COMMONWEALTH OF MASSACHUSETTS
ENERGY FACILITIES SITING BOARD

Petition of Northeast Energy Center LLC for Approval to Construct a New Natural Gas Liquefaction and Storage Facility, Pursuant to G.L. c. 164, § 69J	)	EFSB 18-04
Petition of Northeast Energy Center LLC for Exemptions from the Zoning Bylaw of the Town of Charlton, Massachusetts, Pursuant to G.L. c. 40A, § 3	)	D.P.U. 18-96

FINAL DECISION

Joan Foster Evans
André Gibeau
Presiding Officers
October 22, 2021

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ABBREVIATIONS

2D PHAST (model)	a two-dimensional process hazard analysis software model
3D CFD FLACS (model)	a three-dimensional flame acceleration simulator model
A&F	Executive Office of Administration and Finance ("A&F")
AASHTO	American Association of State Highway and Transportation Officials
ADT	average daily trips
Amended Petition to Construct	NEC's amended petition to construct pursuant to G.L. c. 164 § 69J, filed on February 28, 2019
Amended Petitions	Together, NEC's amended petition to construct and petition requesting individual exemptions and comprehensive zoning exemptions, filed in 2019
Amended Zoning Petition	NEC's amended petition for individual exemptions and a comprehensive zoning exemption from the Town of Charlton Zoning Bylaw pursuant to G.L. c. 40A, § 3, filed on April 19, 2019
Andrew-Dewar	NSTAR Electric Company d/b/a Eversource Energy, EFSB 19-03/D.P.U. 19-15 (2021)
Berkshire Gas (2006)	The Berkshire Gas Company, 15 DOMSB 208; EFSB 05-1 (2006)
BLSF	bordering lands subject to flooding
BMP	best management practices
Boston Edison	Boston Edison Company, EFSC 89-12A (1989)
BTU/ft^2-hr	British thermal units per square foot per hour
BVW	bordering vegetated wetlands
Cape Wind	Cape Wind Associates, LLC and Commonwealth Electric Company d/b/a NSTAR Electric, EFSB 02-2 (2005)
CFD	computational fluid dynamics
CHARM	Complex Hazardous Air Release Model

ABBREVIATIONS

CMR	Code of Massachusetts Regulations
CO	carbon monoxide
Colonial Gas (2006)	Colonial Gas Company d/b/a KeySpan Energy Delivery New England, 15 DOMSB 269, EFSB 05-2 (2006) (Sagamore Line Reinforcement Project)
Colonial Gas (2016)	Colonial Gas Company d/b/a National Grid, EFSB 16-01 (2016) (Mid Cape Replacement Project)
Company	Northeast Energy Center LLC
CWA	Clean Water Act
D.P.U. or Department	Massachusetts Department of Public Utilities
DOMSB	Decisions and Orders of Massachusetts Energy Facilities Siting Board
Dth	Dekatherms
East Eagle	NSTAR Electric Company d/b/a Eversource Energy, EFSB 14-04/D.P.U. 14-153/14-154 (2017)
EEA	Massachusetts Executive Office of Energy and Environmental Affairs
EFSB	Massachusetts Energy Facilities Siting Board
EIR	MEPA Environmental Impact Report
ENF	MEPA Environmental Notification Form
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FTA	Federal Transit Administration
K Street	NSTAR Electric Company, D.P.U. 13-86 (2014)
Gaz Metro	Gaz Métro LNG, LP
GHG	greenhouse gas

ABBREVIATIONS

G.L. c.	Massachusetts General Laws chapter
GMLNG Brief	Gaz Metro's brief, dated February 4, 2020
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)
HCA	host community agreement
HDD	horizontal directional drilling
HTP	Hydrostatic Test Plan
IDC	IDC Bellingham LLC, 9 DOMSB 225; EFSB 95-7 (1999)
ILI	in-line inspection (of a pipe)
Incom	Incom Inc.
IRP	New England Power Company d/b/a National Grid, 20 DOMSB 1; EFSB 12-1/ D.P.U. 12-46/ 12-47 (2014)
ISD	intersection stopping distance
IVW	isolated vegetated wetland
L_{90}	sound level exceeded 90 percent of time
LAP	Language Access Policy
LF	linear feet
LNG	liquefied natural gas
LOS	level of service (of an intersection)
Lowell-Tewksbury	Colonial Gas Company d/b/a National Grid, EFSB 18-01/D.P.U. 18-30 (2019)
LSP	Licensed Site Professional
LUWW	land under waterbodies and waterways
MassDEP	Massachusetts Department of Environmental Protection

