COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD

Petition of New England Power Company d/b/a National Grid for Approval to Construct and Operate Two New Underground 115 kV Transmission Lines And Related Upgrades to Two Existing Substations Pursuant to G.L. c. 164, § 69J	EFSB 13-2
Petition of New England Power Company d/b/a National Grid for Approval to Construct and Operate Two New Underground 115 kV Transmission Lines and Related Upgrades to Two Existing Substations Pursuant to G.L. c. 164, § 72	D.P.U. 13-151
Petition of New England Power Company d/b/a National Grid Pursuant to G.L. c. 40A, § 3 for Individual and Comprehensive Exemptions from the Zoning Ordinance of the City of Salem in Connection With the Proposed Construction and Operation of Two New Underground 115 kV Transmission Lines and Related Upgrades to Two Existing Substations	D.P.U. 13-152

TENTATIVE DECISION

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November 3, 2014

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ABBREVIATIONS

Algonquin	Algonquin Gas Transmission
Berkshire Power	Berkshire Power Development, Inc., D.P.U. 96-104 (1997)
Boston Gas	Boston Gas Company, D.T.E. 00-24 (2001)
Cape Wind	Cape Wind Associates LLC and Commonwealth Electric Company d/b/a NSTAR Electric, 15 DOMSB 1, EFSB 02-2 (2005)
CELT	Capacity, Energy, Loads, and Transmission
City	City of Salem
CMR	Code of Massachusetts Regulations
CO_2	carbon dioxide
Company	New England Power Company d/b/a National Grid
dBA	A-weighted decibels
DCR	Massachusetts Department of Conservation and Recreation
direct-buried	buried beneath public roadway without a duct bank
Department	Massachusetts Department of Public Utilities
DG	distributed generation
DOMSB	Decisions and Orders of Massachusetts Energy Facilities Siting Board
DOMSC	Decisions and Orders of Massachusetts Energy Facilities Siting Council
DPW	Salem Department of Public Works
DR	demand response
EE	energy efficiency
EIR	Environmental Impact Report
EMF	electric and magnetic fields
EFSB	Energy Facilities Siting Board
Existing Cables	the S-145 and T-146 cables

FCA	Forward Capacity Auction
Footprint	Footprint Power Salem Harbor Development LP
Footprint	Footprint Power Salem Harbor Development LP, EFSB 12-2 (2013)
Footprint Certificate	Footprint Power Salem Harbor Development LP, EFSB 13-1 (2014)
FCM	Forward Capacity Market
GHG	Greenhouse Gas
G.L. c.	Massachusetts General Laws chapter
GSRP	Western Massachusetts Electric Company, 18 DOMSB 7, EFSB 08-2 /D.P.U. 08-105/ 08-106 (2010)
Hampden County	New England Power Company d/b/a National Grid, 18 DOMSB 323, EFSB 10-1/ D.P.U. 10-107/ 10-108 (2012)
Harbor	Salem Harbor
HDD	horizontal directional drilling
HPFF	high-pressure fluid-filled
HVAC	heating, ventilation and air-conditioning
IM	Issues Memorandum
IRP	New England Power Company d/b/a National Grid, EFSB 12-1 /D.P.U. 12-46/ 12-47 (2014)
ISO-NE	ISO New England
kV	kilovolts
LSP	licensed site professional
Lower SEMA	NSTAR Electric Company, EFSB 10-2/D.P.U. 10-131/ 10-132 (2012)
LTE	Long-term emergency rating
Mass DEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MEPA	Massachusetts Environmental Policy Act
MBTA	Massachusetts Bay Transportation Authority

MCP	Massachusetts Contingency Plan
MECo/Westford	Massachusetts Electric Company, D.T.E. 01-77 (2002)
mG	milligauss
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement (provided as RR-EFSB-8(S)(1))
MODF	Mineral Oil Dielectric Fluid
MVA	megavolt-amperes
MW	megawatts
MWh	megawatt-hours
NEP	New England Power Company d/b/a National Grid
NERC	North American Electric Reliability Corporation
NHESP	National Heritage and Endangered Species Program
North Shore Loop	transmission loop between Wakefield Junction and Ward Hill
NPCC	Northeast Power Coordinating Council
NPDES	National Pollutant Discharge Elimination System
NSTAR/Stoughton	Boston Edison Company d/b/a NSTAR Electric, 14 DOMSB 233, EFSB 04-1/ D.P.U. 04-5/04-6 (2005)
NY Central Railroad	New York Central Railroad v. Department of Public Utilities, 347 Mass. 586 (1964)
OSHA	Occupational Safety and Health Administration
Project	Salem Cables Project
Proposed Cables	The Project's new underground transmission lines
PNF	Project Notification Form
PSC	Public Service Corporation
PVC	polyvinyl chloride
RAO	Response Action Outcome

ROW	right-of-way
Russell	Russell Biomass, LLC, 17 DOMSB, EFSB 07-4/D.P.U. 07-35/ 07-36 (2009)
S Cable	Existing S-145 cable
Save the Bay	Save the Bay v. Department of Public Utilities, 366 Mass. 667 (1975)
SCFF	self-contained fluid filled
Section 72 Petition	NEP petition pursuant to G.L. c. 164, § 72
SF_6	sulfur hexafluoride
Siting Board	Massachusetts Energy Facilities Siting Board
Siting Board Petition	NEP petition pursuant to G.L. c. 164 § 69 J
Study Area	Massachusetts, Rhode Island, and Connecticut
T Cable	Existing T-146 cable
Tennessee/Agawam	Tennessee Gas Pipeline Company, D.T.E. 01-57 (2002)
Town of Truro	Town of Truro v. Department of Public Utilities, 365 Mass. 407 (1974)
TMP	Traffic Management Plan
ULSD	Ultra-low-sulfur diesel
USEPA	United States Environmental Protection Agency
Westborough	New England Power Company d/b/a National Grid, D.P.U. 12-2 (2012)
WHO	World Health Organization
Worcester	New England Power Company d/b/a National Grid, EFSB 09-1 /D.P.U. 09-52/ 09-53 (2011)
Working Group	a group of City officials, business leaders, and residents
XLPE	cross-linked polyethylene
ZBA	Salem Zoning Board of Appeals
Zoning Petition	NEP petition pursuant to G.L. c. 40A § 3

Pursuant to G.L. c. 164, § 69J, the Massachusetts Energy Facilities Siting Board ("Siting Board" or "Board") hereby approves, subject to the conditions set forth below, the Petition of New England Power Company d/b/a National Grid ("NEP," "Company" or "Petitioner") to construct, operate and maintain two underground 115 kilovolt ("kV") transmission cables connecting NEP's Salem Harbor Substation and Canal Substation in the City of Salem. Pursuant to G.L. c. 14, § 72, the Siting Board hereby approves, subject to the conditions set forth below, the Petition of NEP for a determination that the proposed 115 kV transmission lines are necessary, serve the public convenience, and are consistent with the public interest. Pursuant to G.L. c. 40A, § 3, the Siting Board hereby approves, subject to the conditions set forth below, the Petition of NEP for individual and comprehensive exemptions from the Zoning Ordinance of the City of Salem in connection with the proposed transmission facilities, as described herein.

I. INTRODUCTION

A. Summary of the Proposed Transmission Project

The proposed project, known as the Salem Cables Replacement Project ("Project"), would replace the two underground 115 kV existing transmission cables that connect NEP's Salem Harbor Substation to its Canal Street Substation in Salem, Massachusetts ("Existing Cables"). The Existing Cables, designated as the S-145 (the "S Cable") and the T-146 (the "T Cable") underground cables, were installed in 1971 and 1951, respectively (Exh. NEP-1, at 1-1). The Project would replace the Existing Cables with two underground 115 kV transmission lines (the "Proposed Cables") because, as described below in Section II.C.1, the Existing Cables are experiencing recurring fluid releases, increasing difficulties regarding maintenance and repair, and are approaching the end of their useful lives (Exh. NEP-1, at 1-3). The Company would locate the Proposed Cables in a new 1.63-mile underground duct bank along different streets from those used by the Existing Cables. The Project also includes related modifications to the Company's existing Salem Harbor and Canal Street Substations (id. at 1-1). Figure 1, below, shows the location of the Project. The estimated cost of the Project, based on a

conceptual grade estimate (i.e., -25 percent to +50 percent), is $62.43 million, with a projected in-service date of spring 2016 (id. at 5-51 to 5-52).[1, 2]

Figure 1. The Salem Cables Replacement Project with Primary and Noticed Alternative Routes

Exhs. NEP-1, at Figure 1-2; EFSB-CM-14

The installation of the Proposed Cables would have four phases: manhole installation, duct bank installation, cable installation, and final pavement restoration. The Existing Cables would be removed once the Proposed Cables are energized. As further described in Section II.C.2, below, NEP is proposing sufficient capacity for the Project to serve forecasted regional loads and secondarily to serve the interconnection requirements of the proposed

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1 The estimated cost of the Project in 2013 dollars includes: $33.40 million for cable installation; $12.27 million for substation improvements; $5.95 million for S and T Cable removal; and $10.81 million for project administration and development (Exh. NEP-1, at 5-52).

2 The Siting Board strongly encourages NEP and other companies in the future to submit cost estimates that incorporate a narrower range than -25 percent to +50 percent. An accurate estimate with a narrower range would provide greater certainty about the true cost of a project.

Footprint Power generating facility ("Footprint Generating Facility") at the Salem Harbor Substation (id. at 1-1).

B. Procedural History

On September 20, 2013, NEP filed three petitions with the Siting Board and the Massachusetts Department of Public Utilities ("Department") relating to the Project. In the first petition, the Company requests approval of the Project, pursuant to G.L. c. 164, § 69J ("Siting Board Petition"). A second petition seeks approval of the Project pursuant to G.L. c. 164, § 72 ("Section 72 Petition"), and was docketed as D.P.U. 13-151. The third petition, docketed as D.P.U. 13-152, seeks individual and comprehensive exemptions from the zoning bylaws of the City of Salem pursuant to G.L. c. 40A, § 3 ("Zoning Petition").

Pursuant to the Company's motion, on September 25, 2013 the Chair of the Department issued a Consolidation Order, referring the Section 72 and Zoning Petitions for review to the Siting Board pursuant to G.L. c. 164, § 69H(2). The consolidated proceeding was docketed as EFSB 13-2/D.P.U. 13-151/13-152. The Siting Board conducted a single adjudicatory proceeding and developed a single evidentiary record for the consolidated petitions ("Petitions").

The Siting Board held two public hearings to receive comments on the Project. On November 19, 2013, the Presiding Officer granted intervenor status to the City of Salem ("City"), Footprint Power Salem Harbor Development LP ("Footprint"), Arthur C. Sargent III (a Salem Councillor-at-Large), Hawthorne Hotel, Finz Seafood & Grill, Waters & Brown, Inc., and Salem residents Mary E. Madore and Kristine Doll ("Ruling"). The Ruling granted limited participant status to Tim Clarke, Salem Chamber of Commerce, and New Hampshire Transmission LLC.

The Petitioner presented the testimony of the following nine witnesses in support of the Petitions: George DeLoureiro, John Martin, Joseph Carey, Eamon Kerrigan, Joshua Holden, Lane Puls, Marissa Pizzi, Esq., Marc Bergeron, and Dr. William Bailey. The City presented David Knowlton as its witness.

The Siting Board held four days of evidentiary hearings, beginning on April 22, 2014 and ending on May 2, 2014. The Company, Ms. Madore, and Ms. Doll filed briefs on May 23, 2014.

In lieu of a brief, the City filed a Memorandum of Agreement ("MOA") dated May 22, 2014 between the City and the Company.[3] A description of the MOA follows below.

The Siting Board staff prepared an Issues Memorandum, dated August 6, 2014; on August 14, 2014, the Siting Board held a public meeting to review the Issues Memorandum and directed the staff to prepare a tentative decision approving the Company's Petitions with conditions.

C. Description of the MOA

The MOA covers a range of coordination issues related to the construction of the Project, including communication protocols, schedule considerations, acceptable construction practices, a traffic management plan, mitigation measures for environmental impacts, and procedures for handling potential damage claims. The MOA also includes the following terms:

- NEP will repave all streets affected by the project with curb-to-curb paving. Due to scheduling considerations, NEP will place $640,000 in escrow for the City to use for repaving certain roads within the Project area along the existing S Cable route instead of NEP repaving those roads itself;
- Construction work hours are limited to 7:00 a.m. to 3:30 p.m. weekdays, excluding weekends and holidays, with some identified exceptions;
- NEP will pay the City's reasonable expenses for engineering consultants for work directly related to the Project, not to exceed $130,000;
- NEP will reimburse the City for the cost of updating the tree survey along the Proposed Route ($3,500); require the contractor to pay for signage directing pedestrians and vehicular traffic to alternate routes and parking during construction (up to $5,000); and reimburse the City (up to $15,000) for retaining a Communications Manager from the non-profit agency Destination Salem to liaise among NEP, the City, and the business community during the Project; and

[3] The MOA can be found in the record at RR-EFSB-8(S)(1). Cites to that record request are shown as "MOA at . . ." herein.

- NEP's Stakeholder Relations Representative will participate in twice-monthly meetings with a group of City officials, business leaders, and residents (the "Working Group") to address issues that arise during Project construction and provide a description of construction activities for the upcoming two weeks.

The MOA, in its entirety, is attached to this Decision for informational purposes as Exhibit 1.

D. Jurisdiction and Standard of Review under G.L. c. 164, § 69J

The Company filed the Siting Board Petition pursuant to G.L. c. 164, § 69J, which requires a project applicant to obtain Siting Board approval for the construction of a proposed energy facility before a construction permit may be issued by another state agency. G.L. c. 164, § 69G defines a "facility" to include "a new electric transmission line having a design rating of 69 kilovolts or more and which is one mile or more in length on a new transmission corridor." The proposed 115 kV transmission lines are clearly a "facility" with respect to Section 69J. In accordance with G.L. c. 164, §§ 69H and 69J, before approving a petition to construct, the Siting Board requires an applicant to justify its proposal in four phases.

First, the Siting Board requires the applicant to show that additional energy resources are needed (see Section II, below). Second, the Siting Board requires the applicant to establish that, on balance, its proposed project is superior to alternative approaches in terms of reliability, cost, and environmental impact, and in its ability to address the identified need (see Section III, below). Third, the Siting Board requires the applicant to show that it has considered a reasonable range of practical siting alternatives and that the proposed site for the project is superior to a noticed alternative site in terms of cost, environmental impact, and reliability of supply (see Section IV, below). Finally, the applicant must show that its plans for construction of its new facilities are consistent with the current health, environmental protection and resource use and development policies developed by the Commonwealth (see Section VII, below).

II. NEED ANALYSIS OF THE PROPOSED PROJECT

A. Standard of Review

G.L. c. 164, § 69J provides that the Siting Board should approve a petition to construct if the Board determines that the petition meets certain requirements, including that the plans for the construction of the applicant's facilities are consistent with the policies stated in G.L. c. 164, § 69H to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the least possible cost. To accomplish this, the Board must, among other matters, review the "need for" the transmission facilities to meet reliability, economic efficiency, or environmental objectives. G.L. c. 164, § 69H. Consistent therewith, G.L. c. 164, § 69J requires applicants to include in their petitions an analysis of need for the transmission facility.[4] To ensure reliability, each transmission and distribution company establishes planning criteria for construction, operation, and maintenance of its transmission and distribution system. Compliance with the applicable planning criteria can demonstrate a "reliable" system. New England Power Company d/b/a National Grid, EFSB 12-1/D.P.U. 12-46/12-47, at 5 (2014) ("IRP"); New England Power Company d/b/a National Grid and Western Massachusetts Electric Company, 18 DOMSB 323, EFSB 10-1/D.P.U. 10-107/10-108, at 5 (2012) ("Hampden County"); Boston Edison Company d/b/a NSTAR Electric, 14 DOMSB 233, EFSB 04-1/D.P.U. 04-5/04-6, at 7-8 (2005) ("NSTAR/Stoughton").

Accordingly, to determine whether system improvements are needed, the Siting Board: (1) examines the reasonableness of the petitioner's system reliability planning criteria; (2) determines whether the petitioner uses reviewable and appropriate methods for assessing

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[4] The Siting Board conducts its review of proposed transmission facilities 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 Chapter 164 of the Acts of 1997 (the Restructuring Act) and the subsequent Notice of Inquiry and Rulemaking, D.T.E. 98-84/ EFSB 98-5 (2003), Massachusetts electric companies, including NEP, are now exempt from the requirements of G.L. c. 164, § 69I. Thus, the Siting Board need not consider whether the proposed transmission facilities are consistent with a recently approved long-range forecast.

system reliability over time based on system modeling analyses or other valid reliability indicators; and (3) determines whether the relevant transmission and distribution system meets these reliability criteria over time under normal conditions and under certain contingencies, given existing and projected loads. IRP at 5; Hampden County at 5; NSTAR/Stoughton at 7-8.

When a petitioner's assessment of system reliability and facility requirements are, in whole or in part, driven by load projections, the Siting Board reviews the underlying load forecast. The Siting Board requires that forecasts be based on substantially accurate historical information and reasonable statistical projection methods that include an adequate consideration of conservation and load management. See G.L. c. 164, § 69J. To ensure that this standard has been met, the Siting Board requires that forecasts be reviewable, appropriate and reliable. A forecast is reviewable if it contains enough information to allow a full understanding of the forecast method. A forecast is appropriate if the method used to produce the forecast is technically suitable to the size and nature of the company to which it applies. A forecast is considered reliable if its data, assumptions and judgments provide a measure of confidence in what is most likely to occur. See, e.g., IRP at 5-6; Hampden County at 6; NSTAR/Stoughton at 8.

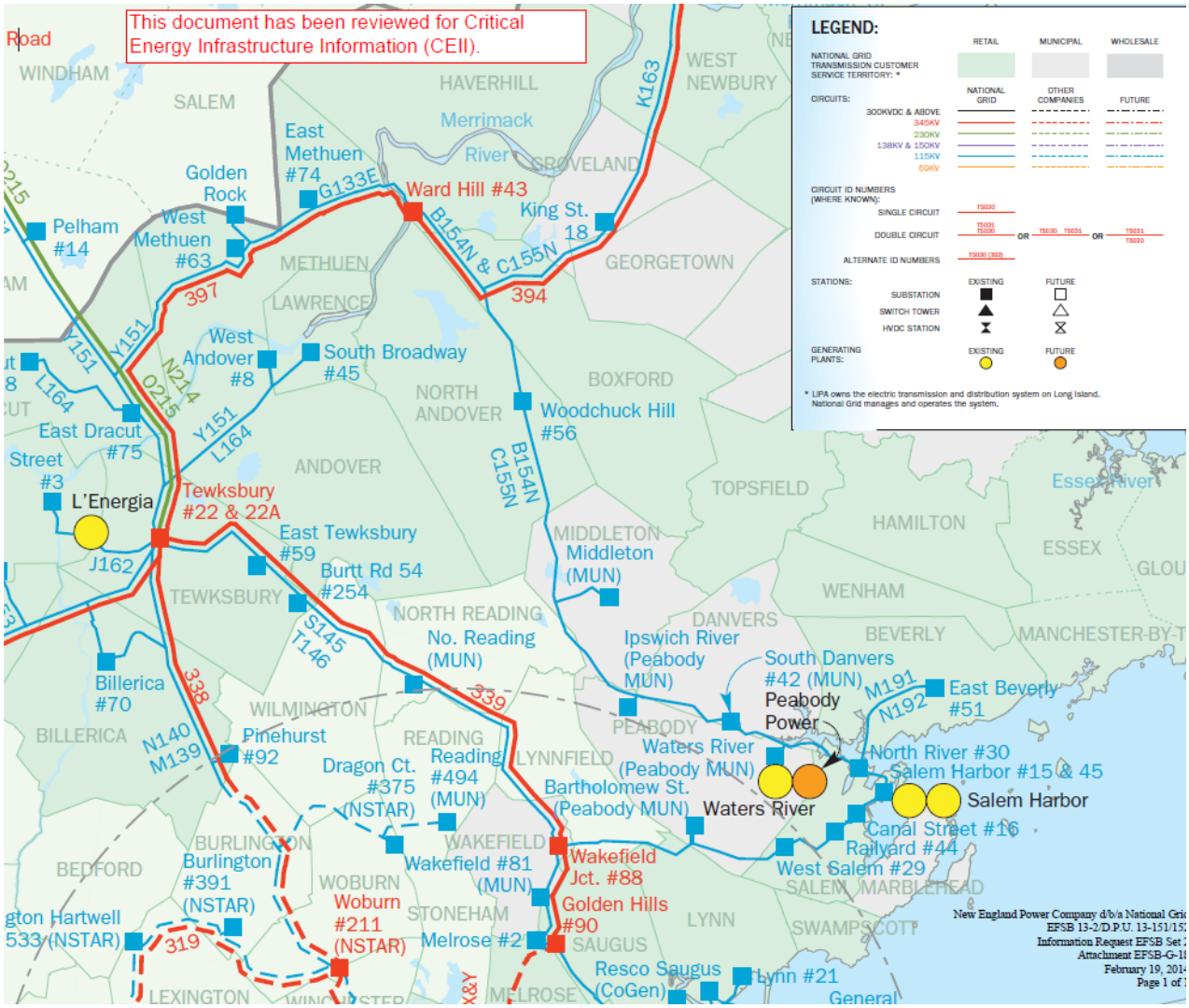
B. Description of the Existing System

The S-145E and T-146E lines are part of a 115 kV transmission loop serving the North Shore area between the substations at Wakefield Junction in Wakefield and Ward Hill in Haverhill, each of which has 345 kV-to-115 kV transformers ("North Shore Loop") (Tr. 1, at 24-25). The S-145E and T-146E transmission lines run from the Salem Harbor Substation to Wakefield Junction, also serving the Railyard Substation in Salem and the West Salem Substations along the way (Exh. NEP-1, at 2-2). From the Canal Street Substation to Wakefield Junction, the S-145E and T-146E lines are overhead conductors (id. at 2-2). NEP's B-154 and C-155 transmission lines comprise the remainder of the North Shore Loop (id. at Figure 2-2).

The functions of the North Shore Loop historically have been to move power between Ward Hill and Wakefield Junction, to connect generation at the Salem Harbor site to the rest of the grid, and to serve load on the North Shore (Tr. 1, at 25-27). With no generation operating at the Salem Harbor site, the North Shore Loop primarily moves power between the 345 kV

sources at the Wakefield Junction and Ward Hill Substations, while also serving customers along the way (Exh. EFSB-N-7).

Figure 2. Map of the 115 kV Transmission Loop from Wakefield Junction to Ward Hill



Source: Exh. EFSB-G-18(1)

As described above in Section I, and as shown in Figure 2, the subject of this case is the portion of NEP's S-145E and T-146E transmission lines that extends approximately 1.5 miles underground between the Salem Harbor Substation and the Canal Street Substation (jointly "Existing Cables" and separately "S Cable" and "T Cable") (Exh. NEP-1, at 2-2). The Existing Cables are self-contained fluid-filled ("SCFF") cable systems with pressurized dielectric fluid for insulation (id. at 2-3). The S Cable is buried beneath public roadways in Salem without a duct

bank ("direct-buried") (id. at 2-3 to 2-4). The T Cable is installed in a duct bank and manhole system (id. at 1-1 and 2-3).

The Salem Harbor Substation is adjacent to the recently retired Salem Harbor Station generating facility, which had a net generating capacity of 740 MW when all four of its units were in operation (Exhs. NEP-1, at 2-3; EFSB-N-1).[5, 6] The site of this retired generating facility is currently owned by Footprint, which intends to build a new 692 MW natural gas-fired, combined-cycle, quick start generating facility at the Footprint Generating Facility with a proposed on-line date of June 2016 (Exh. NEP-1, at 2-3, 2-11).[7] The Salem Harbor Substation connects generation at this site to the transmission grid, and serves local distribution load (Exh. EFSB-N-4). The Canal Street Substation does not serve local distribution; its sole function is to serve as a transition station from underground cables to overhead conductors (Exh. EFSB-G-16).

C. Description of the Company's Demonstration of Need

1. Need to Replace the Asset

The Company stated that the age and condition of the Existing Cables require their immediate replacement in order to maintain the reliability of the transmission system in this area to avoid future environmental incidents, and to minimize the cost of maintenance and repair of

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5 Units 1 and 2 of the recently retired Salem Harbor Station were removed from service in December 2011. Units 3 and 4 were removed from service as of June 2014.

6 In the Petition, the Company stated that it was in the process of reconductoring certain other 115 kV transmission lines in the area besides the Existing Cables to ensure its ability to maintain reliable transmission service in the Merrimack Valley and North Shore areas following the retirement of the generating facility at the Salem Harbor site (Exh. NEP-1, at 2-3).

7 On October 7, 2014, Footprint sought FERC approval of a one-year deferral of its Capacity Supply Obligation because of delays in the permitting process arising from appeals that prevented it from obtaining financing and beginning construction of the facility. The appeal was resolved in favor of Footprint in September 2014. As a result, Footprint's in-service date could be delayed by approximately one year beyond June 1, 2016. See Footprint Power Salem Harbor Development LP, FERC Docket No. ER 15-60-000.

these important facilities (Exh. NEP-1, at 2-11). The Company stated that the S and T Cables, over 40 and 60 years old, respectively, are prone to leakage of dielectric fluid – particularly if corrosion, contractor damage, or other external mechanical forces have compromised the cables (id. at 2-3).[8] The Company stated that potential impacts from dielectric fluid release vary in extent depending on the volume released and the relative location of groundwater and sensitive receptors (Exh. EFSB-HW-2). The Company noted that impacts could range from small, localized releases, which would not have significant detrimental impacts, to larger releases, which could potentially impact the public water supply or cause ecological impacts on flora and fauna (id.).

The S Cable is direct-buried in the roadways of Salem, covered by a concrete cap to provide mechanical protection (Exh. NEP-1, at 2-4). The circuit consists of three single-phase cables each of which has a channel filled with dielectric fluid surrounded by copper conductors and paper insulation impregnated with dielectric fluid (id. at 2-4 to 2-5). The paper insulation is surrounded by an aluminum sheath that is designed to seal the cable and then a high-density polyethylene jacket for corrosion control (id. at 2-4). Since its installation in 1971, the S Cable has experienced at least 24 leaks that resulted in dielectric fluid releases (id. at 2-5). Over half of these leaks (13) have occurred since 2003, during which time the Company has spent more than $1.3 million on locating, repairing, and remediating the leaks on the S Cable (id.).

The Company stated that some of these leaks are the result of the thermal and mechanical characteristics of the cables from carrying electrical load and will inevitably continue over time (id. at 2-6). Other leaks have occurred when the S Cable's polyethylene outer jacket has deteriorated and exposed its aluminum sheath to the soil, which leads to corrosion of the aluminum (id.). The Company predicted that given the S Cable's age and operating history, it is likely that the jacket failure and sheath corrosion will continue to occur on the S Cable (id.).

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[8] While the Existing Cables are in operation, any releases to the environment are subject to evaluation and remediation provisions of the Massachusetts Contingency Plan specified at 310 CMR 40.00 et seq., in accordance with G.L. c. 21E, § 6, which requires reporting leaks to the Massachusetts Department of Environmental Protection ("MassDEP") and conducting clean-up activities in the area where the release occurred (Exh. NEP-1, at 3-1).

The T Cable is installed in a duct bank with two cables per phase (id. at 1-4, 2-8). Like the S Cable, the T Cable has a hollow core to provide a channel for the dielectric fluid surrounded by copper conductors and paper insulation impregnated with dielectric fluid (id. at 2-8 to 2-9). However, the T Cable is sealed in a lead sheath instead of an aluminum sheath and it does not have a polyethylene jacket (id.). The Company stated that the T Cable has required some repairs over its 60-year history, mostly as a result of cracks in the stop joint's epoxy cone insulators that isolate the two hydraulic sections of the cable (id. at 2-9; Tr. 1, at 33). The Company stated that the T Cable is also subject to deterioration as it ages due to the thermal and mechanical behavior of the cables and the corrosion of the cable's lead sheath, which can expose the cables to moisture and cause electrical failure (Exh. NEP-1, at 2-10).

