

the west on the far side of an MBTA ROW (Exh. BECO-3, at 26, Att. C).[65] Along the southern boundary of the existing substation is a service center dedicated to NSTAR use ("NSTAR Service Center"), which is used for lay-down and storage of materials, but does not consist of any structures (Tr. 8, at 1205). The Service Center is located immediately to the south of the existing substation and is approximately 200 x 50 feet (Exhs. EFSB-G-1, Fig. 5.7-3; EFSB-L-14).

NSTAR stated that land uses around the Hyde Park Substation include the MWRA pump station to the north; transportation (MBTA tracks) along the western edge; residences along Hyde Park Avenue to the south, on the opposite side of Hyde Park Avenue to the east, and beyond the MBTA tracks to the west; and commercial uses to the north (Exh. EFSB-G-1, at 4-61) (see Section III.C.3.c, below for a further discussion of specific surrounding uses). The nearest residences are located directly across Hyde Park Avenue, and approximately 75 feet from the south property line, where there is a row of four triple-decker homes (id. at Fig. 5.7-3).

The Company stated that the Hyde Park Substation and the adjacent MWRA site both are highly disturbed sites surrounded by densely developed residential and commercial properties with essentially no wildlife habitat except for typical urban birds, and no wetlands (Exh. EFSB-G-1, at 4-20).

The Company stated that the MWRA pump station is listed in the Massachusetts Inventory of Historic and Archeological Assets of the Commonwealth, but not the National Register (Exh. EFSB-G-1, at 4-63). However, there is no transmission project-related work proposed for the pump station (id.). NSTAR indicated that construction lay down will be provided either offsite or at the NSTAR Service Center parking area located to the south of the Service Center, behind the triple decker residences (id. at 5-25).

(b) K Street Substation

To accommodate the addition of the two-circuit 345 kV transmission line, NSTAR stated it intends to add new substation facilities on four vacant acres of its existing K Street Substation

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[65] The site is located in an M-1 District, Restricted Manufacturing (Exh. BECO-3, at 26). The zoning district to the east and west is S-5, Single Family Residential (id., App. A (att.)).

site (Exh. BECO-1, at 1-16). NSTAR stated that the K Street Substation is bordered by K Street to the east, East First Street to the south, a Federal Express facility to the northeast, an environmental services facility to the northwest, a truck storage facility to the south, and the Reserved Channel to the west and north (Exh. EFSB-G-1, at 4-56, 4-61). The Company asserted that the proposed expansion would not be inconsistent with the industrial character of the site and the surrounding area (id. at 5-43). The site is located in a Waterfront Industrial zoning district, and the surrounding zoning is the same to east and west; to the south is Restricted Manufacturing (Exh. BECO-3, at 29 and App. A(att.). The Company stated the site also is located within the South Boston Waterfront Interim Planning Overlay District ("IPOD") (id. at 29).

NSTAR described the K Street Substation site as highly disturbed, and surrounded by densely developed residential and commercial properties with essentially no terrestrial wildlife habitat (Exh. EFSB-G-1, at 4-20). A portion of the site is formerly filled tidelands; however, the Company indicated the proposed project would not have an impact on flowed tidelands, and would not change the existing non-water dependent use of the tidelands (id. at 4-12). NSTAR indicated that it would be required to obtain a Chapter 91 permit from MDEP for the proposed alterations to filled tidelands on the site (id.; Tr. 13, at 1817). Further, the Company indicated that all construction work would be subject to the NSTAR EMCP and to any requirements contained in the Order of Conditions to be issued by the Boston Conservation Commission (Exh. EFSB-G-1, at 5-25).

(c) Baker Street Substation

To increase the capacity of the 115 kV pipe-type cables operating between the Baker Street Substation and the Hyde Park Substation, NSTAR stated that it intends to add a new heat exchanger at its existing Baker Street Substation (Exh. BECO-1, at 1-15). NSTAR stated that the Baker Street Substation is located in an urban area of Boston, across the street from a park and playing fields (Exh. EFSB-G-1, at 4-2). NSTAR stated that the new heat exchanger would be located approximately 275 feet from residences to the northeast (Exh. BECO-1, at Fig. 4-19). NSTAR further indicated that the site is located in a Community Commercial subdistrict, and the surrounding zoning is the same to south of the site, with zoning that is Local Industrial to the

west, Open Space Recreation to the east across Baker Street, and residential to the north and northeast (Exh. BECO-3, at 25, App. C).[66]

NSTAR indicated that the Baker Street Substation is a pre-existing non-conforming use and that the addition of the heat exchanger on this site would be an expansion of the pre-existing use (Tr. 13, at 1804). The Company indicated that, absent a zoning exemption from the Department, it would be required to come before the City of Boston Zoning Board to obtain a conditional use permit to install the new heat exchanger (Exh. BECO-3, at 25).

The Company noted that the Baker Street Substation is a highly disturbed and developed site with essentially no wildlife habitat or wetlands (Exh. EFSB-G-1, at 4-20).

iv. Analysis

As discussed in Section III.C.2.a, above, the land use and water resource impacts associated with the transmission lines are limited to temporary construction impacts. Consequently, the permanent land use and water resource impacts of the proposed project are limited to those resulting from the construction of the switching station or expansion of the station and substations.

The Route 138 site is zoned Industrial and the proposed switching station is an allowed use at that site under the Town of Stoughton Zoning Bylaws. The record indicates that the areas surrounding the Route 138 site are a mix of commercial and residential land uses, with commercial uses to the west, southwest and northwest, and residential uses to the northeast, east, southeast and south. Similarly, the surrounding zoning is a mix of commercial, industrial and residential. The Company has noted that the proposed switching station would have fewer impacts on nearby residences and businesses than the sand and gravel, mulching, and retail nursery supply businesses currently located on the site. However, the proposed switching station, while compatible with the existing transmission towers, would be of a different use and scale

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[66] The site is located in an Community Commercial district (CC) (Exh. BECO-3, at 26). The zoning district to the west is Local Industrial (LI); to the east is Open Space Recreation (OS-RC); and to the northeast is 1F-6000, One Family Residential, 6000 square foot lot minimum (id., App. C).

from the residential and open space uses in the vicinity of the site that would remain when the sand and gravel business closes. With regard to water resources, the record indicates that the five existing drainage ponds, as well as the new settling pond, would be incorporated into a drainage plan that would control drainage and sedimentation on the entire site.

The record indicates that the Hyde Park and K Street Substations are located in industrial zoning districts, while the Baker Street Substation is located in a commercial district. The land uses across from the Hyde Park and Baker Street Substations are residential and recreational, while the K Street Substation is located along an intensively developed waterfront industrial area of Boston with nearby residential uses. The K Street Substation expansion will be subject to review under Chapter 91 because it crosses historically filled tidelands; however, the expansion would have no impact on flowed tidelands and would cause no change to the existing non-water dependent use of the tidelands.

Accordingly, the Siting Board finds that the permanent land use and water resource impacts of the proposed transmission project along the primary route would be minimized.

The SRA switching station site is located in an industrial/commercial area and zoning district; the surrounding land uses are industrial and large scale commercial. The nearest development would be a recycling facility on SRA property that also is being developed by Conroy. There are no residential developments within ⅓ of a mile of the site. The site is a former landfill that to date has not been found to contain hazardous materials. The site is not located in an ACEC, and there are no Estimated or Priority habitat areas on the site; however, there is a small potential wetland resource on the eastern edge of the site.

In comparing the land use impacts of the two switching station sites, the Siting Board notes that both sites are industrially zoned and are currently used for industrial purposes, and that the proposed switching station would be an allowed use at either site. However, the SRA site is surrounded by other commercial and industrial uses, while there are low density residential areas to the northeast, east, southeast and south of the Route 138 site. In addition, there is an Estimated and Priority habitat area on the Route 138 site, while there is no similar area on the SRA site. In comparing the water resource impacts on the two switching station sites, the Siting Board notes that the Company intends to remediate existing drainage problems at the Route 138

site. There is a small potential wetland on the SRA site, but it likely would be unaffected by construction. Overall, the Siting Board finds that land use and water resource impacts would be slightly greater at the Route 138 site than at the SRA site; consequently, the Siting Board finds that the alternative and hybrid routes would be slightly preferable to the primary route with respect to permanent land use and water resource impacts.

b. Noise

In this section, the Siting Board considers the noise impacts associated with the operation of the proposed transmission project. Because the transmission lines, once in place, do not emit noise, this analysis focuses on the noise impacts at the switching stations and substations associated with the project.

i. Route 138 Switching Station

To estimate the noise impacts of the proposed Route 138 Switching Station, NSTAR analyzed noise levels in the vicinity of the proposed site and the expected changes in noise levels resulting from operation of the switching station equipment (Exhs. EFSB-G-1, at 4-45, 5-17; EFSB-NO-17). The Company stated that the only noise source at the new switching station would be the voltage compensator, which would contribute 66 dBA at 1 meter (Exh. EFSB-NO-17; Tr. 8, at 1118).

The Company measured background noise levels at four noise monitoring locations ("NML"), and calculated the lowest ambient sound levels based on the quietest hour from 96 hours of continuous measurements (Exhs. EFSB-NO-17; EFSB-G-1, at Fig. 4.8-3). The Company determined that existing nighttime L_{90} levels near the Route 138 site range from 33 to 35 dBA (Exh. EFSB-NO-17). At the nearest residence, located on Charles Avenue 250 feet south of the nearest voltage compensator, the quietest nighttime L_{90} level was 33 dBA (id.; Exh. EFSB-G-1, at Fig. 4.8-3). The Company also provided day-night sound levels ("L_{dn}")[67] at four

[67] The L_{dn} noise is the 24-hour A-weighted equivalent sound level, with a 10 dBA penalty added to measured sound levels during the hours between 10:00 p.m. and 7:00 a.m. (Tr. (continued...)

property line ("PL") locations: (1) 49.8 dBA at the southeast property line closest to Charles Street; (2) 50.4 dBA at the east property line at the Town of Stoughton-owned land; (3) 53.7 dBA at the northeast property line closest to York Street; and (4) 65.6 dBA at the southwest property line closest to Route 138 (Exhs. RR-EFSB-45; EFSB-G-1, at Fig. 4.8-3).

NSTAR then modeled future noise levels at four residential receptors and four PL receptors (Exh. EFSB-NO-17). The Company estimated that, in the absence of additional mitigation, nighttime L_{90} noise increases at residential receptors would range from 1 to 6 dBA, including: (1) an increase of 6 dBA to a level of 39 dBA to the south at the Charles Avenue residential receptor; (2) an increase of 1 dBA to a level of 36 dBA to the southwest at the Ewing Drive residential receptor; (3) an increase of 5 dBA to a level of 38 dBA to the north at the York Street residential receptor; and (4) an increase of 1 dBA to a level of 36 dBA to the east at the Darling Avenue residential receptor (id.). The Company indicated that nighttime L_{90} noise increases at the PL locations would range from 1 to 8 dBA, including: (1) an increase of 6 dBA to a level of 40 dBA at the southwest site boundary; (2) an increase of 8 dBA to a level of 41 dBA at the southern site boundary; (3) an increase of 1 dBA to a level of 36 dBA at the eastern site boundary; and (4) an increase of 7 dBA to a level of 40 dBA at the northern site boundary (id.).[68]

NSTAR agreed to construct a three-sided sound attenuation wall around the voltage compensator located closest to the residences to the south of the proposed facility (Exhs. RR-

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[67] (...continued)
11, at 1186). The Company stated that the U.S. Environmental Protection Agency ("EPA") recommends an outdoor L_{dn} level of 55 dBA or less for residential areas (id.).

[68] NSTAR stated that these estimates are conservative because its modeling assumed the operation of all four voltage compensators at full load, and no terrain shielding (Exh. EFSB-G-1, at 5-17). NSTAR noted that, while the four voltage compensators are likely to operate simultaneously, the amount of noise generated varies with load; thus, the voltage compensators would be quieter than modeled whenever they operate at less than full load (Tr. 11, at 1515). The Company also noted that the York Street residences are at a lower elevation than the switchyard; therefore the noise impacts for that area are likely overstated (id. at 1516).

EFSB-28(S); RR-EFSB-62).[69] The sound wall would be approximately 20 feet tall and 150 to 175 feet long, and would cost approximately $100,000 to $120,000 (Tr. 14, at 1902). The Company asserted that the sound attenuation wall would reduce the modeled noise at the closest residential receptors to 3 dBA or less above ambient noise levels (Exhs. RR-EFSB-28(S); RR-EFSB-62; Tr. 14, at 1901). NSTAR noted that, if after additional modeling, it appears that the Charles Avenue area would not achieve a noise increase of 3 dBA or less, it may be necessary to add a one- or two-sided sound wall to the next nearest voltage compensator to the south (Tr. 14, at 1904).

The Company stated that the estimated increases in L_{90} noise with operation of the switching station would be within the 10 dBA limit allowed by MDEP (Exh. EFSB-G-1, at 5-17).[70] NSTAR stated that the Town of Stoughton noise ordinance sets forth project noise limits by octave, equivalent to an A-weighted level of 45 dBA, and concluded that the voltage compensators would meet the Town of Stoughton noise requirements both at the nearest property line and at the nearest residence (Tr. 11, at 1521, 1524).

ii. SRA Switching Station

NSTAR stated that the only noise source at the SRA switching station would be the voltage compensators, which contribute 66 dBA at 1 meter (Exh. EFSB-NO-17; Tr. 8, at 1118). NSTAR stated it collected continuous sound level data for two locations near the SRA site: on the northern boundary near BJ's Wholesale Club and the Reebok Outlet, and at the southwestern corner of the site (Exh. RR-EFSB-46). The Company reported that the lowest measured L_{90} levels at these locations ranged from 43 to 45 dBA at night and from the low to mid 50 dBAs

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69 The easternmost voltage compensator, roughly equidistant between the end of Charles Avenue and the two homes on the south side of York Street, is the compensator closest to these residences (Tr. 14, at 1901).

70 MDEP administers 310 CMR § 7.10, to limit the sound impact of certain new stationary sources and to respond to complaints of certain excessive sound. The Company stated that MDEP regulates community noise according to MDEP Policy 90-001, which provides that a noise source should not increase L_{90} noise by more than 10 dBA over ambient levels, either at the source property line or at inhabited residences.

during the day (id.). NSTAR asserted that project-only noise levels would be higher at the SRA property lines than at the Route 138 site property lines because the SRA site was smaller (Tr. 11, at 1546).

NSTAR noted that the nearest residence to the SRA switching station site is 1,700 feet from the site (Exhs. EFSB-NO-6; ST-11). The Company therefore concluded that the noise increase from the proposed facility would be very close to zero at the nearest residence (Tr. 11, at 1544).

iii. Substations

(a) Hyde Park Substation

To estimate noise impacts of new equipment at the Hyde Park Substation, NSTAR analyzed existing noise levels in the vicinity of the proposed site and the expected changes in noise levels resulting from operation of the new equipment, including a transformer, which generates noise levels of 68 dBA at 1 meter, and a heat exchanger, which generates noise levels of 51 dBA at 50 feet (Exh. EFSB-NO-18).

The Company stated that it measured background noise levels at four NMLs, and calculated the lowest ambient sound levels based on the quietest hour from 96 hours of continuous measurements (Exh. EFSB-NO-18). The Company reported that existing nighttime L_{90} levels near the Hyde Park Substation ranged from 38 to 50 dBA (id.). At the nearest residence, located on Hyde Park Avenue 150 feet east of the new transformer, the quietest nighttime L_{90} level was 40 dBA (Exhs. EFSB-NO-18; EFSB-G-1, at Fig. 4.8-2). The Company also provided L_{dn} levels at four PL locations: (1) 73.5 dBA at the east property line on Hyde Park Avenue; (2) 67.2 dBA at the north property line at the MWRA property; (3) 73.6 dBA at the west property line at the MBTA ROW; and (4) 67.8 dBA at the south property line at the NSTAR Service Center (Exhs. RR-EFSB-43; EFSB-G-1, at Fig. 4.8-4).

NSTAR then modeled future noise levels at three residential receptors and four PL receptors (Exh. EFSB-NO-18). The Company estimated that, in the absence of further mitigation, nighttime L_{90} noise increases at residential receptors would range from 1 to 7 dBA, including: (1) an increase of 2 dBA to a level of 46 dBA to the south, at a residential receptor on

Hyde Park Avenue; (2) an increase of 6 dBA to a level of 46 dBA to the east, at a residential receptor across Hyde Park Avenue; and (3) an increase of 7 dBA to a level of 46 dBA to the west, at a residential receptor beyond the MBTA ROW (Exh. EFSB-NO-18). The Company indicated that nighttime L_{90} noise increases at the PL locations would range from 1 to 23 dBA, including: (1) an increase of 13 dBA to 53 dBA at the eastern site boundary; (2) an increase of 16 dBA to 54 dBA at the northern site boundary; (3) an increase of 23 dBA to 62 dBA at the western site boundary; and (4) an increase of 1 dBA to 51 dBA at the southern site boundary (Exh. EFSB-NO-18; Tr. 11, at 1480).