ABBREVIATIONS

MassDOT	Massachusetts Department of Transportation
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
MHC	Massachusetts Historical Commission
Millennium	Millennium Power Company LLC, formerly Millennium Power Partners L.P.
Millennium Lateral	Tap off of TGP mainline that feeds Millennium facility
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
mph	miles per hour
Mscfh	thousand standard cubic feet per hour
MUTCD	Manual on Uniform Traffic Control Devices
NEC Response to GMLNG	NEC's reply letter, dated March 20, 2020, to Gaz Metro's brief, dated February 4, 2020
Needham-West Roxbury	NSTAR Electric Company d/b/a Eversource Energy, EFSB 16-02/D.P.U. 16-77 (2018)
North American Tool	Unique Industries LLC/North American Tool and Machine Corporation LLC
NEC	Northeast Energy Center LLC
NHESP	Natural Heritage and Endangered Species Program
nmCPA	non-major Comprehensive Air Plan Application
NO_X	nitrogen oxides
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NSTAR Belmont	NSTAR Electric Company, D.P.U. 14-55/14-56 (2015)

ABBREVIATIONS

Oak Bluffs	NSTAR Electric Company, D.P.U. 18-155 (2020)
Original Petition to Construct	NEC's original petition to construct pursuant to G.L. c. 164 § 69J, filed on August 31, 2018
Original Petitions	Together, NEC's original petition to construct and petition requesting individual exemptions and comprehensive zoning exemptions, filed in August 2018
Original Zoning Petition	NEC's original petition requesting individual exemptions and a comprehensive exemption from the Town of Charlton Zoning Bylaw pursuant to G.L. c. 40A, § 3, filed on August 31, 2018
ORW	Outstanding Resource Waters
OSHA	U.S. Occupational Safety Hazard Administration
PHMSA	Pipeline Hazardous Materials Safety Administration
PLAN	Pipe Line Awareness Network for the Northeast, Inc.
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns or less
PM_{10}	particulate matter with a diameter of 10 microns or less
PPE	personal protection equipment
ppmv	parts-per-million-by-volume
Precedent Agreement	precedent agreement between NEC and National Grid, as approved in D.P.U. 15-129 (2016)
Preferred Interconnection Route	NEC's preferred gas pipeline interconnection option for the Route 169 Site, also known as Alternative 2A
Project	Construction and operation of a natural gas liquefaction, storage, and truck-loading Facility and interconnection pipeline in Charlton, Massachusetts
psig	pounds per square inch, gauge
RFA	riverfront area
RGGI	Regional Greenhouse Gas Initiative

ABBREVIATIONS

Route 169 Site	NEC's preferred location for the Facility, which consists of parcels including 304 and 314 Southbridge Road, Charlton, Massachusetts
Route 20 Site	249 Sturbridge Road, Charlton, Massachusetts
ROW	right-of-way
Salem Cables	New England Power Company d/b/a National Grid, EFSB 13-2/D.P.U. 13-151/13-152 (2014)
Siting Board	Massachusetts Energy Facilities Siting Board
SJC	Massachusetts Supreme Judicial Court
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasures [plan]
SSD	stopping sight distance
Stoughton/Boston	Boston Edison Company d/b/a NSTAR Electric, 14 DOMSB 233; EFSB 04-1/ D.P.U. 04-5/04-6 (2005)
Street Restoration Standards	D.T.E. 98-22, att., §§ 1.0-12.0 (August 26, 1999)
Sudbury-Hudson	NSTAR Electric Company d/b/a Eversource Energy, EFSB 17-02/D.P.U. 17-82/17-83 (2019)
SWPPP	Stormwater Pollution Prevention Plan
TGP	Tennessee Gas Pipeline Company, LLC
TMP	Traffic Management Plan
tpy	tons per year
v/c ratio	volume-to-capacity ratio (of an intersection)
ULSD	ultra-low-sulfur diesel fuel
Updated Interconnection Analysis	NEC's December 10, 2020 filing titled "Updated Interconnection Route Selection Analysis"
USACE	U. S. Army Corps of Engineers

ABBREVIATIONS

USEPA	U. S. Environmental Protection Agency
Vineyard Wind	Vineyard Wind LLC, EFSB 17-05/D.P.U. 18-18/18-19 (2019)
Whately LNG	The Berkshire Gas Company, 9 DOMSB 1; EFSB 99-2/D.T.E. 99-17 (1999)
WPA	Massachusetts Wetlands Protection Act

SUMMARY OF THE FINAL DECISION

The Final Decision approves, with conditions, the natural gas liquefaction, storage, and truck loading Facility, and associated gas interconnection pipeline, that Northeast Energy Center LLC ("NEC") proposes to construct and operate on Southbridge Road (Route 169) in the Town of Charlton, Massachusetts ("Project").