To detect leaks, the Company has alarms installed on both the S Cable and T Cable that alert the Company's Control Center if cable oil pressure is dropping rapidly (Exh. EFSB-G-5). Additionally, the Company monitors and records the pressure reading for the S and T Cables during weekly inspections at the Salem Harbor and Canal Street Substations; these weekly readings are used to detect possible fluid releases before the pressure has dropped to the alarm threshold (id.). Once a leak has been detected somewhere between the two substations, the Company has three methods for locating the leak: (1) freezing the cable at one location at a time and measuring pressure drop to either side; (2) introducing a perfluorocarbon tracer to the dielectric fluid and monitoring for the tracer in the environment; and (3) testing for electrical faults in the aluminum jacket (id.). Detecting leaks may require excavation at multiple locations in the public roads, which may cause traffic delays, parking disruptions, noise, as well as a risk of inadvertent damage to the cables (Exh. NEP-1, at 2-8). The Company stated that repairing and remediating the leaks also require taking the affected cable out of service (id.).

Additionally, many replacement parts associated with the Existing Cables, such as fluid alarms and fluid reservoirs, are no longer manufactured and are difficult to obtain (id. at 2-4). Similarly, there is a limited number of experienced craftspeople proficient in the repair of SCFF cables, especially the S Cable; there are currently only two companies in the United States capable of performing repairs on the S Cable (id.).

NEP stated that its transmission asset management group determines when to replace an asset based on its operating history, reliability, availability, environmental impacts, and the cost

and ability to maintain the asset in the future (Exh. EFSB-N-27; Tr. 1, at 20-21). In 2005, following a series of dielectric leaks in 2002 through 2004, the Company commissioned KEMA Associates to conduct an overall assessment of the remaining useful life of the S Cable (Exh. EFSB-N-2). The KEMA Associates study concluded that the Company should consider options for the replacement of the S Cable based on its condition (Exhs. EFSB-N-2; EFSB-N-31). The Company determined that the T Cable also should be replaced based on its age and condition (Exh. EFSB-N-2).

The Company argues that removing the Existing Cables without replacing them would not meet applicable reliability standards as the Existing Cables are an integral part of NEP's 115 kV transmission system (Exh. NEP-1, at 3-4). If the Existing Cables were not replaced, only the existing B-154S/C-155S overhead transmission lines would serve Salem Harbor Substation (on double-circuit structures) (Exh. EFSB-N-4). As a result, 18,500 customers in the Salem area (approximately 70 MW of load) would be at risk of a blackout in an N-1 contingency involving a loss of these double-circuit structures (id.). [9]

The Company noted that, if the Existing Cables were removed and not replaced, the proposed Footprint Generating Facility would face significant operational limitations on delivering capacity and energy to the grid (Exh. EFSB-N-4). Without either the Existing or Proposed Cables, the Salem Harbor Substation (where Footprint would interconnect) would only be able to accept a maximum of 500 to 550 MW of output from the Footprint Generating Facility, assuming unconstrained conditions; significantly lower output limits could occur given constrained system conditions (id.). The Company also noted that the independent system operator, ISO-New England ("ISO-NE"), would likely require the Footprint Generating Facility to operate continuously with at least some minimum output level to mitigate the risk of voltage collapse or overload in the Salem area (id.). The Company concluded that absent the Proposed Cables, it would be very difficult for ISO-NE to operate the transmission system in the Salem area in a reliable manner consistent with applicable reliability standards (Exh. NEP-1, at 3-5).

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[9] An N-1 contingency is a circumstance in which there is an unexpected fault or loss of a single electric element. An N-1-1 transmission consists of the loss of such an element, followed by non-simultaneous loss of an additional element.

2. Capacity for the Replacement Asset

The Company conducted an analysis of transmission capacity needs in the region with and without the proposed Footprint Generating Facility and determined that under both scenarios there is a need to increase the capacity of the Existing Cables in order to ensure the long-term reliability of the regional transmission system (id. at 2-11). Both of these scenarios were analyzed under the applicable ISO-NE and NEP planning criteria and guidelines (id. at 2-11 to 2-12).

a. Load Forecasts with Footprint Interconnection

The proposed Footprint Generating Facility would interconnect at the Salem Harbor Substation (Exh. NEP-1, at 2-11). On October 10, 2013, the Siting Board approved Footprint's petition to construct and on February 25, 2014, the Siting Board granted a certificate of environmental impact and public interest to the proposed generating facility. Footprint Power Salem Harbor Development LP, EFSB 12-2 (2013) ("Footprint"); Footprint Power Salem Harbor Development LP, EFSB 13-1 (2014) ("Footprint Certificate"). The Company maintains that because the capacity rating of the Existing Cables is inadequate to meet the needs to interconnect the proposed Footprint Generating Facility (as described below), the Company needs to replace the Existing Cables with a solution that has higher capacity (Exh. NEP-1, at 2-17).[10]

The Company conducted a transmission planning study with eight load flow scenarios and determined that under the worst-case generation dispatch tested with no transmission contingencies (i.e., N-0 conditions), the required normal rating for each Existing Cable would be 233 megavolt-amperes ("MVA"), which exceeds the capacity of the existing T Cable (id. at 2-14). For the worst-case N-1 contingency, the Company stated that loading would exceed the long-term emergency rating ("LTE") of both of the Existing Cables in all eight power flow cases

[10] The Existing Cables did not have sufficient capacity to serve the full output of Salem Harbor Station and could have overloaded even in some scenarios with all lines in service (Exh. EFSB-N-1; RR-EFSB-1). In May 2008, the Company first filed an application with ISO-NE for replacement of the Existing Cables, based on their condition; that original replacement proposal had a greater capacity than either the Proposed Cables or the Existing Cables (Exhs. NEP-1, at 2-3; EFSB-N-1; EFSB-N-30). However, the 2008 application was later revised in response to announced changes in generation at the Salem Harbor site (Exh. EFSB-N-30).

analyzed (id. at 2-14 to 2-15).[11] The maximum loading for the dispatch scenarios tested under N-1 contingency conditions was 375 MVA (id. at 2-15). In the worst case N-1-1 contingency tested, the loading on the cable left in service would be 647 MVA (id. at 2-16).

Achieving a 647 MVA LTE rating would necessitate two separate duct banks on two separate routes and would cost an estimated $71.76 million compared to the proposed Project's estimated $62.43 million cost (Exh. EFSB-N-17). NEP stated that Footprint would likely have been responsible for the cost increment of this alternative (id.). Footprint chose instead to be prepared to ramp down its units under certain contingencies and load conditions, so that the replacement to the Existing Cables could be built with an LTE of 400 MVA (Exh. NEP-1, at 2-16).[12]

b. Load Forecast Without Footprint

The Company conducted contingency analysis for N-0, N-1, and N-1-1 scenarios with the same eight load flow cases as it used for the analysis with the Footprint Generating Facility operating and determined that a 400 MVA LTE rating would be adequate to meet the needs of the Salem area through the 2026 planning horizon without the proposed Footprint Generating Facility (id. at 2-18 to 2-19). The Company estimated that in the absence of the Footprint Generating Facility, the 400 MVA LTE rating would be sufficient through the year 2062, but emphasized that the results from extrapolating 30 years beyond the planning horizon are highly unreliable based on the many factors that could change over time (Exh. EFSB-N-5).

The Company noted that were it constructing replacement cables solely for the long-term system requirements, without the objective of interconnecting the Footprint Generating Facility, it would have designed the Project with a capacity of at least 350 MVA (Exh. EFSB-N-5). The Company observed that the cost differential between 350 MVA and 400 MVA would probably

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[11] The LTE rating is the twelve-hour capability of the element during the summer loading period, while the element's normal ratings is the continuous operating limit for that element (Exh. EFSB-N-19).

[12] The proposed Footprint Generating Facility would be a quick-start facility, able to produce approximately 300 MW of output within ten minutes of startup and reach its full capacity within one hour. Footprint Decision at 1.

be less than one million dollars (Tr. 1, at 19). Therefore, the added benefits of the higher capacity 400 MVA Proposed Cables in accommodating additional years of system load growth, as well as the their ability to interconnect the Footprint Generating Facility at higher capacity levels, are realized at a relatively low incremental cost.[13] The Company stated that another benefit of increasing transmission capacity in this location would be that the Existing Cables presently have the lowest capacity of any segment of the North Shore Loop and are thus a limiting factor on the capacity of the loop (Exh. EFSB-G-12; Tr. 1, at 31-32). According to the Company, improvement to the capacity and reliability of the loop would provide more flexibility for the integration of distributed generation, such as renewable generation in the North Shore area (id.).

The Company also evaluated need for the Proposed Cables given impacts relating to climate change. The Company noted that even if soil temperatures were to increase by three degrees Celsius, the Proposed Cables would still achieve the desired 400 MVA rating (Exh. EFSB-G-14). In addition, if loads on the system were to increase faster than expected because of increased summer temperatures, the Company noted that an increased percentage of Footprint's output would serve local loads in the Salem area (served from the Salem Harbor Substation) and, therefore, would actually reduce loading on the Proposed Cables (id.). Without Footprint operating, the Company estimated that since the 400 MVA LTE rating would be sufficient through 2062, the Project has a substantial margin of capacity to meet increased loads (id.). The Company therefore contends that the 400 MVA LTE rating would be sufficient to

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[13] The Company noted that while it used a ten- to 15-year planning horizon to evaluate need, once it has determined that a project is needed, the Company typically designs the project with sufficient capacity to serve load well beyond the end of the planning horizon (Exh. EFSB-N-5). The Company's Transmission Planning Guide recommends providing for a 20 percent margin over the maximum flow required for the planning horizon (id.). The Company indicated that without the Footprint Generating Facility, the replacement cables would need an LTE rating of 276 MVA in 2026 and 290 MVA in 2031 (id.). Therefore, the Company stated that the "application of a 20 percent margin to the 2031 value would result in an LTE rating of 350 MVA" (id.).

reliably serve load in the Salem area with or without the proposed Footprint Generating Facility for the foreseeable future, inclusive of potential climate change effects (Exh. NEP-1, at 2-19).

D. Positions of the Parties

None of the parties disputed the need to replace the Existing Cables or commented on the Company's assessment of the necessary capacity for the replacement.

E. Analysis and Findings on Need

For most transmission line cases that the Siting Board reviews, the petitioners rely on quantitative reliability standards to establish the need for the project. In this case, the Company established that the Existing Cables need to be replaced based on an assessment of their condition and then used quantitative reliability standards to determine the necessary capacity of the replacement.

The Siting Board finds that the Company's process to determine the need to replace Existing Cables is reviewable and used appropriate methods for assessing system reliability over time. The history of the leaks from the S Cable, the age and condition of the Existing Cables, and the difficulty of finding qualified repair workers or replacement parts for the Existing Cables justify the replacement of the Existing Cables. Replacing the Existing Cables and removing them from service will achieve the environmental objective of stopping leaks of dielectric fluid. Replacing the Existing Cables will also improve reliability by minimizing unplanned outages. Finally, replacing the Existing Cables will also improve economic efficiency by avoiding the cost of remediating future leaks. Therefore, the Siting Board concludes that the Company has sufficiently demonstrated the need to replace the Existing Cables to address environmental, reliability, and cost concerns, associated with their potential for leaks and difficulty of repair.

The record shows the Existing Cables do not exist solely to interconnect generation at the Salem Harbor site; the Existing Cables are also an integral part of the North Shore Loop that moves power between the Ward Hill and Wakefield Junction Substations and serve local distribution load. The Existing Cables also serve to connect generation at the Salem Harbor site to the regional grid; accordingly, the Company properly considered the needs of Footprint Generating Facility as one of the factors in determining the capacity for the replacement project

for the Existing Cables. As the Company noted during hearings, the incremental cost of increasing the rating of the Proposed Cables to 400 MVA from 350 MVA to fully interconnect the Footprint Generating Facility is not significant – especially relative to the system benefits.

Accordingly, the Siting Board finds that the Existing Cables in Salem need to be replaced for environmental, reliability, and costs considerations, related to the Existing Cables' propensity to leak oil and difficulty to repair. Further, the Siting Board concludes that a capacity of at least 350 MVA is needed to accommodate potential load growth. A target capacity of 400 MVA would address both the potential for load growth as well as reliably interconnect the Footprint Generating Facility. Additionally, the Siting Board notes that any additional cost for such capacity is relatively small. Therefore, the Siting Board finds that a capacity of 400 MVA would be appropriate for the solution to replace the Existing Cables.[14]

III. ALTERNATIVE APPROACHES TO MEETING THE IDENTIFIED NEED

A. Standard of Review

G.L. c. 164, § 69J requires a project proponent to present alternatives to the proposed facility, which may include: (1) other methods of transmitting or storing energy; (2) other sources of electrical power; or (3) a reduction of requirements through load management.[15] In implementing its statutory mandate, the Siting Board requires a petitioner to show that, on balance, its proposed project is superior to such alternative approaches in terms of cost, environmental impact, and ability to meet the identified need. In addition, the Siting Board requires a petitioner to consider reliability of supply as part of its showing that the proposed

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[14] In the Company's discussion of the standard of review applicable in this case, the Company noted that when jurisdictional transmission facilities are proposed to interconnect to a new or expanded generating facility, the Siting Board evaluates the need for the transmission interconnection based on the standard of review for need set forth in Cape Wind at 29 (Company Brief at 13). However, it is unnecessary to review the need for the Project using this standard because we find a need for the Project for environmental, reliability, and costs considerations.

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

project is superior to alternative project approaches. IRP at 25-26; NSTAR Electric Company, EFSB 10-2/D.P.U. 10-131/10-132, at 29 (2012) ("Lower SEMA"); NSTAR/Stoughton at 21.

B. Identification of Alternative Approaches for Analysis

The Company stated that it developed a review process that identified multiple potential alternatives and then first screened these alternatives for their ability to meet the identified resource need and for overall feasibility and constructability (Exh. NEP-1, at 3-4). NEP eliminated any alternative that clearly did not meet the identified need and/or it deemed infeasible to construct (id.). Next the Company screened the remaining project alternatives in more detail for potential reliability considerations, environmental impacts (including permitting requirements), and cost analysis, and selected a project approach based on these comparisons (id.).

The Company highlighted several unique circumstances that limit the number of feasible alternatives (id. at 3-1). First, the Company stated that due to transmission system constraints, it would not be possible to take either of the Existing Cables out of service for an extended period of time, so it must construct the replacement solution while the Existing Cables remain in service (id.). Second, the Company argued that it must remove both the S Cable and the T Cable from the ground once they are retired due to environmental regulations and all project alternatives must therefore include the removal of both of the Existing Cables (id.). Third, the Company asserted that because additional capacity is needed to reliably interconnect the proposed Footprint Generating Facility, the evaluation of project alternatives must therefore include consideration of whether an alternative can be implemented in time for the plant's in-service date (id.).[16] However, the Company also stated that service to electric customers can be maintained even if the Footprint Generating Facility is completed before the Proposed Cables, because the Existing Cables will continue to operate until the two new circuits are placed in service (Exh. EFSB-PA-2). The Company added that Footprint Generating Facility, however, would be limited to operate at an output level within the ratings of the circuits in place at the time (id.).

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[16] NEP stated that as a prerequisite to Footprint's participation in the February 2013 Forward Capacity Auction at full capacity, ISO-NE requested certification from NEP that the two new cables would be in service by 2016 (Exh. EFSB-PA-2).

The Company evaluated the following alternative approaches to meet the identified need: (1) a non-transmission alternative; (2) transmission solutions of varying voltages; (3) an overhead transmission alternative; (4) an underground in-street duct bank alternative; (5) an alternative through Salem Harbor ("Harbor"); and (6) an alternative using the railroad ROW.[17] These alternatives are described below.

1. Non-transmission Alternatives

The Company stated that while non-transmission alternatives such as energy efficiency ("EE") and distributed generation ("DG") have very useful applications, by their nature they cannot serve the function of the Existing Cables in the regional transmission network or interconnect a new generator to the electric grid (Exh. NEP-1, at 3-2). As such, EE and DG would not substitute for a transmission asset in resolving the reliability issues in this case (id.). Therefore, the Company eliminated non-transmission alternatives from consideration as a project alternative (id.).

2. Transmission Voltage Selection

NEP stated that 115 kV is the only transmission voltage in the Salem area, and replacement of the Existing Cables with any other voltage would require voltage transformation at both ends of the new cable (i.e., at the Salem Harbor and Canal Street Substations), necessitating expansion of both substation yards (Exh. EFSB-PA-1). Also, if 69 kV replacement cables were used, multiple cables per phase and separate duct banks would be needed because each cable would have less capacity (id.). Furthermore, the Company stated that, within its planning horizon, there is no identified need for the increased capacity that 345 kV cables would provide (id.). Therefore, the Company argues that a 115 kV transmission solution should be used (id.).

[17] A no-build alternative would not meet the resource need identified in Section II, and therefore is not considered here.

3. Overhead Transmission Alternative

The Company studied the construction of overhead transmission circuits on routes extending through Salem and routes around Salem (Exh. NEP-1, at 3-13). NEP conducted a conceptual analysis of routes through Salem to determine the feasibility of installing two 115 kV overhead transmission circuits between the Salem Harbor and Canal Street Substations (id.). Due to clearance requirements, an overhead route for two 115 kV circuits would require a new 50- to 150-foot-wide right-of-way ("ROW") (id.). To achieve this ROW width, the Company would need to acquire and demolish many existing buildings in the City, which would permanently impact numerous residents and businesses and cause significant social, economic, and visual impacts to the City and its historic districts (id.). Therefore, NEP stated that overhead transmission lines through Salem would be highly impractical and did not merit further consideration (id.).

The Company also evaluated routing two overhead transmission circuits around the periphery of Salem (id.). According to the Company, reliability constraints would necessitate constructing two separate lines of transmission structures because each circuit serves as back-up for loss of the other (Exhs. NEP-1, at 3-14; EFSB-PA-30). While the Company indicated that no existing ROW directly connects the Salem Harbor and Canal Street Substations, the Company was able to identify feasible routes connecting the Salem Harbor Substation to the West Salem Substation, which would serve the same regional transmission function as the Existing Cables (Exh. NEP-1, at 3-14).[18]

NEP evaluated an approximately 6.9-mile route for an overhead route avoiding the center of Salem that combines existing overhead transmission corridors, existing railroad corridors, and a total of 1.4 miles of new easement away from existing ROWs (id.). From Salem Harbor

[18] For a project alternative connecting the Salem Harbor Substation to the West Salem Substation, NEP stated that the existing overhead segments of the S-145 and T-146 transmission lines between the West Salem and Railyard Substations would then supply the distribution load that is served from the Railyard Substation (Exh. NEP-1, at 3-14). Under this scenario, the Company stated that the Canal Street Substation would no longer be needed and it would be decommissioned and removed (id.). Currently, the Canal Street Substation's only function is to serve as a transition station between underground cables coming from the Salem Harbor Substation and overhead lines going to the Railyard Substation (Exhs. NEP-1, at 3-14; EFSB-G-16).

Substation, the two new overhead transmission circuits would first follow the existing 200-foot-wide ROW of the B-154S and C-155S transmission lines for 3.5 miles to the Waters River Substation in Peabody, expanding the existing ROW by 50 feet (id.). NEP described how it could fit the two new circuits into the existing ROW by either: (1) acquiring new easements to expand the ROW by 50 feet; or (2) putting the new segment of the T-146E line on a double circuit structure with a relocated B-154S line, and putting the new S-145E line and a relocated C-155S line on separate single circuit structures (Exhs. NEP-1, at 3-15; EFSB-PA-30).

From the Waters River Substation, the two new overhead circuits would continue along an existing railroad corridor for approximately 2.0 miles, along a local road for approximately 1.4 miles, and then across the Peabody Golf Course to the West Salem Substation (Exh. NEP-1, at 3-15). The Company stated that it would need to demolish at least 60 residences, ten industrial buildings, and eight commercial buildings along the railroad ROW (id.). The Company stated this project alternative would require Article 97 land dispositions from the Legislature and stated that that such disposition is difficult to obtain when a feasible alternative exists (id. at 3-17, 3-18).[19] Additionally, the Company would not be able to obtain secure property rights along the railroad ROW (id. at 3-15).

4. City Streets Underground Alternative

The Company evaluated an underground transmission alternative that would place both replacement circuits within a single new duct bank and manhole system through the public streets of Salem between the Salem Harbor and Canal Street Substations (i.e., the proposed Project) (Exh. NEP-1, at 3-5).[20] The Company stated that, in order to keep the Existing Cables

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19 All open space areas covered by Article 97 of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts require a two-thirds vote of each branch of the legislature before they can be disposed of or used for other purposes.

20 The Company also analyzed installing the two replacement circuits in two separate, new duct bank and manhole systems along different routes, including the possibility of placing one of the replacement circuits within the existing T Cable duct bank (Exh. NEP-1, at 3-5, 3-12). However, the Company determined that it would not be feasible to reuse the existing T Cable's duct bank for this Project (id. at 3-12). Without the option to reuse the existing T Cable duct bank, the Company concluded that the

in service during construction of the replacement project, it would have to build the new duct bank along a different route from the Existing Cables, due to road widths and existing utility density (id. at 3-6). The Company stated that this alternative is technically feasible (id. at 3-8).

5. Harbor Route

NEP evaluated three technologies for installing the new circuits across the Harbor. The three technologies were: (1) overhead transmission lines across the Harbor; (2) the use of jet plow technology to install the new circuits under the Harbor; and (3) the use of horizontal directional drilling ("HDD") technology to install the two new circuits under the Harbor (id. at 3-23).

a. Overhead Transmission Across Salem Harbor

The Company asserted that construction of transmission structures within the Harbor is the only practical means to provide adequate clearance of transmission lines over vessels (Exh. NEP-1, at 3-23). However, the transmission structures themselves would then interfere with navigation through the Harbor, would require extensive environmental permitting, and could significantly impact existing marine resources (id.). The Company stated that it would still need to acquire new onshore overhead ROW easements in order to connect from the Harbor to the Canal Street and Salem Harbor Substations (id.). The Company provided maps that indicate that there is fairly dense residential development between the Canal Street Substation and the Harbor that would preclude these overhead transmission connections unless a substantial number of homes were removed (id. at Figure 5-1). The Company argues that based on these substantial obstacles, this alternative is not practical and should be eliminated from further analysis (Company Brief at 48).

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shorter construction duration of the single duct bank alternative would minimize impacts to the City, as compared to the two-duct bank alternative (id. at 3-39).

b. Jet Plow Alternative

Another option to cross the Harbor would be to install the two new circuits under the Harbor using jet plow technology along an approximately 1.4-mile corridor (Exh. NEP-1, at 3-23). The Company described how, in a jet plow installation, an installation barge would pull an approximately 15-foot-wide plow along the sea floor (id. at 3-24). High-pressure water would be injected into the seabed sediment to create a liquefied trench approximately five feet wide in which the plow would lay the electric cables (id.). The Company stated that each circuit would contain six solid dielectric cables, for a total of twelve cables with a horizontal separation of 20 feet between each cable, resulting in a corridor width of approximately 260 feet (including a 20-foot buffer beyond the outermost cables) (id. at 3-23).

At each landfall location, the cable would be installed using a short-range HDD between an upland manhole location and a temporary cofferdam, located a short distance offshore (id. at 3-24). At the Salem Harbor Substation, a 0.3-mile underground route would be necessary to connect the substation to the Harbor (id.). The Company stated that because of ampere capacity requirements for underwater sections, the jet plow alternative would require two cables per phase (i.e., six cables per circuit) compared to one cable per phase for an all in-street option (Exh. EFSB-PA-20). The lines would continue on land in the same six cables per circuit configuration (id.). This would likely require two separate duct banks along two separate in-street routes from the Harbor to Canal Street Substation due to the existing levels of utility congestion and the narrowness of the Salem streets, resulting in a total of approximately 1.0 to 1.5 miles of construction through mixed residential neighborhoods with small businesses and community buildings (Exhs. NEP-1, at 3-24 and 3-26; EFSB-PA-20). The Company stated that this alternative would be technically feasible (Exh. NEP-1, at 3-30).

c. HDD Harbor Alternative

The HDD Harbor alterative would involve the installation of two circuits along an approximately 2.0-mile corridor under the Harbor using HDD technology (Exh. NEP-1,

at 3-31).[21] The Company stated that it would use high-pressure fluid-filled ("HPFF") cables to accommodate the long pull length (id. at 3-31). To achieve the required ratings with HPFF cable technology, the Company would need to use three cables per phase for a total of 18 cables, installed in six cable pipes (id.).

The Company stated that an HDD installation would involve drilling beneath the Harbor floor to install the 18 cables in six steel pipes, spaced between ten and 35 feet apart (id. at 3-31, 3-32). The Company stated that due to the length of the crossing and the lack of space on either side of the Harbor in which to assemble the pipes, at least one temporary mid-Harbor platform would be needed for 14 months or more during construction (id. at 3-32, 3-33). As a result of the shallow burial depth of the cables around the mid-Harbor platform location, there would be an area approximately 200 feet by 500 feet (2.3 acres) in the Harbor that would have permanent navigation restrictions (id. at 3-32).

Due to limited subsurface space at the Salem Harbor Substation, the two circuits would need to be launched from separate points, and the Company would require two separate land-based routes totaling approximately 0.5 miles (id. at 3-31 to 3-32). To connect to the Canal Street substation, this alternative would require the installation of the two circuits along separate underground routes for a total of approximately 1.0 to 1.5 miles through residential neighborhoods with small businesses and community buildings (id. at 3-31 and 3-34). The Company proposed to use the Palmer Cove ball fields as an HDD staging area, which would occupy the fields for up to five months (id. at 3-33). The Company stated that the HDD alternative through the Harbor would be technically feasible (id. at 3-38).

6. Railroad ROW Alternative

An existing Massachusetts Bay Transportation Authority ("MBTA") railroad corridor for the Newburyport/Rockport line passes though Salem (id. at 3-21). In its initial Petition, the Company conducted a conceptual analysis of the potential use of this corridor to avoid the impacts of in-street construction and argued that it should be dismissed from consideration

[21] NEP commissioned Burns & McDonnell and its sub-consultant Haley & Aldrich to complete a detailed investigation into the feasibility, risks, and estimated costs for installing the new cables under the Harbor using HDD technology (Exh. NEP-1, at 3-30).

because: (1) there did not appear to be room within the railroad corridor for manhole installation; (2) work hour restrictions would make construction and repair very difficult; and (3) the Company could not secure permanent property rights along this corridor (id. at 3-22).

Based on input from the public, the Siting Board requested that the Company conduct supplemental analysis of the feasibility of using the railroad corridor to avoid in-street construction through downtown Salem (Exh. EFSB-PA-12). To address the Siting Board's request, the Company performed additional field work, conducted additional desktop analysis, met with the MBTA, and developed configuration concepts and preliminary cost estimates (Exh. EFSB-PA-12(S)). The Company also engaged its consultant, Burns & McDonnell, to contract with Haley & Aldrich to conduct a preliminary study of using HDD under the Salem railroad tunnel ("MBTA Tunnel") (id.).

The Company assessed the feasibility of the railroad ROW alternative in three segments: (1) options to traverse the area between the Salem Harbor Substation and the railroad ROW ("Segment 1"); (2) options to traverse the area along or adjacent to the railroad ROW east of the north end of the MBTA Tunnel at Bridge Street ("Segment 2"); and (3) options to traverse the area between the north end of the MBTA Tunnel and either the Canal Street Substation or the Railyard Substation ("Segment 3") (id. at 2-1). See Figure 3 below for the options that the Company considered for each segment.