NSTAR noted that the modeled noise increases are worst-case scenarios that assume maximum noise output from the heat exchanger and transformer (Exh. EFSB-G-1, at 5-18; Tr. 11, 1496; Tr. 14, at 1851). The Company noted that the heat exchanger and transformer likely would be operated at well below their full power rating at night, since demand on the grid is lower at night than during the day (Tr. 11, at 1496-1497). NSTAR also indicated that the maximum noise from the heat exchanger occurs when the two fans included as part of the equipment are both operating (Tr. 14, at 1852). The Company stated that this would occur only during a sustained period of high-load operation, which typically would occur only in a contingency situation (id. at 1859). NSTAR also noted that a second heat exchanger is to be installed at the other end of the connected circuit at the Baker Street Substation, and indicated that it could rely more heavily on that heat exchanger to reduce noise impacts at the Hyde Park Substation (id. at 1851).

The Company asserted that the projected noise levels met MDEP noise guidelines and City of Boston requirements (Exh. EFSB-NO-21(S))[71]. However, the Company noted that, for approximately $80,000, it could install a sound wall on the Hyde Park Avenue side of the

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[71] The City of Boston noise regulations set maximum allowable nighttime noise levels of 50 dBA in residential districts and 55 dBA in residential/industrial districts (Exhs. EFSB-NO-27; EFSB-G-1, at 5-18; 5-19). The Company asserted that the 50 dBA limit would apply at the residences on the east side of Hyde Park Avenue, and the 55 dBA limit would apply at the west side of the railroad ROW, and to the residences to the south (Tr. 11, at 1498). NSTAR asserted that since noise from the substation would not exceed 45 dBA at any residence, the substation would be in compliance with the 50 dBA limit (id.; Exh. EFSB-NO-18).

transformer, which could hold noise increases to 3 dBA or less at the closest residence to the east of the site (Exh. EFSB-NO-21(S)). Based on its initial design analysis, the Company expected that the sound wall would be approximately 100 feet long and 20 feet above grade and that to provide adequate clearance it would be placed 30 feet from the transformer building (id.; Tr. 14, at 1868-1869). The Company noted that the clearance requirement for the sound wall may leave insufficient space, along its length, for a segment of the landscaping the Company has proposed bordering Hyde Park Avenue (Tr. 14, at 1867-70).[72] NSTAR stated that there is not enough space to install a sound wall at the western edge of the site because the heat exchanger and other equipment abut the west property line (id.; Tr. 11, at 1489-1490).

(b) K Street Substation

NSTAR stated that it proposes to install two voltage compensators and two transformers at the K Street Substation, and that this equipment will be located at least 600 feet from the nearest residences at the intersection of K Street and East First Street (Exh. EFSB-G-1, at 5-20).

To determine the noise impacts of the new equipment at the K Street Substation, NSTAR analyzed noise levels in the vicinity of the substation and the expected changes in noise levels resulting from operation of the new equipment (Exh. EFSB-NO-20). NSTAR explained that it determined the lowest ambient sound level based on the quietest hour from 96 hours of continuous measurements (id.). The Company stated that the future noise levels at the substation reflect the use of quiet voltage compensators, which generate noise levels of 66 dBA at 1 meter, and transformers, which generate noise levels of 68 dBA at 1 meter (Tr. 11, at 1504). The Company measured background noise levels at two NMLs, and modeled future noise levels at one residential receptor and one PL receptor (Exh. EFSB-NO-20). The Company indicated that: (1) L_{90} noise levels at the nearest residential receptor, located to the southeast of the substation, would increase by 2 dBA to a level of 46 dBA; and (2) L_{90} noise levels at the nearest property

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[72] The Company cited its proposed layout, which shows that a portion of the transformer building would be set back 30 feet from Hyde Park Avenue, although the building setback varies, increasing by over 5 feet from the nearest corner to the opposite front corner (Exh. EFSB-G-1, at figs. 2.6-2, 4,8-4; Tr. 14, at 1856-1870).

line, located to the west of the substation, would increase by 5 dBA to a level of 54 dBA (id.).

(c) Baker Street Substation

NSTAR stated that it proposes to install a new heat exchanger at the Baker Street Substation, which would generate noise levels of 51 dBA at 50 feet, and that this equipment would be located at least 275 feet from the nearest residences (Exhs. BECO-1, at1-15, Fig. 4-19; EFSB-NO-19).

To determine the noise impacts of the new heat exchanger at the Baker Street Substation, NSTAR analyzed noise levels in the vicinity of the proposed site and the expected changes in noise levels resulting from operation of the proposed facility (Exh. EFSB-NO-19). NSTAR stated that it determined the lowest ambient sound level based on the quietest hour from 24 hours of continuous measurements (id.). The Company measured background noise levels at one NML, and calculated future noise levels at two residential receptors and one PL receptor (id.). The Company's modeling indicated that L_{90} noise at the two residential receptors would not increase, and that L_{90} noise at the nearest property line would increase by 1 dBA to a level of 52 dBA (id.).

iv. Analysis

As discussed in Section III.C.2.c, above, the operation of the proposed transmission line will not cause noise impacts. Thus, any permanent noise impacts associated with the proposed transmission project would be limited to the associated above-ground facilities, including the Route 138 Switching Station, the Hyde Park Substation, the K Street Substation, and the Baker Street Substation.

In previous cases, the Siting Board has reviewed the noise impacts of proposed facilities for general consistency with various applicable governmental limits or guidelines, including MDEP's noise policy, EPA day-night noise ("L_{dn}") guideline, and local noise regulations. Nickel Hill Energy, LLC, 11 DOMSB 83, at 180-190 (2000); Mirant Kendall, 11 DOMSB 255, at 337-345 (2000); Sithe West Medway Development, LLC, 10 DOMSB 1, at 322 (2000); Altresco Pittsfield, Inc., 17 DOMSC 351, at 401 (1988). In previous transmission line reviews that

included substations, the Siting Board has reviewed results of noise analyses presented by the applicant to assess whether the proposed substation would produce sound levels audible in surrounding community areas, or noise impacts that are inconsistent with relevant regulatory limits or guidelines for community noise. Boston Edison Company, 6 DOMSB at 297-299, 313-315 (1997) ("1997 BECo Decision"); Norwood Municipal Light Department, 5 DOMSB 109, at 166-167, 181 (1997) ("Norwood Decision"); New England Power Company, 5 DOMSB 1, at 68 (1996) ("1996 NEPCo Decision"). Noise analyses in reviews addressing substation noise have focused on nighttime noise impacts, based in most cases on the L_{90} measure of residual noise used in MDEP's noise policy. 1997 BECo Decision, 6 DOMSB at 297-299, 313-315; Norwood Decision, 5 DOMSB at 166-167, 181.

The record demonstrates that NSTAR has committed to installing noise mitigation at the Route 138 Switching Station that would limit the maximum increase in L_{90} noise at residential receptors to no more than 3 dBA – a change that would not be perceptible.[73] The noise mitigation would consist of a three-sided sound wall surrounding the voltage compensator closest to Charles Street. NSTAR also has stated it would add one or two sound walls to the next closest voltage compensator if necessary to reduce modeled noise impacts to 3 dBA or less. The Siting Board concludes that noise impacts at the Route 138 switching station would be minimized.

With regard to the Hyde Park Substation, the record demonstrates that noise increases at the property line would be 13 dBA to the east, fronting on Hyde Park Avenue, and 23 dBA to the west, bordering the MBTA railroad ROW. The expected property line noise increases, including those along the Hyde Park Avenue frontage, are clearly in excess of 10 dBA. The Siting Board notes, however, that the 23 dBA property line increase to the west would affect a railroad ROW, and not an area of residential use or direct access by the public.

At the nearest residential receptors, located further from facility noise sources, noise increases would be 6 dBA to the east across Hyde Park Avenue, and 7 dBA to the west beyond

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[73] In prior cases, the Siting Board has reviewed projected ambient increases in the L_{90} sound level; in such cases, witnesses have testified that increases in ambient sound of less than 3 dBA would not be perceptible as an increase in noise. See ANP Blackstone, 8 DOMSB 1, at 159; Nickel Hill Energy LLC, 11 DOMSB 83, at 181 (2000); MMWEC Decision, 11 DOMSB at 181.

the MBTA ROW. The maximum noise increases at residences, although less than MDEP's 10 dBA limit, would exceed the minimum level to be perceptible and would affect an area where ambient noise already is high. The record also demonstrates that existing L_{dn} levels in this area are well above the 55 dBA guideline identified by EPA as the level requisite to protect public health and welfare with an adequate margin of safety. Given that outdoor ambient noise levels already are high, and that a perceptible increase in noise is expected with operation of the new equipment, there is reason for the Company to implement cost-effective measures to limit noise increases at residential receptors closest to the Hyde Park Substation site.

NSTAR has indicated that, at an estimated cost of $80,000, it could install a 20-foot high, 100-foot long sound wall to the east of the substation, inside the fenceline along Hyde Park Avenue. The sound wall could reduce the noise increase at the nearest residential receptor to the east from 6 dBA to 3 dBA or less – a level at which the increase would not be perceptible. The expected increase of 13 dBA at the property line also would be reduced. Given the existing high noise levels at the Hyde Park Substation, the Siting Board concludes that installation of the sound wall may be warranted to minimize noise impacts consistent with minimizing cost.

However, the record also shows that the sound wall, if installed, would be placed in a limited space in proximity to new landscaping, including decorative fencing and arborvitae plantings, which the Company proposes to install along Hyde Park Avenue (see Section III.C. 3.c, above). Thus, while finding merit in the option of additional noise mitigation in the form of a sound wall, the Siting Board recognizes that the design of any noise mitigation should be coordinated with the design of project landscaping, particularly to the extent that such landscaping is intended as mitigation for the visual impacts associated with the proposed project. Further, given NSTAR's request for exemption from site plan review for the substation expansion, the Siting Board concludes that the City of Boston should be consulted about any plan for physical noise mitigation measures.

Estimated residential noise impacts to the west of the Hyde Park Substation site are similar to those estimated to the east, absent the additional sound wall mitigation discussed above. However, at least two other factors affect the appropriateness of providing additional noise mitigation to the west of the site. First, project noise to the west is dominated by the new

heat exchanger, which was assumed to have maximum noise levels that would occur in the daytime under contingency conditions. Given that the estimates of project noise to the west reflect a level of equipment operation expected during the day, the Company's analysis likely overstates maximum nighttime noise to the west. Second, the Company has maintained that there is no space available to the west of the facility to install a sound wall on NSTAR property.

Therefore, in order to minimize noise impacts at the Hyde Park Substation consistent with minimizing visual impacts, the Siting Board directs NSTAR to consult with the City of Boston and neighboring residents on its noise mitigation plan for the Hyde Park Substation and options to further reduce nighttime L_{90} increases from the project at residences east of the site, across Hyde Park Avenue. As part of this consultation, NSTAR shall develop a refined noise mitigation option based on the sound wall approach described in the record that would reduce nighttime L_{90} increases at residences east of the site to no greater than 3 dBA, while also minimizing the sound wall's visual impacts and providing the greatest possible implementation of the Company's proposed landscaping plan. In addition, NSTAR shall develop one or more additional noise mitigation options that entail less visual impact or interference with landscaping, and shall provide information on the level of noise mitigation that could be achieved under these options. NSTAR shall consult with appropriate City of Boston officials and neighboring residents as to the relative desirability of the Company's proposed noise plan (which does not incorporate a sound wall) and the options for additional noise mitigation, and shall develop and implement a final noise mitigation plan based on these consultations. NSTAR shall report to the Siting Board on these consultations and on the opinions of the City of Boston and neighboring residents on its final noise mitigation plan for the Hyde Park Substation. The Siting Board finds that, with implementation of the above condition, the noise impacts of the Hyde Park Substation would be minimized.

The noise increase at residential receptors in the vicinity of the Baker Street and K Street Substations, are zero and two respectively, which are below perceptibility. Overall, the Siting Board finds that with the implementation of the above condition, the permanent noise impacts of the proposed transmission project along the primary route would be minimized.

In comparing noise impacts along the primary, alternative, and hybrid routes, the Siting

Board notes that the noise impacts of the Hyde Park, K Street and Baker Street Substations would be the same for all routes. Thus, differences in noise impacts are limited to the differential impacts of the new switching station at the Route 138 site and at the SRA site. The record indicates that noise increases at the Route 138 site have been reduced to only 3 dBA at the closest residence to the switching station. The record also indicates that property line noise impacts are likely to be higher at the SRA site than the Route 138 site, due to the smaller size of the SRA site. However, it is likely that use of the SRA site would not result in increases over existing ambient noise levels at any residential locations, due to the distance from the site to the nearest residential areas. The record shows that commercial uses, including retail stores, are located adjacent to the SRA site; however, while the proximity of such uses and the small size of that site provide limited buffer, noise impacts would be limited to daytime and early evening periods when ambient noise levels are higher than the nighttime ambient conditions which underlie the noise analysis at the Route 138 site. Thus, on balance, the SRA site provides no significant advantage or disadvantage for minimizing noise impact relative to the Route 138 site.

Accordingly, the Siting Board finds that the primary route, the alternative route and the hybrid route would be comparable with respect to permanent noise impacts.

c. Visual

In this section, the Siting Board considers the visual impacts of the proposed transmission project. Because the transmission lines would be located underground along both the primary and alternative routes, except at bridge crossings, this analysis focuses primarily on the visual impacts at switching stations and substations associated with the project.

i. Primary Route

(a) Transmission Lines

NSTAR noted that the proposed transmission lines would be located underground along almost their entire route, and asserted that there would be no permanent visual impacts associated with the underground transmission lines (Exhs. EFSB-G-1, at 5-31; BECO-1, at 5-24, 5-25). At bridge crossings, the transmission lines would be installed in pipe chases beneath the deck of the

bridge, or in a sidewalk; the Company noted that these pipes would be visible at the Southeast Expressway (Exh. EFSB-G-1, at 5-31).

(b) Route 138 Switching Station

The Company stated that the Route 138 switching station would include six new monopole transition poles, ranging from approximately 60 feet to 125 feet high, to be located in an existing transmission ROW, and two incoming line bridges, 60 feet high, and shielding masts at approximately 100 feet to 120 feet high (Exhs. BECO-1, at 1-13; EFSB-G-1, at 2-17; ST-57;. RR-EFSB- 58). NSTAR stated that the switching station also would include four voltage compensators, each comprised of a main tank approximately 22 feet high, and entrance bushings to which the 345 kV line would be connected at a maximum of 30 feet above ground (id.). NSTAR indicated that approximately two-thirds of the 345 kV bus work would be approximately 22 feet high, and that the remainder would be approximately 38 feet high (id.). The Company stated that it would use a rigid bus design, with 22-foot high supports, rather than the 40-foot high A-frame supports initially proposed (Exh. RR-EFSB-28(S)).

The new switching station would be built on a site currently occupied by a working sand and gravel operation, a mulching operation, and a retail nursery supply operation (Exh. BECO-1, at 5-18; Tr. 5, at 722). A Town of Stoughton sewage pump station is located at the northeast portion of the site at York Street (Exh. BECO-1, at 5-18). NSTAR noted that the site presently has 345 kV lattice-structure towers that are approximately 130 feet high located in the ROW (Exh. EFSB-L-3). The Company stated that residences at the end of Charles Avenue, located along the southern border of the site in close proximity to the ROW, have clear views of the existing transmission towers and ROW, and that residences along Ewing Drive, located along the southeastern border of the site, have views of the existing transmission towers, the ROW, and stockpiles of sand and gravel along the southeastern border of the site (Exh. EFSB-G-1, at 5-32, 5-39).

The Company stated that the switching station equipment would be located on approximately four acres of the 14-acre parcel, toward the intersection of Route 138 and York Road, and well below the grade of these roads (Exhs. BECO-1, at 1-12; RR-EFSB-60, Fig. 1;

RR-EFSB-51).[74] The Company noted that a small area of vegetation located east of the pump station between the northern fence line and the northern property border would be removed during construction (Exh. EFSB-L-25). However, the Company stated that existing mature vegetation on the north and east would not be cleared (Exhs. EFSB-G-1, at 2-19; EFSB-L-2).

Pursuant to the Host Community Agreement, NSTAR has agreed to take reasonable steps to ensure that, to the extent feasible, abutters and passersby to the site would not have an unobstructed view of the switchyard facilities, except for the take-off towers and structures and the lightning masts (id.). The Host Community Agreement specified that A-frame structures originally proposed adjacent to the voltage compensators would be eliminated in favor of a rigid-bus design, and that the Company would construct a berm parallel to Route 138 and place vegetation on top of the berm to provide a buffer to the line of site from Route 138 (id.). NSTAR agreed to solicit input from the Town regarding the layout and type of vegetative screening to be used on site for screening purposes, but that the Company retains sole discretion as to landscaping design and materials (id.).