The Final Decision finds that the Project is needed to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. Specifically, the Final Decision finds there is a need for the Project's natural gas liquefaction and storage capacity to meet the terms of NEC's existing, Department-approved Precedent Agreement with National Grid, so that National Grid can continue to serve its customers in an economic and reliable manner. The Final Decision also notes that NEC plans to market some of the Facility's capacity to other gas distribution companies in the Commonwealth, as well as other possible uses.

The Final Decision considers alternatives to the Project, including the use of interstate natural gas pipelines; trucking of gas from existing but more distant facilities; and the use of other fuels such as oil or liquid propane. The Final Decision finds that based on feasibility, reliability, cost, and environmental factors, the Project is, on balance, superior to the other alternatives considered with respect to meeting the identified need.

The Final Decision reviews a range of siting alternatives presented by NEC to ensure that it did not overlook a superior Facility site or natural gas interconnection route. The Company's site selection process included selecting a study area within southern New England, identifying three potential sites within this area, and comparing the sites using a set of environmental, community, and engineering criteria. The Final Decision narrows consideration to two sites, the Route 169 Site and the Route 20 Site, along with associated pipeline interconnection routes, for a detailed comparison of environmental impacts, safety, cost, and reliability. The Final Decision finds that the Route 169 Site (together with NEC's Preferred Interconnection Route) is superior to the Route 20 Site (and associated interconnection routes) in providing a reliable energy supply with a minimum impact on the environment at the lowest possible cost. The Final Decision then confirms that the Project as proposed can be sited at the Route 169 Site in a manner that complies with 980 CMR 10.00.

The Final Decision grants NEC's request for individual exemptions and a comprehensive exemption from the Town of Charlton Zoning Bylaw, on the grounds that the individual exemptions are required within the meaning of G.L. c. 40A, § 3, and that a comprehensive exemption is needed to prevent potentially significant delays in Project construction and operation, and, therefore, is needed to prevent substantial public harm.

The Final Decision finds that approval of the Project is consistent with health, environmental, and resource use and development policies of the Commonwealth, including the Siting statutes (G.L. c. 164, §§ 69G-69R); the Massachusetts Environmental Policy Act; the Global Warming Solutions Act; the 2021 Climate Roadmap Act and EEA's 2050 Decarbonization Roadmap; and the Commonwealth's Environmental Justice laws and policies.

Pursuant to G.L. c. 164, § 69J, the Massachusetts Energy Facilities Siting Board ("Siting Board") hereby APPROVES, subject to the conditions set forth below, the Amended and Restated Petition to Construct ("Amended Petition to Construct") of Northeast Energy Center LLC ("NEC" or the "Company") to construct and operate a new natural gas liquefaction and storage Facility at 304/314 Southbridge Road, Charlton ("Facility"), and an associated natural gas interconnection pipeline in Charlton, Massachusetts (together, "Project"). Pursuant to G.L. c. 40A, § 3, the Siting Board hereby APPROVES, subject to the conditions set forth below, the Amended Zoning Petition of the Company for individual and comprehensive zoning exemptions from the Town of Charlton Zoning Bylaw.

I. INTRODUCTION

A. Summary of the Project

The proposed Facility would produce liquefied natural gas ("LNG") for delivery to Boston Gas Company and Colonial Gas Company, each d/b/a National Grid ("National Grid") and other gas utility customers by liquefying natural gas obtained from the Tennessee Gas Pipeline Company, LLC ("TGP") interstate pipeline (Exh. NEC-2, at 1-1).[1] LNG would be stored in a single on-site tank before being pumped into LNG trucks for delivery to existing LNG storage and vaporization facilities across the Commonwealth (id. at 1-8, 2-5 to 2-6). The Facility would be capable of producing up to 250,000 gallons of LNG per day and would have the capacity to store 2.0 million gallons of LNG (id. at 2-4 to 2-5). Pursuant to a 15-year Precedent Agreement between NEC and National Grid, the Facility would provide approximately 168,500 gallons per day of LNG liquefaction capacity and a minimum of approximately 850,000 gallons of LNG

[1] Kinder Morgan is the parent company of TGP. NEC and other parties used both company names throughout the proceeding. This Decision generally follows the usage of each party and does not attempt to legally distinguish between TGP and Kinder Morgan.