Figure 3. Map of the Options for the Railroad ROW Alternative by Segment

Source: Exh. EFSB-PA-12(S)(1) at Figure 1

For Segment 1, the Company stated that it would be possible to use the existing B-154S/C-155S transmission corridor, as described above (id.). Alternatively, the Company could install the new circuits underground, either in City streets or through City-owned land and the Tracy Multi-Use Path (id. at 2-3). While the Company stated that all of these options were

technically feasible, it argued that the route that consisted of City-owned land and the Tracy Multi-Use Path would be the most preferable and advanced this option for further consideration (id. at 2-4, 2-13).

For Segment 2, the Company first considered the option of installing the new circuits underground within the railroad ROW (id. at 2-5). The Company had significant concerns with this option, namely that: (1) work would be restricted to between the hours of 1:00 a.m. and 5:00 a.m., which would extend the schedule and increase costs; (2) the railroad would only grant a revocable license to the Company, so it might have to relocate the facilities at any time at the Company's expense; and (3) coordination with the MBTA would complicate maintenance and repairs (id.). The Company stated that while there may be marginally enough room to meet the MBTA's written setback requirements, the MBTA indicated that it was unlikely to find this option acceptable (id. at 2-5 to 2-6). The MBTA gave the following reasons: (1) potential track settlement would necessitate a greater setback in this area; (2) the track in this area runs adjacent to a significant amount of rock, and its removal could disrupt the track; and (3) the 115 kV cables could induce false signals or cause other issues with the MBTA signal cables installed adjacent to the tracks (id. at 2-6). Based on the difficulties of this option and the MBTA's likely rejection of it, the Company argued that the option of constructing the cables underground within the railroad ROW for Segment 2 should not be considered further (id.).

Next, the Company evaluated constructing the new circuits overhead within the railroad ROW for Segment 2. The Company indicated that there is not enough physical space between the railroad tracks and the adjacent road or riverbank to reliably site an overhead transmission line (id. at 2-7). The Company noted that to comply with the MBTA setback requirements, the Company would need to site some transmission structures in the river, on the seawall, or on the retaining wall along the riverbank, which would expose the transmission structures to accelerated weathering and erosion at the foundation and raise reliability risks associated with emergency restoration (Exhs. EFSB-PA-12(S)(1) at 2-7; EFSB-PA-43). Additionally, constructing transmission structures on the seawall would most likely require rebuilding the seawall, which the Company stated may not be feasible given that disturbing the existing structure could compromise the integrity of the soil supporting the adjacent railroad tracks (Exh. EFSB-PA-43). For these reasons, the Company concluded that constructing overhead transmission lines in the

railroad ROW for Segment 2 should be eliminated from consideration (Exh. EFSB-PA-12(S)(1) at 2-7).

As an alternative to construction within the railroad ROW for Segment 2, the Company considered constructing the new circuits in the adjacent Bypass Road and Bridge Street or the bike path on the south side of the roads (id. at 2-7 to 2-8). The Company stated that there is not sufficient room to develop an overhead transmission route in this area that meets minimum safety clearance requirements, but that it would be feasible to install the new underground circuits in these locations (id. at 2-8).

For Segment 3, the Company first investigated whether it could attach the replacement circuits to the ceiling of the MBTA Tunnel (id. at 2-9). The MBTA indicated that this option would be unacceptable due to safety concerns related to having two energized 115 kV cables installed within an active railroad tunnel (id.).

The Company next evaluated whether the cables could be installed in a trench next to the tracks within the MBTA Tunnel (id.). The MBTA stated that the tunnel does not have enough room to install a trench and meet the MBTA's written minimum setback requirements. The Company therefore concluded that this option would not be feasible (id. at 2-9 to 2-10).

The Company also investigated the possibility of going under the MBTA Tunnel via HDD (id. at 2-10). The Company determined that an HDD option to connect to the Railyard Substation would most likely be feasible using either: (1) cables insulated with cross-linked polyethylene ("XLPE") spaced ten feet apart within separate steel conduits; or (2) four steel pipes, spaced ten feet apart, each containing three HPFF cables (Exhs. NEP-1, at Appendix 3-3 Section 2.1; EFSB-PA-12(S)(1) at 2-10; EFSB-PA-47). The Company indicated that HPFF cables would be the most likely construction material because the use of XLPE is not standard practice for HDD, and HPFF cables are superior in terms of allowable pull length, total number and/or size of bore holes required, and sheath bonding requirements (Exhs. NEP-1, at Appendix 3-3 Section 2.1; EFSB-PA-12(S)(1) at 2-14).

While NEP acknowledged that using HDD for Segment 3 would reduce community impacts such as traffic congestion, parking disruption, and noise, the Company also noted the serious drawbacks to using HDD in this case (Exh. EFSB-PA-12(S)(1) at 2-13). For example, the Company stated that there is a risk that the conduit could fail due to multiple tight bends,

borehole collapse, or intrusion of drill mud at unplanned locations (id. at 2-10). Beyond the inherent downside to any of these events, NEP noted that there is a further risk that these construction contingencies could undermine the integrity of the MBTA Tunnel and put the safety of the public at risk (id. at 2-13). Additionally, the Company stated that because work hours in this location would be limited to 1:00 a.m. to 5:00 a.m., it would most likely not be able to accomplish the pullback of the HDD in one day without shutting down the railroad operation (Tr. 1, at 52-56). The Company testified that it is undesirable to stop during pullback because stopping increases the chances of the pipe getting stuck (id. at 53). The Company also testified that because of the narrowness of the alignment under the MBTA Tunnel, if one of the pipes became stuck there might not be adequate room to drill a replacement boring for that conduit (id. at 52-53). For these reasons, the Company recommended that if a railroad route were selected, the new circuits should be installed underground within Washington Street and Canal Street for Segment 3 (Exh. EFSB-PA-12(S)(1), at 2-14).

Finally, the Company evaluated the use of the Washington Street and Canal Street ROWs for installing the circuits in Segment 3 adjacent to and above the MBTA Tunnel (id. at 2-11 to 2-12). The Company stated that extensive acquisition and demolition of private property would be required to develop an overhead transmission corridor along these roads, and therefore the Company concluded that this option should be rejected (id. at 2-12). However, the Company stated that it may be feasible to install the new circuits underground within Washington Street and Canal Street to connect to the Canal Street Substation, because there is most likely room on the east side of Washington Street to install the new circuits so that they are not directly over the MBTA Tunnel (id. at 2-11).

In summary, for the railroad ROW alternative, NEP proposed a route that would leave the Salem Harbor Substation, traverse City-owned property and the Tracy Multi-Use Path underground, and then continue underground along Bypass Road and Bridge Street or the adjacent bike path to Washington Street and then to Canal Street, terminating at the Canal Street Substation. The Company asserts that this alternative would be inferior to the proposed Project (id. at 35).

7. Screening Analysis of Project Alternatives

As described above, the Company identified a number of potential alternative approaches to meeting the identified need. The Siting Board notes that EE and DG are important resources for reducing greenhouse gas emissions and may also serve to reduce or postpone the need for infrastructure such as transmission lines in certain applications. However, the Siting Board agrees with the Company that, in this case, EE and DG cannot serve the function of the Existing Cables in the regional transmission network or enable the interconnection of the Footprint Generating Facility to the electric grid. Based on the non-transmission alternatives' inability to meet the identified need, the Siting Board finds that these alternatives do not merit further consideration.

With regard to voltage selection for the remaining transmission alternatives, the Siting Board finds that a 115 kV transmission solution best serves the identified need while minimizing cost and environmental impacts. Because an overhead transmission line would require the acquisition and demolition of numerous properties, the Siting Board does not favor this option when there are other less disruptive alternatives.[22] Based on an initial feasibility analysis, the Siting Board concurs with the Company's view that the single duct bank underground alternative would be technically feasible and merits further consideration.

Among the three cross-Harbor alternatives, the overhead transmission lines across Salem Harbor can be eliminated from consideration because the onshore portion would either require the acquisition and demolition of numerous properties or the construction of a new transition station that would bring the overhead lines underground at the edge of the Harbor, providing the function that the Canal Street Substation performs. On the other hand, the jet plow and HDD technologies are feasible options for the Harbor alternative and merit further consideration.

For the railroad ROW alternative, it would not be feasible to construct the new circuits either underground or overhead along the segment of the ROW for Segment 2 based on the

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[22] The Company asserted that an additional reason to reject the overhead transmission alternative as well as the jet plow and HDD alternatives is the time-sensitive nature of the Project (Exh. NEP-1, at 3-17, 3-28, 3-36). As described above in Section II.B, service to electric customers would not be interrupted if the replacement solution is not in place by Footprint's in-service date. Therefore, we do not necessarily exclude these alternatives at this screening level.

MBTA's objections. For Segment 3, it would not be feasible to put the new circuits in the MBTA Tunnel due to safety considerations, nor would it be practical to use HDD under the MBTA Tunnel due to the very limited available work hours and the particular risks of drilling failure in this location. The Company's proposal for the railroad alternative involves in-street construction on Bridge Street, Washington Street, and Canal Street and would essentially be another form of the single duct bank alternative.

Therefore, in the following sections, the Siting Board further evaluates the single duct bank, jet plow, and HDD alternatives, by comparing the reliability, environmental impacts, and cost of these alternatives.

C. Reliability

The Company evaluated the reliability of the single duct bank, jet plow, and HDD alternatives. The Company stated that the single duct bank alternatives would meet all required transmission planning criteria, and that any necessary maintenance or repair work would use the manholes, be relatively straightforward, and involve minimal environmental impacts (Exh. NEP-1, at 3-8). The Company noted that either of the Harbor alternatives could present future reliability challenges if the cables were damaged or failed (Exh. NEP-1, at 3-29 and 3-37). The Company stated that submarine cables failures take longer to repair than underground cables (id. at 3-29). Additionally, the Company stated the use of HPFF cables for the HDD alternative could result in dielectric fluid leaks to the Harbor and the availability of replacement cables may be at risk because there is only one manufacturer of HPFF cables in the United States (id. at 3-37).

Further, the Company expected that both Harbor alternatives would face permitting challenges since many of the permits required contain statutory standards that require an applicant to prove that there is no practicable alternative to the proposed action (id. at 3-27, 3-28, and 3-34). For example, the Company argued that these alternatives would not meet the statutory test of approval under Chapter 91 for a non-water dependent project located within a Designated Port Area (id. at 3-28, 3-36). Therefore, the Company stated that it may be unable to obtain the necessary permits for the Harbor alternatives, and estimated that even if it could, the permitting process for these alternatives would take 18 to 24 months (id.).

D. Environmental Impacts

The Company evaluated the environmental impacts of the single duct bank, jet plow, and HDD alternatives. The Company stated that the underground single duct bank alternative would avoid direct impacts to natural resources such as vegetated wetlands, rare species habitats, aquifers, or marine resources and, further, does not require Massachusetts Environmental Policy Act ("MEPA") review (Exh. NEP-1, at 3-7). The Company stated that the single duct bank alternative would impact the residences, small businesses, commercial retail centers, and community buildings in downtown Salem, including a large number of historic properties and popular tourist attractions (id. at 3-6). The Company stated that because this alternative would be entirely within City streets, environmental impacts would primarily consist of temporary construction impacts, such as traffic disruption, dust, and noise (id.).

Both of the Harbor alternatives would impact marine resources, including a variety of fish and invertebrate species that rely on Salem Harbor as essential forage habitat (id. at 3-26). Based on correspondence with the Massachusetts Division of Marine Fisheries, the Company stated that the jet plow alternative would most likely require time-of-year restrictions, particularly for winter flounder between mid-February and mid-June (Exh. EFSB-PA-18).

The Harbor routes would avoid impacts to downtown Salem, but would still require in-street construction through residential neighborhoods in the City (Exh. NEP-1, at 3-26, 3-34). Additionally, the Harbor alternatives would impact navigation and use of Salem Harbor, one of the region's largest natural harbors (id. at 3-25 and 3-33). The Company said that the jet plow and HDD alternatives could permanently displace moorings for recreational boaters (id.). The jet plow alternative could also conflict with the proposed Salem Wharf Project off Blaney Street, which would house a new port terminal building, a boardwalk, and dock space (id. at 3-25).

E. Cost

The Company evaluated the cost of the single duct bank, jet plow, and HDD alternatives. All estimates are summarized in Table 1 below and have a target accuracy of -25 percent to +50 percent (Exh. NEP-1, at 3-8, 3-30, 3-37). The Company stated that the estimated project cost of the single duct bank alternative is approximately $62.43 million (id. at 3-8). The

estimated cost of the jet plow alternative is $169.79 million, while the estimated cost of the HDD alternative is $162.08 million (id. at 3-30 and 3-37).[23]

Table 1. Cost of Project Alternatives

Option	**Cost***
Single Underground Duct Bank	$62 million
Harbor Jet Plow	$170 million
Harbor HDD	$162 million

Sources: Exh. NEP-1, at 3-8, 3-30, 3-37
* All of these costs include substation upgrades, removal of the Existing Cables, and project administration and development.

F. Position of the Parties

The Company argues that the single duct bank alternative is superior to all the other alternatives (Exhs. NEP-1, at 3-39; EFSB-PA-12(S)(1) at 3-5). With the execution of the MOA, the City is supportive of the Project, as proposed by the Company (MOA at 2).

Intervenor Mary Madore argues the HDD alternative through the Harbor is a viable alternative and questions the cost estimate provided by the Company for this alternative (Madore Comments on IM). Individual intervenor Tim Clarke (who is affiliated with the business Waters & Brown, which also intervened separately) argues that the railroad ROW route would be considerably less disruptive to Salem than the single duct bank alternative and should be further vetted (Clarke Comments on IM).

G. Analysis and Findings

The record shows that cables under the Harbor would be more difficult to maintain and repair than cables in streets. Difficulties obtaining Chapter 91 approval for the Harbor

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23 NEP presented several widely varying cost estimates of the Harbor alternatives to the public (Exh. EFSB-PA-31). The Company first stated at a April 2012 public meeting at the Forrester Street neighborhood that the cost of installing a single circuit under Salem Harbor using HDD was $43.1 million compared to a $27.8 million cost for a land-based alternative (id.). In a July 2013 report, the Company estimated the cost of installing the cables using HDD would be approximately $110 million (id.). The Company stated that these two early estimates did not include all costs, such as substation construction, project administration, and engineering, and that the Company made these estimates before the project scope had been finalized (id.).

alternatives could substantially delay or even derail the Harbor alternatives, increasing the length of time that the Company is forced to use the Existing Cables, which have reliability concerns as described above in Section II.C.1. Accordingly, the Siting Board finds that the single duct bank is preferable to the other alternatives with respect to reliability.

The record shows that that the single duct bank, jet plow, and HDD alternatives would all have significant environmental impacts. The Harbor alternatives would avoid impacts on Salem's downtown and would impact a slightly shorter total length of the City's streets, but would have construction and permanent impacts to the Harbor. The Siting Board finds that while the types of impacts would vary among the alternatives, overall the environmental impacts among the three alternatives would be comparable.

The record shows that the single underground duct bank is estimated to cost approximately $100 million less than the Harbor alternatives. The Siting Board finds that the single duct bank alternative is preferable to the Harbor alternatives with respect to cost.

Although the Siting Board found that the single duct bank and the Harbor alternatives are comparable with respect to environmental impacts, the Harbor alternatives are significantly more costly than the single duct bank alternative. The Harbor alternatives are also inferior to the single duct bank alternative in terms of reliability, due to the potential difficulty of accessing the underwater cables. Additionally, the Company may be unable to obtain Chapter 91 licenses for the Harbor, given the existence of other practicable alternatives. Therefore, the Siting Board finds that the single duct bank alternative is preferable to the other identified project alternatives with respect to providing a reliable energy supply for the Commonwealth with minimum impact on the environment at the lowest possible cost.

IV. ROUTE SELECTION

A. Standard of Review

G. L. c. 164, § 69J requires a petition to construct to include a description of alternatives to the facility, including "other site locations." Thus, the Siting Board requires an applicant to demonstrate that it has considered a reasonable range of practical siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts. To do so, an applicant must meet a two-pronged test. First, the applicant must establish that it

developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes that, on balance, are clearly superior to the proposed route. Second, the applicant must establish that it identified at least two noticed sites or routes with some measure of geographic diversity. IRP at 41-42; Hampden County at 35; NSTAR/Stoughton at 32-33.

B. The Company's Route Selection Process

Based on its conclusion that two 115 kV cables installed in a single duct bank within the City streets between the Salem Harbor and Canal Street Substations would be the best alternative to meet the identified need, the Company undertook a process to identify potential routes for the replacement cables (Exh. NEP-1, at 4-1). The Company demarcated a Project Study Area that encompasses routing opportunities that could provide a relatively direct connection between the two substations over a reasonable distance (id. at 4-2). Next the Company met with numerous City officials, representatives of Footprint and Spectra Energy, and members of the public, and obtained mapping of existing utility infrastructure (id. at 4-2 to 4-3). The Company eliminated from consideration any street where the existing utility density is too high to install a new duct bank, and eliminated other streets based on input from City personnel (id. at 4-3).[24] After the Company eliminated these streets based on feasibility, it then eliminated several other streets from consideration, as they were no longer logical components of any non-circuitous route between the Salem Harbor and Canal Street Substations (id. at 4-4).

The route segments that were not screened out based on feasibility concerns were combined into "candidate routes" and assessed in more detail by applying a set of environmental

[24] In this initial screening, the Company eliminated Washington Street because of the MBTA Tunnel and several underground utilities beneath it, and eliminated Canal Street based on the presence of the existing S Cable and multiple large-diameter sewer, gas, water, and telecommunications facilities (Exh. NEP-1, at 4-4). Based on the Siting Board's request for the Company to reexamine the railroad ROW alternative, the Company reopened its investigation of installing the cables in Washington and Canal Streets (Exh. EFSB-PA-12(S)(1)). The Company concluded, however, that it may not be feasible to construct a duct bank on Canal Street based on the existing utility density; in addition, the City engineer asked the Company not to use Washington Street if it could be avoided (Tr. 2, at 276-277, 290-291).

criteria and evaluating conceptual cost estimates (id. at 4-1). To evaluate the relative environmental impacts of these nine routes, the Company developed twelve criteria, based on input from City officials and the public in several different meetings including public open houses, appearances at regularly scheduled meetings of various civic and neighborhood groups, and meetings with representatives from City government (id. at 4-10). The Company selected the following twelve criteria for evaluation: (1) residential land uses; (2) commercial or industrial land uses; (3) sensitive land uses; (4) recreational land uses; (5) historic resources; (6) potential for traffic congestion; (7) public/private transportation facilities; (8) potential to encounter subsurface contamination during construction; (9) number of public shade trees; (10) the length of the route; (11) existing road width; and (12) existing utility density (id. at 4-10 to 4-11). The Company scored each candidate route from one to three for each criterion based on its impacts relative to other candidate routes, with a three being the worst score, so that a higher score signified greater impacts (id. at 4-11).

The Company then weighted the criteria to reflect the relative importance of the criteria (Exh. NEP-1, at 4-16). The Company stated that it did not test different weighting schemes, but developed a single scheme based on input from the City and the public, as well as its own experience (id. at 4-16 to 4-17; Tr. 2, at 288). The criteria of residential land uses, commercial/industrial land uses, and potential for traffic congestion were each assigned a triple weight (Exh. NEP-1, at 4-17). Sensitive land uses, existing road width, and existing utility density were each assigned a double weight (id.). The Company assigned the remaining criteria a weight of one (id.). The Company then developed a cost per mile based on the general conditions found in the project area and applied this cost per mile to each of the candidate routes (id. at 4-23).[25] The weighted score and projected cost of each of the candidate routes are shown below in Table 2.

[25] The Company stated the cost for each candidate route represented only those costs associated with the construction of the underground cable systems (Exh. NEP-1, at 4-25). Total Project costs including substation upgrades and the removal of the Existing Cables are discussed below in Section V.

Table 2. Weighted Scores and Costs of Candidate Routes

Candidate Route	Description	Weighted Environmental Impact Score	Environmental Score Ranking	Estimated Cost (millions)	Cost Ranking	Length (miles)
A	Boardman-Congress	32	2	$34.03	2	1.66
B	Boardman-Lafayette	48	6	$36.99	6	1.80
C	Forrester-Congress	30	1	$33.40	1	1.63
D	Forrester-Lafayette	44	5	$36.15	5	1.76
E	Andrew-Congress	38	3	$35.30	3	1.72
F	Andrew-Charter-Lafayette	54	7	$38.32	8	1.86
G	Briggs-Congress	40	4	$35.93	4	1.75
H	Briggs-Lafayette	56	8	$38.89	9	1.89
I	Andrew-Derby-Lafayette	56	8	$37.62	7	1.83

Sources: Exh. NEP-1, at 4-21, 4-24

The Company stated that there would not be meaningful differences in operating characteristics among the candidate routes and that underground cables along any of the routes would meet the identified need in a reliable manner; therefore, reliability was not a determining factor in the Company's route selection process (id. at 4-24). As a result, the Company based its route selection on relative environmental impacts (as measured by the Company's weighted criteria) and estimated cost, although the costs of all Candidate Routes were relatively similar (id. at 4-23 to 4-24). The Company selected Candidate Route C as its Primary Route because it had both the best environmental impact score and the lowest estimated cost (id. at 4-24).

C. Geographic Diversity for Notice Alternative

To identify a Noticed Alternative, the Company sought a candidate route that offered geographic diversity (Exh. NEP-1, at 4-25). The Company eliminated Candidate Routes A, B,

D, E, and G from consideration since they are similar to the Primary Route in using Forrester, Boardman, and Congress Streets (id.). The remaining routes were F, H, and I, which are generally located on different streets from the Primary Route, although all routes make use of Hawthorne Boulevard between Washington Square South and Charter Street (id.). Of those routes, the Company dismissed Candidate Route H because it had the worst cost ranking and was tied with Candidate Route I for the worst environmental score (id.). Candidate Route I was the least expensive of these three options, but it was tied for the worst environmental score; the Company also argued that Candidate Route I was undesirable because it would impact a portion of Derby Street, which would already be impacted by the removal of the Existing Cables (id.). The Company then selected Candidate Route F to be the Noticed Alternative Route, concluding it was the best route among the three routes that are geographically distinct from the Primary Route (id.).

D. Positions of the Parties

The City concurs with the Company's assessment that the Proposed Route is the best route for the single duct bank alternative (Tr. 3, at 407). The City specifically supports the Company's elimination of Washington Street and Canal Street as potential routes, citing the utility density and ongoing projects at Canal Street (id.). No other parties commented on the Company's route selection process for the single duct bank alternative.

E. Analysis and Findings on Route Selection

In past decisions, the Siting Board has found various criteria to be appropriate for identifying and evaluating route options for transmission lines and related facilities. These criteria include natural resource issues, land use issues, community impact issues, cost and reliability. IRP at 42; Hampden County at 38; NSTAR/Stoughton at 43-44. The Siting Board has also found the specific design of scoring and weighting methods for chosen criteria to be an important part of an appropriate site selection process. IRP at 45; Hampden County at 37; Boston Edison Company, 19 DOMSC 1, EFSC 89-12A, at 34-38 (1989).

Here, the Company developed numerous screening criteria, which it used to evaluate the routing options. These criteria generally encompass the types of criteria that the Siting Board

previously has found to be acceptable. The Company also developed a quantitative system for ranking routes based on compilation of weighted scores across all criteria. This is a type of evaluation approach the Siting Board previously has found to be acceptable. IRP at 45; Hampden County at 38; NSTAR/Stoughton at 43-45.

The Company's Noticed Alternative Route for the Project reflects some measure of geographic diversity. The Company appropriately identified a study area that would encompass all viable siting options, given the limitations imposed by an interconnection between the Salem Harbor and Canal Street Substations. Although various segments of the Candidate Routes analyzed were overlapping or within blocks of each other, given the urban setting and relatively short distance between the substations, each route has varying degrees of environmental impacts. The Siting Board finds that the Company established two routes (the Primary and the Noticed Alternative Route) for the Project with some measure of geographic diversity.

In conclusion, the Company has: (1) developed and applied a reasonable set of criteria for identifying and evaluating alternative routes in a manner that ensures that it has not overlooked or eliminated any routes that are clearly superior to the proposed project; and (2) identified a range of practical transmission line routes with some measure of geographic diversity. Therefore, the Siting Board finds that the Company has demonstrated that it examined a reasonable range of practical siting alternatives and that its proposed facilities are sited in locations that minimize cost and environmental impacts.

V. ANALYSIS OF PRIMARY AND NOTICED ALTERNATIVE ROUTES

A. Standard of Review

In implementing its statutory mandate under G.L. c. 164, § 69H, the Siting Board requires a petitioner to show that its proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply. To determine whether such a showing is made, the Siting Board requires a petitioner to demonstrate that the proposed route for the facility is superior to the alternative route on the basis of balancing cost, environmental impact, and reliability of supply. IRP at 46-47; Hampden County at 39; NSTAR/Stoughton at 32-33.

Accordingly, in the sections below, the Siting Board examines the environmental impacts, reliability and cost of the proposed facilities along the Primary and Noticed Alternative Routes to determine: (1) whether environmental impacts would be minimized; and (2) whether an appropriate balance would be achieved among conflicting environmental impacts as well as among environmental impacts, cost and reliability. In this examination, the Siting Board compares the Primary Route and the Noticed Alternative Route 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.

B. Description of the Primary and Noticed Alternative Routes

1. Primary Route

The Company stated that its Primary Route for the Proposed Cables is approximately 1.63 miles long and would be located underground in City streets in a new duct bank and manhole system, connecting the Salem Harbor Substation to the Canal Street Substation (Exh. NEP-1, at 1-9, 5-2). The Primary Route would exit the Salem Harbor Substation and proceed in a westerly direction along Fort Avenue and Webb Street, traveling past the Bentley Elementary School and through a mix of residences and small businesses (id. at 5-2). From Webb Street, the Primary Route would turn southwest into a residential neighborhood on Essex Street and Forrester Street (id.). The Primary Route would next pass the south side of the Salem Common on Washington Square South and then turn south onto Hawthorne Boulevard and continue south on Congress Street, passing a mix of commercial, tourist, residential, and institutional uses (id. at 5-2 to 5-3). The Primary Route would then turn west onto Leavitt Street and continue onto Fairfield Street, before turning north onto Cabot Street, west on Cypress Street, and then north across a vacant NEP-owned parcel to connect to the Canal Street Substation (id. at 5-3). Leavitt, Fairfield, Cabot, and Cypress Streets all pass through primarily residential neighborhoods (id.).

The Company stated that the Primary Route would include six manhole locations, spaced approximately 1,500 to 2,000 feet apart based on the length of cable that can be pulled through the conduits (Exhs. NEP-1, at 5-5; EFSB-CM-14). The manhole locations are shown above in Figure 1, in Section I.A.

2. Noticed Alternative Route

Like the Primary Route, the Noticed Alternative Route would traverse City streets in a duct bank and manhole system to connect the Salem Harbor Substation to the Canal Street Substation (Exh. NEP-1, at 5-3). The Noticed Alternative would be approximately 1.86 miles long (id.). It would exit the Salem Harbor Substation and proceed in a westerly direction along Fort Avenue and Webb Street traveling past the Bentley Elementary School and through a mix of residences and businesses (id.). The Noticed Alternative Route would then turn southwest on Andrew Street, a residential street (id.). The Noticed Alternative Route would run along the north side of Salem Common on Washington Square North and then turn south along Washington Square West and Hawthorne Boulevard and then turn west on Charter Street, passing a mix of commercial, tourist, residential, and institutional uses on these streets (id.). At Lafayette Street, the Noticed Alternative Route would turn south, passing through a mixed commercial and residential area before transitioning to a more residential area (id.). Finally, the Noticed Alternative Route would turn west onto Gardner Street and north onto Canal Street to connect to the Canal Street Substation, passing through a residential neighborhood (id.). The Company concluded that the Noticed Alternative is less advantageous than the Preferred Route, but stated that it would be constructible and would provide a distinct alternative to most segments of the Primary Route (id.).