During the proceeding, NSTAR provided additional information regarding its plans for visual mitigation at the Route 138 site. Along Route 138 and a northwest portion of York Street, the Company proposed planting a mix of 71 evergreen trees 8 to 12 feet tall, 48 smaller white pines 4 to 5 feet tall, 15 understory trees, and 6 canopy trees (Exhs. RR-EFSB-51; RR-EFSB-49; EFSB-L-5). These trees would be planted atop a 10- to 12-foot natural earth berm to be constructed roughly parallel to Route 138 and running a short distance along York Street, for a total of approximately 1,500 feet (Exh. RR-EFSB-28(S); Tr. 14, at 1905). NSTAR stated that it would loam and seed approximately 2.2 acres of the substation site between Route 138/York Street and the switching station fence line (Exh. RR-EFSB-51).

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[74] The Company explained that the elevation of the switching station yard would range from approximately 214 feet on the north side near York Street, to 218 feet on the southerly portion (Exhs. EFSB-G-1, at 5-31; RR-EFSB-51; RR-EFSB-60). According to the Company, the switching station yard therefore would be considerable lower than the western frontage of the site, which ranges from approximately 232 feet at the York Street/Route 138 intersection to 240 feet at the southwest corner along Route 138 (Exh. RR-EFSB-60). The yard would be lower than the existing grade of 248 feet to the south of the switching station (Exhs. ST-57a; RR-EFSB-60).

The Company stated that it is considering additional on-site landscaping, off-site landscaping or a combination of the two to buffer views from the residential areas along Charles Street and Ewing Street to the south of the switching station (Exh. EFSB-L-27). The Company suggested that 60 evergreen trees, 75 small evergreen trees, and 100 shrubs, planted primarily to the southeast of the proposed facility on currently disturbed land, could screen views from residences along Charles Street, Ewing Street, and York Street (Exh. RR-EFSB-51). The Company has also suggested that a 10- to 12-foot berm, similar to that proposed for the western portion of the site, could be installed on the southeastern portion of the site to improve the screening effect of the plantings in that location (id.; Exh. RR-EFSB-49; Tr. 14, at 1907). The Company stated that such a berm could screen views from Ewing Street, but that the existing transmission ROW would preclude the installation of a berm that would help screen views from the residences along Charles Street (Exh. EFSB-RR-49).

The Company estimated that the on-site landscaping costs for the landscaping as discussed above, excluding the berm, would be approximately: (1) $165,000 for the Route 138/York Street area, which includes trees, bark mulch, and loaming and seeding; (2) $100,000 for the York Street/Charles Avenue/Ewing Street area for trees and bark mulch; and (3) $110,000 for the loam and seeding of approximately 4 acres of open areas to the east and southeast (Exh. RR-EFSB-51).[75] In addition to the costs provided, NSTAR estimated that the added cost to provide additional taller deciduous plantings of 15 to 20 feet high, would be approximately $2,000 to $3,000 per tree, and that the added cost for comparable evergreen trees would be $4,000 to $6,000 (Exh. RR-EFSB-49; Tr. 14, at 1913-1914).

NSTAR identified the two homes at the end of Charles Street, and possibly three homes on Ewing Street, that could benefit from off-site landscaping (Tr. 13, at 1714; Tr. 14 at 1917). Given the difference in elevation between the facility yard and the areas south of the facility, the Company indicated that relatively low screening plantings or fencing placed close to the two homes at the end of Charles should effectively screen views of the switching station equipment,

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[75] For the Route 138/York Street area, the trees and bark mulch costs are between $75,000 to $80,000 and the loam and seed cost for 2.2 acres is between $80,000 to $85,000 (Exh. RR-EFSB-51).

with the exception of the upper portion of the bridge structure and the shielding masts (Exh. RR-EFSB-60). The Company stated that placing evergreens along the rear yards of two or three residences along Ewing Street could reduce or eliminate sightlines to the proposed switching station from those residences (Exh. RR- EFSB-51). NSTAR noted that it has retained a landscape architect to work with affected landowners on the selection of appropriate plantings (Exhs. EFSB-L-26; EFSB-L-27; Tr. 13, at 1714).

Overall, the Company concluded that its proposed mitigation, including landscaping, berming, and structural changes, would shield views of the switching station from Route 138, York Street, and Charles Street (Exh. RR-EFSB-28(S); Company Brief at 136).

During the proceeding, the Town of Stoughton and NSTAR considered the use of gas-insulated switchgear ("GIS") as an option for visual mitigation for the proposed switching station. The Company noted that GIS equipment relies on sulfur hexaflouride ("SF_6") gas as an insulating medium, rather than air, allowing a smaller equipment footprint (Exh. EFSB-ST-2). NSTAR estimated that, for an incremental cost of $4.8 million, it could install a hybrid GIS system[76] at the Route 138 site, which would reduce the overall switchyard footprint of approximately 3.8 acres, by up to one-third (Exhs. RR-EFSB-28(S); RR-EFSB-26; Tr. 14, at 1871). NSTAR indicated that a full GIS switchyard could be installed at an incremental cost of $8.24 million; the Company did not estimate the footprint reduction that would result from using a full GIS system, but asserted that the footprint would not be significantly smaller than that of the hybrid GIS switchyard (id.; Tr. 14, at 1896, 1897). NSTAR stated that the use of GIS would not reduce the height of the take-off structures (the most visible component of the substation), or the size or height of the voltage compensators (id.).

The Town of Stoughton's witness provided a sketch of the Route 138 site using a hybrid GIS arrangement which shows the switching equipment occupying approximately 1.24 acres, or less than one third of the area required for the open-air switchyard (Exh. RR-EFSB-58a). However, this layout used a six-breaker configuration, rather than the eight-breaker configuration

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[76] In a hybrid GIS system, the gas insulated switching equipment would be connected to the four voltage compensators using air-insulated equipment, while in a full GIS system, all connections would be made using gas-insulated equipment (Tr. 14, at 1890).

proposed by NSTAR (id.; Exh. RR-EFSB-59).

NSTAR stated that it would provide the switching station with high-pressure sodium lighting; however, standard operation would require no lighting (Exhs. EFSB-G-1, at 2-17). The lighting would generally be used only during emergency conditions, or for maintenance activities that can only be completed in the evening (id.).

ii. Alternative and Hybrid Routes

(a) Transmission Lines

The Company stated that the proposed transmission lines would be located underground from the SRA Switching Station to the terminus at the K Street and Hyde Park Substations (Exh. BECO-1 at 5-25). The Company asserted that there would be no permanent visual impacts associated with the underground transmission lines (id.). NSTAR asserted that the visual impacts of alternative and primary routes are comparable (id.).

(b) SRA Switching Station

As part of the transmission project along the alternative route, NSTAR would construct a new switching station at the SRA site. The switching station equipment would be the same as that installed at the primary site (Exh. BECO-1, at 1-12-1-14). The SRA site is a former landfill site traversed by existing 345 kV transmission facilities, including 130-foot high lattice towers; it has no existing vegetative screening (Exhs. EFSB-L-2; EFSB-L-3). The Company stated that the SRA site is located in a retail/commercial/warehousing area; the nearest residence is 1,700 feet away, and there currently are no sensitive receptors in the vicinity of the site (Exhs. BECO-1, at 5-24; EFSB-NO-6; EFSB-L-5). However, the Company noted that the large number of customers who frequent commercial businesses in the area would have unobstructed views of the proposed switching station facilities (Tr. 5, at 616 -618).

The Company did not propose visual mitigation for the SRA site, stating that the design of the substation and the size of the site leave limited available space to provide screening (Exhs. EFSB-L-5; EFSB-RR-51; Tr. 8, at 1219-1221). However, the Company stated that it would be possible to install limited landscaping, consisting of shrubs and/or compact evergreen trees,

along the western and northern perimeter of the site, as well as loam and seed along the entire perimeter (Exh. RR-EFSB-51). The Company estimated that the cost of this landscaping would be between $50,000 to $75,000 (id.).

Overall, NSTAR asserted that the visual impacts of a new switching station at the SRA site would be more significant than those of a new switching station at the Route 138 site, citing the unobstructed views of the SRA site from commercial businesses in the area, and the visual mitigation planned for the Route 138 site (Tr. 5, at 616 -618; Company Brief at 136).

iii. Substations

(a) Hyde Park Substation

The Hyde Park Substation is bounded on the north by the MWRA pump station facility, to the east by Hyde Park Avenue and residences across the street, to the south by the NSTAR Service Center and four triple decker residences, and to the west by MBTA tracks (Exhs. EFSB-G-1, at 4-56; EFSB-L-14). The Company stated that the site is surrounded by a chain link fence with some low shrubbery located along Hyde Park Avenue inside of the fence (Exhs. EFSB-L-5; EFSB-L-6). NSTAR stated that beyond the railroad tracks, a band of vegetation varying in width from approximately 30 feet to 150 feet extends from opposite the pumping station to opposite the Service Center (Tr. 8, at 1200). The Company noted that at present, the four residences immediately to the south of the substation have views of the NSTAR Service Center parking area and the existing substation facilities, somewhat mitigated by the fencing (Exh. EFSB-G-1, at 5-43).

As part of the transmission project, NSTAR intends to install new equipment at the Hyde Park Substation, including an autotransformer 35 feet high, GIS equipment between 12 and 32 feet high, a 10- to 12-foot high control house, and a 10-foot high heat exchanger (Exh. EFSB-L-31). The substation will be provided with high-pressure sodium lighting; however, the lighting generally would be used only during emergency conditions, or for maintenance activities that can only be completed in the evening (Exh. EFSB-G-1, at 5-40).

The Company stated that it is proposing to provide new 8-foot high chain-link black vinyl fencing with brick columns along Hyde Park Avenue to screen views of the expanded substation

from Hyde Park Avenue (Exh. EFSB-L-6). The same fencing, without brick columns, would be placed along the southern border of the site (Tr. 8, at 1200). The Company indicated that it also proposes to plant 5- to 6-foot arborvitae, or similar evergreen shrubbery, along Hyde Park Avenue, and along approximately 80 feet of the southern boundary of the site and approximately 100 feet of the northern boundary (Exhs. EFSB-L-5; EFSB-L-6; EFSB-RR-31(a)). NSTAR explained that the vegetative screening proposed along the southern boundary is intended to extend from Hyde Park Avenue to the back edge of the nearest residence to the south (Exhs. EFSB-L-6(a); EFSB-RR-30). The Company has indicated that plantings along the southern boundary could be extended another 15 to 20 feet to provide screening to the rear porches and backyards of the triple deckers (Tr. 8, at 1184). NSTAR noted that discussions with the City of Boston regarding the Hyde Park Substation have focused on the appearance of the substation, as well as operational issues (Tr. 13, at 1815).

The Company asserted that, due to the bank of the MBTA tracks and the vegetation along the western side of the MBTA tracks, the residences to the west would have very limited views of the new equipment (Exhs. EFSB-G-1, at 5-40; RR-EFSB-31).

(b) K Street Substation

NSTAR stated that the proposed expansion of the present K Street Substation would occur on a vacant portion of the developed 14-acre site (Exh. EFSB-L-3). NSTAR asserted that the new substation equipment would be generally consistent with the existing substation facilities (id.). The proposed expansion, to be situated to the north of the existing distribution-level facilities, would be set back approximately 400 feet from East First Street on the western portion of the site and approximately 800 feet north of East First Street on the eastern portion of the site (Exh. EFSB-G-1, at Fig. 4.8-6). The Company stated that no trees would be cleared at the K Street Substation site (Exh. EFSB-L-2).

NSTAR stated that a site-wide landscaping plan is currently in place at the existing K Street Substation site (Exh. EFSB-L-6). The Company explained that the views toward the facilities have been improved with the addition of evergreen and deciduous trees and shrubs along East First Street (id.). In addition, there will be landscaping along the new sections of the

Harborwalk[77] located on the north and west sides of the site (id.).

The new sections of the switch and transformer yards will have metal hallide yard lighting; however, the lighting would generally be used only during emergency conditions, or for maintenance activities that can only be completed in the evening (Exh. EFSB-G-1, at 5-43).

(c) Baker Street Substation

NSTAR stated that it intends to install a new heat exchanger at the Baker Street Substation, which would be 10 feet high, would occupy an area 50 feet long by 10 feet wide, and would be set back approximately 125 feet from the street (Exh. EFSB-L-3; Tr. 8 at 1212). The Company noted that while the site presently has both above ground and underground transmission facilities, the new equipment would be confined to the heat exchanger and underground transmission facilities (Exh. EFSB-L-3). NSTAR noted that along the edge of Baker Street, at the fence that separates the property from the street, a 150 to 200 foot long row of deciduous trees exists (Tr. 8, at 1212). The Company stated that no trees would be cleared at the Baker Street Substation site (Exh. EFSB-L-2).

The Company stated that the heat exchanger would be installed approximately 17 feet below the grade of Baker Street, and asserted that views of the heat exchanger generally would be shielded by the slopes from the road to the site (Exh. EFSB-G-1, at 4-56; Tr. 8, at 1212; Tr. 13, at 1804). NSTAR also noted that the heat exchanger would be located as far as possible from the residential area to the north of the site (Tr. 13, at 1806). The Company indicated that it does not expect to landscape the site due to the lack of visual impacts associated with the heat exchanger (Exh. EFSB-L-6; Tr. 13, at 1802-1803).

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[77] NSTAR stated that consistent with Coastal Zone Management Policies, to provide community access to the waterfront where none currently exists, it is licensing and constructing a Harborwalk (Exh. EFSB-G-1, at 5-46, 7-9). The Company indicated that the Harborwalk will be constructed in two phases (id). The first phase is an 850-foot long segment that runs along the extension of the Reserved Channel on the west of the site, and the second phase is a 175-foot long segment will run along the Reserved Channel on the north of the site (Exh. EFSB-G-1, at 5-46). The Harborwalk project was scheduled to begin in the summer of 2004 and be completed in the fall of 2004; however, the Company indicated that the project may be behind schedule (Exh. EFSB-L-7; Tr. 8, at 1212).

The Company stated that the Baker Street Substation is located in the West Roxbury Community Commercial district and that the zoning bylaws for this district require the front yard of industrial buildings to include an adequate landscape buffer (Exh. BECO-3, at 25 ;Tr. 13, at 1803). The Company acknowledged that the existing substation landscaping may not conform to current bylaws, and stated that it would be willing to provide additional screening for the substation if requested to do so by the City of Boston (Tr. 13, at 1802, 1804, 1807).

iv. Analysis

The record demonstrates that the proposed transmission lines would be installed almost entirely underground along either the primary or the alternative route, and that views of the transmission lines at bridge crossings would be insignificant. Consequently, the permanent visual impacts of the proposed project are confined to those resulting from the construction or expansion of the switching station and substations.

The Route 138 Switching Station would include a number of taller elements similar in scale to existing support structures for the transmission lines that traverse the site – six new transition monopoles, two bridge structures, and shielding masts. These taller elements, all proposed to reach heights of 60 feet or more, would be generally visible from the surrounding area. The remaining substation facilities would consist of buswork and other equipment, most of which would be 22 feet in height or lower; however, one-third of the buswork is proposed to be 38 feet high.

The Company proposes to provide landscaping and other mitigation to screen all but the taller elements of the proposed facility from surrounding areas. NSTAR has proposed a berm with predominantly evergreen trees that would provide a 20-foot high screen of the substation facilities, both to the west along the Route 138 frontage and on the northwest portion of the site toward York Street near Route 138. Although there is existing deciduous vegetation to the northeast toward residences further east along York Street, NSTAR also has included supplemental plantings in its landscape plans to screen the facility from those residences. The record shows that residential areas to the south, at the end of Charles Street, and to the southwest along a portion of Ewing Street, also would have views of the substation, absent any mitigation.

Due to the higher elevation of the Charles Street and Ewing Street areas, and the presence of the intervening transmission ROW, the ability to provide effective on-site screening is limited, and the Company expects to consider use of mitigation in both on-site and off-site areas. Consistent with provisions of the Host Community Agreement, NSTAR will consult with Stoughton regarding all its landscaping plans, including the on-site plans provided in the record and plans being developed to screen areas south of the site. However, the Company has not provided the Siting board with specific landscaping plans.

In order to minimize visual impacts at the Route 138 site, the Siting Board directs NSTAR to develop and implement detailed landscape plans to screen the proposed switching station from residential and roadway locations on all sides, and to consult with the Town of Stoughton regarding the plans. To screen locations to the south and southeast, NSTAR shall consider, in consultation with affected landowners and the Town of Stoughton, use of plantings or other mitigation in off-site as well as on-site areas. NSTAR shall, if agreeable to the affected landowners or appropriate Town officials, include as part of its landscape plans plantings or other mitigation in off-site residential or roadway locations. To ensure a mix of plantings that provides some immediate screening in all directions, NSTAR shall offer the Town and affected landowners larger plantings in lieu of several smaller plantings at selected locations within the areas of vegetative screening planned in different directions from the site. NSTAR shall provide a copy of its final landscape plans to the Siting Board for its information.