storage capacity for use by National Grid (Exhs. EFSB-N-2; EFSB-N-3; see D.P.U. 15-129, at 25).[2,3]

The Precedent Agreement between NEC and National Grid was the result of a National Grid resource planning process that focused on the utility's long-term LNG strategy; the Precedent Agreement was reviewed and approved by the Massachusetts Department of Public Utilities ("Department") as part of D.P.U. 15-129 (Exh. NEC-2, at 3-1). The LNG liquefaction and storage capacity under contract to National Grid represents approximately 67.2 percent of the Facility's liquefaction capacity and 42.5 percent of the Facility's storage capacity; thus, National Grid would serve as the Project's anchor customer (id. at 4-0; EFSB-N-2; EFSB-N-3).

The Amended Petition to Construct identified three potential locations for the Facility, all noticed in this proceeding and all in Charlton (Exh. NEC-2, at 2-1, 2-7). The Company's Preferred Site is located along State Route 169 ("Route 169 Site"). A second site, which was originally selected by the Company in an earlier (August 31, 2018) version of the petition ("Original Petition to Construct"), is on a hilltop site near U.S. Route 20 ("Route 20 Site"). The third potential site described in the Amended Petition to Construct, off Sherwood Lane ("Sherwood Lane Site"), is not included in the detailed impact analysis below, due to numerous deficiencies and siting issues, as described in Section IV.B.2.

The Project would include: an interconnection pipeline that feeds natural gas from the TGP mainline to the Facility; a feed gas pretreatment system; a gas liquefaction system; an LNG

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2 NEC described its Precedent Agreement with National Grid as a "tolling agreement" in which NEC would provide liquefaction and storage services and National Grid would own the gas taken off the pipeline and turned into LNG (Tr. 1, at 109-110). NEC also noted that National Grid would arrange for its own LNG trucking (Exh. EFSB-T-21; Tr. 2, at 269-270). For other customers, NEC stated that it would enter into similar tolling agreements or that NEC could directly pursue gas ownership (Exhs. EFSB-N-30, EFSB-N-31). NEC indicated that other utilities could likewise arrange their own trucking (Exh. EFSB-T-21; Tr. 2, at 269-270).

3 NEC has a smaller agreement with Narragansett Electric Company d/b/a National Grid: "for up to 1,780 Dth [dekatherms] per day [i.e., 21,716 gallons/day] of liquefaction capacity and up to 8,900 Dth [i.e., 108,580 gallons] of temporary LNG storage capacity for a term of 15 years" (Exh. EFSB-N-1).

storage tank; and an LNG truck loading station (Exh. NEC-2, at 2-1). The Project would include these same main components, whichever site is selected (id. at 2-4).

The new interconnection pipeline would have a diameter of ten inches and would be designed to match or exceed the maximum allowable operating pressure of the TGP system (Exh. NEC-2, app. A, at A-4). NEC indicated that the inlet pressure of the interconnection pipeline would be the same as the operating pressure of the TGP mainline, which has generally fluctuated between about 442 and 628 pounds per square inch, gauge ("psig") (Exh. EFSB-S-9). The most recent plan for the Company's now-preferred interconnection route is for the interconnection pipeline to be owned by NEC up to the point that it reaches the existing TGP right-of-way (Exh. NEC-14, at 2).[4] The Company stated that each interconnection option would require a feed gas meter to measure the gas delivered from the TGP mainline to the Facility (Exh. NEC-2, at 2-3 to 2-4).

After the feed gas reaches the Facility, the gas pretreatment system would remove carbon dioxide and water vapor from the gas stream to quantities less than 50 parts-per-million-by-volume ("ppmv") and 1 ppmv, respectively, before the gas is liquefied (Exh. NEC-2, at 2-4). LNG is produced by cooling natural gas to a temperature of -258° Fahrenheit ("°F") using a liquefaction system consisting of nitrogen refrigerant, a hybrid gas-turbine/electric-motor driven compressor, two combination compressor/expander units, and an aluminum heat exchanger ("cold box") (id.; Exhs. NEC-2, app. A, at fig. A-1.1; EFSB-G-3). The liquefaction system is designed to produce 250,000 gallons of LNG per day at an ambient temperature of 60°F (Exh. NEC-2, at 2-4; Tr. 2, at 203).