3. Substation Upgrades

NEP stated that regardless of whether the Primary or Noticed Alternative Route were constructed, the same improvements would be necessary at the Salem Harbor and Canal Street Substations (Exh. NEP-1, at 5-41). At the Salem Harbor Substation, the Company stated that it would remove electrical equipment associated with the Existing Cables, including cable termination structures, disconnect switches, and dielectric fluid reservoirs (id. at 5-42). To accommodate the Proposed Cables, the Company would install new cable riser termination structures in the area of the substation currently used as the parking lot, to allow for removal of the existing structures without an electric outage (id.). The Company stated that it would also install electrical equipment similar to that associated with the Existing Cables, but without

dielectric fluid reservoirs (id.). Additionally, the Company would install new relay, control, and communication equipment inside the existing control house (id.).

NEP stated that at the Canal Street Substation, the Company would remove all existing electrical equipment, support structures, and foundations with the exception of the existing steel lattice transmission structures, which NEP would repaint (id. at 5-45). The Company would install new electrical equipment, support structures, and foundations similar to the components that would be removed, but without dielectric fluid reservoirs (id.). Additionally, the Company would install a new control building (id.). The Company stated that it would build a new control house because the addition of a new fiber optic cable and new microprocessor relays would require a battery system as well as a climate controlled environment and protection from the elements (Exh. EFSB-N-26). At the Canal Street Substation, the Company would grade the site to allow for the installation of the new equipment and replace the existing retaining wall and the perimeter fence, as well as include new landscaping elements (Exh. NEP-1, at 5-45).

4. Removal of the Existing Cables

The Company argues that the Project must include the removal of the Existing Cables based on MassDEP regulations (Exh. NEP-1, at 1-4). NEP stated that once the Proposed Cables are installed and ready for service, the Existing Cables would be de-energized and taken out of service (id. at 5-48, 5-50). NEP stated that once the existing oil-filled cables have been removed from service, they would no longer be pressurized and monitored, and the Company would have no ability to detect any new leaks (Exh. EFSB-HW-3). As a result, the Company indicated that once removed from service, the Existing Cables would be regulated by the MassDEP as a Threat of Release subject to the Massachusetts Contingency Plan ("MCP") 310 CMR 40 (id.; Tr. 2, at 248).[26] The Company indicated that under the MCP, once the Existing Cables were removed from service, a two-hour notification requirement would be triggered and an "Immediate Response Action" would be required (Exh. EFSB-HW-3).[27]

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[26] The reportable quantity for dielectric fluid under the MCP is 25 gallons (Tr. 2, at 250-251).

[27] Immediate Response Actions are assessment and/or remedial actions that must be undertaken in an expeditious manner to address sudden releases, Imminent Hazards and

The Existing Cables traverse the City's streets underground from the Salem Harbor Substation to the Canal Street Substation (Exh. NEP-1, at 5-50). From Salem Harbor Substation, the Existing Cables follow Derby Street to the west through a mix of residential, commercial, and tourist uses (id.). The T Cable turns south on Lafayette Street and then west into the Canal Street Substation on Cedar Street, transitioning from mixed use to mostly residential (id.). From Derby Street, the S Cable turns south on Canal Street, transitioning from mixed use into primarily commercial and industrial uses (id.). See Figure 1 in Section I.A for a map of the route of the Existing Cables.

After NEP removes the Existing Cables from service, the Company would flush them with water and then purge them with nitrogen or another gas to remove as much of the dielectric fluid as feasible (Tr. 2, at 249-250). The Company estimated that approximately 430 gallons of dielectric fluid would remain in each phase after the flushing, compared to the current amount of approximately 1,000 gallons of dielectric fluid per phase (id.). Once the Company flushes dielectric fluid from the cable core, the Company could begin to remove the Existing Cables (Exh. NEP-1, at 5-48, 5-50). Removal of the direct-buried S Cable would require excavating a trench along the route of the cable (id. at 5-48). The Company estimated that it would take approximately two months to excavate the direct-buried S Cable (Tr. 2, at 253). Because the T Cable is installed in a duct bank, the Company anticipated it would be able to pull the T Cable out through the manholes without excavation (Exh. NEP-1, at 5-50).

At the Salem Harbor Substation and Canal Street Substation, fluid reservoirs, cable terminations, and other auxiliary equipment would be drained and removed for proper disposal (id. at 5-49, 5-51).

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other time-critical release or site conditions. Immediate Response Actions must be taken whenever and wherever timely actions are required to assess, eliminate, abate or mitigate adverse or unacceptable release, threat of release and/or site conditions, as set forth in 310 CMR 40.0412. 310 CMR 40.0405.

C. Discussion of the Project with the Primary Route

1. Construction and Restoration Methods

NEP would install the Proposed Cables in four phases: (1) manhole installation; (2) trench excavation, duct bank installation, and initial pavement patching; (3) cable installation; and (4) final pavement restoration (Exh. NEP-1, at 1-9, 1-10, 5-4, 5-5). The Company would conduct these four phases in sequence at each location along the route, although the Company anticipates that several phases of construction could be ongoing simultaneously in different sections of the routes (id. at 5-5). Removal of the Existing Cables is addressed in Section VI, below.

a. Manhole Installation

Two precast concrete manholes (one manhole for each circuit) would be placed adjacent to each other approximately every 1,500 to 2,000 feet along the route (Exh. NEP-1, at 5-5). Manholes facilitate cable installation and splicing and allow access for maintenance and future repairs (id.). Each pair of manholes would take approximately ten to twelve days to install (id.). Based on space requirements for cable pulling and splicing, each manhole would be approximately eight feet wide by 21 feet long and nine feet high, and typically would be installed as a lower half and an upper half (Exhs. NEP-1, at 5-5; EFSB-CM-2; Tr. 1, at 63). Each half would be precast off-site and transported via flatbed truck and then installed in the ground with a crane (Tr. 1, at 63). The only visible aspects at ground level would be the manhole covers (Exh. NEP-1, at 5-5).

NEP stated that all excavated soil from the manhole installation would be loaded directly into trucks and transported to an off-site stockpile area (Exh. NEP-1, at 5-5; Tr. 1, at 63). Machinery involved in the manhole installation would include an excavator or backhoe for excavation, dump trucks moving in and out of the area to carry away the soils, and then a crane to lower the manhole sections into the hole (Tr. 3, at 496-497). As needed, suitable soils would be used to backfill the excavation (Exh. NEP-1, at 5-5). Any excess soil would be tested and disposed of off-site (id.).

b. Trench Excavation and Duct Bank Installation

Each of the two proposed circuits would consist of three cables installed in individual polyvinyl chloride ("PVC") conduits (Exh. NEP-1, at 5-4). The trench for the duct bank would be approximately four feet wide by five to eight feet deep (id.). The duct bank would contain a total of ten PVC conduits: six six-inch diameter PVC conduits for the cables and four smaller PVC conduits for grounding cables, communication cables, and potentially a temperature monitoring cable (id.). The PVC conduits would be encased in a common concrete envelope. Additionally, the Company stated that it would install a de-energized loop of conducting wire alongside the duct bank at approaches to the manholes (id.), as described below in Section V.C.2.i.

NEP stated that the underground duct banks for the Project would be installed using open-cut trenching (id. at 5-6).[28] For each segment of the route, the width of the trench would be marked on the street, the Company would contact Dig-Safe, Dig-Safe would mark the location of existing utilities, and the Company would cut the pavement with a saw (id.). Saw cutting is a relatively fast operation (several hundred feet may be cut in one day); therefore, to avoid proceeding too far ahead of the next crew, pavement cutting would not be done every day (id.; Exh. EFSB-CM-4). Following saw cutting, the existing pavement would be broken up with pneumatic hammers and both pavement and excavated soil would be loaded by backhoe into awaiting dump trucks (Exhs. NEP-1, at 5-6; EFSB-CM-4). The Company would handle pavement separately from the soil because the pavement would be recycled at an asphalt batching plant (Exh. NEP-1, at 5-6).

The trench would then be excavated to the required depth by backhoe (id. at 5-7). In some locations, soils would be dewatered in place to preclude instability of the excavation (Exh. EFSB-CM-12). In some locations, part of the excavation would be done by hand to avoid disturbing existing utility lines or service connections (Exh. NEP-1, at 5-7; Tr. 4, at 584). Work

[28] The only portion of the Primary Route that would not utilize open-cut trenching is along the Congress Street Bridge where the conduits and cables would cross the South River in an available utility bay beneath the southbound side of the bridge (Exh. NEP-1, at 5-10; Tr. 1, at 68-69).

may be slower at street intersections because these locations tend to have the greatest concentration of underground utilities (Exh. NEP-1, at 5-7). Typically, an advance crew would excavate street intersections so that obstructions could be precisely identified and the conduit locations can be determined before the main work crew reaches the intersection (id.). As with the manhole excavations, "clean trench" method would be used in which soil is loaded directly into a dump truck for off-site recycling, disposal, or reuse – i.e., soil would not be stockpiled along the side of the trench (id.; Tr. 1, at 63).

The trench would be sheeted and shored as required by soil conditions (Exh. NEP-1, at 5-7). Once a portion of the trench is excavated, the PVC conduits would be assembled and lowered into the trench (id. at 5-7, 5-8). The area around the conduits would be filled with thermal concrete; the trench backfilled with clean excavated material, thermal concrete, and/or sand with low thermal resistivity; and any excess soil tested and disposed of (id. at 5-7). Finally, temporary pavement would be laid; the Company anticipated the temporary pavement would remain in place from six to 15 months to allow the trench to settle over at least one winter season (id. at 5-8; EFSB-CM-5).

The duct bank trench would cross several streets. While some smaller side streets might need to be closed temporarily, NEP stated that it expects to be able to maintain partial access to other streets by a phased construction in which the first phase would consist of excavating and constructing across approximately one-half of the roadway, thereby keeping the other half open for traffic with a police detail as needed, and the second phase would consist of construction across the second half of the roadway, with the first half completed and re-opened to traffic (Exhs. EFSB-CM-4; EFSB-PA-37).

NEP anticipated that a typical business or residence would see activities related to trench excavation, duct bank installation, and pavement patching in the front of its house/business or general vicinity for two to three weeks (Exh. NEP-1, at 5-8). Total work durations at manhole locations would be longer, as noted above. The pace of construction may be slower in areas of higher existing utility density, where the Company encounters unanticipated obstructions, where it increases the trench depth, or in areas of higher traffic volumes (id.). Depending upon the number of these conditions work crews encounter, the Company expects duct bank construction durations could increase up to approximately five weeks (id.). Overall, in-street work involving

the installation of manholes, installation of the duct bank and temporary pavement restoration is expected to take approximately twelve months (see Section 5.4.2) (id.).

NEP stated that it would make every reasonable effort to maintain access to adjacent residences and businesses during trenching and duct bank construction (id. at 5-9). At various points in the trenching and duct bank construction process, it would be necessary to have an open trench that might temporarily impede access, but once the crews are finished for the day, the trench would be steel-plated to re-establish access to nearby homes and commercial buildings (Exh. NEP-1, at 5-9; Tr. 3, at 536). At the end of each work day, any remaining open trenches would be covered with securely anchored steel plates of sufficient thickness to withstand traffic loading, and the site would be left in broom-swept condition (Exh. NEP-1, at 5-9; MOA at 5).

c. Cable Installation and Testing

Following the installation of the manholes and duct bank, the cable would be pulled through the conduit (Exh. NEP-1, at 5-9). Sections of each cable would be installed between consecutive manholes (id.). NEP projected that cable pulling would take twelve days at each pair of manholes (Exh. EFSB-CM-3; Tr. 3, at 497-498). This process would be repeated until all of the cable sections were installed (Exh. NEP-1, at 5-9).

Adjacent cable sections would be spliced together inside the manhole vaults (id.). The splicing operation would require a splicing van containing equipment and material; an air conditioning unit to control moisture in the manhole; and a portable generator to provide power for the splicing van and air conditioning unit (id.). The Company stated that splicing high-voltage solid dielectric transmission cable typically requires 40 to 60 hours to complete the splicing of all three cables at each manhole, but that the splicing activities would take place over several days such that splicing work at a pair of manholes would extend over twelve days (Exhs. EFSB-CM-3; NEP-1, at 5-9). Once the complete cable system is installed, it would be field-tested from the substations. At the completion of successful testing, the line would be energized (Exh. NEP-1, at 5-10).

d. Final Pavement Restoration

Street restoration typically occurs in two steps. Following duct bank installation, the Company would temporarily patch the pavement, and subsequently, repair or replace the pavement as required to provide final pavement restoration (id. at 5-5). The Company would provide a leveling course at driveways as needed to meet the new road surface elevation (id. at 5-10). Sidewalk restorations would also comply with all requirements of the Salem Department of Public Works ("DPW"), the Massachusetts Department of Transportation ("MassDOT"), and the Street Restoration Standards established by the Department Order in D.T.E. 98-22,[29] including installation of curb cuts at crosswalks wherever sidewalks are replaced (Exh. NEP-1, at 5-10; MOA at 3).

Overall, the Company estimated that work at the each manhole location would take a total of 43 construction days, whereas duct bank installation between manhole locations would take between ten and 25 construction days (Exh. EFSB-CM-3).

2. Impacts

a. Land Use and Historic Resources

i. Company Description

Land uses along the Primary Route are a dense mix of residential, commercial/industrial and recreational uses (Exh. NEP-1, at 5-14). The Primary Route passes eleven sensitive receptors, defined as land uses that may be more susceptible to Project impacts (other than residences); potentially affected sensitive receptors include three funeral homes, a church, a daycare center, government offices, and civic institutions (id. at 5-15, 5-16; RR-EFSB-19). The Primary Route also passes the grounds of the Bentley Elementary School on Fort Avenue (Exh. EFSB-LU-2). The athletic fields and a basketball court abut the route, and the school

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[29] The full citation for the proceeding in which the Department adopted the Street Restoration Standards is Investigation by the Department of Telecommunications and Energy upon its own motion, pursuant to G.L. chapters 164, 165 and 166A commencing a review of standards employed by public utility operators when restoring municipal street surfaces after performing excavations, D.T.E. 98-22 (1999). The Order was issued on August 26, 1999.

building itself is approximately 420 feet from the edge of the Primary Route along Fort Avenue (id.). The Primary Route also passes near the Salem Academy Charter School; the school would be 325 feet away from the Project at the closest point (RR-EFSB-18).

The Company has not yet determined where it would locate the staging and laydown area for the Project, stating that this determination would be the responsibility of its contractor, subject to NEP approval (Exh. EFSB-CM-15). However, the Company anticipates that a possible staging and laydown area for the Project would be adjacent to the Salem Harbor Substation (id.). Construction workers would park their personal vehicles at a staging area and drive to the work site in construction vehicles (Exh. EFSB-T-1).

NEP stated that there would be no permanent impacts to land uses from the installation of the Proposed Cables, as they would be installed entirely underground within City streets, but the adjacent land uses would be temporarily affected by construction impacts (Exh. NEP-1, at 5-15). The Company stated that it would minimize construction impacts on adjacent land uses by minimizing traffic impacts, implementing duct control/air quality measures, employing erosion and sediment controls, and using noise control measures (as discussed in Sections V.C.2.e to V.C.2.h, below).

As part of its community outreach, NEP committed to participate in semi-monthly meetings with the Working Group to coordinate construction impacts (MOA at 2). Additionally, the Company committed to develop a Project website at least two months prior to the start of construction and to publicize and maintain a hotline in Spanish and English for emergencies after hours (MOA at 1-2).

NEP stated that the Salem Harbor Substation is situated on the Salem Harbor Station site and therefore is completely surrounded by industrial land uses associated with power generation, and that the Project would not affect these land uses (Exh. NEP-1, at 5-42). Land uses adjacent to the existing Canal Street Substation include commercial and industrial uses to the north and west, and residential neighborhoods to the east and south (id. at 5-45). The Company asserted that because there would be no significant expansion of this substation, there would be no long-term impacts to surroundings land uses (id.). The Company's proposed mitigation measures to minimize construction impacts on land uses adjacent to the substation from traffic, dust/air pollution, and noise are discussed below in sections V.C.2.e to V.C.2.h.

The Company stated that for underground transmission projects in urban settings, it typically requires its contractors to complete pre-construction and post-construction video surveys of structures and other features along the proposed routes, including the internal and external conditions of structures, if the landowner gives permission (Exhs. NEP-1, at 5-16; EFSB-G-11). The Company will notify by mail any abutters within 300 feet of the Primary Route of the opportunity to have their property surveyed (Exh. EFSB-G-11). The video surveys would be used if future damage claims are submitted as a result of the Project (id.).

The Company stated that it would designate a Company Project representative who would direct a potential claimant to the Company's contractor when the potential claimant wishes to submit a damage claim. The Company's contractor would be responsible for administering a damage claim process and would be required to have appropriate insurance coverage (Tr. 2, at 302-305). In the MOA, the Company and the City agreed to have NEP's contractor manage the damage claims process with the condition that the contractor must provide weekly notice of damage claims to the Company's Project representative. In turn, the Company's Project representative would provide the City's engineer with a weekly summary of the damage claims. The MOA states, "NEP's agreement to acquire claims processing information and provide it to the City is not an agreement or acceptance by NEP to be responsible for compensating for claims resulting from the negligence, gross negligence, reckless misconduct or intentional acts of the [c]ontractor" (MOA at 3).

In light of the proximity of the proposed construction to many historic homes, staff asked questions about the process that would occur in the event that construction activities damage property (e.g., the foundation of a private home). The Company's witness stated that its proposed damage claim process (i.e., reliance on the contractor) is consistent with the Company's longstanding practice (Tr. 2, at 302-304).

Salem's unique history and many historic and cultural attractions make it a major tourist destination (Exh. NEP-1, at 5-17). The Primary Route would pass visitor destinations such as the Hawthorne Hotel, the Crowninshield-Bentley House, and the Salem Waterfront Hotel (id.). To minimize impacts to the City's tourism industry, the Company committed to reimburse the City $15,000 to retain Destination Salem, a non-profit agency that markets, promotes, and manages tourism in Salem (MOA at 1). For this Project, Destination Salem would employ a

communications manager to liaise among NEP, the City, and the business community (id.). The Primary Route passes multiple historic buildings, National Historic Districts (the Derby Waterfront, Salem Common, and Essex Institute National Historic Districts), Local Historic Districts, and inventoried, but as of yet undesignated historic areas (Exh. NEP-1, at 5-32).

The Primary Route also passes in front of three archaeological sites (id. at 5-33). NEP stated that it would work with the Massachusetts Historical Commission ("MHC") and the Salem Historical Commission to ensure that there are no adverse effects from the Project to historic and archaeological resources (id. at 5-34). To comply with G.L. c. 9, § 27C (Chapter 254 Review), NEP submitted a Project Notification Form ("PNF") to the MHC (Exh. EFSB-LU-4). On December 6, 2013, the MHC responded to the PNF (id.). MHC requested a program of archaeological monitoring between Congress Street and Lafayette Street to identify any unmarked human burials because bone spoons that appeared to have been buried in a grave were previously found at that site (Exhs. EFSB-LU-3; EFSB-LU-4(S)). MHC requested that a qualified professional archaeologist with experience in urban archaeology and New England Native American unmarked grave identification submit a State Archeologist's Permit to MHC to halt construction and contact MHC immediately in the event that an unmarked human burial is discovered (Exhs. EFSB-LU-3; EFSB-LU-4-S). The Company stated that it had reached out to a qualified contractor to serve as the archaeologist during construction (Tr. 2, at 296).

ii. Positions of the Parties

With the measures agreed to in the MOA, the City supports the Project as proposed (MOA at 2). The City testified that its experience with the damage claims process in two recent MassDOT projects was deficient because residents found it difficult to obtain any reconsideration of the contractor's determination concerning damage claims (Tr. 3, at 386-387). However, in the City's comments on the Issues Memorandum, the City maintains that through the process of negotiating the MOA with NEP, the City is now confident as to the process for resolving claims as outlined in the MOA (City Comments on IM at 2). Therefore, the City requests the Siting Board to allow the MOA to govern the claims reporting process and allow NEP's contractors to process all damage claims (id. at 2-3).

Ms. Madore argues that the Working Group created to advise the Project has inadequate resident participation, stating that the City councilors are the only residents of the City in the Working Group (Madore Brief at 1). Ms. Doll suggests that specialized construction techniques should be used to protect the many historic properties that abut the Project route (Doll Comments on IM). Both Ms. Madore and Ms. Doll state that they are concerned about the damage claims process and their ability as homeowners to resolve damage claims with a contractor rather than with NEP. They voice concern about the potential lack of responsiveness and accountability of contractors based on difficulties that occurred with other projects (Madore Comments on IM at 1; Doll Comments on IM).

The Chamber of Commerce also argues that NEP should process the damage claims and be responsible for claims for all work done (Chamber of Commerce Comments on IM).

iii. Analysis and Findings

Because the Project primarily involves underground construction, there would be no permanent land use impacts. However, there would be significant land use and historic resource impacts during the construction of the Project due to the dense, mixed-used nature of the Project route. The Company's proposed mitigation measures for erosion and sedimentation, noise, traffic, and air impacts (discussed below) would help to mitigate the construction impacts to the dense, mixed-use land-uses that would abut the Project.

The Company has not yet established a staging and laydown area. Because the activities at the staging and laydown area have the potential for significant land use impacts, the Siting Board directs the Company to provide a staging and laydown plan for review by the Board prior to the commencement of construction.

The Working Group is an important community outreach measure that would give residents, businesses, and City officials a forum to express concerns and to improve coordination. The Siting Board supports this initiative and anticipates that the Company's active participation in the Working Group would help generally to mitigate particular land use impacts as they arise.

Given the historic nature of many of the buildings abutting the Project route, the video surveys are an important measure to ensure that construction does not damage any of these

buildings, and that compensation is provided as appropriate for any valid damage claims. The Siting Board recognizes the potential for confusion among claimants where, as in this case, NEP is obtaining Siting Board approval to construct the Project, and is the public "face" of the Project, but is hiring a contractor(s) to perform the construction. It is also a legitimate consideration that the level of customer service a contractor provides may not meet the expectations of NEP's customers. In this case, however, there is no record evidence to indicate that NEP's contractor(s) have historically failed to properly address reasonable claims of liability caused by construction-related activities. Accordingly, we will not disturb or impose further conditions on the Company's proposed damage claim process, to which NEP and the City have agreed.

In response to a question about liability, NEP asserted that, as a general rule, it would not be legally liable for damage that arises from the tortious acts of its contractors (RR-EFSB-22). Because NEP's possible liability for the tortious conduct of its contractors would be dependent on the specific factual circumstances surrounding each claim, statements to Salem residents that "in general" NEP would not be liable for the torts committed by its contractors could be confusing or even misleading in some circumstances.[30] The Siting Board directs the Company and its contractors to avoid making representations to the public bearing on legal liability for damages caused by its contractors, either on the Company's or its contractors' websites, at public meetings, in mailings circulated to abutters, or through any similar media. So that the Siting Board can understand how effectively the proposed damage claims process works, the Board directs the Company to provide quarterly summaries of the functioning of the damage claims process, which could consist of a compilation of the weekly reports that the Company has committed to submit to the City.

In addition, the Siting Board directs the Company to fully comply with the MHC's requested program of archaeological monitoring, as described in Section V.C.2.a.i, above.

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[30] We note that the Supreme Judicial Court has adopted a common law principle that a utility can be found to be liable for the harmful acts of its independent contractor when its contractor is performing the work of the utility. See, generally, Barry v. Keeler, 322 Mass. 114, at 126-127 (1947).

Given implementation of the mitigation measures proposed by the Company and the conditions described above, the Siting Board finds that land use and historic resource impacts of the Project using the Primary Route would be minimized.

b. Other Infrastructure

i. Company Description

The Project has the potential to impact other infrastructure in the City, including streets, sidewalks, public shade trees, gas mains, and sewer and drain pipes. In the MOA, NEP agreed to pay for reasonable expenses up to $130,000 for the City to hire engineering consultants to observe construction activities, in part to ensure that the Project does not adversely affect City infrastructure (MOA at 1). The Company's commitment to participate in semi-monthly meetings with the Working Group would also help coordinate around issues that arise during construction (id. at 2).

The Project would entail extensive excavation of the City's streets for manhole and duct bank installation and the removal of the Existing Cables (Exh. NEP-1, at 5-5, 5-6, and 5-48). Project work would disrupt the sidewalk in some areas, and the sidewalks would also need to be excavated (Tr. 1, at 78-79; RR-EFSB-4(S)(1)). The impacted sidewalks would be a mix of concrete, asphalt, and brick sidewalks (RR-EFSB-4(S)(1)). The Company stated that it does not anticipate any excavation on private property (Tr. 1, at 80).

As part of the MOA, NEP agreed to provide curb-to-curb repaving of all streets excavated for the Project, including excavation for removal of the Existing Cables, and to repaint centerlines, crosswalks, and any other markings (MOA at 3). The Company also agreed to replace all sidewalks affected by the Project with the same type of surface material (id.). The Company stated that, to the extent possible, it would reuse existing pavers for the restoration of brick sidewalks, and in the event that it cannot reuse existing pavers, NEP would work with the City and abutters to select appropriate new paver material (Exh. EFSB-V-2). Additionally, the Company committed to install curb cuts at crosswalks (MOA at 3).

The Company stated that there are 123 public shade trees along the Primary Route (Exh. NEP-1, at 5-18). NEP stated that it expected it would need to remove at least three or more of these public shade trees, and that the Project would affect a total of 16 public shade trees

(Tr. 1, at 81-82).[31] To mitigate the impacts to public shade trees, NEP agreed to replace any trees that were removed as part of the Project in accordance with Salem's tree replacement policies and to guarantee any newly planted trees for two years after planting (MOA at 4).[32]

The Company agreed to consult with the City's tree warden before cutting the roots of any tree (MOA at 4). Additionally, the Company outlined a number of measures it would take to protect trees affected by the project, such as erecting a temporary fence around individual tree pits and dressing cut tree roots with a tree rooting hormone compound (Exh. NEP-1, at 5-20). Further, the Company agreed to guarantee the survival of all trees affected by the Project for at least one year post root cutting and to replace the trees in accordance with the City's policy if the tree warden orders such replacement (MOA at 4).

The Company stated that because the Primary Route would be entirely within City streets, the predominant impact would be on existing underground utilities (Exh. NEP-1, at 3-6). Among these underground utilities, National Grid's affiliate owns the gas mains (Tr. 1, at 117). The City requested that, before commencement of the Project, on streets affected by the Project, National Grid replace all the natural gas lines that were already slated for replacement under National Grid's five-year plan in order to prevent another excavation of the streets in the near future (id. at 118).[33] The Company stated that this work would typically involve the replacement

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31 The three trees the Company has slated to remove are all under 30 feet tall and less than six inches in diameter as of 2010 (RR-EFSB-5(S)). One of the three is located in front of a residence on Fairfield Street; the other two are located on the Congress Street Bridge (RR-EFSB-5(S)(1)). The Company indicated that the need to remove more than three identified trees would depend on the extent to which its excavations impact roots of others among the 16 trees that would be affected (Tr. 1, at 81-82).

32 The City's tree replacement policy requires that if a live shade tree is removed, the City must be compensated for the number of inches in the tree's diameter (measured 4.5 feet above the ground), either with new trees or equivalent payment (Exhs. EFSB-V-4(1) at 1; COS-13). For example, if the Company removes a twelve-inch diameter red maple tree, it could replace the tree with a new three-inch diameter red maple tree in addition to either three three-inch trees to be selected and delivered based on the City's tree warden direction or, alternatively, provide the funds for three additional three-inch trees (Exh. COS-13).