NSTAR intends to install a new transformer, heat exchanger, and GIS equipment at its existing Hyde Park Substation. To screen views of the equipment from residences across Hyde Park Avenue and from passersby, NSTAR proposes to install new 8-foot high decorative brick pillar fencing and a border of 5- to 6-foot tall arborvitae, or similar evergreen shrubbery along Hyde Park Avenue. The landscaping will continue around to the north and south of the substation, using the same type of vegetative border, but without the decorative brick pillars. As discussed above, there is a row of triple-decker residences directly to the south of the existing substation, abutting the NSTAR Service Center. The rear property lines of these residences appear to be approximately 100 to 125 feet from Hyde Park Avenue. The nearest of these residences is located less than 50 feet from the proposed fencing and landscaping, and would

benefit from the same decorative fencing proposed for Hyde Park Avenue. Therefore, the Siting Board directs NSTAR to provide a border of 5- to 6-foot arborvitae and decorative brick pillar fencing for a total distance of approximately 100 to 125 feet along the southern border of the Hyde Park Substation site, extending from Hyde Park Avenue to a point flush with the rear property line of the closest residence to the south of the site.

NSTAR also intends to install new equipment at its K Street Substation, which is densely developed with substation and transmission facilities and is located in an industrial area, surrounded on three sides by industrial uses. The K Street Substation already is the subject of a comprehensive landscaping plan that calls for the placement of significant landscaping along East First Street and K Street and the construction of a new Harborwalk. The Siting Board concludes that the visual impacts of the expansion of the K Street Substation will be mitigated to the extent possible by the existing landscaping plan.

NSTAR also intends to install a new heat exchanger at its existing Baker Street Substation. The Company argues that the installation of the heat exchanger would have no visual impacts, because it would be placed behind existing equipment and well below the grade of Baker Street. The Siting Board agrees that installation of the heat exchanger is unlikely to alter views from nearly residences or the neighboring park and playing fields. However, the Siting Board notes that the existing substation landscaping along Baker Street is minimal, and that, under the applicable zoning regulations, the Company likely would be required to upgrade landscaping at the substation as a condition for new construction on the site. In Section IV, below, the Siting Board grants NSTAR an exemption from the City of Boston Zoning Code applicable to this site in order to facilitate the construction of the transmission project; however, it is not our intent to undercut the substance of the bylaws as they relate to landscaping. Therefore, the Siting Board directs NSTAR to provide plantings similar to those proposed for the Hyde Park Substation along those portions of the Baker Street fence line where there is no existing landscaping, and to supplement areas where there are existing deciduous trees with plantings and/or landscaping similar to those proposed for the Hyde Park Substation.

The Siting Board finds that with the implementation of the above conditions, the visual impacts of the proposed transmission project along the primary route would be minimized.

In comparing the primary, alternative and hybrid routes, the Siting Board notes that the underground transmission lines would have no permanent visual impacts, and that visual impacts at the Hyde Park, K Street, and Baker Street Substations would be the same regardless of the route chosen. Thus, differences in visual impacts are limited to the differential impacts of the southern switching station at the Route 138 and SRA sites.

The Company has argued that the visual impacts of the switching station would be greater at the SRA site than at the Route 138 site, because it would be unable to provide anything more than minimal screening at the SRA site, while the larger Route 138 site provides both a natural buffer and room for more significant screening. Both sites are industrially zoned, and in each case the change in view would be from one type of industrial activity to a different type. The record demonstrates that, if the switching station were built on the SRA site, the upper portions of the taller substation elements, and, in early years, the upper portion of the substation buswork, would be visible to passersby. In contrast, views of the switching station at the Route 138 site likely would be limited to the upper portions of taller substation elements from the beginning of project operation; at the same time, some of these views would be from residential areas. In the Siting Board's judgement, the impacts on these residences outweigh the starker views that would be seen by individuals using the businesses near the SRA site. Thus, on balance, the Siting Board finds that the alternative and hybrid routes would be preferable to the primary route with respect to visual impacts.

d. Electric and Magnetic Fields

In this section, the Siting Board reviews the potential impacts of electric and magnetic fields ("EMF") associated with the proposed transmission line, the existing 345 kV transmission line that would be tapped, and the Hyde Park and K Street Substations.

i. Primary Route

NSTAR asserted that EMF impacts associated with the project would be minimized (Company Brief at 177). The Company asserted that the underground 345 kV lines would have no electric field impacts, and that the magnetic field impacts of the project would be well within

the Siting Board's guideline of 85 milligauss ("mG") (id. at 178-179, 181-183). In support, the Company provided estimates of EMF levels: (1) from the proposed transmission lines operated at full capacity, (2) at property boundaries and off-site areas surrounding the proposed switching station and existing substation sites, with and without the project, and (3) at the edges of the Walpole-to-Holbrook ROW occupied by the 345 kV line that the proposed facilities would tap, with and without the project (Exhs. BECO-1, at C-1; EFSB-EM-1; EFSB-EM-4).

With respect to the proposed transmission lines, NSTAR predicted that the peak magnetic field for the underground circuits when carrying a total of 1,500 MW would be 1.1 mG (Exh. BECO-1, at C-1). The Company stated that at distances greater than about 15 feet from the centerline of the transmission line, the magnetic field would be undetectable (id.). NSTAR stated that because the circuits would be installed underground, no above-ground electric fields would be produced (id.).

With respect to the proposed switching station and substation expansions, the Company stated that, in general, the highest EMF levels at affected sites are produced by the power lines entering and leaving each facility (Exh. BECO-1, at C-7). To estimate maximum public off-site EMF, NSTAR explained that it first conducted a walking survey at the accessible portions of the fence or property lines of the properties, taking EMF measurements at regular intervals (Exh. EFSB-EM-1(S) at 1; Tr. 12, at 1586). The Company stated that it then extrapolated the results from power flow (current) conditions on the day of measurement to power flow conditions that represent 2008 peak normal loads, without the proposed project in place (Exh. EFSB-EM-1(S) at 1). The Company then modeled EMF levels under 2008 peak normal load with the proposed project in place (id.). The Company characterized these modeled levels as conservative, in that they are maximum rather than typical levels (id. at 1-2).

At the property line of the Route 138 site, the Company projected the maximum magnetic field to be 24 mG in 2008 under peak normal load conditions, without the proposed project in place (Exh. EFSB-EM-1(S) at 5).[78] With the project in place, NSTAR modeled the maximum

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[78] The Company stated that the maximum magnetic field at the property line that it measured on June 10, 2004 was 16 mG, but this figure was not scaled to reflect peak

(continued...)

magnetic field at the property line to be 42 mg (id.). The Company stated that the location of this maximum level would be at the intersection of the property line with the overhead transmission line ROW, at Route 138, where it is dominated by the influence of the transmission line (Exh. RR-EFSB-47; Tr. 12, at 1594-1595). The Company noted that at the northern border of the site property (at a point along York Street), the maximum magnetic field under 2008 peak normal load, with the switching station, would be approximately 10 to12 mG (Exh. EFSB-EM-1, at 2; Tr. 12, at 1596-1597). The Company explained that at this point along the property line, the influence of the overhead ROW is the least (Tr. 12, at 1618). The Company also noted that magnetic fields drop off sharply as the distance from the source increases (Exh. EFSB-EM-1(S) at 2). For example, the Company stated that a magnetic field level of 54 mG at the switching station's northern fence-line (i.e., close to the equipment and not at the property line) decreases to 11 mG at a distance of 50 feet from the fence line, and to 1 mG at a distance of 200 feet from the fence line (Exh. EFSB-EM-1(S) at 3).

At the K Street Substation, NSTAR calculated the maximum magnetic field at the property line, under 2008 peak normal load, without the proposed project, to be 55 mG (Exh. EFSB-EM-1, at 5).[79] The Company predicted the maximum property-line level associated with the new equipment required for the project to be 30 mG (id.). The Company explained that this location is different from the location of the peak level associated with the existing equipment, and that the two values are not additive (id.).

Similarly, at the Hyde Park Substation, the Company projected that the maximum magnetic field level at the property line would be 96 mG under 2008 peak normal load without the project, whereas the maximum magnetic field level due to the equipment associated with the project would be 5.2 mG, but at a different point along the property line (Exh. EFSB-EM-1, at 5; Tr. 12, at 1598). The Company explained that the locations of the highest peak magnetic fields

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[78] (...continued)
normal load for 2004 (Exh. EFSB-EM-1(S) at 1, 5).

[79] The Company stated, that, currently, the maximum magnetic field measured, 33 mG, occurs at the midpoint of the access road to 530 East First Street (Clean Harbors) (Exh. RR-EFSB-47).

(i.e., 96 mG) would be at the fence line along Hyde Park Avenue at the points where low-voltage underground distribution lines exit the substation (Exh. RR-EFSB-47; Tr. 12, at 1603, 1635).[80] The Company stated that the proposed project would not affect these peak levels, which are driven by customer load on the distribution lines (Tr. 12, at 1602-1603).

With regard to electric field levels, NSTAR stated that the maximum electric field at the property line of the proposed Route 138 switching station site would be 2.5 kV/m in 2008 under peak normal loads, with or without the proposed project, although the average level[81] would increase from 0.08 kV/m to 0.3 kV/m (Exh. EFSB-EM-1(S) at 5). For the K Street Substation, the Company projected maximum electric field levels no higher than 1.9 kV/m, and average levels no higher than 0.7 kV/m, with or without the proposed project (id.). The Company stated that at the Hyde Park Substation, the new equipment would not produce any external electric field (id.).

The Company stated that it does not propose any changes in the electrical circuitry or electrical structures at the Baker Street Substation (Exh. EFSB-EMF-1 (S)).

With regard to projected changes in magnetic fields associated with the existing overhead 345 kV transmission line between the West Walpole and Holbrook Substations that would be tapped by the proposed facilities, the Company provided the following estimates for 2008 magnetic field levels, with and without the proposed project:

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[80] The Company stated that magnetic fields are attenuated when pipe-type cables are used, but the distribution lines here are not pipe-type cables (Tr. 12, at 1604). The Company also stated that the closest residences to the substation's fence line on Hyde Park Avenue are across the avenue, and that present-day magnetic field readings were on the order of 12 mG on that side of the street (id. at 1635).

[81] The Company explained that its "average" figures represented both spatial and temporal averaging (Tr. 12, at 1585-1586).

Table 4: Projected Magnetic Fields (mG) Along Walpole-Holbrook ROW, 2008

	Peak	Off-Peak		Peak	Off-Peak	
Without Project	9.9	13.8		9.9	13.8	*Without Project*
With Project	43.0	6.3		16.6	22.7	*With Project*
<----------*northern edge of ROW*---------->						
W. Walpole Subst. ----------ROW to West----------**Switching Station**----------ROW to East--------Holbrook Subst.						
<----------*southern edge of ROW*---------->						
Without Project	76.2	33.7		76.2	33.7	*Without Project*
With Project	54.0	32.4		40.5	23.5	*With Project*
	Peak	Off-Peak		Peak	Off-Peak	

Source: Exh. EFSB-EM-4.

These projections indicate that operation of the proposed project would cause magnetic field strength to decrease along the southern edge of the ROW, during both peak and off-peak load conditions, both east and west of the switching station site (Exh. EFSB-EM-4). The Company's figures also indicate that magnetic field strength would decrease along the northern edge of the ROW west of the switching station during off-peak loadings, but would increase along the northern edge east of the switching station under off-peak conditions, and would increase both east and west of the switching station under peak load conditions (id.).[82] The Company's data show that the largest increase in magnetic fields, from 9.9 mG to 43 mG, would occur west of the switching station site, on the north side of the ROW under peak normal loading, while the largest decrease would be from 76.2 mG to 40.5 mG to the east of the site, on the south side of the ROW under peak normal loading (id.; Tr.12, at 1612).

The Company provided a summary of recent developments in EMF epidemiological research by Gradient Corporation which asserts that, although some studies have reported associations between EMF and adverse health effects, the body of available epidemiological evidence regarding environmental levels of power-line EMF remains inconsistent and

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[82] Use of "switching station site" in this context is generic, and could refer to either the Route 138 or SRA site.

inconclusive with respect to establishing power-line EMF as a human health hazard (Exh. EFSB-EM-3, Att. at 2).

ii. Alternative Route

NSTAR did not provide measurements of present-day EMF at the SRA site. However, the Company asserted that because the SRA site is smaller and the switching station circuitry more complex, future magnetic field levels at the site's property lines would be somewhat greater than at the Route 138 site (Exh. ST-31). The Company projected that, at the point along the future fence line where magnetic fields would be least influenced by the overhead ROW lines, the maximum magnetic field level associated with the new facilities would be 31 mG (id.; Tr. 12, at 1618). The Company stated that the appropriate Route 138 figure to which this should be compared is 12 mG, the maximum level along the northern border of the Route 138 site (furthest from the influence of the overhead ROW lines at that site) (Tr. 12, at 1618).

With respect to magnetic field impacts along the 14.5-mile Walpole-to-Holbrook ROW, the Company stated that siting the switching station as far west as possible (i.e., at the Route 138 site) would minimize the length of ROW subject to magnetic field increases on the northern side of the ROW, while maximizing the length of ROW subject to magnetic field reductions on the southern side (Exh. RR-EFSB-48; Tr. 12, at 1629). The Company explained that magnetic field strength would increase relative to projected levels without the project under some conditions, and would decrease under others, depending upon whether the point of measurement is east or west of the new switching station, whether it is on the north or south side of the ROW, and whether loading on the 345 kV line is at peak or off-peak levels (see Table 4) (Exh. EFSB-EM-4, at 2). Due to the these differences, the choice of switching station site could have a differential effect on magnetic fields along the ROW between the two candidate sites (Exh. EFSB-EM-4; Tr. 12, at 1612-1613, 1629).

The Company observed that the largest increase in magnetic field level would occur to the west of the switching station (on the north side of the ROW, during peak conditions) and that the largest decrease would occur to the east of the switching station (on the south side of the ROW, during peak loads) (Tr. 12, at 1611, 1629). From this information, the Company

concluded that siting the switching station as far west as possible would provide the most favorable outcome with respect to EMF by limiting the length of line over which the increase occurs and extending the length of line over which the decreases occur (id. at 1629).

The Company characterized the land uses between the West Walpole and Holbrook Substations as a mixture of undeveloped land, residential, and commercial/industrial (Exh. RR-EFSB-48). Between the Route 138 and SRA sites in particular, NSTAR characterized the land uses as a mix of residential and open space (id.). The Company estimated that there are currently six to eight houses within 200 feet of the south side of the ROW between the Route 138 and SRA sites, and somewhat fewer on the north side (id. at Fig. 3; Tr. 12, at 1629-1630).

iii. Analysis

In a previous review of proposed transmission line facilities, the Siting Board accepted edge-of-ROW levels of 85 mG for magnetic fields. 1985 MECo/NEPCo Decision, 13 DOMSC 119, at 228-242. The Siting Board has used this edge-of-ROW level in subsequent facility reviews to determine whether anticipated magnetic field levels are unusually high. See CELCo Decision, 12 DOMSB 305, at 348, 349; Norwood Municipal Light Department, 5 DOMSB 109, at 145 (1997); MASSPOWER, Inc., 20 DOMSC 301, at 401-403 (1990).[83] Here, the maximum magnetic field levels associated with the proposed transmission project would be 1.1 mG directly above the proposed underground transmission lines, 12 mG at the switching station northern property line (where it is least influenced by the overhead ROW), 30 mG at the K Street Substation property line, and 5 mG at the Hyde Park Substation property line.

In addition, the maximum magnetic field level along the edge of the existing Walpole-Holbrook ROW would be 54 mG with the project, which represents a decrease from the

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[83] More recently, the Siting Board has inquired into the current scientific literature regarding the possible impact of exposure to magnetic fields on human health. The Siting Board has consistently found that, although some epidemiological studies suggest a correlation between exposure to magnetic fields and childhood leukemia, there is no evidence of a cause-and-effect association between magnetic field exposure and human health. Southern Energy Kendall, LLC, 11 DOMSB 255, at 385-386 (2000); Nickel Hill Energy, LLC, 11 DOMSB 83, at 134 (2000) ("Nickel Hill Decision").

maximum level without the project, along the corresponding side and length of the ROW under peak load conditions. Along other portions of the ROW under certain conditions, the maximum magnetic field level would be higher with the project than without it, but in no such cases would it be higher than 43 mG. In addition, all in-street, property-line, and edge-of-ROW levels would remain well below levels found acceptable in the 1985 MECo/NEPCo Decision.