The Facility would use a single, flat-bottom, full-containment LNG storage tank, constructed on site, with a net usable LNG capacity of approximately 2.0 million gallons (Exh. NEC-2, at 2-5). The inner tank, made of alloy steel, would provide primary containment for

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[4] TGP would be responsible pursuant to its FERC blanket certificate for the permitting and constructing of all the metering facilities and the interconnection line between the meter station and the southern limit of its ROW (Exhs. NEC-14, at 2; EFSB-LU-5). Although this short segment of pipeline and the meter station is subject to FERC jurisdiction, the Siting Board considers its impacts in this Decision.

the LNG (id.). The outer tank would be constructed of reinforced concrete, with a steel liner on the outside, and operated at 1 psig in normal atmospheric conditions, and always kept above atmospheric pressure, with excess boil-off gas handled by a boil-off gas system (id.; Exh. EFSB-PA-6; Tr. 4, at 686-687).[5] The outer tank would serve as secondary containment for the inner tank, which directly stores LNG, see Section III.B.1 (Exh. NEC-2, app. A, at A-10). A domed roof would cap the outer tank and an aluminum deck suspended from the outer-dome would cover the inner tank (id., app. A, at A-5). According to the Company, the outer tank would be able to contain 150 percent of the volume of the inner tank (Exh. EFSB-SS-28). To reduce heat transfer, expanded perlite insulation would be installed below the tank floor, between the inner and outer tanks, and above the aluminum cover of the inner tank (Exhs. NEC-2, at 2-5, app. A, at A-5; EFSB-S-24). LNG pumps that serve the truck loading station would be located within the inner tank; NEC also stated that there would be no tank wall penetrations below the maximum liquid level of the tank (Exh. NEC-2, at 2-5, 4-21).

The LNG truck loading station would consist of four truck loading bays with loading skids, and three truck-weighing scales (Exhs. NEC-2, at 2-6; EFSB-PA-18(S1); EFSB-PA-22). The Company intends that the Facility would fill no more than two trucks at a time (Exh. EFSB-T-24). NEC stated that the Facility would be equipped with a sump with a capacity of 15,000 gallons, adequate to handle a potential spill of the full contents of an LNG truck (Exh. NEC-2, app. C, at C-8). The sump would be surrounded by an aluminum slatted fence to retain any LNG vapor (Tr. 4, at 668).

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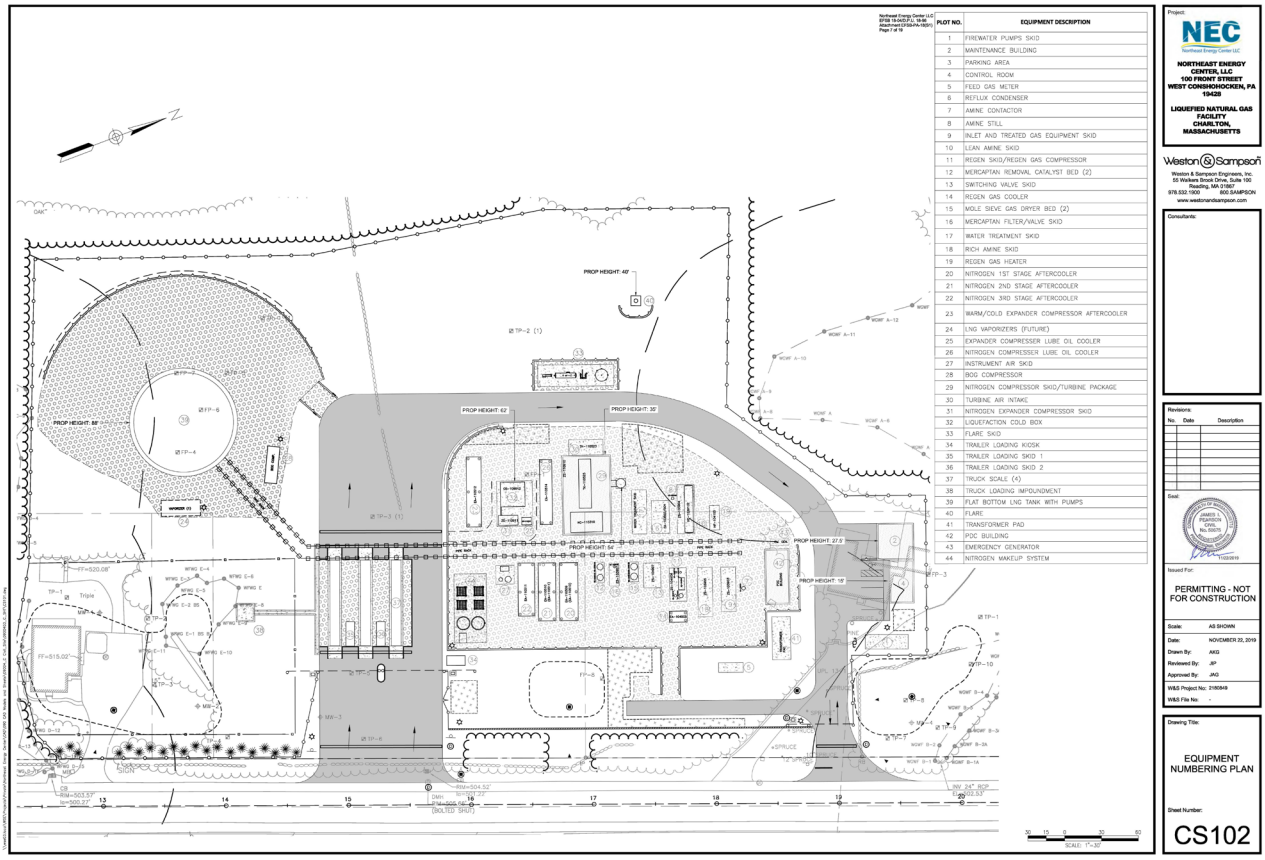
[5] Boil-off gas results from heat transfer between the tank surroundings and LNG in the tank (Exhs. NEC-2, at 2-5; EFSB-S-24). The Company stated that, when the liquefaction system is in operation, the boil-off gas would be combined with the treated feed gas stream to be re-liquefied and returned to the LNG storage tank (Exh. EFSB-A-10(1)(S2) at 30). When the Facility is not liquefying, boil-off gas would be directed to run two natural gas fired engines to power the existing site electrical load; any excess power from boil-off gas combustion would be net metered back to the electrical grid (id.).