33 NEP elaborated that where the new duct bank would have been directly adjacent to a cast-iron main it would have asked National Grid to do this replacement work anyway, so

of cast-iron gas mains with plastic mains (id. at 116). The replacement of the gas mains would occur before the Project work and would occur on almost every street affected by the Project (id. at 117-118, 120). The Company stated that work would occur before the Project instead of concurrently with the Project in order to avoid severe traffic disruptions (id. at 119). The Company elaborated that for streets where the gas main is on the opposite side from the location of the Proposed Cables, replacing the gas mains before the construction of this Project would avoid the need to completely close the street (id. at 119-120).

This Project also has the potential to impact the City's water and sewer mains (Tr. 3, at 395-396). The City stated that some of its water and sewer lines are almost 100 years old and could be vulnerable to damage from construction (id.). As part of the MOA, NEP committed to inspect each of the 44 locations where the Project crosses the City's sewer and drain mains by closed circuit television with the City's engineer before Project construction and to inspect the crossings again after Project construction (MOA at 5). While the City would repair damage that was identified during the original inspection, the Company committed to pay for the repair of any damage caused by the construction (id.). In addition to the post-construction inspection, the Company stated it would expect that any damage, such as a backup or blockage to the City's sewer and drain infrastructure, would become apparent between the temporary paving and the final repaving, so that there would be an opportunity to address the damage prior to the final repaving (Tr. 1, at 128). The City's Engineer agreed that any damage to City infrastructure would most likely become apparent before the final repaving given that the Company has agreed to wait through the stresses of a winter season before doing the final repaving (Exh. EFSB-CM-5; Tr. 3, at 405).

NEP stated that it would need to relocate some utility infrastructure to accommodate the new duct bank for the Proposed Cables, which would result in minor interruptions of service to businesses or residents along the Primary Route that could last several hours (Exhs. EFSB-CM-8; EFSB-CM-11). The Company committed to working closely with the City

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that the Project would not damage the old cast-iron mains (Tr. 1, at 118-119). On the other hand, where the new duct bank would be on the other side of the street from the existing gas mains, National Grid would replace the gas mains before the Project, solely to avoid additional excavation of repaved streets in the near future (id.).

and other utilities to identify potential impacts and mitigate service disruptions to the extent possible (Exh. EFSB-CM-8).

ii. Positions of the Parties

Mr. Clarke and Ms. Madore both express concerns about coordination of this Project with other utilities (Clarke Comments on IM; Madore Brief). Ms. Madore specifically emphasizes her concern about the age of the existing infrastructure and the potential for damage to water, sewer, and gas mains (Madore Brief).

With the measures agreed to in the MOA, the City supports the Project as proposed (MOA at 2). Specifically, the City supports the Company replacing the existing gas mains on streets affected by the Project before the Project commences in order to minimize traffic impacts (Tr. 3, at 384-385).

iii. Analysis and Findings

Given the nature of the Project and the age and density of the existing utility infrastructure in the City's streets, there is significant potential for the Project to impact the City streets and the existing utilities within them. The Company's commitment in the MOA to pay for the City to hire a consulting engineer to monitor construction would help minimize the potential for the Project to damage infrastructure.

Additionally, the Company's commitment to repave all streets impacted by the Project from curb to curb and to repave all sidewalks with materials similar to existing materials would reduce the Project's long-term impacts on the City's infrastructure. In this situation, due to the dense and historic character of downtown Salem and its surrounding neighborhoods, curb-to-curb repaving is appropriate to mitigate the Project's impacts.

The Company has outlined a detailed plan to protect public shade trees where possible and to replace any public shade trees it removes in accordance with the City's policy. These measures would minimize impacts to public shade trees.

NEP's coordination with its parent company, National Grid, to replace all gas mains that were slated for replacement within five years on Project-affected streets would minimize the need for future excavation and maximize the benefit of curb-to-curb repaving. Therefore,

although the gas main replacement will increase the near-term disruption in the City, the anticipated practice will minimize the long-term disruption to the City.

NEP committed to inspect all water and sewer mains prior to construction and again after construction and to wait at least six months between construction and final repaving. Additionally, the Company committed to pay for any Project-related damage to water and sewer infrastructure caused by the Project. These commitments will minimize the impacts on the City's water and sewer infrastructure.

The Siting Board finds that, with the Company's described implementation of the mitigation measures, the impacts on other infrastructure along the Primary Route would be minimized.

c. Visual Impacts

i. Company Description

NEP asserted that, because it would install the Proposed Cables underground within City streets, the Proposed Cables would not create any permanent visual impacts (Exh. NEP-1, at 5-38). For the Salem Harbor Substation, the Company stated that the proposed upgrades would include replacement of some existing equipment and expansion into the existing parking lot (id. at 5-42). The Company argued that these changes would have minimal visual impacts, given the visual integration of the substation into the adjacent and much larger generating facility (id.).

NEP stated that work at the Canal Street Substation would include removal of existing equipment, installation of new equipment, and construction of a new control house (id. at 5-46). The Company stated that it would not expand the footprint of the substation and that the dominant visual features of the site, which are two existing termination structures for transmission lines extending to the west, would remain unchanged (id.). As part of the Project, NEP would replace the perimeter fence at the Canal Street Substation, which it stated would require the removal of several trees along the Cedar Street fence line and slope and vegetation that has grown on the Cypress Street fence (Exhs. NEP-1, at 5-46; EFSB-V-6). The Company also stated that some of the existing trees on the slope adjacent to Cedar Street have become too

tall relative to the height of the transmission structures and need to be removed for that reason (Tr. 2, at 333).

As part of the Company's proposed landscaping at the Canal Street Substation, the Company stated that it would restore the vacant lot to approximately the original grade and install grass and other plantings (Exh. EFSB-LU-6). Additionally, the Company would construct a new retaining wall in this lot to support approximately five feet of backfill on the abutter's property that has, over time, accumulated against the Company's fence (id.). NEP stated that it is responsible for the upkeep of the vacant lot next to the Canal Street Substation (Tr. 2, at 331). Within the substation yard, the Company would replace the existing timber retaining wall with a gabion retaining wall (Tr. 1, at 61). The Company stated that it selected gabion, metal mesh structures filled with large stones, because gabion could be installed more quickly than a concrete retaining wall, reducing the construction duration at the Canal Street Substation (id. at 61-62). As a condition of the Special Permit issued by the Salem Zoning Board of Appeals ("ZBA"), the Company committed to new landscaping along Canal Street and along the boundary of the substation with the abutters on Cypress Street (RR-EFSB-23(S)). The Company's updated landscaping plan includes a row of trees along Canal Street and a row of trees behind the abutters on Cypress Street, as well as trees and shrubs on the slope adjacent to Cedar Street (RR-EFSB-23(S)(1)). The new landscaping would include eight trees at the perimeter of the east side of the Canal Street Substation but there would be a gap in the new trees adjacent to an abutting residence; the Company stated that the steep slope in that area prevents the planting of additional trees (id.; RR-EFSB-24).

As part of the project, NEP would replace the existing lighting at the Canal Street Substation with new lighting (Exh. EFSB-V-8). The lighting would normally be off and would only be used to illuminate equipment in the event of nighttime emergency work; it would be controlled by a switch just inside the entrance gate (id.). The lights would be located on stand-alone poles and equipment support structures at a height of approximately 25 feet and directed downward (id.). The Company would install low wattage door entrance lights on the control building to allow safe nighttime entry (id.). The Company stated that it would add lights to the new structure at the Salem Harbor Substation, but otherwise the lighting at the substation would remain the same (id.).

ii. Positions of the Parties

With the measures agreed to in the MOA, the City supports the Project as proposed (MOA at 2). The City specifically requests that if the Siting Board grants NEP zoning exemptions, all the conditions of the ZBA's Special Permit for the Canal Street Substation control house, including the additional landscaping at the Canal Street Substation, be preserved by the Board (City Brief).

iii. Analysis and Findings

The Project would have no permanent visual impacts along the Primary Route. The Company's landscaping plan for the Canal Street Substation would provide better visual screening of the substation from Canal Street than the existing conditions. The row of shrubs behind the abutter on Cypress Street should also provide adequate screening for that abutter. Along the east side of the site adjacent to Cedar Street, however, some residences may have increased views of the substation due to tree removal, even with the new tree plantings. The current landscaping plan appears to appropriately balance the goal of screening abutters with the physical constraints of the site; however, during the course of the Project the Company should seek additional opportunities to screen the abutters along Cedar Street as feasible considering the slope of the site. Regardless of the Siting Board's decision on zoning exemptions, NEP is responsible for installing all the landscaping shown on the most recent landscaping plan submitted to the Siting Board, as it is part of the Company's description of the Project to the Board. The Company's proposed lighting at the substations would be minimally disruptive to the abutters while still allowing for the safe operation of the substations.

Given implementation of the mitigation measures proposed by NEP, the Siting Board finds that visual impacts from the Project would be minimized.

d. Water

i. Company Description

The land on both sides of the Congress Street Bridge is filled tideland subject to Chapter 91 jurisdiction (RR-EFSB-20). As a result, the Project requires a Notice of Minor

Project Modification, which the Company first submitted to MassDEP on March 7, 2011 (RR-EFSB-21). The Company submitted a revised version on September 12, 2013 (id.). MassDEP granted the first Minor Modification Request and did not formally respond to the second request (id.). Pursuant to 310 CMR 9.22(3), an applicant may proceed with a minor modification if no objection from MassDEP is received within 30 days of submission of a notice (id.). The Company stated that its contractor may decide to use a temporary floating platform in the South River for the installation of the Proposed Cables under the Congress Street Bridge, but committed that its contractor would coordinate any in-water work with all relevant regulatory agencies (Tr. 4, at 604-605).

The Company stated that it expects that excavation along the Primary Route would encounter groundwater (Exh. EFSB-W-1). To manage excess groundwater the Company stated that it would use one of several different best management practices, determined by site-specific conditions and/or any pertinent permit conditions (id.). Potential practices include pumping water from the trench and conveying it though either a settling basin or filter pad and letting the treated water infiltrate into a different portion of the excavation away from the active work area or discharging it into the municipal storm drainage system (if approved by the City) (id.). The Company stated that in the event that contaminated soils affected groundwater, the Company would dispose of the groundwater as necessary to prevent its introduction into the storm drain system (Exh. NEP-1, at 5-8).

The Company stated that the Proposed Cables and associated accessories could withstand exposure to both fresh and salt water from groundwater, surface runoff, or flooding, including continuous, full submergence (Exh. EFSB-W-3; Tr. 2, at 313). Because the Proposed Cables would be designed to withstand exposure to water, the Company stated that no design changes would be required to address potential increased flooding due to rising sea levels (Exh. EFSB-G-13). The Company further stated that the Canal Street Substation is located inland and should not be affected by the potential for increased flooding due to rising sea levels, while the limited scope of work for this Project at the Salem Harbor Substation does not offer the opportunity to redesign the whole substation to address potential future flooding (id.).

NEP committed to implement appropriate best management practices for the control of erosion and sedimentation during construction, enforced by regular Company inspections

(Exh. NEP-1, at 5-8). In any areas where stormwater is directed to a local storm drain, the Company stated that it would install filter fabric barriers to prevent sediment from entering the storm drain system (id.). The Company would remove filter fabric from the storm drain when construction is complete at each location (id.). As described above in Section V. C.1, excavated soils will be loaded directly into trucks and transported to an off-site stockpile area, which will limit the potential for soils to migrate off-site and into the municipal storm drain system (id. at 5-9). The Company stated that it would obtain a National Pollutant Discharge Elimination System ("NPDES") Construction General Permit and would maintain a storm water pollution prevention plan onsite (id.).

NEP stated that because it would install the Proposed Cables underground within City streets, the installation would not cause any permanent impacts to wetlands or waterbodies (id. at 5-38). Additionally, the Company stated that the Project would not impact stormwater drainage at either the Canal Street Substation or the Salem Harbor Substation (Exh. EFSB-W-2).

ii. Analysis and Findings

The record shows that the Project would not have any permanent impacts on water resources. NEP has notified MassDEP of its Minor Modification Request related to the Project and has committed to seek approval from all relevant entities for any in-water construction work. NEP committed to appropriately manage and dispose of any groundwater that it encounters. Additionally, the Company committed to implement best management practices to control erosion and sedimentation during construction. The Company analyzed increased flooding due to rising sea levels to an appropriate extent in the design of the Project.

Accordingly, the Siting Board finds that the Project's impacts to water resources would be minimized.

e. Traffic

i. Company Description

NEP stated that traffic impacts would be confined to the time period of construction (Exh. NEP-1, at 5-21).[34] The Company stated that the heaviest traffic volumes along the Primary Route are along Hawthorne Boulevard and continuing onto the section of Congress Street north of Harbor Street, and that at peak travel hours there is congestion on this entire corridor from Washington Square South to Leavitt Street (id. at 5-21, 5-22).[35] The Company stated that lane closures or full street closures would be most likely where the existing roadway is less than 30 feet wide, which occurs for approximately 1,100 feet of the 1.63-mile primary route (id. at 5-21). Construction workers would park their personal vehicles at a staging area and drive to the work site in construction vehicles (Exh. EFSB-T-1).

According to NEP, the primary route includes streets that are used as part of routes for motor coaches, trolleys, and public buses, and that provide access to public parking lots and a parking garage (Exh. NEP-1, at 5-21). NEP stated that the primary route does not pass by the main entrance of any school, but several school bus routes use parts of the route (Exh. EFSB-T-9). The Company would also arrange for a police detail to facilitate alternating travel wherever construction reduces road width to a single travel lane (Tr. 3, at 521). The Company stated that a technical advisory group would be formed to integrate construction activities with Footprint, Algonquin Gas Transmission Company ("Algonquin"), and other construction projects in Salem, to limit construction-related traffic volume wherever possible (Exh. NEP-1, at 5-25). In addition, the Company stated that it would work with the City of Salem to prepare and implement a traffic management plan ("TMP") to reduce the potential for inconvenience (id. at 5-21, 5-25). The TMP must address the following:

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34 Traffic impacts and also noise impacts are affected by Project schedules. Since schedule is relevant to each of these impact categories, Project schedule is addressed in a separate section, Section V.C.g, below.

35 From north to south along this fairly straight section of the Primary Route, the name of this effectively continuous street changes from Washington Square South to Hawthorne Boulevard to Congress Street (Exh. NEP-1 at fig. 5-3).

- Coordination with Salem school, police, and fire departments;
- Provisions for emergency vehicle access;
- Identification of lane locations and widths at work zones;
- Schedule and duration of lane closures, road closures, and/or detours;
- Warning signs, reflective barriers, barricades, flashers, and other protective devices;
- Temporary provisions needed to maintain access to homes and businesses;
- Routing and safeguarding of pedestrian, personal transporter, and bicycle traffic;
- Continuity of MBTA, school bus, trolley tour, and motor coach routes;
- Communication with adjacent businesses relative to critical product deliveries;
- Roadway level-of-service effects from temporary lane closures; and
- For the timing and duration of travel and parking restrictions, a notification system for municipal officials, local businesses, adjacent residents, and the public.

(Exhs. EFSB-1, at 5-25, 5-26; EFSB-T-5; EFSB-T-9).

NEP stated that it would mail project notification to all abutters approximately three to four weeks prior to the start of construction (Exh. EFSB-T-2). Then, approximately three to seven days prior to construction in particular streets, the Company would contact residents by phone to alert them to construction dates and hours, and to any road closures or lane restrictions; construction crews would also post signage alerting the public to upcoming road closures and/or restrictions (id.). Also, NEP stated that it has developed a website to provide up-to-date information on construction scheduling, road openings, and traffic around the Project (Exh. EFSB-T-8).

NEP stated that traffic impacts from the removal of the Existing Cables would be similar to those anticipated for the installation of the Proposed Cables and the Company committed to employ similar mitigation measures for the removal of the Existing Cables (Exh. NEP-1, at 5-50 to 5-51).

ii. Positions of the Parties

In its original testimony, which preceded development of the MOA between the City and the Company, the City requested that the Siting Board condition the Project, requiring that the

TMP identify streets that would be temporarily closed during project construction, that NEP discuss these street closures with the City in its development of the TMP, and more generally that the City approve the TMP prior to the issuance of any street opening permit (Exh. COS-3, at 3, 5). Also, the City requested that the Siting Board impose a condition that in the evening, NEP's contractor mark with cones the parking spaces needed for construction the following day; that, in the event a vehicle is parked in the work zone, the Company make reasonable efforts to locate the owner to move the car; and to work with the City to identify nearby locations where vehicles could be moved for easy retrieval and at no cost to owners (id. at 3). (NEP agreed to the last two requests (COS-NEP-9)). The City stated that it would expect to lead the coordination of the various contemporaneous construction projects (Tr. 3, at 399-401). Finally, the City requested that the Siting Board impose a condition that, following construction, the Company repave streets curb to curb, replace sidewalks, install curb cuts, and paint crosswalks and center lines (Exh. COS-3, at 3).

NEP and the City have agreed in the MOA that NEP would develop a TMP in consultation with the City, which would detail streets to be temporarily closed due to manhole installation, the anticipated timing of closures, and the amount of notice, with road closures posted on the Project website as well (MOA at 3). Furthermore, NEP has agreed to notify abutters of parking restrictions five days in advance of construction in an area and to post no-parking signs at least 48 hours prior to such construction (id. at 4). With respect to repaving, NEP and the City have also agreed to set up an escrow account for repaving certain streets, and have established as well that sidewalks would be replaced in kind, and that curb cuts would be installed at crosswalks on those sidewalks (id. at 3).

iii. Analysis and Findings

The record shows that during construction the Project would have significant impacts on traffic in Salem, and that, as described below in Section V.C.g, the Company proposes to work with the City to minimize impacts by scheduling work outside of Salem's October tourist season and, as practicable, around other events and periods of higher tourist activity. There are several other major construction projects expected in Salem in approximately the same time period. The Company has indicated that it would work to coordinate schedules with Footprint, Algonquin,

and other construction projects. In Footprint, the Siting Board required Footprint to coordinate with the City, National Grid, and Algonquin, as available, to prepare a plan for roadway and traffic mitigation system for Salem, to submit the plan to the Siting Board, and to implement the plan. Footprint at 88. The Siting Board required that the roadway and traffic mitigation system include a number of elements, including: a single repository of information relevant to construction scheduling, road openings, and traffic flow; a menu of potential mitigation options, and a decision tree or other suitable approach determining their implementation; a platform for Footprint, National Grid, Algonquin, and the Salem DPW to coordinate construction activities; and a protocol for allocation of mitigation costs. Footprint at 88.

With respect to coordinating with the other construction projects and with the City, it would be advantageous to have an approach to that coordination that is consistent with Footprint. Accordingly, the Siting Board directs NEP to: (1) contact the City, representatives of Footprint, and Algonquin and solicit their cooperation and participation in preparing the Company's TMP; (2) prepare the TMP with the cooperation of as many parties as are agreeable; (3) submit the plan to the Siting Board and all parties by January 1, 2015; and (4) implement the plan. The Company shall participate in a roadway and traffic mitigation system with the City and other participants, that shall include the following elements: (a) a single repository of information relevant to construction scheduling, road openings, and traffic flow; (b) a menu of potential mitigation options, and a decision tree or other suitable approach determining their implementation; (c) a platform for NEP, Footprint, Algonquin, and the DPW to coordinate construction activities; and (d) a protocol for allocation of mitigation costs. In addition, the Siting Board directs NEP to provide the Siting Board with quarterly reports on its traffic monitoring, coordination with other entities, and traffic mitigation activities, beginning three months after the date of this Decision and ending with the completion of Project construction.

With the implementation of the traffic management plan condition and schedule-related conditions imposed below in Section V.C.2.g, the Siting Board finds that traffic impacts from construction and operation of the Project along the Primary Route would be minimized.

f. Noise

i. Company Description

With respect to operational noise from the Project, NEP stated that there would be no change in operational noise at the Salem Harbor Substation (Exh. EFSB-NO-8; Tr. 3, at 480). At the Canal Street Substation, the Project includes addition of a control house, which would have a heating, ventilation, and air conditioning ("HVAC") unit, with a noise level that the Company likened to a window-type air conditioner (Exh. EFSB-NO-8). The Company stated that its designs had not advanced to the point of determining a location for the HVAC unit, but indicated that it would be able to install the HVAC unit on the Canal Street side of the building, to direct sound away from nearby residents (Tr. 3, at 483, 491-493). Aside from the HVAC unit for the control house at Canal Street Substation, the Company asserted that none of the new electrical equipment would generate noise (Exh. EFSB-NO-8).

Noise from construction of the Project would impact adjacent residences, businesses, and other sensitive uses (Exh. NEP-1, at 5-26). To minimize construction noise impacts, staff explored a variety of mitigation strategies beyond those the Company proposed. The Company stated that construction would generally comply with City and state noise requirements (id. at 5-28). The Company would mitigate noise by training its contractors to maintain equipment, use functioning sound mufflers, and comply with MassDEP's anti-idling requirements for equipment (id.). In addition, the Company stated that it would maintain communication with a designated stakeholder representative in order to provide abutters an opportunity to raise questions or concerns (id.).[36]

The Company has provided noise estimates in A-weighted decibels ("dBA"). For reference, a ten-dBA noise increase is perceived as a doubling in loudness to the average person, while a noise increase less than three dBA is typically regarded as imperceptible (Exh. EFSB-NO-6). Some typical environmental sound levels are provided in Table 3, below.

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[36] Noise impacts and also traffic impacts are affected by Project schedules. As schedule is relevant to each of these impact categories, Project schedule is addressed in a separate section, Section V.C.2.g, below.

Table 3. Typical Environmental Sound Levels

Sound Source	**Sound Level (dBA)(L_{eq})**
Gas Lawn Mower at 3 feet	95
Diesel Truck at 50 feet	85
Shouting at 3 feet	75
Normal Speech at 3 feet	65
Quiet Urban Area (Daytime)	55

Source: Exh. EFSB-NO-6

Noise mitigation at manhole locations is of particular concern as these areas would face both longer workdays and a longer construction schedule than duct bank installation locations. NEP stated that construction at manhole locations would take a total of 43 working days for manhole installation, adjacent duct bank installation, and cable pulling and splicing (Exh. EFSB-CM-3). The Company anticipates extended work days of ten to twelve hours for the cable splicing operation (Exh. EFSB-NO-14). However, manhole installation would be louder than cable splicing; maximum noise levels from pavement saws, manhole cranes, asphalt pavers, backhoes, and dump trucks would be up to 90 dBA at 50 feet (Exh. NEP-1, at 5-27).

Noise sources from cable pulling and splicing at the manhole locations would include a generator, an air conditioner, and a splicing van (id.). The Company originally estimated that maximum noise impacts from cable pulling and splicing would be up to 84 dBA at 50 feet (id.).[37] NEP stated that the generator providing electrical power for the splicing van and air conditioning unit would be muffled to minimize noise and has been used successfully in other locations with sensitive receptors (id. at 5-9). The Company subsequently committed also to use a

[37] Since many residential buildings are closer to manhole construction locations than 50 feet, including homes as close as eleven feet, NEP projected that exterior sound levels at these buildings would be as high as 97 dBA – i.e., 13 dBA louder due to closer proximity to the sound source (Exh. EFSB-NO-11). For a prediction of maximum indoor noise levels during construction, NEP used estimates of sound reduction of 17 dBA with windows open and 25 dBA with windows closed, and predicted maximum indoor noise impacts at the closest buildings as 80 dBA and 72 dBA, for windows open and closed, respectively (id.).

WhisperWatt™ generator, or its equivalent, in order to reduce noise impacts for cable pulling and splicing (Exh. EFSB-NO-12). A WhisperWatt generator would have a maximum noise impact of 58 dBA at 50 feet (id.). With the use of a WhisperWatt generator, the loudest noise from the cable pulling and splicing would be the vehicle noise from the splicing truck, which would produce up to 75 dBA at 50 feet (RR-EFSB-29).

One potential mitigation measure for construction noise (not addressed in the MOA) would be to use portable sound barriers along the Primary Route. The Company stated that sound reduction for portable sound barriers typically ranges from eight to 15 dBA for receptors at the ground floor of an adjacent building and five to eight dBA at the second floor (RR-EFSB-41). The Company stated that the use of movable noise barriers would create two hours of additional work at the beginning and end of each shift and would require an additional construction vehicle for delivery at the start of each shift, adding significant labor costs to the Project by either extending the construction workday or lengthening the construction schedule (RR-EFSB-28; RR-EFSB-42). The Company stated that the necessary space for vehicles and equipment to maneuver around the worksite during manhole installation would mean that the portable noise barriers would need to be set back from the worksite, increasing the footprint of the Project, which could result in additional road closures or blocked sidewalks (RR-EFSB-28; RR-EFSB-42). Further, in order to maintain access to the site and private driveways, a continuous noise barrier around some worksites might not be feasible, reducing the effectiveness of the noise mitigation (RR-EFSB-42). The Company argues that the projected noise benefits of portable sound barriers are limited and that the additional construction vehicle, additional work time, and other added difficulties could add to, rather than reduce, the level of impacts experienced in the City and could complicate completing construction without affecting two on-peak seasons (NEP Comments on IM at 4-5).

Construction noise could be produced over a longer period of time at the Canal Street Substation, where the Company projected that relatively intensive work would occur over a period of four to six months (Tr. 3, at 489-490). The Company stated that extended work, including weekend work, might be required at the substations before and during transmission outages to limit the duration of the transmission outages (Exhs. EFSB-NO-5; EFSB-NO-13; Tr. 3, at 466-467). There are several residential abutters to the Canal Street Substation, with the

closest abutter located 20 feet away (Exhs. NEP-1, at 5-43; EFSB-NO-10). NEP stated that the cost of using temporary noise barriers at the Canal Street Substation would be insignificant, but that the barriers could impede construction activities due to the small size of the site (Exh. EFSB-43(S)). The Company therefore has proposed to mitigate noise from stationary construction equipment first by locating the equipment away from nearby residences (id.). Where that is not practical, the Company would then install moveable noise barriers close to the noise source(s) (id.). Additionally, the Company would use well maintained equipment with functioning mufflers and prohibit extended idling of construction equipment when the equipment is not performing a productive function (id.).

NEP stated that noise impacts from the removal of the Existing Cables would be similar to those anticipated for the installation of the Proposed Cables and the Company committed to employ similar mitigation measures for the removal of the Existing Cables (Exh. NEP-1, at 5-50 to 5-51).

ii. Positions of the Parties

The City acknowledges that the work hours agreed to between the Company and the City differ from the City's noise and construction work hour ordinances (MOA at 6). The City has committed to provide any waivers from its Noise Ordinance (and construction hours ordinance) that may be required to enable the work schedule as described below in Section V.C.2.g (MOA at 6). In comments on staff's Issues Memorandum, the City notes its concern that impacts may be greater than anticipated and requests that the Siting Board require the Company to develop a mitigation plan with the City for the selective use of portable noise barriers for work at manhole locations when maximum noise impacts are expected for significant durations and site conditions allow for the effective use of noise barriers (City Comments on IM at 2). However, the City suggests that notwithstanding the considerable day-time noise impacts of construction, any noise mitigation should be used judiciously to avoid bigger problems of decreased access to homes (August 14, 2014 EFSB Meeting Tr. at 84-85). Therefore, the City requests that the mitigation plan be flexible so that it can be altered as the Project progresses and City officials become more familiar with the advantages and disadvantages of portable noise barriers (City Comments on IM at 2).

iii. Analysis and Findings

The record shows that during construction the Project would have appreciable noise impacts on Salem, as residences are generally close to the edge of the streets in which work would occur. Locations that would have the longest duration of noise impacts would be at manhole locations, where manholes would need to be installed and cables pulled and then spliced; and at the Canal Street Substation. Among the activities at manhole locations, the record shows that all work could be completed within regular construction hours except for cable splicing, which would require ten to twelve hours of work per day. In order to minimize sound impacts during cable splicing in particular, the Siting Board requires the Company to use WhisperWatt or equivalent sound attenuated generators. The record shows that the Company is willing to use temporary noise barriers at Canal Street Substation. The Siting Board requires the Company to locate stationary noise-generating equipment at the Canal Street Substation as far from residences as is feasible, and to use temporary noise barriers for such equipment that is located close to residences.