The Siting Board notes that, in the past, electric companies have recognized that some members of the public are concerned about magnetic fields and therefore have incorporated design features into proposed transmission lines that would reduce magnetic fields at little or no additional cost. See, e.g., New England Power Company, 4 DOMSB 109, at 148 (1995). The Siting Board has encouraged the use of practical and cost-effective designs to minimize magnetic fields along transmission ROWs. See, e.g., Nickel Hill Decision, 11 DOMSB at 211; Sithe Edgar Development LLC, 10 DOMSB 1, at 117 (2000); IDC Bellingham LLC, 9 DOMSB 225, at 333. Here, the magnetic fields associated with the proposed pipe-type cables would be low due to the pipes themselves. With regard to the overhead ROW from Walpole to Holbrook, the proposed project would result in lower peak magnetic fields that those which would occur in the absence of the project. Accordingly, the Siting Board finds that the EMF impacts of the proposed transmission project along the primary route would be minimized.

In comparing the primary route to the alternative and hybrid routes, the Siting Board notes that magnetic fields above the proposed transmission line would be the same minimal level along any of the routes. Impacts at K Street and Hyde Park also would be the same, regardless of route selected. While magnetic field levels at the property lines of the SRA switching station site would be somewhat higher than at the Route 138 site, no residential properties are located within 1700 feet of the SRA site.

The principal difference between the two routes is the differential impact along the 14.5-mile section of the Walpole-to-Holbrook ROW between the possible switching station sites. The Company's modeling indicated that, under peak and off-peak loads, the project would result in a decrease in magnetic field levels along the entire southern edge of the ROW regardless of site choice, although they would decrease to a lower level to the east of the switching station. Therefore, this lower magnetic field level would extend over a greater portion of the ROW if the

Route 138 site were selected. Along the northern edge of the ROW, the changes in magnetic field levels would differ for peak and off-peak load, with mixed results both with respect to the direction of change with the project and with respect to whether the resultant magnetic field would be lower east of the switching station site. For the northern edge of the ROW, the model's results do not clearly suggest that either switching station location is preferable to the other.

Accordingly, the Siting Board finds that the primary route would be slightly preferable to the alternative or hybrid routes with respect to EMF impacts.

e. Hazardous Materials

i. Description

NSTAR indicated that the proposed project would require the long-term use of two substances with potential environmental impacts if leaked or spilled: (1) sulfur hexafluoride gas ("SF_6"), an insulator in the switchgear to be installed at Hyde Park; and (2) alkyl benzene, a dielectric fluid used for electrical insulation in the pipe-type cable ("PTC") (Exh. BECO-1, at 1-15, B-2 to B-3; Tr. 7, at 1038; Tr. 8, at 1116; Tr. 9, at 1293). The use of these materials would not be route-dependent.

The Company stated that it uses SF_6 to insulate existing switchgear at the Hyde Park Substation (Tr. 9, at 1293). According to the Material Safety Data Sheet for SF_6, the gas can pose some short-term health risks if inhaled; however, the Company indicated that it was highly unlikely that a leak from the outdoor switchgear would expose a passerby to the gas in a concentration sufficient to induce such effects (Exh. RR-EFSB-36(a); Tr. 14, at 1972). The Company indicated that the environmental concerns with releases of the gas are of greater concern than the direct human health effects (Tr. 14, at 1974-1975). According to the U.S. Environmental Protection Agency ("EPA"), SF_6 is a greenhouse gas that is 22,200 times more potent per pound than carbon dioxide (Exh. RR-EFSB-36, Att. B). To address releases of SF_6 from the electric power sector, EPA administers a program called the SF_6 Emission Reduction Partnership for Electric Power Systems (id.). According to EPA, program partners establish what their baseline SF_6 emissions are, develop management strategies, set an SF_6 emission reduction goal, and report on their annual SF_6 usage (id.). The Company indicated that it monitors its SF_6-

insulated systems and follows specific protocols to recover the gas when performing maintenance work on these systems (Tr. 9, at 1294), but did not indicate that it participates in the EPA program.

With respect to the dielectric fluid, NSTAR stated that alkyl benzene meets the definition of "oil" under the Massachusetts Contingency Plan, and is thus regulated only if it is released to the environment (Exh. RR-EFSB-35). The Company indicated that alkyl benzene floats on the surface of water, leaving a sheen (Exh. EFSB-CT-12). The Company stated that the PTCs would contain 410,000 gallons of alkyl benzene, with an additional 10,000 gallons to be stored in a 25,000-gallon capacity tank at the pump plant at the Stoughton switching station (Exhs. EFSB-G-1-S Bulk Att., App. G at 13-14; EFSB-CT-16). NSTAR explained that the extra volume in the tank would allow for thermal expansion of the fluid, and that the tank's concrete foundation would provide containment for 110% of the tank's volume (Exh. EFSB-CT-16). The Company also indicated that it would use a leak detection system at the new pump plant that would be capable of detecting leaks as slow as one gallon per hour (Exh. BECO-1, at B-7). The Company stated that each of the autotransformers and voltage compensators would have a fluid containment system lined with impermeable fabric and equipped with a special drain that blocks the dielectric fluid (id. at 14).

The Company stated that it employs emergency contractors to remediate leaks or spills of dielectric fluid (Exh. BECO-1, at B-7). According to the Company's Oil Spill Contingency Plan, NSTAR has contracted with two oil spill response companies that have committed to providing cleanup resources within two hours of notification (Exh. RR-EFSB-34, Att. at 4). Depending on the type of impact, the Company explained that remediation may involve the removal of affected soil, the use of absorbent booms or pads, or the pumping of groundwater (Exhs. BECO-1, at B-7; EFSB-CT-12). The Company stated that it has also used bioremediation agents to treat affected soil (Exh. BECO-1, at B-7).

ii. Analysis

The record shows that NSTAR has prior experience with both SF_6 and alkyl benzene. With respect to alkyl benzene, the record shows that the Company would employ appropriate

leak containment and leak detection measures. The record also shows that the Company has established protocols for addressing leaks when they occur. With respect to SF_6, a potent greenhouse gas, the record shows that the Company monitors its SF_6-insulated systems and implements gas-recovery measures when working on this equipment, but does not participate in EPA's SF_6 emissions reduction program. Participation in the EPA program, including developing management strategies and monitoring and reporting emissions, could enhance NSTAR's efforts to control SF_6 emissions from this and other GIS equipment it operates. The Siting Board also notes that such participation would be consistent with the Commonwealth of Massachusetts' Climate Protection Plan. Accordingly, to help ensure that the environmental impacts of facility expansion at the Hyde Park Substation related to SF_6 emissions are minimized, the Siting Board directs NSTAR to study participating in EPA's SF_6 Emission Reduction Partnership and, within six months of the date of the Final Decision in this matter, inform the Siting Board of the Company's decision to join the program or of its reasons for not doing so. The Siting Board finds that with the implementation of this condition, the permanent hazardous materials impact of the proposed transmission project along the primary route would be minimized.

Given that the long-term impacts from alkyl benzene and SF_6 are not route-dependent, the Siting Board finds that the primary, alternative and hybrid routes would be comparable with respect to permanent hazardous materials impacts.

f. Conclusions on Permanent Impacts

The Siting Board has found that, with the implementation of certain conditions and mitigation, the permanent land use, water resource, noise, visual, hazardous material, and EMF impacts of the proposed transmission project would be minimized. In comparing permanent impacts along the three routes, the Siting Board has found that the primary route would be slightly preferable to the alternative and hybrid routes with respect to EMF impacts; that the alternative and hybrid routes would be slightly preferable to the primary route with respect to land use and water resource impacts and preferable with respect to visual impacts; and that the three routes would be comparable with respect to noise impacts and impacts associated with

hazardous materials. On balance, the Siting Board finds that the alternative and hybrid routes would be slightly preferable to the primary route with respect to permanent environmental impacts.

4. Cost

a. Cost Comparison

i. Description

The Company provided several estimates of the cost of the proposed project, representing different assumptions and levels of refinement as project design and permitting advanced (Exhs. BECO-1, at 5-53; EFSB-G-11; COB-F-1; RR-EFSB-16; RR-EFSB-21). For the latest stage at which a fair comparison of the primary, noticed alternative and hybrid routes could be made, NSTAR provided the following cost estimates (with associated circuit lengths for each route):

Table 5: Route Cost Comparison

	Primary Route		**Noticed Alternative**		**Hybrid Route**	
	$ million	length (ft.)	$ million	length (ft.)	$ million	length (ft.)
3-Circuit Segments	83.5	55,812	65.9	45,968	89.5	59,384
2-Circuit Segments	37.5	35,306	43.8	39,156	37.5	35,306
1-Circuit Segments	2.7	3,832	12.4	16,952	2.7	3,832
Circuit Subtotal	123.7	94,950	122.1	102,076	129.7	98,522
Stoughton	23.4		19.8		19.8	
Hyde Park	12.7		12.7		12.7	
K Street	22.4		22.4		22.4	
Heat Exchangers	2.3		2.3		2.3	
Station Subtotal	60.8		57.2		57.2	
Project Total	$184.5		$179.3		$186.9	

Source: Exh. RR-EFSB-16.

The Company presented its estimates for the transmission line components broken down by segments corresponding to the number of cables (one, two, or three) in the trench (Exh. RR-EFSB-16). In addition to segment length and number of cables, the Company noted several other factors that affect construction costs along various portion of a route, such as subsurface congestion in urban areas, the need to restrict work hours, the presence of substantial rock, and bridge crossings (Exhs. BECO-1, at 5-51; RR-EFSB-16; Tr. 12, at 1636-1637, 1642). The Company provided detailed information about its assumptions regarding cost adders for these factors (id.).

NSTAR stated that the principal reason that the Route 138 switching station site (primary route) is more expensive than the SRA site (alternative or hybrid route) is that the former contains an active business (Tr. 13, at 1734). However, the Company indicated that its estimate for the cost of Route 138 switching station site was based on a signed agreement, whereas it had not obtained a signed agreement for a permanent easement on the SRA site (Tr. 7, at 1009; Tr. 13, at 1733, 1734). In addition, the Company stated that it assumed for cost estimation that the SRA site would be delivered in a ready-to-build condition, with all landfill waste removed, graded flat, and permitting complete (Exhs. ST-13; RR-EFSB-52 Att. at 3; Tr. 7, at 1002; Tr. 13, at 1745); as discussed in Section III.C.2.d, the Company indicated that these assumptions were somewhat uncertain, and noted that ultimate costs could be different, depending on the outcome of negotiations for the site (Tr. 13, at 1012, 1733).

The Company indicated that the cost of easements was not included in the above estimates, and that two easements would be required along the primary or hybrid routes, only one of which would be required along the alternative route (Tr. 1, at 1670). According to the Company's estimates, the easements would increase costs for the primary or hybrid route by $250,000, but would increase the cost of the alternative route by only $200,000 (id.). Some cost differentials also would be associated with proposed or required mitigation not included in the Company's cost estimates. Specifically, on-site landscaping at the Route 138 site could cost approximately $375,000, whereas landscaping at the SRA site is estimated to total approximately $50,000 to $75,000 (Exh. RR-EFSB-51). The Company estimated that a three-sided sound-attenuation wall at the Route 138 site would cost approximately $110,000 (Tr. 14, at 1902,

1983). On the other hand, the Company calculated that the visual- and noise-attenuation berm at the Route 138 site would represent a savings of approximately $100,000 in avoided soil disposal costs (id. at 1983). The net effect of these elements would be to increase the cost of the primary route by approximately $635,000, the cost of the alternative route by approximately $125,000 and the cost of the hybrid route by approximately $325,000.

ii. Analysis

The Company's estimate of the cost of the project along the primary route ($184.5 million) is $5.2 million higher than its estimate for the noticed alternative route ($179.3 million) but $2.4 million lower than its estimate of the hybrid route ($186.9 million). After factoring in the costs of easements and mitigation, these cost differentials change only slightly: the primary route cost becomes $5.5 million more than that of the noticed alternative and $2.1 million less than that of the hybrid route. The difference between the primary route and the hybrid route cost estimates is about one percent of the project total, which, in light of some of the cost uncertainties highlighted by the Company, is likely to be within the margin of error of these estimates. The difference between the primary route and the alternative route is higher, at approximately three percent of total route cost. Accordingly, the Siting Board finds that the alternative route is slightly preferable to the primary and hybrid routes with respect to cost, and that the primary route and the hybrid route are comparable with respect to cost.

b. Total Costs and Financial Impact

As noted above, the Company provided multiple estimates of the cost of the proposed project. As part of NSTAR's "12.C Application,"[84] the Company submitted to NEPOOL and ISO-NE a substantially higher estimate for the primary route than it presented to the Siting Board – $217 million vs. $177.6 million for the original primary route without the American Legion

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84 A "12.C Application" is a request to ISO-NE that the costs of the transmission project be shared regionally, rather than be borne by the applicant's customers alone. Typically, projects that benefit the regional grid, such as 345 kV transmission lines, are granted such treatment (see: Tr. 15, at 2062-2065).

Highway modification (Exhs. COB-F-1, at 1-9, Fig. 1-3, 3-19; RR-EFSB-21).[85] The 12.C Application did not contain estimates for the noticed alternative or hybrid routes, and thus could not be used for route-comparison purposes.

The Company explained some of the differences between the cost estimate in the 12.C Application and that provided to the Siting Board for the primary route. For example, the 12.C costs included $5.2 million for potential circuit breaker replacements at other substations (with associated engineering field supervision and relay modifications) that might be required as a result of the proposed project; $4.1 million for consultant fees for regulatory and environmental issues, legal expenses, project management costs, and community relations costs; approximately $3 million as an "Allowance for Funds Used During Construction;" and an approximately $3 million increase for soil disposal (Exh. RR-EFSB-21; Tr. 5, at 665; Tr. 12, at 1649). The Company also mentioned increased costs of $6 per foot for pipe and $4 per foot for cable (Tr. 12, at 1647, 1649), but did not calculate project-wide totals for these items. Based on the circuit lengths for the original primary route along Blue Hill Avenue contained in Exh. RR-EFSB-16, the Siting Board calculated that these two items would total approximately $2.0 million for that route. The Company also discussed, but did not quantify, additional road restoration activities (Exh. RR-EFSB-21). With respect to substation costs, the Company stated that differences between the 12.C Application estimates and those submitted to the Siting Board, amounting to $5.5 million in total, were due to updated figures from supplier bids (id.). The Siting Board notes that these items total approximately $17 million, leaving unexplained a $22.4 million discrepancy between the 12.C costs and those presented to the Siting Board.

NSTAR stated that the project has been approved by NEPOOL's Reliability Committee

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[85] The Company asserted that the 12.C Application's estimate reflected, among other factors, the additional costs associated with using American Legion Highway (Exh. RR-EFSB-21; Tr. 5, at 672-673). However, all descriptions of the route in the 12.C Application correspond to the Company's originally noticed primary route, not the version using the American Legion Highway variation (see Exh. COB-F-1, at 1-2, 1-9, Fig. 1-3). Thus, it appears that the 12.C estimate is for the original primary route. If so, the differential between the 12.C costs and the costs presented to the Siting Board for the same route is $39.4 million, not the $32.5 million that the Company stated in RR-EFSB-21.

as meeting all the criteria of a Regional Benefit Upgrade, as defined in the NEPOOL Transmission Tariff (Exh. COB-F-3; Tr. 12, at 1676). According to the Company, subject to similar approval by ISO-NE, all of the project's costs would be included in the regional transmission rate, and Boston Edison's customers would pay only that portion of the costs that represent BECo's share of the regional load, or approximately 13 % (Exh. COB-F-3).

While the Company has defined the need for the proposed project in terms of reliability, it also discussed some of the project's economic benefits. The Company stated that the proposed project would increase the overall import capability of the transmission system supplying the Greater Boston Area by approximately 800 MW with the addition of the first two circuits, and by 1,000 MW at project completion (Exh. BECO-1, at 2-31). The Company stated that the improved import capability would provide access to new, high-efficiency combined-cycle generating facilities located in southeastern Massachusetts (id.). NSTAR also asserted that the increased import capability would reduce congestion costs in the Greater Boston Area–that is, the increase in electricity costs that results from the need to run generating units out of merit due to transmission constraints (id.). The Company further asserted that the project would reduce or eliminate reliance on "reliability must-run" ("RMR") generators, which are units that would be shut down were they not required to run to maintain area system reliability (Exh. EFSB-–17). NSTAR noted that customers in the northeast Massachusetts ("NEMA") zone currently pay fixed costs in excess of $30 million per year to keep the New Boston generator in South Boston, which operates under an RMR contract, in operation (Exhs. EFSB-–17; RR-ISO-NE-1). Based on these and other considerations, the Company stated that a conservative estimate of congestion-related savings that would accrue from the proposed project would be in the tens of millions of dollars per year (Exhs. BECO-1, at 2-31; EFSB-–17).