NEC stated that the Project would cost more than $100 million, inclusive of land acquisition costs (Exh. NEC-2, at 2-9).[6] Figure 1, below, shows the Facility as proposed for the Route 169 Site.

Figure 1. Proposed Facility Plan, Route 169 Site



Note: From south to north, the plan shows the LNG storage tank, truck loading bays and main driveway entrance, process equipment, and exit driveway. Source: Exh. EFSB-PA-18(S1).

B. Procedural History

1. The Original Petitions

On August 31, 2018, NEC filed a petition with the Siting Board and a petition with the Department relating to the Project. In the Original Petition to Construct, docketed as EFSB 18-04,

6 The Company also provided the Sting Board with more precise, confidential, cost estimates. See Presiding Officer Ruling on Motion for Protective Treatment (November 11, 2019).

the Company requested Siting Board approval of the Project pursuant to G.L. c. 164, § 69J. The second petition, docketed as D.P.U. 18-96, requested individual exemptions and a comprehensive exemption from the Town of Charlton Zoning Bylaw pursuant to G.L. c. 40A, § 3 ("Original Zoning Petition") (together, "Original Petitions").

On August 31, 2018, the Company also filed a motion to consolidate the Original Petitions for review and decision by the Siting Board. Pursuant to G.L. c. 164, § 69H(2), the Chair of the Department on September 19, 2018, issued a Referral and Consolidation Order referring the Original Zoning Petition to the Siting Board for review and decision with the Original Petition to Construct. The combined proceeding was docketed as EFSB 18-04/D.P.U. 18-96. The Siting Board accordingly conducted a single adjudicatory proceeding and developed a single evidentiary record with respect to the two Original Petitions.

The Siting Board issued Notice for the Original Petitions on October 11, 2018. The Siting Board conducted a public comment hearing in Charlton on November 13, 2018, to receive public comments on the Project ("First Public Comment Hearing").

2. The Amended Petitions

On December 13, 2018, the Company notified the Siting Board that it was proposing changes to the preferred location and design of the Facility as presented in the Original Petitions. The changes were such that, on January 9, 2019, the Siting Board directed the Company to file amended petitions reflecting the changes to the Project, and re-notice the Project. On February 28, 2019, the Company filed the Amended Petition to Construct; on April 19, 2019, the Company filed an Amended Zoning Petition (together "Amended Petitions").[7] The Siting Board issued notice of