One option for additional mitigation at manhole locations could be the selective use of portable noise barriers wherever they would be a practical solution mitigating significant noise impacts. The Board could mandate the use of noise barriers both on days when the Company expects construction equipment to produce noise levels at or near the maximum range for extended periods of time, such as prolonged jack hammering, and at locations where it would be feasible for the Company to maintain a near-continuous noise barrier around the noise source. However, the record shows that noise barriers may contribute to longer construction periods and may exacerbate access difficulties. Accordingly, the Siting Board requires the Company to develop a flexible mitigation plan, in cooperation with the City of Salem, for the selective use of portable noise barriers for work at manhole locations that would balance the benefit of reducing noise at locations where maximum noise impacts are expected for significant durations against site conditions that may not allow the effective use of noise barriers while maintaining vehicle and pedestrian access and safety. In the event that the City and the Company reach an impasse on developing the noise mitigation plan, either party can request resolution by the Siting Board. Furthermore, the Company shall provide a report to the Siting Board detailing the extent,

efficacy, and difficulties experienced in its use of noise barriers within three months following the completion of construction, including removal of the Existing Cables.

With the implementation of the above noise conditions and schedule-related conditions imposed below in Section V.C.2.g, the Siting Board finds that noise impacts from construction and operation of the Project, using the Primary Route, would be minimized.

g. Schedule

i. Company Description

NEP provided a generic schedule for the Project showing how it would distribute work across two years of construction, starting with construction of a new duct bank and manhole system and continuing with removal of the existing cables:

Construction Year 1:

- Street excavation and construction of a single new duct bank and manhole system.

Construction Year 2:

- Installation of the new cables;
- Pavement restoration along the new cable route;
- Street excavation and removal of the existing S cable;
- Backfill and pavement restoration along the route of the S cable;
- Removal of the existing T cable from the duct bank; and
- Disposal of the existing cable and accessories (Exh. NEP-1, at 3-5, 3-6).

Construction Years 1 and 2:

- Modifications to the existing substations (id. at 3-6).

The City of Salem's many historical and cultural attractions draw numerous tourists every year (id. at 5-17). The City testified that its peak tourist season runs from mid-April to November 1, with events throughout the year, such as seasonal holiday events (Exh. NEP-1, at 5-17; RR-EFSB-26).[38] The City has requested that NEP avoid work in certain areas along the

[38] As a condition to the MOA, the City has provided the Company with a schedule of local events that could be affected by the Project, such as the Black Cat Road Race and the Salem Film Festival. The Company has agreed to incorporate these schedules into its construction bid documents (RR-EFSB-44).

Project from October 1 to November 1 to avoid impacts to the Halloween tourist season (Exh. NEP-1, at 5-11). To comply with this request, the Company's most recent construction schedule includes no in-street work in October (id.; Exh. EFSB-G-15).[39, 40]

The most recent construction schedule in the record has manhole installation occurring from November 2014 through January 2015 and cable pulling and splicing occurring from November 2015 through March 2016, so all work at the manhole locations would be outside of the summer tourist season as well (Exh. EFSB-G-15). However, duct bank installation would take place from January 2015 through September 2015, which would avoid the Halloween tourist season but span the summer tourism season (id.). Under that schedule, the somewhat less intrusive cable pulling and splicing operations would then occur from November 2015 to March 2016, to be followed by final pavement restoration along the Primary Route in March to May 2016 as well as removal of the Existing Cables (id.; Exh. NEP-1, at 3-6). With respect to the specifics of scheduling duct bank installation, the Company stated that work must proceed linearly between two manhole locations, but the Company could choose the order of each segment between adjacent manhole locations (Tr. 1, at 98-99).[41]

The same schedule would have the Existing Cables de-energized in April or May 2016 (Exh. EFSB-G-15). The Company stated that the dielectric fluid in the decommissioned cables would represent a threat of release under 310 CMR 40, the MCP, putting the site into the MCP process, starting with a two-hour notification requirement from which there are no express waiver provisions (RR-EFSB-16; Tr. 2, at 247-248). De-energizing the cables in April or May 2016 would therefore cause cable removal to coincide with the City's peak tourist season (RR-EFSB-26). The Company stated that it is willing to work with MassDEP, the Siting Board,

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39 With respect to off-street work at the two substations, the Company stated that specific dates would be dictated by the available electrical outages schedule (Exh. EFSB-NO-9).

40 NEP also stated that the City ordinarily imposes a street opening moratorium from December through April, to facilitate snow removal, but that preliminary discussions indicated that the City would exempt the Company from this moratorium to allow construction in the winter months (Exhs. NEP-1, at 5-11; EFSB-G-10; Tr. 1, at 73).

41 The Company stated that its contractor might prefer to construct the entire route in a single directional sequence (Tr. 1, at 98-99).

and the City to determine whether a mutually agreeable solution could be reached, but emphasized that it must comply with the rules and regulations of the MassDEP (Company Reply Brief at 2).

NEP stated that it would coordinate construction activities with Footprint, Algonquin, and other active construction projects along the installation routes to minimize impacts to the City (Exh. NEP-1, at 5-11, 5-12). NEP stated that it will coordinate with City officials and with Footprint and Algonquin on location-specific construction schedules (id. at 5-5). The Company stated that some adjustments to the proposed schedule would be required to accommodate and coordinate with other projects such as those proposed by the City, MassDOT, Footprint, and Algonquin; some Project construction activities may be advanced or delayed to align with construction of these other projects (id. at 5-11).

With respect to weekly and daily work schedules, and following discussions with the City, NEP stated that it would be amenable to a typical schedule of 7:00 a.m. to 3:30 p.m. for work at the jobsite (Tr. 3, at 463-465).[42] The Company stated that certain construction activities would require extended work days, most notably cable splicing, for which it anticipates approximately 60 extended work days, requiring ten- to twelve-hour work days (Exhs. NEP-1, at 5-11; EFSB-NO-5). NEP would also consider the use of extended hours if requested by the City to accelerate the pace of work in specific areas (Exh. NEP-1, at 5-11). The Company anticipates that there would be no work on weekends or holidays, but would request permission from the City if weekend work was needed at either substation in order to work around outage schedules (id.; Tr. 3, at 466-467). NEP stated that it would work with the City and community to limit the impacts of any extended work schedules, noting that the City does not typically endorse night work but would consider it for this Project if it were determined that it was appropriate and would not cause hardships for certain businesses and residents (Exh. NEP-1, at 5-11).

The Company argues that its discussions with the City have led to a comprehensive mitigation agreement in the form of the MOA, and that the Company and the City are continuing

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[42] The Company noted that the schedule the City requested for in-street work is somewhat different from hours allowed by the Salem noise ordinance (Tr. 3, at 486). For work at the substations, NEP stated that it would follow the City ordinance and restrict work to the hours of 8:00 a.m. to 5:00 p.m. if the City does not request other hours (id. at 487).

that cooperative effort, in order to mutually develop a more detailed construction schedule, that it expects this cooperative effort would produce more effective results than a fixed schedule would be able to do if it were established at a preliminary planning stage (August 14, 2014 EFSB Meeting Tr. at 72). Furthermore, the Company states that it is optimistic that, with the City's cooperation, it can develop a schedule for Project installation that would avoid in-road construction during summer months (id. at 72, 78). The Company argues that construction schedules are, by definition, iterative and subject to change based on conditions actually experienced in the field, and submits that the best option is to allow the Company and the City to work out a schedule in a cooperative manner to ensure that impacts to residents and associated disruptions are minimized (NEP Comments on IM at 3).

ii. Positions of the Parties

The City requests that duct bank installation occur only between January and April for the segment from Washington Square South to Hawthorne Boulevard (in the heart of Salem's historic downtown) (RR-EFSB-37). Additionally, the City requests that, to the extent possible, all work – not just duct bank installation – on Washington Square South, Hawthorne Boulevard, and Derby Street take place during November through April (outside of peak tourist season), with as much of the work as possible occurring between January and April (id.). Based on the current schedule, work that might occur on these three streets during the peak tourist season includes one segment of duct bank installation (described above) and the removal of the existing S Cable, as well as a short segment of duct bank installation on Washington Square South (approximately 150 feet) and duct bank installation through the intersection of Derby Street and Hawthorne Boulevard (Exh. EFSB-CM-14).

The City requests that the Siting Board require the Company to seek a waiver from MassDEP so that the removal of the S Cable is not performed during the months of May through October to avoid the peak tourist season (City Brief). The City also prefers that the removal of the S Cable occur between January and April (id.).

The MOA between NEP and the City limits construction hours to 7:00 a.m. to 3:30 p.m. on weekdays, except for those days when NEP is performing cable splicing and unless otherwise

approved or required by the City engineer (MOA at 6).[43] The MOA states that the City shall provide waivers from its Noise Ordinance and Construction Work Hours rules as may be required in order to comply with the 7:00 a.m. to 3:30 p.m. schedule (id.). The MOA states that NEP shall prohibit its contractor from conducting any preparatory work generating a noise disturbance prior to 7:00 a.m., such as starting construction vehicles (id.). The MOA requires NEP to submit an e-mail to the City engineer explaining the necessity and duration of the extended work hours, prior to performing work such as cable splicing that requires extended work hours (id.).

Mr. Clarke, Ms. Madore, and the Salem Chamber of Commerce all request avoidance of construction during the peak tourist season. Specifically, Mr. Clarke requests that construction in critical business areas be limited to January through March (Clarke Comments on IM). Ms. Madore argues that the Company should avoid construction during the peak tourist season and October (Madore Comments on IM). The Chamber of Commerce argues that the Siting Board should impose strict calendar restrictions on the project (Salem Chamber of Commerce Comments on IM). Additionally, Ms. Doll argues that abutters should vet daily construction start-up times, including any discussion of construction on evenings and weekends, and further argued that an 8:00 a.m. start time would be standard and more acceptable than a 7:00 a.m. start time (Doll Brief; Doll Comments on IM).

iii. Analysis and Findings

The record shows that there are a number of competing factors relative to a calendar schedule for the Project, including a need for timely completion of the Project, and a tourism season that Project construction could disrupt. The record also shows that the Company and the City have made substantial progress in working out construction schedules that are acceptable to both parties, with adherence to an October construction moratorium as the only firm limitation. Schedule details would need to be adjusted as the Project progresses, so detailed instructions in

[43] David Knowlton, City engineer, indicated that the City wants construction of manholes and conduits confined to the period 7:00 a.m. to 3:30 p.m., but that splicing would be relatively quiet and localized so could be allowed to extend beyond those hours (Tr. 3, at 425-426).

advance may not be realistic. Accordingly, the Siting Board requires the Company to avoid all construction in the month of October, and to continue its work on developing a detailed construction schedule in cooperation with the City of Salem. In the event that the City and the Company reach an impasse on developing the construction schedule, either party may request resolution by the Siting Board. Furthermore, NEP shall provide a quarterly report to the Siting Board detailing the progress of construction schedule preparation in cooperation with the City, with the first report due on January 2, 2015.

With respect to scheduling the removal of the existing S Cable, the Siting Board recognizes that the removal of the Existing Cables would have significant traffic, noise, and air impacts on the City, especially if the cables were removed during the peak tourist season. While delaying the removal of the Existing Cables could lessen the impacts of the cable removal on Salem's peak tourist season, it would also extend the period during which additional undetected leakage might occur. The evidence in this case suggests that the Company would need to remove the existing S cable starting immediately after de-energizing the cables. Nevertheless, the Siting Board requires the Company to consult with MassDEP on the potential threat of release of oil or hazardous materials posed by unpressurized unmonitored dielectric fluid in the S Cable and the potential for the Company to do some or all of the removal of the S Cable at a time that avoids Salem's peak tourist season.

h. Air

i. Company Descriptions

NEP stated that construction activities may generate dust and also air emissions from equipment engines (Exh. NEP-1, at 5-30). The Company stated that it would require its contractors to use dust control measures to mitigate potential fugitive dust emissions (id. at 5-31, 5-43, 5-47). The Company stated its contractor would have water trucks available nearby, and would spray water onto source areas whenever the contractor observed airborne dust (Exh. EFSB-A-1). As described above in Section V. C.1, excavated soils would be loaded directly into trucks and transported to an off-site stockpile area, which reduces the potential for dust (Exh. NEP-1, at 5-7). The Company stated that brooms and hand tools would be used for localized clean-ups at construction sites and street sweepers would be employed for larger areas

(Exh. EFSB-A-1). Additionally, the Company stated that equipment used to cut concrete or asphalt would be fitted with dust suppression water distribution systems that the contractor would use during all cutting activity (id.).

To mitigate air emissions from construction equipment, NEP committed to retrofit any diesel-powered, non-road construction equipment rated 50 horsepower or above, whose engine is not certified to USEPA Tier 4 standards, and that will be used for 30 days or more over the course of the Project with USEPA-verified (or equivalent) emission control devices (e.g., oxidation catalysts or other comparable technologies) (Exh. NEP-1, at 5-31). The Company also stated that it would exclusively use ultra-low-sulfur diesel fuel for all construction equipment it uses for the Project, and that it would comply with state law and MassDEP regulations that limit vehicle idling to no more than five minutes except in certain circumstances, such as when vehicles need to run their engines to operate accessories (id.). NEP stated that air impacts from the removal of the Existing Cables would be similar to those anticipated for the installation of the Proposed Cables and the Company committed to employ similar mitigation measures for the removal of the Existing Cables (id. at 5-50 to 5-51).

The only long-term potential air impacts that NEP anticipated as a result of this Project would be sulfur hexafluoride gas ("SF_6") emissions from the four new circuit breakers that NEP would install at the Salem Harbor Substation to replace four existing oil-filled circuit breakers there (id. at 5-43).[44] The Company estimated that the four new circuit breakers would require 340 pounds of SF_6 (Exh. EFSB-A-5).[45] The Company stated that the equipment manufacturer

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44 The Massachusetts Clean Energy and Climate Plan for 2020 identifies SF_6 as a non-toxic but highly potent greenhouse gas ("GHG") and estimates one pound to have the same global warming impact as eleven tons of carbon dioxide ("CO_2"). See G.L. c. 21N. Reducing SF_6 emissions is an important policy goal of the Clean Energy and Climate Plan. The Siting Board's mandate requires it to ensure the consistency of new energy facilities with the Commonwealth's current health, environmental protection, and resource and development policies. In accordance with this mandate, the Siting Board reviews the Company's proposed use of SF_6 to ensure reduction of SF_6 emissions to the maximum extent possible.

45 Both NEP and Footprint would install additional SF_6-containing equipment at the Salem Harbor Substation as a result of the construction of the proposed Footprint Generating Facility (Exhs. EFSB-A-5; EFSB-SHR-1). NEP would install two additional circuit breakers with 170 pounds of SF_6 and Footprint would install a new switchyard with two

would guarantee that the new equipment would have an SF_6 emissions rate of less than 0.5 percent per year and would factory-test the equipment prior to delivery (Exh. NEP-1, at 5-44; RR-EFSB-31).[46] The Company would have a low-SF_6-pressure alarm and, as a redundant method of leak detection, NEP would also record the SF_6 pressure in the circuit breakers as part of its regular monthly or bi-monthly substation equipment inspections (Exh. NEP-1, at 5-44). The Company stated that it has implemented measures to quantify and reduce its system-wide SF_6 emissions, by repairing or replacing its worst-performing equipment and providing training programs to substation maintenance personnel on the proper handling of SF_6 (id.).

ii. Analysis and Findings

NEP committed to dust control measures during Project construction including spraying water, stockpiling soils offsite, and maintaining clean worksites. The Company also stated that it would limit vehicle idling and use ULSD fuel to reduce air emissions. As NEP has agreed, the Siting Board directs the Company to ensure that all diesel-powered non-road construction equipment with engine horsepower ratings of 50 and above to be used for 30 or more days over the course of Project construction must have USEPA-verified (or equivalent) emission control devices, such as oxidation catalysts or other comparable technologies (to the extent that they are commercially available) installed on the exhaust system side of the diesel combustion engine.

SF_6-insulated collector bus systems and four generator breakers with 628 pounds of SF_6, so that in total the construction of the Footprint Generating Facility would require 798 pounds of SF_6 (Exhs. EFSB-A-5; EFSB-SHR-1). As a condition of the approval of the Footprint Generating Facility, the Siting Board directed Footprint "to consult with National Grid and develop a joint comprehensive SF_6 reduction plan in connection with the anticipated National Grid upgrades to the Salem Harbor Substation." Footprint at 30. NEP testified that it has provided Footprint all of its documents and procedures for SF_6 mitigation and monitoring and made its subject matter experts available to Footprint as necessary (Tr. 4, at 566).

46 The Company stated that this equipment would comply with MassDEP's new regulation 310 CMR 7.72, *Reducing Sulfur Hexafluoride Emission from Gas-Insulated Switchgear*, which limits all new equipment to a 1.0 percent annual leak rate (Exh. NEP-1, at 5-44, n.19).

Prior to the commencement of construction, the Company shall submit to the Siting Board certification of compliance with this condition.

NEP selected SF_6-containing equipment with relatively low leakage rates that complies with MassDEP regulations. Additionally, the Company committed to monitor the SF_6-containing equipment with low-pressure alarms and regular inspections. The Siting Board directs the Company to inform the Board if it adds SF_6 to any equipment or replaces any equipment due to SF_6 loss at the Salem Harbor Substation within five years of the completion and initial operation of the Project, after which time the Company will consult with the Siting Board to determine whether the Siting Board deems it appropriate to require continued reporting. So that the Siting Board can stay informed of NEP's overall progress to reduce SF_6 emissions, the Board directs the Company to submit to the Siting Board a copy of its annual SF_6 reports to MassDEP.

The Siting Board recognizes that it is also important to minimize SF_6 emissions from SF_6-containing equipment Footprint owns at the Salem Harbor Substation. Accordingly, the Siting Board directs NEP to assist Footprint in fulfilling its condition for a joint SF_6 reduction plan by continuing to provide Footprint with all of the Company's updated documents and procedures for SF_6 mitigation and monitoring at the Salem Harbor Substation and by continuing to make the Company's subject matter experts available to Footprint as necessary.

With the proposed measures to minimize dust and air emissions from construction equipment and the Company's selection of low-leakage SF_6-containing equipment, as well as the conditions outlined above, the Siting Board finds that potential air impacts from construction and operation of the Project would be minimized.

i. Hazardous and Solid Waste

NEP stated that construction mitigation measures would include removal of any subsurface contamination the Company encounters during earthwork and solid waste disposal (Exh. NEP-1, at 5-12). With respect to existing contamination, the Company stated that it determined that seven active sites under the Massachusetts Contingency Plan ("MCP") program exist along the Primary Route (id. at 5-29). The Company stated that, as appropriate, it would contract with a Licensed Site Professional ("LSP") to manage contaminated soils (id.).

At locations where NEP has been identified as the Responsible or Potentially Responsible Party for a known historical release, and for which a Temporary or Permanent Solution has been filed along with a Class A, B, or C Response Action Outcome ("RAO"), the Company may perform a post-RAO Release Abatement Measure pursuant to 310 CMR 40.0440 and 310 CMR 40.1067 (id.). In other areas, the Company would address contaminated soils under MCP provisions for a Utility Release Abatement Measure under MCP regulations (id.).

NEP stated that it would take asphalt and concrete generated during the Project to an asphalt, brick, and concrete recycling facility (Exh. EFSB-HW-11). The Company would ship waste from shipping of equipment and supplies for reuse or recycling to the extent possible (id.). The Company would recycle copper, aluminum, and lead, and it would also sort used substation equipment for re-use or sale to outside vendors (id.; Tr. 3, at 461).

Disposal of dielectric fluid from the Existing Cables is discussed in Section V.B.4. As noted above, the Company has stated that the dielectric fluid in the decommissioned cables would represent a *threat of release* under the MCP, requiring an *immediate response action* (Exhs. EFSB-HW-3; EFSB-HW-4). Once the Company has flushed oil from the Existing Cables, it would transport the oil and water for disposal at a licensed receiving facility (Exhs. NEP-1, at 5-48 to 5-30; EFSB-HW-7).

The record shows that the Company would minimize the amount of waste material it creates in the construction process, would dispose of the fluid from the Existing Cables at a licensed facility, and would follow MassDEP procedures if it encountered existing contamination when excavating for the Proposed Cables and to remove the existing S Cable. Accordingly, the Siting Board finds that hazardous and solid waste impacts from construction and operation of the Project, incorporating the Primary Route, would be minimized.

j. Safety

i. Company Description

NEP committed to design, build, and maintain the Project facilities in a manner that would protect the health and safety of the public (Exh. NEP-1, at 5-12). The Company stated that it would adhere to all federal, state, and local regulations, as well as industry standards and guidelines established to protect the public, such as the Massachusetts Code for the Installation

and Maintenance of Electric Transmission Lines (220 CMR 125.00), the National Electrical Safety Code, and design codes and guides established by the Department, the Institute of Electrical and Electronic Engineers, the American Society of Civil Engineers, the American Concrete Institute, and the American National Standards Institute (id.). Once the Project is constructed, the Company would inspect all manholes on a five-year cycle to look for defects (Exh. EFSB-S-6). To ensure security at the substation, both the Salem Harbor and Canal Street Substations would be surrounded by a perimeter fence, and the Salem Harbor Substation would have security cameras and restricted access by badge to the control building (Exh. EFSB-S-7).

NEP stated that there are no fire stations or police stations along the Primary Route from which emergency service vehicles are actively dispatched (Exh. EFSB-LU-1). Salem Fire Station No. 6 is located on Fort Avenue, along the Primary Route, but it is currently used as office space for the Salem Fire Prevention Bureau (id.). The existing S Cable is located in front of an active fire station at the intersection of Lafayette Street and New Derby Street (id.). The Company committed to coordinating emergency access with the Salem Fire Department at this location so that emergency services would not be disrupted (id.). The Company stated that its TMP would describe how all emergency vehicles would have the necessary access, and that mitigation measures could include temporarily stationing a fire engine or other emergency response vehicles in strategic locations (Exh. EFSB-S-4).

The Company committed to using a police detail as students arrive and depart from the Salem Academy Charter School to ensure that the students can safely cross the street to their school from the MBTA bus stop (RR-EFSB-18; Tr. 3, at 521-522). The Company stated that it would also consider the need for a police detail at the Bentley School, in consultation with the Working Group (Tr. 3, at 522)

NEP stated that it would contact Dig Safe before construction, and Dig Safe notification would be sent to all member utilities and any non-participating entities would be notified of the upcoming work (Exh. EFSB-S-1). During construction, the Company would sheet and shore the trench as required by soil conditions and Occupational Safety and Health Administration ("OSHA") safety rules, to prevent trench collapses and allow traffic to pass next to the trench safely (Exhs. NEP-1, at 5-7; EFSB-S-2). During non-work hours, the Company would cover the trench with steel plates secured in place with an asphalt berm to prevent movement of the plate

or unauthorized access to the trench (Exh. EFSB-S-3). The TMP would detail required warning signs, drums, and flashing lights to be used in the work zone during non-working hours (id.).

ii. Analysis and Findings

NEP committed to follow all relevant safety laws and regulations during construction and to have ongoing inspections of the Proposed Cables after construction. The Company stated that it would work with the City to coordinate emergency vehicle access to all parts of the City during construction. Additionally, the Company would use police details where necessary to ensure the safety of commuting students. The Company would maintain a safe worksite by calling Dig Safe before all construction, following relevant OSHA requirements, and covering and signing the worksite during non-work hours.

Based on the Company's proposed mitigation measures, the Siting Board finds that potential safety impacts from the Project's construction would be minimized.

k. Magnetic Fields

i. Background

Electrical current in the Proposed Cables will create magnetic fields since magnetic fields are created whenever current flows in a conductor (Exh. NEP-1, at 5-34). Some epidemiological studies suggest a statistical correlation between exposure to magnetic fields and childhood leukemia. Footprint at 99; Pioneer Valley Energy Center, LLC, 17 DOMSB 294, EFSB 08-1, at 42 (2009); Sithe Mystic Development, LLC, 9 DOMSB 101, EFSB 98-8, at 86-87 (1999). However, according to a 2007 World Health Organization ("WHO") report, "the evidence for a causal relationship is limited, therefore exposure limits based upon epidemiological evidence are not recommended, but some precautionary measures are warranted" (Exh. NEP-1, appendix 5-3, at vii). In past decisions, the Board has recognized public concern about electric and magnetic fields ("EMF") and has encouraged the use of low cost measures that would minimize magnetic fields along transmission ROWs. GSRP, 18 DOMSB 7, EFSB 08-2/ D.P.U. 08-105/ 08-106, at 87 (2010); Cambridge Electric Light Company, 12 DOMSB 305, EFSB 00-3/D.T.E 00-103, at 38 (2001); IDC Bellingham, LLC, 9 DOMSB 225, EFSB 97-5, at 104 (1999).

According to the Company's consultant on magnetic fields, when the WHO concluded in 2007 that consistent epidemiological evidence suggests that chronic low-intensity magnetic field exposure is associated with an increased risk of childhood leukemia, it was a conclusion that WHO based on small numbers of cases and controls in the epidemiological literature (Tr. 2, at 181; see Exh. NEP-1, app.5-3, at 17). The Company indicated that more recently published studies have been based on larger data sets, and studies using different methods to estimate past exposures (Exh. NEP-1, app.5-3, at 22-28; Tr. 2, at 182).

The Company's consultant reported on the more recent evaluations of the potential for a connection between exposure to magnetic fields and childhood leukemia. One of these studies was a 2012 pooled analysis of data involving over 3,000 cases from Canada, Denmark, Germany, Japan, the United Kingdom, and the United States that did not show any statistically significant elevation in the hazard ratio for childhood acute lymphoblastic leukemia for exposure categories above one milligauss ("mG") (Exh. NEP-1, app.5-3, at 25). The Company's consultant stated that the new studies do not alter the WHO conclusion that epidemiologic evidence on magnetic fields and childhood leukemia is "limited" as defined by the International Agency for Research on Cancer ("IARC") (id. at 27).[47] Nonetheless, the Company's consultant concluded that recent studies show that if there is an association between elevated magnetic field levels and childhood leukemia, the association is "weak" (id. at 27).[48]

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[47] In relation to epidemiological studies, IARC describes "limited evidence" as follows: "A positive association has been observed between the exposure and cancer for which a causal interpretation is considered to be credible, but chance, bias or confounding could not be ruled out with 'reasonable confidence'" (Exh. NEP-1, app.5-3, at 16).

[48] Once connected, the Proposed Cables would also create electric fields since electric fields are created whenever voltage is present on conductors (Exh. NEP-1, at 5-34). However, electric fields are shielded by earth, so the Proposed Cables would not create above-ground electric fields (id.). Therefore, this section reviews only the magnetic fields that the Project would induce.

ii. Project Magnetic Field Impacts and Mitigation

NEP stated that its plan to place the S and T Cables together in a single duct bank would minimize magnetic fields with a phase arrangement optimized to maximize mutual cancellation of magnetic fields (Tr. 2, at 205). Over most of the route, the circuits would be in a configuration of three phases of one circuit placed in a horizontal arrangement over the other circuit (three over three), which results in lower magnetic field levels than a vertical arrangement at most locations (except directly over the duct bank) (Exh. NEP-1, appendix 5-2, at 3-4). In some locations the Company would use a vertical arrangement of the cables (two wide by three deep), resulting in higher magnetic fields to the sides but lower levels directly above the duct bank (id.). The burial depth of cables varies depending on the location of existing underground utilities, and would vary from 2 ½ to ten feet (id., appendix 5-2, at 3). For the shallowest locations, the magnetic field three feet above pavement at the centerline would be 55 mG for a horizontal configuration and 43 mG for a vertical configuration (id., appendix 5-2 at 10-13). At locations 15 feet laterally from the duct bank centerline, the magnetic field would be nine to ten mG for the horizontal configuration and 16 to 18 mG for the vertical configuration (id.). At all locations where the duct bank is buried over six feet deep, maximum magnetic fields would be less than 20 mG (id.).