5. Reliability

NSTAR asserted that construction of the proposed project along the preferred and alternative routes would provide similar levels of reliability (Exh. BECO-1, at 5-54). The Company noted that the routes are nearly the same length and require approximately the same number of bridge and rail crossings (id.). With respect to the switching station facilities, the

Company stated reliability is affected only by differences in the layout of tap lines required at the preferred and alternative switching station sites (id.). The Company stated that work at the Hyde Park and K Street Substations would be the same for either alternative (id.).

a. Switching Station Sites

NSTAR identified differences in the layout of the preferred and alternative switching station sites that could affect transmission system reliability (Exh. BECO-1, at 5-54). The Company stated that at the Route 138 site, no existing lines or structures intervene between the 345 kV circuit to be tapped and the proposed switching station, allowing new overhead lines to drop freely to a bridge structure and into the switchyard (id.). The Company contrasted this layout with the SRA site, where existing 115 kV lines and support structures are located between the 345 kV circuit to be tapped and the switching station, requiring the new taps to pass underneath the 115 kV lines (id.). According to NSTAR, the configuration at the SRA site would pose some risk that one of the existing overhead 115 kV conductors or static (shielding) wires could break or separate from its connectors and fall onto the new 345 kV bus, thereby de-energizing the switching station (id.; Exh. EFSB-R-4; Tr. 9, at 1303-1304). Noting that static wire breakage accounts for the majority of such failures, the Company stated that it could use a stronger, more corrosion-resistant type of static wire in the vicinity of the switching station to reduce somewhat the risk of breakage (Tr. 9, at 1304-1305). The Company further stated that the risk could be minimized by annual corrective maintenance inspections, including aerial inspection and ground patrols to identify and repair weakened connectors (Exh. EFSB-R-4).

b. Operational Reliability of Proposed PTC Design

NSTAR stated that it has extensive experience in the installation and operation of pipe-type cable ("PTC") systems at the 115 kV and 345 kV voltage levels, including 30 years of experience with 345 kV PTC systems (Exh. BECO-1, at B-1). The Company stated that it has encountered very few operating problems with PTCs, but reported several incidents over the last 50 years in which it experienced electrical faults or leaks of dieletric fluid (id. at B-1, B-4 to B-6). According to the Company's accounts, some of the electrical faults led to leaks of dielectric

fluid; other leaks of dielectric fluid were caused by other means, such as corrosion or damage by third parties (id. at B-4 to B-6; Exhs. EFSB-CT-9; EFSB-CT-10). NSTAR stated that outages of the cables are considered in the Company's contingency analyses (Tr. 9, at 1251, 1276-1277).

The Company stated that neither the North American Electric Reliability Council nor NEPOOL have any standards for testing, inspecting or maintaining PTCs (Exh. EFSB-CT-6). However, the Company stated that it would inspect the condition of the pipes via the manholes annually (Exh. EFSB-CT-5). In addition, the Company stated that it would survey the cathodic protection system annually (id.).[86]

i. Electrical Faults

NSTAR reported that its PTCs have experienced eight electrical malfunctions over the last 50 years (Exh. BECO-1, at B-4). Of these, three occurred shortly after installation and were quickly repaired with no further problems (id.). Of the remaining five, the Company stated that three incidents resulted from third-party encroachments, and only two incidents resulted from equipment problems during operation (id.).

The Company stated that it uses redundant monitoring systems to detect faults on all its PTCs and that two independent high-speed relay protection systems de-energize and isolate a line within a tenth of a second of detecting a fault (Exh. EFSB-CT-8; Tr. 9, at 1251).[87] NSTAR explained that it identifies the location of a fault using a technique known as time-domain reflectometry ("TDR"), which involves sending a pulsed signal into the conductor, and then

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[86] NSTAR explained that this is accomplished by using test leads that extend up from the pipe to hand holes in the sidewalk, which can be monitored for low voltages to detect degradation in the pipe's coating (Exh. EFSB-CT-5). The Company stated that the hand holes can also be used to monitor the operating temperature of the PTCs (id.).

[87] The Company explained that its system sends an alarm to NSTAR's Supervisory Control and Data Acquisition ("SCADA") system within a few seconds of fault detection (Exh. EFSB-CT-8). The Company noted that although the alarm informs the SCADA system which circuit breakers opened to isolate the line, it does not tell operators precisely where the fault occurred (Exhs. EFSB-CT-8; EFSB-CT-22).

examining the reflection of the pulse (Exh. ST-26; Tr. 9, at 1252). According to the Company, NSTAR owns some of the specialized equipment needed to perform TDR on lower-voltage cable, but sometimes must bring in outside experts to assist it (Tr. 9, at 1254). For each of two faults it had on 345 kV cables, NSTAR reported that it took approximately one month to pinpoint the locations of the faults (id. at 1254-1255). The Company stated that after locating the fault, repairs can take approximately one additional month (id. at 1255).[88]

ii. Fluid Leaks

NSTAR reported that in 50 years of operating experience with PTC, the Company has experienced 28 instances of leakage of dielectric fluid, of which 22 were due to corrosion (Exh. BECO-1, at B-4). However, the Company noted, due to improvements in the pipes' cathodic protection system, monitoring, and other measures, none of the PTCs installed in the past 25 years have experienced corrosion-related leaks (id. at B-5). NSTAR stated that PTCs that have leaked since 1998 were older structures located on bridges that had been exposed to road salt and stormwater runoff (id.). The Company cited electrical faults, mechanical fretting (rubbing), and third-party encroachment as other causes of fluid leaks (id. at B-5 to B-6; EFSB-CT-10; Tr. 9, at 1245).

The Company stated that, unless they are associated with electrical faults, fluid leaks do not automatically take a cable out of service (Tr. 9, at 1273, 1275). NSTAR explained that pump operations and related parameters are monitored continuously and that abnormal conditions trigger an alarm at NSTAR's System Control Center (id.). The Company stated that it will employ a leak detection system at the new pump plant that will be capable of detecting leaks as slow as one gallon per hour (Exh. BECO-1, at B-7).

NSTAR explained that it uses two different methods to identify the precise location of a leak (Exh. BECO-1, at B-7; ST-59). The "traditional" method starts with inspections of

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[88] The record includes contradictory information on this point: the Company also discussed two cables that were returned to service in 1 to 3 weeks, but another that was out of service for at least 19 months (October, 2002 through at least May, 2004) (Exh. EFSB-CT-9).

manholes and catchbasins along the route for evidence of the fluid (Exhs. BECO-1, at B-7; ST-59). If nothing is found, the Company can take the line out of service, hydraulically sectionalize it, then measure changes in hydraulic pressure to home in on the location of the leak (Exh. ST-59; Tr. 9, at 1265-1266). The Company characterized this method as slow and inefficient for finding a small leak, but better for a large-volume leak (Tr. 9, at 1267).

The second leak identification method involves the use of tracer gas in the dielectric fluid (Exhs. BECO-1, at B-7; ST-59). The Company explained that by conducting air sampling at the surface and then through small holes drilled into the pavement above the cable, this method can ultimately locate the leak to within 5 feet of its source (Exhs. EFSB-CT-21; ST-59). NSTAR stated that, while tracer gas sampling can locate a leak as quickly as in a few days, the contractors who perform the work are not always immediately available (Tr. 9, at 1269-1270).

iii. Bridge Crossings

The Company asserted that the bridge crossings associated with the proposed project will be less subject to corrosion than the bridge crossings that have experienced corrosion-related leaks in the past (Tr. 9, at 1241-1243). First, the Company noted that the coating on the PTCs used in this project would be of the newer, more corrosion-resistant and longer-lifespan variety (Exh. BECO-1, at B-6; Tr. 9, at 1249-1250). The Company explained that to cross the Neponset River along the primary or hybrid routes, the PTC would be buried in sand under the sidewalk of the Neponset River Bridge, exposed to neither the atmosphere nor road salt, and that it would be covered by a one-inch thick steel plate to protect it from damage (Exh. EFSB-G-1, App. G at 16; Tr. 9, at 1242-1245).[89] Along the alternative route, the Company anticipated that crossing the Neponset River would involve hanging the pipe from the Central Avenue Bridge and around its concrete abutments (Exh. EFSB-L-18). The Company stated it would install the pipe in an area where the bridge's drainage system would not discharge onto it, and would conduct annual

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[89] In the Company's opinion, the greater risk to the PTC across the Neponset River Bridge is mechanical damage due to excavations through the sidewalk (Tr. 9, at 1241-1242). The Company stated it will protect the pipe with a one-inch steel plate in this area (id.). The Company noted that none of its PTCs have ever been damaged by third-party encroachment in places where they were protected by such plates (Exh. EFSB-CT-14).

inspections to make sure that neither the drainage system nor other atmospheric factors were causing corrosion of the pipe (Tr. 9, at 1249, 1251). The Company stated that thermal isolation is needed to avoid conflicting movements between the bridge and the pipe, and that electrical isolation from a bridge is necessary for the cathodic protection system to work properly (id. at 1248). The Company noted points along both the primary and alternative routes where it would need to take precautions with regard to stray current associated with rail or subway lines, which can interfere with cathodic protection of the cable (id. at 1246). NSTAR stated it would add reverse-current switches to address these situations, if necessary (id. at 1247).

c. Analysis

The record shows that electrical faults or leaks of the dielectric fluid may cause PTCs to be taken out of service for a period of time. Due to the significant length of time it may take to find and repair faults or leaks, preventing such episodes is critical to the overall reliability of the system. The Company has detailed improvements in the technology that have been made over the past 50 years, and measures it would take to protect the pipes from corrosion or other physical damage. Both the primary and alternative routes use the same technology and would therefore face similar risks due to these factors, although the different bridge crossings would require different measures to prevent damage or corrosion.

The record shows a slight difference in risk associated with the choice of switching station site. Specifically, the location of the existing 345 kV and 115 kV lines in relation to the SRA site would put certain switchyard structures at risk of being downed by overhead lines, should those lines break or become disconnected. This risk appears to be low, but no similar risk exists at the Route 138 site. Thus, the Siting Board finds that the primary route is slightly preferable to the alternative and hybrid routes with respect to reliability.

6. Conclusions on Route Comparison

The Siting Board has found, above, that the primary route is preferable to the alternative and hybrid routes with respect to construction impacts, while the alternative and hybrid routes are slightly preferable to the primary route with respect to permanent environmental impacts. The

Siting Board also has found that the primary and hybrid routes are comparable with respect to cost, while the alternative route is slightly preferable to the other two routes with respect to cost. Finally, the Siting Board has found that the primary route is slightly preferable to the alternative and hybrid routes with respect to reliability. Based on its review of the record, the Siting Board finds that NSTAR has provided sufficient information regarding cost, reliability, and environmental impacts to allow the Siting Board to determine whether it has achieved a proper balance among cost, reliability, and environmental impacts.

Based on the information presented in Sections III.C.2 and III.C.3, above, the Siting Board finds that, with the implementation of the proposed mitigation and conditions, and compliance with all applicable local, state and federal requirements, the temporary and permanent environmental impacts of the proposed transmission project along the primary route would be minimized. The Siting Board also finds that the proposed project along the primary route would achieve an appropriate balance among conflicting environmental concerns as well as between environmental impacts, reliability, and cost.

The record demonstrates the NSTAR has presented the Siting Board with two diverse routes with significant strengths, and that elements of these two routes can be combined to create a third route, also with significant strengths. The record suggests that a case could be made for approving any of the three routes analyzed in this section. In this instance, NSTAR has chosen to present for the Siting Board's approval the primary route, which is preferred by the MHD and affected municipalities along the route including the City of Boston, and the Towns of Milton and Canton. The primary route also appears to have fewer permitting complexities than either the hybrid or the alternative route, as it does not require re-permitting by MDEP to place a switching station in a former landfill, or permits from the Army Corps of Engineers to accomplish a crossing of the Neponset River. On balance, use of the primary route provides the greatest assurance that the proposed transmission project can be put in place in a timely, environmentally sensitive manner. Accordingly, the Siting Board finds that the primary route is preferable to the alternative and hybrid routes with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

IV. ZONING EXEMPTION AND SECTION 72

NSTAR is seeking, pursuant to G.L. c. 40A, § 3, certain zoning exemptions from the Zoning By-laws of the Town of Stoughton regarding the Route 138 switching station site.[90] NSTAR also is seeking pursuant to Section 6 of Chapter 665 of the Acts of 1956, certain zoning exemptions from the City of Boston Zoning Code regarding modifications to the Baker Street, Hyde Park and K Street Substations. In addition, NSTAR is seeking, in accordance with G.L. c. 164, § 72, a determination that the proposed transmission lines in the City of Boston and the Towns of Canton, Milton, and Stoughton are necessary and will serve the public convenience and be consistent with the public interest.

A. 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.

Similarly, Section 6 of Chapter 665 of the Acts of 1956 provides:

> A building, structure, or land used or to be used by a public service corporation may be exempted from the operation of a zoning regulation or amendment if, upon petition of the corporation, the state [Department] shall, after public notice and hearing, decide that the present or proposed situation of the building, structure, or land in question is reasonably necessary for the convenience or welfare of the public.

Thus, a petitioner seeking exemption from a local zoning bylaw under G.L. c. 40A, § 3 must

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[90] In light of the Siting Board's finding in Section III.C, above, that siting of the proposed 345 kV transmission project along the primary route is superior to the alternative or hybrid routes with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost, we will not address the Company's request for an exemption from the Stoughton Zoning By-laws for the SRA site.

meet three criteria. 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 a zoning exemption(s). Boston Gas Company, D.T.E. 00-24, at 3 (2001) ("Boston Gas"). Finally, the petitioner must demonstrate that its present or proposed use of the land or structure is reasonably necessary for the public convenience or welfare. Massachusetts Electric Company, D.T.E. 01-77, at 4 (2002) ("MECo (2002)"); Tennessee Gas Pipeline Company, D.T.E. 01-57, at 3-4 (2002) ("Tennessee Gas (2002)").[91]

1. Public Service Corporation

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 ("SJC") 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, 366 Mass. at 680. See also, Boston Gas at 3-4; Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997) ("Berkshire Power").

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 at 30; Save the Bay at 685-686. 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 at 30; see

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[91] In evaluating the Company's petition for zoning relief pursuant to Section 6 of Chapter 665 of the Acts of 1956, the Siting Board relies on the standard of review established for G.L. c. 40A, § 3 petitions.

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) ("Nextel"). 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 at 31.

2. Exemption Required

In determining whether exemption from a particular provision of a zoning bylaw is "required" for purposes of G.L. c. 40A, § 3, the Department looks to whether the exemption is necessary to allow construction or operation of the petitioner's project as proposed. See MECo (2002) at 4-5; Tennessee Gas (2002) 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). It is the petitioner's burden to identify the individual zoning provisions applicable to the project and then to establish on the record that exemption from each of those provisions is required:

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

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

3. Public Convenience or Welfare

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. Save the Bay at 680; Town of Truro v. Department of Public Utilities, 365 Mass. 407, at 411 (1974). 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.

4. G.L. c. 164, Section 72

With respect to a petition filed pursuant to G. L. c. 164, § 72, the statute 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 [Department], after notice and a public hearing in one or more of the towns affected, may determine that said line is necessary for the purpose alleged and will serve the public convenience and is consistent with the public interest.[92]

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 making a determination under G.L. c. 164, § 72. Town of Sudbury v. Department of Public Utilities, 343 Mass. 428, 430 (1962).

As the Department has noted in previous cases, the public interest analysis required by G.L. c. 164, § 72 is analogous to the Department's analysis for the "reasonably necessary for the convenience or welfare of the public" standard under G.L. c. 40A, § 3. See New England Power Company, D.P.U. 89-163, at 6 (1993); New England Power Company, D.P.U. 91/117/118, at 4

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[92] Pursuant to the statute, an electric company must file with its petition a general description of the transmission line, provide a map or plan showing its general location, and estimate the cost of the line in reasonable detail. G.L. c. 164, § 72.

(1991); Massachusetts Electric Company, D.P.U. 89-136/136/137, at 8 (1990). Accordingly, in evaluating petitions filed under G.L. c. 164, § 72, the Department relies on the standard of review for determining whether the proposed project is reasonably necessary for the convenience or welfare of the public under G.L. c. 40A, § 3, as set forth above.

B. Analysis and Findings

1. Public Service Corporation Status

NSTAR is an "electric company" as defined by G.L. c. 164, § 1. Commonwealth Electric Company d/b/a NSTAR, D.T.E. 03-7, at 5 (2003). Accordingly, the Siting Board finds that NSTAR qualifies as a public service corporation for the purposes of G.L. c. 40A, § 3 and for the purposes of Section 6 of Chapter 665 of the Acts of 1956.