[7] The Original Petitions were for a plant with a liquefaction capacity of 250,000 gallons per day and a total storage volume of 1,000,000 gallons in ten horizontal single-walled prefabricated "bullet" tanks; the Company's preferred location was the Route 20 Site and the alternative location was off Route 169, next to and north of Millennium (Exh. NEC-8, at 1-1, 1-5, 1-12, 1-13). The Amended Petitions are for a plant with a liquefaction capacity of 250,000 gallons per day and a total storage volume of 2,000,000 gallons in a single field-erected full-containment tank; the Company's now preferred location is the Route 169 Site, with the Route 20 Site and the Sherwood Lane Site as alternatives (Exh. NEC-2, at 1-5).

the Amended Petitions on April 26, 2019. On May 29, 2019, the Siting Board conducted a second public comment hearing in Charlton, regarding the Amended Petitions ("Second Public Comment Hearing").[8]

3. Public Notice

For both the First Public Comment Hearing and Second Public Comment Hearing, the Siting Board required the Company to comply with comprehensive notice requirements regarding the proposed Project. Consistent with the Executive Office of Administration and Finance ("A&F") Language Access Policy and Implementation Guidelines, issued under A&F Administrative Bulletin #16 in March 2015, and the Department of Public Utilities 2018 Language Access Policy ("LAP"),[9] and the most recent demographic data for the Project area, the Siting Board required translation of the Notice and of a one-page "Please Read" document summarizing the Notice into Spanish.[10]

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8 The Siting Board received comments in writing, and oral comments at the First and Second Public Comment Hearings. Commenters raised a number of safety-related issues, including traffic safety associated with LNG truck use at both the Route 169 Site and Route 20 Site; emergency response accessibility at both sites; and the adequacy of existing municipal emergency response resources to respond to emergency situations at the Facility. Commenters also raised concerns regarding potential environmental impacts of the Facility including: noise associated with 24-hour operation; air emissions; alterations to wetlands and conservation land; potential blasting of bedrock for construction; and greenhouse gas emissions associated with the use of natural gas. Commenters noted other impacts of the Project to the Town of Charlton and to the public, particularly in light of other recent large commercial developments in the area, and their associated burdens on local roadways and municipal resources.

9 The A&F Bulletin is at https://www.mass.gov/administrative-bulletin/language-access-policy-and-guidelines-af-16. The Department's 2018 Language Access Policy is at https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/13901041.

10 The Project did not trigger enhanced public participation or enhanced impacts analysis by the Siting Board under the 2017 EJ Policy, as revised on June 24, 2021. Specifically, while the Project is located within one mile of low income and minority environmental justice populations, the Project did not exceed the Environmental Notification Form ("ENF") thresholds for air, solid and hazardous waste, or wastewater and sewage sludge treatment and disposal (Exh. EFSB-G-7(1)(S2) at 8). Similarly, MEPA did not require enhanced

The Siting Board directed the Company to publish the Notice once a week for two consecutive weeks in the Worcester Telegram and Telegraph, the Charlton Villager, the Southbridge Evening News, and the Sturbridge Villager; and to post the Notice in the Charlton, Sturbridge, and Southbridge town clerks' offices and public libraries. As directed by the Siting Board, the Company mailed the Notice (in English) and the Please Read summary document (in English and Spanish) to all owners of property: (1) within one-half mile of the proposed LNG Facility fenceline for the Company's preferred site and two alternative sites; (2) within one-quarter mile of all proposed pipeline gate/meter station fencelines; and (3) within 300 feet of the outermost edge of all proposed pipeline routes and new or enlarged access roads, including abutters and abutters to abutters, and owners of land directly opposite any public or private street or way. The Siting Board required a copy of the Notice in English and in Spanish to be sent to the Charlton, Sturbridge, and Southbridge Planning Boards; the planning board of each town abutting Charlton, Sturbridge, or Southbridge; and the town manager and chair of the select board for each of these municipalities; the Charlton Planning Department director, the Charlton Department of Public Works director, the Charlton Zoning Board of Appeals chair, and the Charlton Conservation Commission chair. The Siting Board also required the Company to place copies of the Amended Petitions in the town clerks' offices and public libraries in Charlton, Southbridge, and Sturbridge, and to post (1) the Abutter Notice in both English and Spanish, and (2) both the Amended Siting Board Petition and Amended Zoning Petition, including all attachments, on its website, until the Siting Board renders a final decision in this matter.

4. Adjudicatory Hearings

On July 2, 2019, the Presiding Officer issued an intervention ruling granting intervenor status to seven persons or entities: the Town of Charlton Planning Board; the Town of Charlton

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public participation for the Project as part of its ENF review, filed on July 31, 2020 (Exh. EFSB-G-7(1)(S1)).