However, as the Proposed Cables approach the paired manhole vaults, the two circuits would split into separate duct banks and would have less mutual cancellation, resulting in higher magnetic field levels at these locations (id., appendix 5-2, at 15). The area directly above the manhole vaults would have lower magnetic fields than the area above the manhole approaches because the manhole vaults contain reinforcing steel and a copper ground ring (Tr. 2, at 204). As originally designed (i.e., with no additional mitigation), magnetic fields directly above the duct bank near the manhole would be 143 mG at summer normal maximum loading conditions, which is higher than magnetic field levels projected in past underground transmission line cases the Siting Board has approved (id. at 5-35 and appendix 5-2, at 16). The 143 mG figure represents the location where cables would enter a manhole vault at the shallowest depth proposed, 3.8 feet (id., appendix 5-2, at 15-18).

The Company evaluated means of potential mitigation that would reduce magnetic fields at the approaches to manholes. One form of mitigation for the Proposed Cables would be to

install wire loop shielding alongside the manhole approaches on both sides of the conduits, and not attached to the cables. This design would induce an opposing current in the wire loop by current in the Proposed Cables, thereby cancelling out some of the original magnetic field ("uncompensated passive loops") (id., appendix 5-2, at 19). The Company testified that any type of passive loop mitigation would be relatively novel; one Company witness was unaware of any such application within the United States and a second witness was aware of one project in the United States that had installed this mitigation but had not yet published results (Tr. 2, at 211-213).

Another form of mitigation would be similar to the uncompensated passive loops the Company proposed, but would add capacitors to the loops to increase current in the loops and thereby enhance the cancellation effect ("capacitive-compensated passive loops") (NEP-1, appendix 5-2, at 15; RR-EFSB-13). NEP stated that capacitive-compensated passive loops would require two electrical boxes per manhole and that the capacitors would need to be inspected at least every year to confirm that they were still in operation, for which inspection the Company would need to switch off the Proposed Cables (RR-EFSB-13). This would add ongoing operational and maintenance costs to the installation costs provided below (id.).

A third option would be to install the manhole vaults several feet deeper. While source of the magnetic fields would then be further from receptors at the surface, burying the manholes deeper would also increase the distance that the Proposed Cables would be divided into two separate duct banks by about 50 feet in each direction – which would decrease the mutual-cancellation from having the two circuits in close proximity to each other (Tr. 2, at 216; RR-EFSB-13).

Table 4, below, identifies resultant magnetic field levels and installation costs for the uncompensated passive loop and alternative forms of magnetic field mitigation as evaluated by NEP. The modeled magnetic field values assume a loading of 250 MVA for each cable, representing a summer normal maximum loading condition with full generation operating at the proposed Footprint generating facility (Exh. NEP-1, at 5-35).[49] NEP has proposed to install the

[49] NEP modeled the uncompensated passive loops as copper cables formed into a rectangular loop shape with dimensions of 50 feet along the Proposed Cables and six feet

uncompensated passive loop as magnetic field mitigation (Exh. EFSB-E-6; Company Brief at 82).

Table 4. Efficacy and Cost of Magnetic Field Mitigation at Manhole Approaches

Mitigation Strategy	Magnetic Field (mG) based on Distance from duct bank centerline			Cost to Install Mitigation
	-25 feet	0 feet	25 feet	
No mitigation	30	143	27	$0
Uncompensated Passive Loop	26	71	24	$100,000
Capacitive-Compensated Passive Loop	25	53	23	$336,000
Additional Vault Depth (4 feet) with No Passive Loop	24	56	21	$611,000

Sources: Exh. NEP-1, at Appendix 5-2 at 18; RR-EFSB-13.

The Proposed Cables would also separate from each other as they enter the Canal Street Substation. In order to minimize magnetic fields at neighboring locations, NEP proposed to locate the S and T Cables such that they would remain in the same duct bank into the Company's property at the Canal Street Substation, and has selected a route for the separated cables that avoids passing close to residences (RR-EFSB-14-S-2; RR-EFSB-47; RR-EFSB-49).

iii. Positions of the Parties

Ms. Madore voices concern about cancer correlating with magnetic fields even as low as three mG and argues in favor of taking whatever actions are possible to minimize magnetic fields (Madore Comments on IM). Ms. Doll is concerned about magnetic fields contributing to childhood leukemia and argues that the magnetic field impacts of the project are unacceptable (Doll Comments on IM).

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vertical, installed nine inches to the outside of the Proposed Cables (Exh. NEP-1, appendix 5-2, at 20-22; Tr. 2, at 203).

iv. Analysis and Findings

A number of historical studies appear to show a statistical association between residential distances from transmission lines and human health effects. The WHO has stated that the evidence for a causal relationship between magnetic field exposure and childhood leukemia is limited; WHO therefore does not recommend exposure limits based on the epidemiological evidence, but does recommend taking some precautionary measures. Consistent with the WHO recommendations, the Siting Board continues to look for low cost measures that would minimize exposures to magnetic fields from transmission lines. In this case, NEP has identified a novel approach to minimizing exposures by installing underground loops of wire adjacent to locations where the two proposed circuits have reduced mutual magnetic field cancellation. Specifically, the uncompensated passive loops the Company proposed for manhole approach locations would cost an estimated total of $100,000 and reduce centerline magnetic field levels at summer normal maximum loadings from 143 mG to 71 mG. The Siting Board endorses this measure as relatively low-cost mitigation providing a relatively large reduction in exposure levels. This approach is new, and information on its performance would be useful to the Siting Board. Accordingly, the Siting Board requires the Company to install uncompensated passive loops at manhole approaches and to file a report with the Siting Board on the efficacy of this mitigation following one year of Project operation. With the implementation of the passive loop measures proposed by the Company and the above reporting condition, the Siting Board finds that magnetic field impacts of the Project would be minimized.

D. Discussion of the Project with the Noticed Alternative Route

The Primary and Noticed Alternative Routes would use similar construction methodologies and would pass through similar built environments (Exh. NEP-1, at 5-40). The Primary Route is approximately 1.63 miles long, while the Noticed Alternative route is approximately 1.86 miles long (id. at 5-2 to 5-3). The Noticed Alternative would pass in front of 238 more residential units, seven more commercial/industrial buildings, and four more sensitive receptors than the Primary Route (id. at 5-15). NEP argues that because the Noticed Alternative Route is longer and would pass more residences and sensitive receptors, it has a greater potential for impacts from traffic, noise, and dust and emissions (id. at 5-25, 5-28, 5-30).

NEP also estimated that because the Noticed Alternative Route is slightly longer than the Primary Route it would cost more (id. at 5-41). Specifically, the Company estimated that the cost to install the Proposed Cables would be $33.40 million for the Primary Route versus $38.32 million for the Noticed Alternative (id.).[50] The Company stated that because the length, physical environment, and construction methodology of the two routes are similar, there would be no material difference between the routes in terms of reliability (id. at 5-40).

E. Findings on Primary and Alternative Routes

The Siting Board finds that the information the Company provided regarding the Project's environmental impacts is substantially accurate and complete. The Siting Board finds that there would be no unique benefit to the Noticed Alternative Route over the Primary Route, but there would be greater impacts associated with the Noticed Alternative Route. Accordingly, the Board finds that the Primary Route would be preferable to the Noticed Alternative Route with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Based on review of the record, the Siting Board finds that the Company provided sufficient information regarding to allow the Siting Board to determine whether the Project has achieved a proper balance among cost, reliability and environmental impacts. Based on the information presented in Section V.C, above, the Siting Board finds that with the implementation of the specified mitigation and conditions, and compliance with all local, state and federal requirements, the temporary and permanent environmental impacts of the Project along the Primary Route would be minimized. The Siting Board finds that the Project along the Primary Route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, reliability, and cost.

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50 The Company stated that it developed a detailed cost-per-mile estimate based on extensive utility mapping and geotechnical investigation of the Primary Route and used this estimate to generate cost estimates for the Noticed Alternative Route (Exhs. EFSB-G-7; EFSB-G-19). The Company argued that because the Noticed Alternative Route would be in a similar urban environment and would require similar construction techniques and traffic management and restoration plans, the construction cost-per-mile would be approximately the same (Exh. EFSB-G-19).

VI. CONSISTENCY WITH POLICIES OF THE COMMONWEALTH

A. Consistency Standard of Review

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

B. Analysis and Conclusions

1. Health Policies

In Section 1 of the Electric Utility Restructuring Act of 1997, the Legislature declared that "electricity service is essential to the health and well-being of all residents of the commonwealth…" and that "reliable electric service is of utmost importance to the safety, health, and welfare of the Commonwealth's citizens…" See c. 14 of the Acts of 1997, Sections 1(a) and (h). In Section II, above, the Siting Board found that the Project would improve the reliability of electric service in Massachusetts and New England. In addition, in Section V.C.2.h, the Siting Board requires the Company to use only retrofitted off-road construction equipment to limit emissions of particulate matter during Project construction. This condition is consistent with MassDEP's Diesel Retrofit Program designed to address health concerns related to diesel emissions. In Section V.C.2, the Siting Board finds that the Project's magnetic field, hazardous materials, and air impacts have been minimized. Accordingly, subject to the Company's specified mitigation and the Siting Board's conditions set forth in Section X, below, the Siting Board finds that the Company's plans for construction of the Project are consistent with current health policies of the Commonwealth.

2. Environmental Protection Policies

In Section V.C.2 above, the Siting Board reviewed how the Project would meet various state environmental protection requirements. The Siting Board also: (1) considered the Project's environmental impacts, including those related to land use, historical resources, noise, and visual impacts; and (2) concluded that subject to the specified mitigation and conditions set forth below, the Project's environmental impacts have been minimized.

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

3. Resource Use and Development Policies

In 2007, pursuant to the Commonwealth's Smart Growth/Smart Energy policy produced by the Executive Office of Energy and Environmental Affairs, Governor Patrick established Sustainable Development Principles. Among the principles are: (1) supporting the revitalization of city centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources and integrates uses; (2) encouraging reuse of existing sites, structures and infrastructure; and (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes. In Section IV, the Siting Board reviewed the process by which the Company sited the Project. The Project has been designed and conditioned to avoid or minimize impacts to natural and cultural resources. See Section II.C.2 for a discussion of Siting Board consideration of the effects of increased temperatures and Section V.C.2.d for a discussion of Siting Board consideration of the effects of predicted sea level rise, consistent with G.L. c. 30, § 61. Subject to the specific mitigation and the conditions set forth in this Decision, the Siting Board finds that the Company's plans for construction of the Project are consistent with the current resource use and development policies of the Commonwealth.

VII. ANALYSIS UNDER G.L. c. 40A, § 3 – ZONING EXEMPTIONS

Pursuant to G.L. c. 40A, § 3, the Company requests individual zoning exemptions from the City of Salem Zoning Ordinance (Exh. NEP-2, at 1). NEP also seeks a comprehensive zoning exemption from the City of Salem as it relates to the construction of the Project described herein.

A. Individual Zoning Exemptions

1. Standard of Review

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

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

Thus, a petitioner seeking exemption from a local zoning bylaw under G.L. c. 40A, § 3 must meet three criteria.[51] 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 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); Tennessee Gas Pipeline Company, D.T.E. 01-57, at 3-4 (2002). Finally, the petitioner must establish that it requires exemption from the zoning ordinance or bylaw. Boston Gas Company, D.T.E. 00-24, at 3 (2001) ("Boston Gas").

2. Public Service Corporation

a. Standard of Review

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

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

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

G.L. c. 164, § 69H.

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

Save the Bay at 680. See also, Boston Gas at 3-4; Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997) ("Berkshire Power").[52]

b. Analysis and Findings

The Company is an electric company as defined by G.L. c. 164, § 1 and, as such, qualifies as a public service corporation. Accordingly, the Siting Board finds that the Company is a public service corporation for the purposes of G.L. c. 40A, § 3.

3. Public Convenience or Welfare

a. Standard of Review

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. Save the Bay at 680; Town of Truro at 407. Specifically, the Department is empowered and required to undertake "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and

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

individual interests which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964) ("NY 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; NY Central Railroad at 592.

Therefore, when making a determination as to whether a petitioner's present or proposed use is reasonably necessary for the public convenience or welfare, the Department examines: (1) the need for, or public benefits of, the present or proposed use; (2) the present or proposed use and any alternatives or alternative sites identified;[53] and (3) the environmental impacts or any other impacts of the present or proposed use. The Department then balances the interests of the general public against the local interest and determines whether the present or proposed use of the land or structures is reasonably necessary for the convenience or welfare of the public. Boston Gas, D.T.E. 00-24, at 2-6; MECo/Westford at 5-6; Tennessee/Agawam at 5-6; Tennessee Gas Company, D.T.E. 98-33, at 4-5 (1998).

b. Analysis and Findings

With respect to the need for, or public benefits of the Project, the Siting Board found in Section II, above, that the Company needs to replace and upgrade the existing energy resources for environmental concerns, economic efficiency, and reliability. In Section III, the Siting Board analyzed a number of different project approaches other than the Company's proposed 115 kV underground transmission lines that the Company might use to meet the reliability need (such as overhead transmission lines or a non-transmission alternative) and concluded that the proposed approach is preferable to other approaches. The Siting Board also reviewed the Company's

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

route selection process in Section IV, and determined that the Company applied a reasonable set of criteria for identifying and evaluating routes to ensure that the Company missed no clearly superior route. The Siting Board also compared the benefits of the Primary and Noticed Alternative Routes and concluded that the Primary Route is preferable to the Noticed Alternative Route in providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Finally, regarding the Project impacts, in Section V the Siting Board reviewed the environmental impacts of the Project and found that, while the Project would result in some local adverse impacts, the impacts of the Project would be minimized with the implementation of certain mitigation measures and conditions.

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

4. Individual Exemptions Required

a. Standard of Review

In determining whether exemption from a particular provision of a zoning bylaw is "required" for purposes of G.L. c. 40A, § 3, the Department looks to whether the exemption is necessary to allow construction or operation of the petitioner's Project. New England Power Company d/b/a National Grid, D.P.U. 12-02, at 6-7 (2012) ("Westborough"); NSTAR Electric Company, D.P.U. 11-80, at 4 (2012); Tennessee Gas Company, D.P.U. 92-261, at 20-21 (1993).[54]

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

> The Company is both in a better position to identify its needs, and has the responsibility to fully plead its own case . . . The Department fully expects that, henceforth, all public service corporations seeking exemptions under c. 40A, § 3 would identify fully and in a timely manner all exemptions that are necessary for the corporation to proceed with its proposed activities, so that the Department is provided ample opportunity to investigate the need for the required exemptions. New York Cellular Geographic Service Area, Inc., D.P.U. 94-44, at 18 (1995).

b. List of Exemptions Sought

NEP seeks individual zoning exemption from the following sections of the Salem Zoning Ordinance:

(1) Section 3.3.2, which requires a special permit for a change or substantial extension of pre-existing nonconforming use, including erecting the new control house at the Canal Street Substation; and

(2) Use Table under Section 3.1 of the Zoning Ordinance, requiring a new special permit to establish an "essential services" use, including erecting the new control house at the Canal Street Substation.

On August 28, 2013, NEP filed a petition with the ZBA seeking a Special Permit to establish a new "essential services" use pursuant to the Use Table in Section 3 of the Zoning Ordinance; and a Special Permit under Section 3.3.2 to extend a pre-existing, nonconforming use (Exh. EFSB-Z-3(1)). The ZBA issued a final decision on October 2, 2013, granting NEP's application (Exh. EFSB-Z-4(1)). The appeal period expired on October 22, 2013; no appeals were filed (Exh. EFSB-Z-2). The Company maintains that it still requires an exemption from these provisions notwithstanding the fact that the ZBA granted NEP's application for the Special Permits because the Special Permits are subject to lapse if substantial use or construction has not begun within 24 months following the filing of the Special Permit approval with the City Clerk, or October 2, 2015 (Company Brief at 102, citing Exh. EFSB-Z-2; Tr. 3, at 356).

According to NEP, it may not be able to vest its rights under the Special Permits by completing substantial use or construction of the Canal Street Substation for reasons beyond its control, such as delays resulting from an appeal of the Siting Board's decision in this proceeding (Company Brief at 102). Although the Zoning Ordinance provides for an extension of the 24-month period for "good cause," NEP maintains that the Company's ability to secure such an extension is uncertain given the discretion of the reviewing body and the ambiguity surrounding the procedural process (Tr. 3, at 356). In addition, the Company contends that any required delays associated with obtaining such extensions "would undoubtedly" delay the construction and completion of the Project "beyond the immediately needed in-service date" of June 2016 (Company Brief at 103). The City's indicates its support for the Company's requested individual and comprehensive zoning exemptions provided that the Siting Board also requires the Company

to comply with the City's original conditions to the City's Special Permit (City comments to IM at 3).[55]

c. Consultation with the Municipalities

The Siting Board favors the resolution of local issues on the local level whenever possible to reduce local concern regarding any intrusion on home rule authority. Thus, the Siting Board encourages zoning exemption applicants to consult with local officials, and in some circumstances, to apply for local zoning permits, prior to seeking zoning exemptions from the Department under G.L. c. 40A, § 3. Hampden County at 85-86; Worcester at 75-77; Russell Biomass at 60-63 (2009).[56]

As noted, NEP has already sought and obtained the necessary Special Permits for the Project. In addition, NEP met with Salem's Inspectional Services Director on several occasions to discuss the zoning requirements related to the Project, and secured the written support from the City for the individual and comprehensive exemptions sought by NEP in this case (Exh. NEP-3-1 (Atts. B(a) and B(b)). According to the terms of the MOA, the City continues to

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55 The following are the conditions of the Special Permit: (1) NEP to comply with all city and state statutes, ordinances, codes and regulations; (2) all construction to be done per the plans and dimensions submitted to and approved by the Building Commissioner; (3) adherence to all requirements of the Salem Fire Department; (4) NEP must obtain building permit prior to construction; (5) a Certificate of Inspection is obtained; (6) petitioner to obtain street numbering from Assessor's Office and display them so as to be visible from the street; (7) NEP to obtain approval from any City board or commission having jurisdiction; (8) NEP to construct a retaining wall along western boundary of 8 Cypress Street without barbed wire on top of chained link fence to be installed on top of retaining wall; (9) NEP to install additional landscaping along Canal Street where feasible, and along northern boundary of 8 Cypress Street for screening; (10) location of building may vary from plans by no more than 20 feet eastward, and it shall not be moved any closer to Canal Street; and (11) barbed wire on top of chain link fence bordering north side of 8 Cypress Street to be angled in toward the site (and not angled over 8 Cypress Street) (Exh. EFSB-Z-4).

56 The Department has adopted and clarified the Russell principle in subsequent Department zoning exemption decisions: e.g., Tennessee Gas Pipeline Company, D.P.U. 11-26, at 26 (2012); New England Power Company, D.P.U. 09-136/09-137, at 34-37 (2011); New England Power Company, D.P.U. 09-27/09-28, at 47 (2010); Western Massachusetts Electric Company, D.P.U. 09-24/09-25, at 33 (2010).

support the zoning exemptions, and requests that the Siting Board include the conditions contained in the Special Permits (City Comments at 1).

d. Analysis and Findings

The Siting Board concurs with the Company and the City that that an exemption from these provisions is required notwithstanding the fact that the ZBA granted NEP's application for the Special Permits because the Special Permits are subject to lapse if substantial use or construction has not begun within 24 months. The record shows that the Project is needed due to the continuing environmental risk of further dielectric fluid leakage, to provide continued reliability and to serve the need to interconnect Footprint with customers throughout New England. The granting of the requested individual zoning exemptions will eliminate any risk that the zoning required for the Project causes any unnecessary delay in the Project's completion. The conditions included in the City's Special Permit are reasonable. In addition, the record shows that the Company has engaged in good faith consultations with the City.

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

5. Conclusion on Request for Individual Zoning Exemptions

The Siting Board found above that: (1) the Company is a public service corporation; (2) the proposed use is reasonably necessary for the public convenience or welfare; and (3) the specifically named zoning exemptions are required for construction of the Project, within the meaning of G.L. c. 40A, § 3. Additionally, the Siting Board found that the Company engaged in good faith consultation with the City.

Accordingly, the Siting Board grants the Company's request for the individual zoning exemptions described above, subject to the eleven conditions set forth in the City's Special Permit, dated October 2, 2013.

B. Comprehensive Zoning Exemption

1. Standard of Review

The Company has requested a comprehensive exemption from the City of Salem Zoning Ordinance. The Siting Board will grant such requests on a case-by-case basis where the applicant demonstrates that issuance of a comprehensive exemption could avoid substantial public harm by serving to prevent a delay in the construction and operation of the proposed use. Hampden County at 93; Worcester at 81; GSRP at 135.

In order to make a determination regarding substantial public harm, the Department and the Siting Board have articulated relevant factors, including, but not limited to, whether: (1) the project is time sensitive; (2) the project involves multiple municipalities that could have conflicting zoning provisions that might hinder the uniform development of a large project spanning these communities; (3) the proponent of the project has actively engaged the communities and responsible officials to discuss the applicability of local zoning provisions to the project and any local concerns; and (4) the affected communities do not oppose the issuance of the comprehensive exemption. Hampden County at 89; Worcester at 82; GSRP at 136-137.

2. Company Position

The Company offered three reasons why a comprehensive zoning exemption is still necessary, despite its receipt of the two Special Permits from the ZBA. First, the Company believes that a comprehensive zoning exemption would also address the risk that the Special Permit approval could lapse, as discussed above for individual zoning exemptions (Exh. EFSB-Z-2). The Company's second argument is that if the City were to amend or enact new zoning provisions, these provisions would apply to the Project since construction did not commence within six months of the permit issuance or by April 2, 2014 (Tr. 3, at 352).[57]

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[57] The Company stated that the Project would be protected by another six-month immunity period from any new zoning amendments or provisions once it receives the building permit for the new control house but, in the interim, that new zoning amendments or provisions would be applicable to the Project (Tr. 3, at 362). As of May 7, 2014, the City stated that it was not planning any new zoning amendment or provision that would impact the Project and estimated that new zoning amendments or provisions typically take no more than 90 days from being introduced to being adopted (RR-EFSB-25).

Third, the Company argues that design changes – either an unanticipated design change or a change ordered by the Siting Board or some other regulator – could necessitate new zoning relief (id. at 361). For example, NEP suggested that relocating the new control house at the Canal Street Substation could necessitate further zoning relief (Exh. EFSB-Z-7).

3. Analysis and Findings

Importantly, as discussed in Section II above, the Project is needed to replace and upgrade existing energy resources for environmental concerns, economic efficiency, and reliability. In addition, the Company has engaged in substantial good faith consultations with numerous City officials regarding the Project, and the City has given its support for both individual and comprehensive zoning exemptions. The Siting Board finds that completion of the Project is time sensitive and its delay may result in substantial public harm because of the continuing environmental risk of further dielectric fluid leakage, the need to provide continued electric reliability to customers, and the need to interconnect Footprint with customers throughout New England. Accordingly, we grant a comprehensive zoning exemption, subject to the conditions set forth in the City's October 2, 2013 Special Permit. The comprehensive exemption shall apply to the construction and operation of the Project as described herein, to the extent applicable. See Planning Bd. of Braintree v. Department of Public Utilities, 420 Mass. 22, at 29 (1995).

VIII. ANALYSIS UNDER G.L. c. 164, § 72

A. Standard of Review

General Laws c. 164, § 72, requires, in relevant part, that an electric company seeking approval to construct a transmission line must file with the Department a petition for:

> authority to construct and use … a line for the transmission of electricity for distribution in some definite area or for supplying electricity to itself or to another electric Company or to a municipal lighting plant for distribution and sale … and shall represent that such line will or does serve the public convenience and is consistent with the public interest .... The [D]epartment, after notice and a public hearing in one or more of the towns affected, may determine that said line is

> necessary for the purpose alleged, and will serve the public convenience and is consistent with the public interest.[58]

The Department, in making a determination under G.L. c. 164, § 72, considers all aspects of the public interest. Boston Edison Company v. Town of Sudbury, 356 Mass. 406, 419 (1969). Among other things, Section 72 permits the Department to prescribe reasonable conditions for the protection of the public safety. Id. at 419-420.

In evaluating petitions filed under G.L. c. 164, § 72, the Department examines: (1) the need for, or public benefits of, the present or proposed use; (2) the environmental impacts or any other impacts of the present or proposed use; and (3) the present or proposed use and any alternatives identified. Westborough at 37-38; NSTAR Electric Company/New England Power Company d/b/a National Grid, D.P.U. 11-51, at 6 (2012); Boston Edison Company, D.T.E. 99-57, at 3-4 (1999). The Department then balances the interests of the general public against the local interests and determines whether the line is necessary for the purpose alleged and will serve the public convenience and is consistent with the public interest.

B. Analysis and Decision

Based on the record in this proceeding and the above analyses in Sections I through VI and with implementation of the specified mitigation measures proposed by the Company and the conditions the Siting Board sets forth in Section X below, the Siting Board finds pursuant to G.L. c. 164, § 72 that the proposed transmission line is necessary for the purpose asserted, would serve the public convenience, and is consistent with the public interest. Thus, the Siting Board approves the Section 72 Petition.

IX. SECTION 61 FINDINGS

MEPA provides that "[a]ny determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all

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

feasible measures have been taken to avoid or minimize said impact" ("Section 61 findings"). G.L. c. 30, § 61. Pursuant to 301 C.M.R. § 11.01(3), Section 61 findings are necessary when an Environmental Impact Report ("EIR") is submitted to the Secretary of Energy and Environmental Affairs, and that such finding should be based on the EIR. Where an EIR is not required, Section 61 findings are not necessary. 301 C.M.R. § 11.01(3). In this case, NEP obtained an advisory ruling from MEPA indicating that the Project does not require MEPA review because it would not exceed any review thresholds (Exh. NEP-1, at 3-10). Accordingly, Section 61 findings are not necessary in this case.[59]

X. 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. Thus, an applicant must obtain Siting Board approval under G.L. c. 164, § 69J, prior to construction of a proposed energy facility.

In Section II, above, the Siting Board finds that the existing electric transmission system is inadequate to continue to serve current and projected loads in New England based on environmental, cost, and reliability considerations, and thus additional energy resources are needed in Salem and the North Shore area of Massachusetts.

In Section III, above, the Siting Board finds that the Project, on balance, is superior to the alternative project approaches in terms of cost and environmental impact and with respect to the ability to reliably meet the identified need. The Siting Board thus finds that the Project is

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59 The Siting Board notes the requirements set forth in G.L. c. 30A, § 61, effective November 5, 2008, regarding findings related to climate change impacts. Since Section 61 findings are not required in this case, the Project is not subject to the Greenhouse Gas Emissions Policy and Protocol. The Siting Board nonetheless notes that this Project will have minimal GHG emissions, as it consists of underground transmission lines and modifications to two existing substations. As such, the Project will have minimal direct emissions from a stationary source under normal operations and will have minimal indirect emissions from transportation sources limited to construction, occasional repair, or maintenance activities. The Siting Board addresses Project SF_6 emissions and temporary emissions from off-road construction vehicles in Section V.C.2.h, above.

preferable to the identified project alternatives with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

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

In Section V, above, the Siting Board finds that the proposed facilities along the Primary Route would be preferable to the proposed facilities along the Noticed Alternative Route with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section V, above, the Siting Board reviewed environmental impacts of the Project and finds that with the implementation of the specified mitigation and conditions, and compliance with all applicable local, state and federal requirements, the environmental impacts of the Project along the Primary Route would be minimized.

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

Accordingly, the Siting Board APPROVES the Company's Petition to construct the Project using the Primary Route, as described herein, subject to the following Conditions A through O.