2. Need for the Requested Exemptions

a. Town of Stoughton-Route 138 Switching Station

NSTAR's preferred site for a new 345 kV switching station is at the intersection of Route 138 and York Street in Stoughton (see Section III.B, above). The proposed switching station site is located in an industrial district ("ID") which permits public utility uses (Exh. BECO-3, at 9; and App. A, at Section V.D "Table of Use Regulations"). The Company identified eight sections of the Stoughton Zoning By-laws from which it is seeking an exemption in order to construct and operate the proposed switching station (id. at 8- 3). NSTAR stated that the process of obtaining zoning relief locally could delay the Company's proposed in-service date of 2006 (id. at 31).[93] The sections for which the Company is seeking zoning relief are described below.

i. Height Requirements

NSTAR is seeking exemption from Section VI of the Stoughton Zoning By-laws, which

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[93] The Company indicated that pursuant to the Host Community Agreement it has reached with Stoughton, the Town of Stoughton has agreed to relinquish all rights to appeal, challenge, or collaterally attack the Siting Board's final decision in this matter (Exh. EFSB-62, at 5).

prohibits the construction or alteration of a building or structure that exceeds the height specified for the district in which it is located (Exh. BECO-3, App. A at Section II). Section VI, Table II places a 40 foot height limit on structures in an industrial district (id. at App. A at Section VI). According to the Company, the proposed facility would include six new monopole transition poles, ranging in height from approximately 60 to125 feet, and two line bridges, each 60 feet high (Exh. RR-EFSB-58).

The Company maintained Section II of the Stoughton Zoning By-laws defines "height" in relation to a roof, and that none of the structures in question has a roof as a design element (Exh. BECO-3, at 9-10). Therefore, it is the Company's position that the structures identified would not exceed the height restriction. NSTAR stated, however, that the building inspector may have a different interpretation of "height" as defined in the Stoughton Zoning By-laws (id.). The Company stated that if the building inspector determined that the project fails to comply with the height restriction, the Company would need to appeal the decision to the Stoughton Board of Appeals, or petition directly to the Stoughton Board of Appeals for zoning relief (id. at 10).

The record shows that certain project structures may exceed the height requirements in Section VI, Table II of the Stoughton Zoning By-laws. The Siting Board concludes that since the applicability of the Section VI, Table II to the proposed structures is subject to interpretation, it may be necessary for the Company to petition the Stoughton Board of Appeals for relief in order to construct the proposed project. While the proposed project could be built following a petition to the Board of Appeals, the outcome of any Board of Appeals process is uncertain and could delay construction. Accordingly, the Siting Board finds that exemption of the proposed transmission project from Section VI of the Stoughton Zoning By-laws is required within the meaning of G.L. c. 40A, § 3, since the proposed project is time sensitive.

ii. Off-street Parking

NSTAR seeks an exemption from Section VIII of the Stoughton Zoning By-laws, which requires one off-street parking space for each 800 square feet of gross floor area for uses other than office use (Exh. BECO-3, at 10, App. A at Section VIII). NSTAR stated that the 2100 square feet of gross floor area of the proposed new buildings at the Route 138 site would require

three parking spaces under a strict interpretation of the Stoughton Zoning By-laws (Exh. BECO-3, at 10). The Company stated that there will be no full-time employees at the site and that there already are 15 available parking spaces associated with the ongoing business at the site (id.). The Company could apply for a variance pursuant to Section X-K of the Stoughton Zoning By-laws for relief from Section VIII.

While the proposed project could be completed following an application for a variance from Section VIII, the outcome of the variance process is uncertain and could delay construction. Accordingly, the Siting Board finds that exemption from Section VIII of the Stoughton Zoning By-laws is required within the meaning of G.L. c. 40A, § 3, Since the proposed transmission project is time sensitive.

iii. Landscaping

The Company seeks exemption from the Section XII of the Stoughton Zoning By-laws, which provides that the Stoughton building inspector must review site landscaping plans for all uses within an industrial district (Exh. BECO-3, at 11; App. A at Section XII). NSTAR stated that the uncertainty related to the building inspector's review of the Company's landscaping plan could jeopardize the Company's in-service date of 2006 (Tr. 13, at 1753).

The record shows that the Stoughton Zoning By-laws require landscaping review for the proposed project. While the proposed project likely could be built without relief from Section XII, the outcome of the landscaping review process is uncertain and could delay construction. Accordingly, the Siting Board finds that exemption from Section XII of the Stoughton Zoning By-laws is required within the meaning of G.L. c. 40A, § 3 to the extent that the proposed transmission project is time sensitive.[94]

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[94] The Siting Board notes that NSTAR and Stoughton have entered into a Host Community Agreement which addresses landscaping issues, and that the Siting Board has addressed landscaping issues in Section III.C, above.

iv. Removal of Earth

NSTAR indicated that Section V of the Stoughton Zoning By-laws requires a special permit in all districts for any removal of earth associated with building construction on a lot (Exh. BECO-3, at 17-18, App. A at Section V).[95] The Company has not determined whether it will remove earth from the site or use the excavated material for regrading (Tr. 13, at 1791-93). However, NSTAR is seeking an exemption from the special permit requirement of Section V in the event that the Company removes earth from the proposed switching station site (Exh. BECO-3, at 11).

The record demonstrates that the Company would be required to obtain a special permit from Stoughton if there were earth removal from the Route 138 site. While the proposed project likely could be built without relief from Section V of the Stoughton Zoning By-laws, the outcome of the special permit process is uncertain and could delay construction. Accordingly, the Siting Board finds that exemption from Section V of the Stoughton Zoning By-laws is required within the meaning of G.L. c. 40A, § 3, since the proposed transmission project is time sensitive.

v. Environmental Performance Standards

NSTAR stated that Section XI-I of the Stoughton Zoning By-laws sets forth a list of ten environmental performance standards related to emissions, sound levels, vibrations, discharges, storage of hazardous materials and lighting with which the Company must comply (Exh. BECO-3, at 12). According to the Company, it intends to comply with the standards set forth in Section XI-I, but cannot provide "absolute assurances" that construction-stage dust, noise and vibration, as well as operating-stage noise, glare and electrical disturbances would satisfy a literal interpretation of Section XI-I (Exh. EFSB RR-53, at 1-2). The Company explained that, during certain atmospheric, emergency or maintenance conditions when it will require night lighting, it would not be able to comply with the prohibition on "direct or sky reflected glare" (Exh. RR-EFSB-53; Tr. 13, at 1766-67).

The record is not clear as to whether the Environmental Performance Standards apply to

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[95] Section XI.B.5 of the Stoughton Zoning By-laws contains exceptions to this requirement; however, NSTAR stated that it meets none of the exceptions (Exh. BECO-3, at 11).

the construction phase of the proposed project. If the Environmental Performance Standards do apply during construction, the record shows that the Company would not be able to construct the proposed switching station without relief from Section XI-I. The record also shows that the Company would not be able to operate the proposed switching station without relief from Section XI-I (10), which prohibits "direct or sky reflected glare." However, the record demonstrates that the Company could operate the switching station in accordance with the remaining provisions of Section XI-I. Accordingly, the Siting Board finds that exemption from Section XI-I of the Stoughton Zoning By-laws may be required during construction of the proposed facility, and thus is within the meaning of G.L. c. 40A, § 3 . The Siting Board further finds that, during operation of the proposed facility, exemption from only Section XI-I (10) would be required within the meaning of G.L. c. 40A, § 3.

vi. Flood Hazards, Wetlands and Watershed Districts

The Company stated that portions of the Route 138 switching station site are within both wetlands and watershed districts that are governed by Section III-E of the Stoughton Zoning By-laws, which prohibits construction in such districts ("Flood Hazard/Wetland/Watershed Maps of the Town of Stoughton") (Exh. BECO-3, at 12). The Company explained that the Stoughton Zoning By-laws provide an exception allowing for construction, installation and maintenance of public-utility facilities, including, without limitation, electric transmission lines in wetlands districts (id. at 12 and App. A at Section III.-E.4(a)(xi)). The Company asserted that the proposed switching station falls within this exemption; however, the Company stated that the building inspector may have a different interpretation (id. at 12).

The Company also stated that no new construction is allowed in watershed districts except as allowed in wetlands districts (Exh. BECO-3, at 13 and App. A at Section III-E. (4) (b)). Therefore, the Company explained that an exemption from Section III-E. 4(b) of the Stoughton Zoning By-laws may be required in the event of a determination that the proposed project does not fall within the public utility facilities exception for wetlands districts (id. at 13). The Company further stated that because the Stoughton Zoning Board of Appeals is not authorized to issue use variances, there is no local zoning relief available with respect to Sections III-E.4(a)(xi) and III-E.

4(b)(id. at 12).

The record demonstrates that the Company may not be able to construct the proposed switching station absent relief from Section III-E. 4(a)(xi) and III-E.4(b) of the Stoughton Zoning By-laws. Accordingly, the Siting Board finds that exemption from Sections III-E. 4(a)(xi) and III-E.4(b) of the Stoughton Zoning By-laws may be required within the meaning of G.L. c. 40A, § 3.

vii. Filling of Water, Wet Area, or Depression

NSTAR stated that, pursuant to Section XI-C. of the Stoughton Zoning By-laws, Stoughton regulates the filling of any water, wet area or depression where 500 cubic yards or more of filling is required or where an area to be filled exceeds 10,000 square feet (Exh. BECO-3, at 13, App. A at Section XI.C.). The Company explained that it would be able to comply with many of the requirements of Section XI-C. However, due to the topography of the site, the Company is uncertain that it could comply with certain aspects of this section (e.g., XI-C(6), requiring replacement of at least six inches of topsoil and seeding of all filled areas) without jeopardizing the project schedule (Tr. 13, at 1776-77). The Company indicated that whether or not a zoning exemption is granted, the Company would be required to make a filing with the Conservation Commission regarding the alteration and preservation of wetlands on the site (id. at 1772).

The record demonstrates that the Company may not be able to build the proposed project in a timely fashion absent relief from Section XI-C of the Stoughton Zoning By-laws. Accordingly, the Siting Board finds that exemption from Section XI-C of the Stoughton Zoning By-laws may be required within the meaning of G.L. c. 40A, § 3, since the proposed transmission project is time sensitive.

b. Zoning Relief Requested in the City of Boston

NSTAR stated that certain provisions of the Boston Zoning Code, if applied to the proposed transmission project, would preclude construction by the Company's in service date of 2006 (Exh. BECO-3, at 31-32). The Company identified eight specific exemptions of the Boston Zoning Code that may be needed to permit construction and operation at the existing Baker Street,

Hyde Park, and K Street Substations.[96]

i. Baker Street Substation

NSTAR plans to install a heat exchanger at the Company's existing Baker Street Substation in order to increase the electrical capacity of the existing cables operating between the Baker Street Substation and the Hyde Park Substation (see Section III. C., above) The Company stated that the substation is in a Community Commercial subdistrict ("CC subdistrict") of the West Roxbury Neighborhood District, governed by Section 56 of the Boston Zoning Code (Exh. BECO-3, at 25). The Company identified two sections of the Boston Zoning Code from which it is seeking an exemption.

(a) Conditional Use Permit

The Company stated that Section 56-45 of the Boston Zoning Code requires NSTAR to obtain a conditional use permit from the Boston Zoning Board in order to install the heat exchanger (Exh. BECO-3, at 25 and App. C at Section 56-45, Table B). NSTAR stated that the overall permitting process, especially in the event of any appeal of the decision, would jeopardize the Company's ability to meet its 2006 in-service date for the project (id.).

The record demonstrates that the Company is required to obtain a conditional use permit for the new equipment at the Baker Street Substation. While this equipment likely could be built without relief from Section 56-45 of the Boston Zoning Code, the outcome of the conditional use permit process is uncertain and could delay construction. Accordingly, the Siting Board finds that exemption of the proposed project from Section 56-45 of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956 , since the proposed transmission project is time sensitive.

(b) Screening and Buffering

NSTAR also seeks an exemption from Section 56-37 of the Boston Zoning Code which

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[96] The City of Boston did not address on brief the Company's request for an exemption from the Boston Zoning Code (see City of Boston Brief).

requires screening and buffering of certain parcels in the district (Exh. BECO-3, at 25-26 and App. C at Section 56-37). The Company indicated that, because the Baker Street Substation is located across the street from a public park and is in proximity to residences, this section of the Boston Zoning Code applies to the proposed substation expansion (id. at 26). The Company maintains that there is sufficient screening and buffering at the site, and is seeking an exemption from this provision of the Boston Zoning Code (id.; Tr. 17, at 1801-06).

The record demonstrates that Section 56-37 of the Boston Zoning Code requires the Company to provide screening and buffering along property lines abutting public parks and proximate to residences. While the proposed transmission project likely could be built without relief from Section 56-37, the outcome of the landscaping review process is uncertain and could delay construction. Moreover, as set forth in Section III. C, above, the Siting Board has directed the Company to provide plantings along those portions of the Baker Street fence line where there is no existing landscaping, and to supplement areas where there are existing deciduous trees. Accordingly, the Siting Board finds that exemption of the proposed project from Section 56-37 of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956, since the proposed transmission project is time sensitive.

ii. Hyde Park Substation

NSTAR proposed to expand its existing Hyde Park Substation to accommodate a new 345 kV transformer, control center building and heat exchanger (see Section III. C.) The existing substation is located in an M-1district that is zoned for industrial use, including public utilities. (Exh. BECO-3, at 26). The Company identified two sections of the Boston Zoning Code from which it is seeking an exemption (id.).

(a) Height and Dimensional Requirements

NSTAR seeks an exemption from Section 13-1, "Table B: Dimensional Requirements" (Exh. BECO-3, at 27). Section 13-1 provides a 20 foot rear yard setback requirement in an M-1 district (id. at 27 and App. C. at Section 13-1). The Company indicated that the proposed heat exchangers and the control building would be placed approximately 1 to 2 feet from the rear lot

line in order to facilitate operation and maintenance activities and to meet necessary access requirements (id. at 27; Tr. 13, at 1809-10). NSTAR stated that it would be required to seek a dimensional variance in order to construct the control building and the heat exchangers (Exh. BECO-3, at 27).

The Company also stated that, depending upon the building inspector's definition of "height", the 2.5-story or 35-foot building height restriction for an M-1district may apply to the proposed structures at the substation (Exh. BECO-3, at 26 and App. C, Section 13-1). According to the Company, the proposed new 345 kV transformer would be 38 feet high, and the Company might need to seek a variance from this provision (id. at 26).

While the proposed modifications to the existing Hyde Park Substation could be completed following an application for a variance from Section 13-1 of the Boston Zoning Code, the outcome of the variance process is uncertain and could delay construction. Accordingly, the Siting Board finds that exemption from Section 13-1 of the Boston Zoning Code for the aforementioned dimensional requirements of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956, since the proposed transmission project is time sensitive.

(b) Off-Street Parking

The Company seeks an exemption from Section 23-5 of the Boston Zoning Code, which requires one parking space for every 1200 square feet of gross floor area (Exh. BECO-3, at 27) . NSTAR stated that the spacing requirements of the substation equipment and the layout of the existing facilities preclude the Company from creating any additional parking spaces and that the substation is and will remain an unmanned facility after construction and operation of the proposed transmission project (id.).

The record demonstrates that the Company could not expand the Hyde Park Substation without relief from Section 23-5 of the Boston Zoning Code. Accordingly, the Siting Board finds that exemption from the off-street parking requirements of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956.

iii. K Street Substation

NSTAR proposes to expand the existing substation to include the following facilities: two 345 kV-to-115 kV transformers, shunt reactors, circuit breakers, switching equipment, an emissions monitoring station, disconnection switches, bus work and support structures (Exh. BECO-3, at 28). The site is located in a Waterfront Industrial Zoning District ("W-2 District'), and is within the South Boston Waterfront Interim Planning Overlay District ("IPOD"). In addition, portions of the K Street Substation are on tidelands and governed by G.L. c. 91. The Company identified five sections of the Boston Zoning Code related the K Street Substation expansion for which it is seeking an exemption (id. at 29).

(a) Use Regulations

The Company stated that because the proposed project is located in a W-2 District in South Boston it would be subject to Section 8-7, " Table A- Use Regulations" of the Boston Zoning Code (Exh. BECO-3, at 29). The Company seeks a comprehensive exemption from this portion of the Zoning Code, or, at a minimum, those provisions imposing dimensional requirements, off-street parking requirements, standards for construction in filled tidelands, development review and design guideline requirements and flood plain restrictions.

NSTAR explained that Section 27P of the Boston Zoning Code governs construction within IPOD districts (Exh. BECO-3, at 29). The Company stated that the proposed expansion of the K Street Substation would comply with all of the Article 27P dimensional requirements except for the waterfront area requirement (id. at 29). Article 27P-11 prohibits buildings or structures in a waterfront yard area, which is defined as 50 feet, measured perpendicularly from either the high tide line or the ends of and sides of piers (Exh. BECO-3, at 29 and App. C at Article 27P-11). According to the Company, several of its proposed structures must be located in the waterfront area, and NSTAR, therefore, is seeking an exemption from Article 27P-11 of the Boston Zoning Code.