In addition, the Siting Board has found pursuant to G.L. c. 40A, § 3 that construction and operation of the Company's proposed facilities are reasonably necessary for the public convenience or welfare. Accordingly, the Siting Board approves NEP's Petition for an exemption from certain provisions of the Salem Zoning Ordinance, as enumerated in Section VII above. The Siting Board grants the Company's Petition for a comprehensive exemption from the operation of the Salem Zoning Ordinance, as described in Section VII.

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

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

A. The Siting Board directs the Company to provide the Siting Board with a staging and laydown plan for review by the Board prior to the commencement of construction.

B. The Siting Board directs the Company and its contractors to avoid making any representations to the public bearing on legal liability for damages caused by the Company's contractors, either on the Company's or its contractors' websites, at public meetings, in mailings circulated to abutters, or through any similar media. The Board directs the Company to provide quarterly summaries of the functioning of the damage claims process, which could consist of a compilation of the weekly reports that the Company has committed to submit to the City.

C. The Siting Board directs the Company to fully comply with the MHC's requested program of archeological monitoring.

D. The Siting Board directs the Company to: (1) contact the City, representatives of Footprint, and Algonquin and solicit their cooperation and participation in preparing the Company's TMP; (2) prepare the TMP with the cooperation of as many parties as are agreeable; (3) submit the plan to the Siting Board and all parties by January 1, 2015; and (4) implement the plan. The Company shall participate in a roadway and traffic mitigation system with the City and other participants, that shall include the following elements: (a) a single repository of information relevant to construction scheduling, road openings, and traffic flow; (b) a menu of potential mitigation options, and a decision tree or other suitable approach to determining their implementation; (c) a platform for NEP, Footprint, Algonquin, and the Salem Department of Public Works to coordinate construction activities; and (d) a protocol for allocation of mitigation costs. In addition, the Siting Board directs NEP to provide the Siting Board with quarterly reports on its traffic monitoring, coordination with other entities, and traffic mitigation activities, beginning three months after the date of this Decision and ending with the completion of Project construction.

E. The Siting Board directs the Company to use WhisperWatt or equivalent sound attenuated generators for the Project.

F. The Siting Board directs the Company to locate stationary noise-generating equipment at the Canal Street Substation as far from residences as is feasible, and to use temporary noise barriers for such equipment that is located close to residences.

G. The Siting Board directs the Company to develop a flexible noise mitigation plan in cooperation with the City of Salem for the selective use of portable noise barriers for work at manhole locations that would balance the benefit of reducing noise at locations where maximum noise impacts are expected for significant durations against site conditions that may not allow the effective use of noise barriers while maintaining vehicle and pedestrian access and safety. Furthermore, the Company shall provide a report to the Siting Board detailing the extent, efficacy, and difficulties experienced in its use of noise barriers within three months following the completion of construction, including the removal of Existing Cables.

H. The Siting Board directs the Company to avoid all construction in the month of October, and to continue its work on developing a detailed construction schedule in cooperation with the City of Salem. In the event that the City and the Company reach an impasse on developing the construction schedule, either party may request resolution by the Siting Board. Furthermore, NEP shall provide a quarterly report to the Siting Board detailing the progress of its construction schedule preparation in cooperation with the City, with the first report due on January 2, 2015.

I. The Siting Board directs the Company to consult with MassDEP on the potential threat of release of oil or hazardous materials posed by unpressurized unmonitored dielectric fluid in the S Cable and the potential for the Company to do some or all of the removal of the S Cable at a time that avoids Salem's peak tourist season.

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

K. The Siting Board directs the Company to inform the Siting Board if it adds SF_6 to any equipment or replaces any equipment due to SF_6 loss at the Salem Harbor Substation within five years of the completion and initial operation of the Project, after which time the Company will consult with the Siting Board to determine whether the Siting Board deems it appropriate to require continued reporting. The Siting Board further

directs the Company to submit to the Siting Board a copy of its annual SF_6 reports to MassDEP.

L. The Siting Board directs the Company to assist Footprint in fulfilling its condition for a joint SF_6 reduction plan by continuing to provide Footprint with any of the Company's updated documents and procedures for SF_6 mitigation and monitoring at the Salem Harbor Substation and by continuing to make the Company's subject matter experts available to Footprint as necessary.

M. The Siting Board directs the Company to install uncompensated passive loops at manhole approaches and to file a report with the Siting Board on the efficacy of this mitigation following one year of Project operation.

N. The Siting Board directs the Company to submit to the Board an updated and certified cost estimate for the Project prior to the commencement of construction. Additionally, the Siting Board directs NEP to file semi-annual compliance reports with the Siting Board starting within 60 days of the commencement of construction, that include projected and actual construction costs and explanations for any discrepancies between projected and actual costs and completion dates, and an explanation of the Company's internal capital authorization approval process.

O. The Siting Board directs the Company, within 90 days of Project completion, to submit a report to the Siting Board documenting compliance with all conditions contained in this Order, noting any outstanding conditions yet to be satisfied and the expected date and status of such resolution.

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

In addition, the Siting Board notes that the findings in this decision are based upon the record in this case. 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 NEP, or its successors in interest, to notify the Siting Board of any changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. NEP or its successors in interest are obligated to provide the Siting Board with sufficient information on changes to the proposed Project to enable the Siting Board to make these determinations.

The Secretary of the Department shall transmit a copy of this Decision and the Section 61 findings herein to the Executive Office of Energy and Environmental Affairs and the Company shall serve a copy of this decision on the City of Salem, City of Salem Planning Board, and the City of Salem Zoning Board of Appeals within five days of its issuance. The Company shall certify to the Secretary of the Department within ten business days of issuance that such service has been made.

Stephen H. August

Stephen H. August
Presiding Officer

Dated this 3rd day of November 2014

ATTACHMENT 1

MEMORANDUM OF AGREEMENT BETWEEN CITY OF SALEM, MASSACHUSETTS AND NEW ENGLAND POWER, d/b/a NATIONAL GRID

MEMORANDUM OF AGREEMENT

THIS AGREEMENT is made and entered into this 22nd day of May, 2014 between the City of Salem, Massachusetts (hereinafter referred to as "Salem" or the "City"), acting through its Mayor Kimberley Driscoll, and New England Power, d/b/a National Grid (hereinafter referred to as "NEP"), acting through Marie Jordan, Senior Vice President, Authorized Representative.

WHEREAS, NEP is proposing to replace two existing underground 115 kV electric transmission cables located within Salem city streets between NEP's Salem Harbor substation and NEP's Canal switching station and to conduct related work within its substation (the "Project");

WHEREAS, on or about November 1, 2014, NEP is planning on commencing work on the Project, subject to having received all necessary rights, permits, and approvals, such work to include without limitation the installation of duct banks, manholes, and the cables; and

WHEREAS, both Salem and NEP have been discussing the mitigation of impacts from construction of the Project within Salem's streets;

NOW, THEREFORE, for mutual consideration, the receipt and sufficiency of which is hereby acknowledged, Salem and NEP hereby agree as follows:

1. To ensure the Project does not adversely affect City infrastructure and planned construction projects along the construction route, Salem intends to hire an engineering consultant to oversee construction of the Project as more specifically set forth below. Since this is an expense that Salem would not have incurred but for the Project and is intended to minimize impacts to City infrastructure, NEP agrees to pay the City of Salem's reasonable expenses for engineering consultants for work directly related to the Project. Such expenses paid by NEP shall not exceed $130,000. Both parties agree that the engineering consultant for Salem needs to be on site during many activities, including, but not limited to: excavation, cable and manhole installation, and backfilling ("civil construction"). The estimate of $130,000 is based on NEP's estimated production rate of their contractor. If the total time for civil construction extends beyond fourteen (14) months and/or the duration of specific civil construction task extend beyond what has been estimated by the City and NEP engineers, the not-to-exceed amount to be paid by NEP shall be reviewed for adequacy and modified accordingly. The resident engineer shall be hired and paid directly by the City. The City shall submit the invoices received from the Engineer to NEP for reimbursement. The resident engineer will observe construction activities, but will not have the authority to direct National Grid contractors. No monies paid for under this provision may be used to oppose the Project in any public or in any private discussions.

2. NEP will maintain a project website throughout the duration of the Project. The website shall be established no later than two months prior to Project construction. This website shall be listed on any material sent to residents and on all Project signage. The City shall provide a link on its website to the project website and shall have meaningful input into the site's content. NEP shall include a brief description of the Project in Spanish on the website and

direct Spanish speaking individuals to NEP's Stakeholder Relations Representative if they need further translation of the information appearing only in English.

3. The City shall collect schedules from its departments for the period of November, 2014 through November, 2015 and provide such to NEP no later than May 21, 2014. Those schedules will be included as part of the construction specification for incorporation by NEP's contractor in the construction schedule to the extent practicable. NEP agrees to work with the Mayor of Salem and her designee(s) to make any final adjustments to the contractor's construction schedule. NEP recognizes that the City prohibits any major construction in the streets of Salem during the month of October. The City recognizes that the construction schedule may require revisions during the Project's lifecycle. Project milestones, updated as necessary, shall be posted on the Project website.

4. The City understands that time is of the essence and agrees, to the extent that it is able, to expedite the granting of all local permits licenses and approvals that maybe required for NEP to proceed with the Project. To further that purpose, the City agrees to support NEP's petition to the Energy Facilities Siting Board for: (a) approval of the Project under G.L. c. 164, §§ 69J and 72; and (b) individual and comprehensive zoning exemptions from the zoning bylaw in the City of Salem pursuant to G.L. c. 40A, § 3.

5. NEP's Stakeholder Relations Representative shall attend meetings twice monthly with a group of City officials, business leaders and residents (the City's Working Group) during and prior to construction, commencing on June 12, 2014. When necessary, specific representatives of NEP will be available at such meetings to address specific concerns such as traffic, safety, relocating bus stops and on-street parking and environmental issues. In advance of each meeting, the Stakeholder Relations Representative shall provide the City with a two-week look ahead describing the construction activities planned for the upcoming two weeks.

6. During manhole and duct bank construction, as well as cable installation and removal, NEP shall have a construction supervisor assigned full time to the Project and available to respond to any questions and/or concerns. NEP's construction specifications will require that the contractor provide a Site Installation Project Manager who will, among other responsibilities, maintain a permanent presence at the Project site for the duration of the Project and act as the contractor's point of contact with individuals and groups, as well as the City of Salem and all its departments; representatives of local neighborhood groups; and representatives of local businesses. NEP's construction specifications also will require that the contractor provide a field office with separate desk space for NEP personnel. The Site Installation Project Manager shall be responsive to City officials 24 hours a day/seven days a week and to residents and businesses during hours of construction.

7. NEP shall publicize and maintain a hotline phone number and process for reporting emergencies after business hours. The message on the hotline shall be in English and Spanish. NEP shall respond to inquiries in Spanish as necessary.

8. To account for the event that NEP's Project, during construction, results in damage to persons, vehicles or property to Salem residents, visitors, business owners or the City itself, NEP shall require its contractor to have a detailed damage claim process, which shall be in place prior to the start of construction. Information on how to submit claims to the Contractor will be included as part of the Project website. In order to ensure that the Contractor is being responsive, NEP agrees that its contract with the selected contractor for the Project shall require the contractor to provide notice of damage claims weekly, to the Stakeholder Relations Representative. This Representative shall provide the City Engineer a weekly list of the number of claims made, the date they were made and whether the claims have been resolved. The Parties understand that such damage claims constitute private matters between the claimant and Contractor and that neither the contractor nor NEP may disclose private information to the City. NEP's agreement to acquire claims processing information and provide it to the City is not an agreement or acceptance by NEP to be responsible for compensating for claims resulting from the negligence, gross negligence, reckless misconduct or intentional acts of the Contractor.

9. NEP shall work with City officials to ensure that residents and businesses along the construction route have the opportunity to participate in pre-construction photo surveys to document the pre-construction condition of residences and businesses along the construction route. Residents and businesses shall be entitled to receive a copy of the survey taken from their property upon written request. Prior to construction, NEP shall mail a letter to all abutters (including property owner and tenant) of the approved construction route explaining the survey process. The Project website shall include information regarding the survey process.

10. NEP agrees that streets excavated in support of the installation of the cable and the removal of the S cable, as shown in Exhibit A, shall be repaved curb to curb and center lines and any other lines present prior to construction will be repainted by NEP.

11. Sidewalks removed for manhole and duct line installation or during S cable removal are to be replaced in kind as set forth in Exhibit A; curb cuts shall be installed at crosswalks on those sidewalks that are replaced as required by City Engineer.

12. Due to work the City has planned along certain roads within the Project area along the existing S cable, in lieu of repaving those certain streets and sidewalks set forth in Exhibit A, Subpart IV, these areas will be repaved by the City at NEP's cost and expense. To that effect, NEP shall place in escrow, no later than two months prior to the removal of the S cable, the sum of $640,000 in accordance with a separate escrow agreement. The escrow agreement shall set forth the process for releasing incremental payments to the City as it repaves those streets set forth in Exhibit A, Subpart IV. The escrow agreement will also set forth the amount that will get released back to NEP if the City fails to repave any portions of these streets within 1 1/2 year after NEP completes the removal of the S cable. The $640,000 represents the amount that would have been incurred by NEP for repaving as more fully itemized in Exhibit A, Subpart IV.

13. NEP shall require its cable contractor or sub-contractors to post no parking signs, approved by the City Engineer, at least 48 hours in advance where construction is planned. Abutters shall be notified 5 days in advance of any no-parking areas. In the event that a vehicle is parked in the work zone, NEP shall make reasonable efforts to identify and acquire nearby locations where vehicles could be moved for easy retrieval and at no cost to the owners.

14. NEP shall identify streets to be temporarily closed due to manhole installation and include such in a Traffic Management Plan (TMP) that NEP shall develop in consultation with Salem public safety officials. In addition, NEP shall require the anticipated timing of closures be carried out by the contractor and the amount of notice required written into the TMP. Road closures shall be posted on the Project website.

15. The TMP shall be approved by the City Engineer and Police Chief and in consultation with the Fire Chief prior to the issuance of any street opening permit. Information on road or land closing and detour shall be posted on the website in a timely manner.

16. a. In the event NEP contractor(s) remove public shade trees after consultation with the City's Tree Warden, NEP or its contractor shall replace the trees removed in accordance with Salem's tree replacement policies (every inch in caliper that is removed is replaced by planting trees in locations determined by the Tree Warden) and any newly planted trees must be guaranteed for two years after planting. It shall be a priority of the parties to ensure that any excess trees (or equivalent funds per inch of caliper) available as a result of removing trees along the construction route be used to improve the landscape buffer at the Peabody Street sub-station.

    b. Any required cutting of tree roots may only be performed after consultation with the Tree Warden. Those trees subject to root cutting shall be guaranteed by the contractor for at least one year post root cutting and shall be replaced pursuant to City Policy if ordered by the Tree Warden.

    c. In addition, the City shall secure a report from a Certified Arborist, at a cost reimbursed by NEP in an amount not to exceed $3,500, evaluating the condition of the trees along the preferred route, as presented in the Siting Board proceeding, and indicating any changes noted from the 2010 report filed with NEP's Petition.

17. The City acknowledges that on April 15, 2014 NEP provided the City with NEP's construction bid documents (specifications and plans) with applicable City construction requirements due by June 6, 2014 for incorporation into the Project construction specifications as appropriate.

18. When the existing cable is removed at the Webb and Derby Street intersection, NEP shall work with the City to determine if any modifications can be made to their remaining conduit to accommodate the removal of the 48-inch drain siphon. The siphon is a hydraulic restriction that takes away system capacity for the Forrester Street neighborhood and is a maintenance concern for the City. If modifications are possible, NEP will be responsible for

modifications to the duct bank only and not any associated work required on the City's facilities.

19. The City acknowledges that NEP has provided the City location data on structures to remain for future use.

20. NEP's contractor shall clean, inspect and review results with the City Engineer, by closed circuit television, for each of the 44 crossings identified in the January 30, 2014 "Mainline Sewer and Drain Crossings" prior to starting excavation work on any street they are located on to confirm the crossing pipes condition and capacity. The crossing pipes will be re-inspected after the cables are installed. Any defects in the pipes to be crossed identified before construction will be repaired by the City at the City's expense. Any damage caused during construction by the Company's contractor will be repaired by a City approved contractor and billed to the Company's contractor. The City will be allowed to review all inspection results and provide final approval on defects and repair procedures for any sewer and drain lines to be repaired. The City will require that brick constructed sewer lines be structurally reinforced prior to excavation to expose the brick sewer when encountered.

21. Any City of Salem infrastructure requiring relocation and/or implementation of any system by-pass shall be identified by NEP in drawings with the proposed relocation plan. NEP shall indicate if relocation is permanent or temporary during construction and if temporary, infrastructure shall be returned to original location prior to restoration. Any permanent utility relocation plan shall be approved by the City. NEP shall compensate the City for any reasonable expense it incurs to relocate infrastructure to accommodate NEP's Project.

22. NEP's contractor shall take standard care to ensure any gravity services either exposed during construction, or unseen during construction (i.e. that have been crossed above by the Project) shall be in good condition prior to final Project paving. NEP's contractor shall repair any gravity lateral services that fail within 180 days after temporary repaving.

23. Upon completion of the installation of the Cable System, NEP shall provide Salem with copies of as-built plans and all engineering and survey information produced by and for NEP relating to the installation of the Project within public and private ways of the City of Salem.

24. NEP shall require its contractor to comply with City policy, as set forth in Exhibit B, relative to blocking access to parking meters. City policy requires the contractor to obtain a permit from the City's Parking Department to cover a parking meter at a rate of $15/day.

25. As part of the TMP, NEP shall agree to require the construction contractor to include an add-on of $5,000 (not to be exceeded) for signage directing pedestrians and vehicular traffic to alternate routes and parking, to special events, construction schedules, NEP contact information, and the like. NEP shall make every effort to ensure the businesses along the route have customer access during construction. NEP shall incorporate the City's specific sign requirements and material into contract documents.

26. NEP shall require its contractor(s) to leave the construction site in broom-swept condition at the close of each construction each day. NEP shall require its contractor to establish a dust

control procedure. In the event of snow, NEP's contractor shall ensure the work area is plowed.

27. To minimize traffic impacts to businesses, residents, tours and tourists during construction of the Project and facilitate outreach and communication between NEP, the Salem business community, and tour companies who will visit Salem, NEP agrees to reimburse the City for retaining Destination Salem, a non-profit agency that markets, promotes and manages tourism in Salem, at a cost not to exceed $15,000. Destination shall employ a Communications Manager to liaise between NEP, the City of Salem, and the business community. Destination Salem's designated communications manager's responsibilities will include, but not be limited to, the following responsibilities:
    - Attending the Project update meetings to be held twice a month.
    - Communicating with NEP regarding Project schedules, streets affected, and unplanned changes to the construction schedule.
    - Relaying Project information to the City of Salem for the BuildingSalem.com web site.
    - Communicating construction updates via email, Facebook, and Twitter to businesses that abut the construction zone and are impacted by road closures and construction delays. These businesses include, but are not limited to:
        - Salem Trolley
        - Tourist Attractions
        - Tour Companies
        - Transportation Companies
        - The Boys & Girls Club
        - Shetland Properties
        - Pickering Wharf
    - Work with NEP and the City of Salem to redirect residents, visitors, and motor coaches whose anticipated parking locations are temporarily unavailable during construction of the Project; provide relevant information regarding where vehicles can be parked and passengers can safely disembark.

28. Construction work hours shall be limited to 7:00 am to 3:30 pm weekdays, excluding weekends and holidays, except for those days when cable splicing is conducted and unless otherwise approved or required by the City Engineer. The City acknowledges that its noise and construction work hour ordinances may vary and shall provide any waivers from its Noise Ordinance or Construction Work Hours as may be required in order to comply with the 7:00 am - 3:30 pm work hours schedule. NEP shall prohibit its contractor from conducting any "pre-work" that generates a noise disturbance prior to 7:00 am, such as starting construction vehicles. As noted above, there will be certain exceptions when NEP will need to extend work outside of these work hours such as during cable splicing which will take approximately a 12-hour shift per day. During those instances and prior to commencing any work requiring extended work hours, NEP shall submit in an e-mail to the City Engineer an explanation of the reasons and the duration of the extended work hours.

29. NEP shall require its contractor to place a sign, with National Grid's logo, phone, and Project website at all worksites during the Project.

30. NEP shall work with the City's Health Agent to determine what, if any, rodent controls must be implemented, such as baiting catch basins.

31. NEP shall receive approval from the City Engineer of any construction staging area on public property. Daily staging near the construction work site, which will be removed at the end of the day as set forth in paragraph 32 herein, is not subject to this provision and shall not require prior approval.

32. NEP shall require its contractor to remove any unused equipment or materials from the worksite each evening.

33. This agreement constitutes the entire agreement between NEP and the City of Salem regarding the mitigation of impacts to the City by NEP that are attributable to construction of the Project. The City agrees not to require further mitigation other than what has been agreed to herein. The parties may agree, however, that due to unforeseen circumstances such that construction start or completion is delayed by more than 180 days, to re-open negotiations and amend this agreement. Agreement to re-open negotiations shall not be unreasonably withheld and any amendments to this Agreement shall be in writing and executed by both parties.

Signed this 22nd day of May, 2014 by the parties' authorized representatives.

CITY OF SALEM

By: Kimberley Driscoll

Kimberley Driscoll, Mayor

THIS SECTION INTENTIONALLY LEFT BLANK
NEW ENGLAND POWER AUTHORIZED REPRESENTATIVE
SIGNATURE ON NEXT PAGE

NEW ENGLAND POWER COMPANY
D/B/A NATIONAL GRID

By:_____
Marie Jordan
Senior Vice President

EXHIBIT A

CURB TO CURB REPAVING:

I. Cable Installation Alignment:

1. Fort Avenue:
Public Way, extending from Footprint Power plant property southwest for 1,100 feet (36-feet wide) to Webb Street.

2. Webb Street:
Public Way, extending from Fort Avenue northwest for 300 feet (28-feet wide) to Essex Avenue.

3. Essex Street:
Public Way, extending from Webb Street southwest for 420 feet (51-feet wide) to Forrester Street.

4. Forrester Street:
Public Way, extending from Essex Street southwest for 1,160 feet (28-feet wide) to Washington Square South.

5. Washington Square South:
Public Way, extending from Forrester Street west 850 feet (30-feet wide) to Washington Square West

6. Washington Square West:
Public Way, extending from Washington Street South southeast 170 feet (37-feet wide) to Hawthorne Boulevard

7. Hawthorne Boulevard:
Public Way, extending from Washington Street West southeast 1,425 feet (50-feet wide) to Congress Street

8. Congress Street:
Public Way, extending from Hawthorne Boulevard southeast 2,100 feet (42-feet wide) to Leavitt Street

9. Leavitt Street:
Public Way, extending from Congress Street west 900 feet (26-feet wide) to Fairfield Street.

10. Fairfield Street:

Public Way, extending from Leavitt Street west 645 feet (18-feet wide) to Cabot Street. NOTE: Existing trees may necessitate addressing sidewalk reconstruction on this street in an alternate manner, as directed by the City Engineer.

11. Cabot Street:
Public Way, extending from Fairfield Street north 75 feet (40-feet wide) to Cypress Street.

12. Cypress Street:
Public Way, extending from Cabot Street west 280 feet (34-feet wide) to the Canal Street Substation property.

II. Required Gas Main Relocation/Replacement for Cable Project

1. Alignments 1, 2 and 3 above, Fort Ave, Webb and Essex Streets:
Existing gas to be relocated to other side of roadway to avoid conflict with new Cable. 1,950 feet of main to be installed, including 180-feet (28-feet wide) on Webb Street towards Bridge Street and 100 feet (30-feet wide) on Szetela Lane off Essex Street which are new installations. A total of 28 gas services to be replaced.

2. Alignment 6 above, Washington Square West:
Existing gas to be relocated to other side of roadway to avoid conflict with new Cable. 160 feet of main to be installed.

3. Alignment 7 above, Hawthorne Boulevard:
Existing gas to be relocated to other side of roadway to avoid conflict with new Cable. 1,425 feet of main to be installed, including 400-feet (28-feet wide) on Derby Street towards Liberty Street, 325 feet (28-feet wide) on Liberty towards Charter Street, plus 1,100 feet (28-feet wide) on Derby ending at Palfrey Court, including 20 feet of new main into the side streets of Union, Hebert, and Hodge Streets, Curtis Street Extended (all 20-feet wide) and 240 feet (12-feet wide) up Custom House Court and 120 feet (12-feet wide) Palfrey Court. An approximate total of 40 gas services to be replaced.

4. Alignment 8 above, Congress Street:
Existing gas to be relocated to other side of roadway to avoid conflict with new Cable, 500 feet of main to be installed from Peabody/Ward Street intersection to Leavitt Street, including 200-feet (28-feet wide) up Peabody Street, 160 feet (28-feet wide) up Ward Street, 80 feet (36-feet wide) up Harbor Street, 60-feet (25-feet wide) up Lynch Street and 240 feet (22-feet wide) up Dow Street from Congress Street. An approximate total of 40 gas services to be replaced.

5. Alignment 9 above, Leavitt Street:
Existing gas to be relocated to other side of roadway to avoid conflict with new Cable, 880 feet of main to be installed in Leavitt Street, including 360-feet (16-feet wide) up Harrison Street, 240 feet (26-feet wide) up Prince Street and 75 feet (20-feet wide) up Naumkaeg Street. An approximate total of 40 gas services to be replaced.

6. Alignments 10, 11, and 12 above, Fairfield, Cabot and Cypress Streets:
   Existing gas to be relocated to other side of roadway to avoid conflict with new Cable, 645 feet of main to be installed in Fairfield Street, 270 feet in Cabot Street, including 180 feet (40-feet wide) towards Cedar Street, and 350 feet of main on Cypress Street. A total of 36 gas services to be replaced.

III. Sidewalk Repaving/Reconstruction

Any sidewalk impacted by the Cable Project will be reconstructed to City standards and of the same materials as existing. The City will decide the limits of restoration, as some sidewalks are in poor condition and will require improvement to meet ADA requirements if disrupted, including the installation of handicap access ramps and crosswalks. The following is a list of sidewalks and limits of restoration identified based on review of construction bids documents prepared by NEP, however, as work progresses, other sidewalks may be impacted wand will require restoration as described above:

	s/w type	direct impact length		complete restoration limits	
location		length	width	length	SY
Fort Avenue	concrete	45	5	100	56
Wash. Sq. South	brick	190	10	300	333
Hawthorne Blvd.	concrete	45	6	45	30
Congress St	concrete	35	11	35	43
Congress St	concrete	70	10	70	78
Leavitt St	concrete	40	8	100	89
Fairfield St	concrete	20	5	20	11
Fairfield St	concrete	95	5	200	111
			Total		751

IV. Pavement and Sidewalk Restoration related to the S Cable Removal

The cost of pavement and sidewalk restoration related to the S cable removal is as follows:

sidewalk (s/w) and roadway restoration cost estimate

location	from	to	type	material	total
canal street **	sub station	thru Mill St	road		
washington st	Mill st intersection	new derby st	sidewalk	concrete	$31,667
new derby st	washington st	lafayette st			
			sidewalk	concrete	$42,222
			sidewalk	brick	$15,000
			road		$1,000
lafayette st intersection	new derby	derby			
			road		
			crosswalk	concrete	$33,333
derby st	lafayette	power plant			
	lafayette	daniels st	road		$205,333
	daniels st	carlton st	sidewalk	concrete	$77,778
	carlton st	power plant	road		$177,333
			crosswalks (17 total)	concrete	$52,889
				total	$636,556
				SAY	**$640,000**

EXHIBIT B

City of Salem, Massachusetts
Parking Department
1 New Liberty Street Salem, Massachusetts

PERMIT APPLICATION TO BLOCK PARKING METER

Company Name_____

Address_____

Phone_____

Vehicle Manufacture (If Applicable)_____

Plate # (If Applicable)_____

Days Required_____

Spaces Needed_____

$15.00 PER DAY PER SPACE

TOTAL DUE

_____
SIGNATURE OF REPRESENTATIVE