Pursuant to G.L.c. 91, § 18, when a project is proposed in tideland areas, a developer must obtain a written recommendation from a local planning board to file with MDEP addressing whether the proposed project: (1) serves a public purpose; and (2) would not be detrimental to the

public's rights to the tidelands (Exh. BECO-3, at 30 and App. C at Section 27P-15). The IPOD provisions set forth the standards for the Boston Redevelopment Authority ("BRA") to use in making its recommendation to MDEP (id.). NSTAR explained that exemption from this requirement would not obviate the need for the Company to file with MDEP pursuant G.L. c. 91 and to include an order of conditions from the Boston Conservation Commission (Tr. 13, at 1817).

Pursuant to Section 27P-14 of the Boston Zoning Code, all proposed projects in the South Boston IPOD area must be subject to development review by the BRA and must follow applicable design guidelines (Exh. BECO-3, at 30).

The record demonstrates that the Company could not expand the K Street Substation without relief from Table 8-7 of the Boston Zoning Code. Accordingly, the Siting Board finds that exemption from Table 8-7 of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956. The record also demonstrates that the Company could not expand the K Street Substation without relief from Section 27P-11 of the Boston Zoning Code. Accordingly, the Siting Board finds that exemption from Section 27P-11of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956. The record also demonstrates that the Company could not expand the K Street Substation absent relief from Sections 27P-14 and 27P-15 of the Boston Zoning Code. Accordingly, the Siting Board finds that exemption from Sections 27P-14 and 27P-15 of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956 to the extent that the proposed transmission project is time sensitive.[97]

(b) Flood Hazard District

The Company stated that the K Street Substation is located within a Flood Hazard District that is subject to Section 25 of the Boston Zoning Code which governs, inter alia, new construction of nonresidential structures in Flood Hazard Districts (Exh. BECO-3, at 30-31).

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[97] While the Siting Board finds that relief from the Boston Zoning Code is required, this does not preclude MDEP from exercising its authority pursuant to G.L. c. 91 as its relates to the K Street Substation expansion.

According to the Company, it would not be able to comply with the Section 25 requirement to have the lowest floor of a non-residential structure elevated to the level of base flood elevation (id. at 31).

The record demonstrates that the Company could not expand the K Street Substation without relief from Section 25 of the Boston Zoning Code. Accordingly, the Siting Board finds that an exemption from Section 25 of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956.

3. Public Convenience and Welfare

a. Need or Public Benefit of Use

In Section II.A, above, the Siting Board evaluated the need for the proposed project. Based on this analysis, the Siting Board found that additional energy resources are needed for reliability in the Greater Boston Area under certain contingencies. The finding was based on the Company's load flow analyses showing thermal overloads in the Downtown Boston Area as early as 2006.

b. Alternatives Explored

In Section II.B, above, the Siting Board analyzed potential alternatives to the proposed transmission line and a number of routing alternatives. Based on this analysis, the Siting Board found that the proposed 345 kV underground transmission project is preferable to both the lower voltage alternative and the bundled improvements alternative with respect to providing a reliable energy supply for the Commonwealth, with a minimum impact on the environment at the lowest possible cost.

c. Impacts of the Proposed Use

In Section III, above, the Siting Board analyzed the environmental impacts, including traffic, noise, land use, water resources, visual, hazardous materials, and EMF impacts, of the proposed transmission project. The Siting Board found that, with the conditions set forth in Section III, above, the Company has minimized the environmental impacts associated with the

proposed transmission project.

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C. Scope of Exemption

The Siting Board found that NSTAR requires an exemption from the following sections of the Stoughton Zoning By-laws for the Route 138 switching station: III-E.4(a)(xi); II-E.4(b); V; VI; VIII; XI-C; XI.I during construction only; XI-I (10) during operation, and XII. The Siting Board also found that NSTAR requires an exemption from the following sections of the Boston Zoning Code for: (1) the Baker Street Substation: 56-45 and 56-37; (2) the Hyde Park Substation:23-5 and 13-1; and (3) the K Street Substation:8-7, 25, 27P-11, 27P-14, and 27P-15. NSTAR also has requested a comprehensive exemption from the operation of the Stoughton Zoning By-laws and the Boston Zoning Code. As the Department has noted, petitions for comprehensive zoning relief are infrequently granted but may be appropriate in certain circumstances. For example, the Department will consider the issuance of comprehensive relief where numerous individual exemptions are required or where the issuance of a comprehensive exemption could avoid substantial public harm be serving to prevent delay in the construction and operation of the proposed use. USGen New England, D.T.E. 03-83, at 34 (2004); Tennessee Gas Pipeline Company, D.T.E. 01-57, at 11 (2002).

The Siting Board has found a need for the proposed transmission project, based on its analysis that additional energy resources are required as early as 2006 to ensure reliability in the Greater Boston Area. It is therefore essential to the public interest that construction of the proposed project be completed by 2006.

The Siting Board finds that the advantage to the public in the construction of the proposed transmission project outweighs any benefit that could be obtained from further local review, with the exception set forth below. Accordingly, in light of the substantial advantage in constructing and operating the proposed transmission project to address the need to ensure transmission system reliability in the Greater Boston area, the Siting Board finds that exemption from Sections III. E.4(a)(xi), III-E.4(b) V, VI, VIII, XI-C, XI-I.(1 through 10) during construction, XI-I(10) during operation, and XII of the Stoughton Zoning By-laws is required within the meaning of G.L. c. 40A, § 3. The Siting Board denies the request of the Company for exemption from Section XI-I

(1 through 9) of the Stoughton Zoning By-laws during operation.

The Siting Board further finds that exemption from Sections 8-7, 13-1, 23-5, 25, 56-37, 56-45, 27P-11, 27P-14, and 27P-15 of the Boston Zoning Code is required within the meaning of Section 6 of Chapter 665 of the Acts of 1956. In addition, the Siting Board finds that, with the exception related to enforcement of Section XI-I (1 through 9) of the Stoughton Zoning By-laws during operation of the switching station, it is appropriate in this case to grant NSTAR's request for a comprehensive exemption from the operation of the Stoughton Zoning By-laws and the Boston Zoning Code generally in connection with the Company's use of the sites and the construction, operation and maintenance of the proposed transmission project.

1. G.L. c. 164, § 72

As stated above, in evaluating petitions filed pursuant to G.L. c. 164, § 72, the Department relies on the standard of review established for G.L. c. 40A, § 3 for determining whether the proposed project is reasonably necessary for the convenience or welfare of the public. Based on the record in this proceeding and the above analysis, and with the implementation of mitigation measures proposed by the Company and directed by the Siting Board, the Siting Board finds pursuant to G.L. c. 164, § 72, that the proposed transmission line and ancillary equipment are necessary for the purpose alleged, will serve the public convenience, and are consistent with the public interest.

The Siting Board directs NSTAR to serve a copy of this decision on the Town of Stoughton Board of Selectmen, the Town of Stoughton Planning Board, the Town of Stoughton Zoning Board of Appeals, the City of Boston City Council, the City of Boston Planning Board, and the City of Boston Zoning Board of Appeals within five business days of its issuance. The Siting Board further directs NSTAR to certify to the Secretary of the Department within ten business days of its issuance that such service has been made.

D. Section 61 Findings

The Massachusetts Environmental Policy Act ("MEPA") provides that "[a]ny determination made by an agency of the Commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been

taken to avoid or minimize said impact." G.L. c. 30, § 61. Pursuant to 301 CMR § 11.01 (3), these findings are necessary when an Environmental Impact Report ("EIR") is submitted by a petitioner to the Secretary of Environmental Affairs, and should be based on such EIR. Where an EIR is not required, G.L. c. 30, § 61 findings are not necessary. 301 CMR § 11.01 (3). The record indicates that a single EIR was required for NSTAR's proposed transmission project and ancillary facilities. Therefore, a finding under G.L. c. 30, § 61 is necessary for the Company's Zoning Exemption Petition and its Section 72 Petition.

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

V. DECISION

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. In addition, the statute requires that the Siting Board determine whether plans for the construction of energy facilities are consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth. G. L. c. 164, § 69J.

In Section II.A, above, the Siting Board found that the existing electric transmission system is inadequate to reliably serve projected loads in the Greater Boston Area under certain contingencies, and thus that additional energy resources are needed for reliability in the Greater Boston Area.

In Section II.B, above, the Siting Board found that the proposed transmission project is preferable to both the 115 kV alternative and the bundled improvements alternative with respect to providing a reliable energy supply for the Commonwealth, with a minimum impact on the environment at the lowest possible cost.

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

In Section III.C, above, the Siting Board reviewed environmental impacts of the proposed transmission project in light of related regulatory or other programs of the Commonwealth, including programs related to wetlands, tidelands and waterways, coastal zone management, rare and endangered species, historic resources, climate protection, and the handling of hazardous materials. As evidenced by the above discussions and analyses, the proposed transmission line along the primary route would be generally consistent with the identified requirements of all such programs.

In Section III.C, the Siting Board found that, with the implementation of the proposed mitigation and conditions, and compliance with all applicable local, state and federal requirements, the temporary and permanent environmental impacts of the proposed transmission project along the primary route would be minimized. The Siting Board also found that the proposed project along the primary route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost.

In Section III.C, above, the Siting Board found that the proposed facilities along the primary route would be preferable to the proposed facilities along the alternative route and the hybrid route with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Accordingly, the Siting Board APPROVES the Company's petition to construct a three-circuit 17.5 mile, 345-kilovolt underground electric transmission line in Stoughton, Canton, Milton and Boston, Massachusetts, using the Company's primary route with the use of American Legion Highway and Day Boulevard routing, and, if necessary, using the Glenway Street/Old Road variation and the variation crossing the shopping center parcel near the intersection of

Cummins Highway and American Legion Highway, subject to the following conditions:

(A) To ensure that the traffic impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to submit the draft TMP to appropriate officials in the City of Boston, and the Towns of Stoughton, Canton, and Milton, to school administrators in each of these communities, and to the MHD and the MBTA, at least two months prior to the commencement of construction affecting these entities.

(B) To ensure that the traffic impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR, in consultation with the City of Boston and the Towns of Stoughton, Canton, and Milton, to develop a comprehensive outreach plan for the proposed project. The outreach plan should lay out the procedures to be used to notify the public about: the scheduled start, duration, and hours of construction in particular areas; the methods of construction that will be used in particular areas (including any use of nighttime construction); and anticipated street closures and detours. The outreach plan also should include information on complaint and response procedures, contact information, the availability of web-based project information, and protocols for notifying the MBTA and schools of upcoming construction.

(C) To ensure that the noise impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to use portable noise barriers in nighttime periods to mitigate the noise impact of cable splicing wherever cable splicing operations are staged within 50 feet of a residential structure.

(D) To ensure that the noise impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to develop a noise mitigation plan covering each residential area where nighttime construction would take place. In

developing the plans, NSTAR should work with appropriate officials to develop an initial noise mitigation plan, conduct public outreach in that area, and then, based on public input, develop a final noise mitigation plan in consultation with appropriate officials. The plans also should include a description of the Company's outreach plan. NSTAR shall provide copies of the final noise mitigation plans to the Siting Board for its information.

(E) To ensure that the noise impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to develop construction outreach plans tailored to the neighborhoods surrounding the Hyde Park, Baker Street and K Street Substations, and the Route 138 switching station site, that provide the neighborhoods with regular updates on the timing and progress of work at these locations, provide advance notice when noisier activities are to be undertaken, and provide the neighborhoods with an opportunity to request changes in the scheduling of evening work activities if certain activities prove unduly burdensome.

(F) To ensure that the noise impacts at the Hyde Park Substation of the proposed transmission project are minimized consistent with minimizing visual impacts, the Siting Board directs NSTAR to consult with the City of Boston and neighboring residents on its noise mitigation plan for the Hyde Park Substation and options to further reduce nighttime L_{90} increases from the project at residences east of the site, across Hyde Park Avenue. As part of this consultation, NSTAR shall develop a refined noise mitigation option based on the sound wall approach described in the record that would reduce nighttime L_{90} increases at residences east of the site to no greater than 3 dBA, while also minimizing the sound wall's visual impacts and providing the greatest possible implementation of the Company's proposed landscaping plan. In addition, NSTAR shall develop one or more additional noise mitigation options that entail less visual impact or interference with landscaping,

and shall provide information on the level of noise mitigation that could be achieved under these options. NSTAR shall consult with appropriate City of Boston officials and neighboring residents as to the relative desirability of the Company's proposed noise plan (which does not incorporate a sound wall) and the options for additional noise mitigation, and shall develop and implement a final noise mitigation plan based on these consultations. NSTAR shall report to the Siting Board on these consultations and on the opinions of the City of Boston and neighboring residents on its final noise mitigation plan for the Hyde Park Substation.

(G) To ensure that the visual impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to develop and implement detailed landscape plans to screen the proposed switching station from residential and roadway locations on all sides, and to consult with the Town of Stoughton regarding the plans. To screen locations to the south and southeast, NSTAR shall consider, in consultation with affected landowners and the Town of Stoughton, use of plantings or other mitigation in off-site as well as on-site areas. NSTAR shall, if agreeable to the affected landowners or appropriate Town officials, include as part of its landscape plans plantings or other mitigation in off-site residential or roadway locations. To ensure a mix of plantings that provides some immediate screening in all directions, NSTAR shall offer the Town and affected landowners larger plantings in lieu of several smaller plantings at selected locations within the areas of vegetative screening planned in different directions from the site. NSTAR shall provide a copy of its final landscape plans to the Siting Board for its information.

(H) To ensure that the visual impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to provide a border of 5- to 6-foot arborvitae and decorative brick pillar fencing for a total distance of approximately 100 to 125 feet along the southern border of the Hyde Park Substation site,

extending from Hyde Park Avenue to a point flush with the rear property line of the closest residence to the south of the site.

(I) To ensure that the visual impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to provide plantings similar to those proposed for the Hyde Park Substation along those portions of the Baker Street fence line where there is no existing landscaping, and to supplement areas where there are existing deciduous trees with plantings and/or landscaping similar to those proposed for the Hyde Park Substation

(J) To ensure that the hazardous waste impacts of the proposed transmission project are minimized, the Siting Board directs NSTAR to study participating in EPA's SF_6 Emission Reduction Partnership and, within six months of the date of the Final Decision in this matter, inform the Siting Board of the Company's decision to join the program or of its reasons for not doing so.

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

In addition, the Siting Board has found pursuant to G.L. c. 164, § 72 that NSTAR's proposed transmission line is necessary for the purpose alleged, and will serve the public convenience and is consistent with the public interest.

In addition, the Siting Board has found pursuant to G.L. c. 40A, § 3 and Section 6 of Chapter 665 of the Acts of 1956 that construction and operation of the Company's proposed facility is reasonably necessary for the public convenience or welfare. Accordingly, the Siting Board GRANTS the Company's petition for an exemption from certain provisions of the Town of Stoughton Zoning By-laws. Specifically, the Company shall be exempt from those sections of the Town of Stoughton Zoning By-laws enumerated in Section IV, above, with the exception of Section XI-I(1-9) during operation of the proposed facility. The Siting Board further GRANTS,

with the exception of Section XI-I (1-9) during operation of the proposed facility, the Company's petition for a comprehensive exemption from the operation of the Town of Stoughton Zoning By-laws.

The Siting Board also GRANTS the Company's petition pursuant to Section 6 of Chapter 665 of the Acts of 1956 for an exemption from certain provisions of the City of Boston Zoning Code. Specifically, the Company shall be exempt from those sections of the City of Boston Zoning Code enumerated in Section IV, above. The Siting Board further grants the Company's petition for a comprehensive exemption from the operation of the Boston Zoning Code.

The Siting Board notes that the findings in this decision are based on 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 the Company to notify the Siting Board of any changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. The Company is obligated to provide the Siting Board with sufficient information on changes to the proposed project to enable the Siting Board to make these determinations.

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Selma Urman
Presiding Officer

Dated this 14th day of January, 2005.

APPROVED by the Energy Facilities Siting Board at its meeting of January 13, 2005, by the members and designees present and voting: Paul G. Afonso (Chairman, DTE/EFSB), W. Robert Keating (Commissioner, DTE); Robert Sydney (for David L. O'Connor, Commissioner, Division of Energy Resources); Stephen R. Pritchard (for Ellen Roy Herzfelder, Secretary of Environmental Affairs); Judith F. Judson (Commissioner, DTE) and Deborah Shufrin (for Ranch Kimball, Secretary of Economic Development).

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Paul G. Afonso, Chairman
Energy Facilities Siting Board

Dated this 13th day of January, 2005.

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).