Zoning Board of Appeals; and the Town of Charlton Board of Health;[11] the Southbridge Town Council ("Southbridge"); Unique Industries, LLC/North American Tool and Machine Corporation ("North American Tool"); Millennium Power Partners, L.P. (now Millennium Power Company LLC, "Millennium"); and Charlton resident William Krukowski. The ruling granted limited participant status to eleven persons or entities: Charlton residents David Barbale; Julie Dowen; Joseph Holewa; Margaret Krukowski; Joseph Lawendowski; and Melissa Widing; Southbridge resident Maureen Doyle; Gaz Métro LNG, LP ("Gaz Metro"); Massachusetts Electric Company d/b/a National Grid; Pipe Line Awareness Network for the Northeast, Inc. ("PLAN"); and UGI Energy Services, LLC. In a supplemental intervention ruling issued on September 13, 2019, the Presiding Officer granted intervenor status to David Barbale, originally a limited participant.[12]

Siting Board staff and the parties conducted written pre-hearing discovery from July 2019 through October 2019. Siting Board staff issued three sets of discovery to the Company and one set to the Town of Charlton. The intervenors Southbridge, North American Tool, and the Town of Charlton each issued one set of discovery to the Company. Siting Board staff conducted six days of evidentiary hearings, beginning on November 19, 2019, and ending on December 16, 2019.

The Company and two intervenors, the Town of Charlton and Mr. Barbale, presented testimony in the proceeding. The Company presented five witnesses; each of the Company's

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[11] The three Town of Charlton boards subsequently participated as a joint intervenor, represented by counsel. The combined entities are considered in this decision to represent the Town of Charlton, and are referred to as such.

[12] In response to the Original Petitions, the Siting Board received seven petitions to intervene and two petitions for limited participant status. Intervention petitions were filed by the Town of Charlton Planning Board; the Town of Southbridge Town Council; Joseph Holewa; William Krukowski; Margaret Krukowski; David Barbale; and Millennium Power Partners, LP. UGI Energy Services, LLC and John Pulawski filed each filed a petition for limited participant status. In response to the Amended Petitions, the Siting Board received four petitions to intervene and six petitions for limited participant status. Intervention petitions were filed by the Town of Charlton Zoning Board of Appeals; the Town of Charlton Board of Health; Julie Dowen; and Unique Industries, Inc. Limited participation petitions were filed by Gaz Metro LNG, LP; Joseph Lawendowski; Maureen Doyle; Melissa Widing; Massachusetts Electric Company d/b/a National Grid; and the Pipe Line Awareness Network for the Northeast, Inc.

witnesses submitted pre-filed direct testimony in advance of evidentiary hearings and appeared for examination during hearings. The Company's witnesses were: Boris Brevnov, managing member, NEC; A.J. Jablonowski, principal, Epsilon Associates, Inc. ("Epsilon"); John A. Gamble Jr., senior project manager, Weston & Sampson Engineering, Inc.; Dwight R. Dunk, principal, Epsilon; and R. Christopher Barros, president and CEO of Odin EPC LLC f/k/a Northstar Industries LLC.

The Town of Charlton presented pre-filed direct testimony of three witnesses, each of whom also appeared for examination during hearings: Dennis M. Carlson, Town of Charlton fire inspector; Sean P. Reardon, vice president and civil engineer, Tetra Tech, Inc., and Ted Williams Guertin, senior air quality meteorologist, Tetra Tech, Inc. At the request of Siting Board staff, the Town presented two additional witnesses at hearings: Frank C. Lombardi, chair of the Town of Charlton Zoning Board of Appeals and of the Selectmen's LNG Committee; and Randall Scott Benson, Town of Charlton planning director. Mr. Barbale submitted pre-filed direct testimony and appeared for examination during hearings.[13]

NEC, the Town of Charlton, Millennium, North American Tool, Mr. Barbale, PLAN, and Mr. Lawendowski filed initial briefs on January 21, 2020; NEC, the Town, and North American Tool filed reply briefs on February 4, 2020. On February 4, 2020, the last day of the briefing period, Gaz Metro filed a brief. On February 6, 2020, NEC filed a letter objecting to the Gaz Metro brief as untimely. On March 12, 2020, the Presiding Officer granted all of the parties and limited participants an opportunity to file a reply to the Gaz Metro brief. On March 20, 2020, NEC filed a reply.

5. Post-Hearing

As noted above, adjudicatory hearings concluded on December 16, 2019. Prior to and during hearings, NEC represented that the Project did not trigger any review thresholds under the Massachusetts Environmental Policy Act ("MEPA"), and therefore did not require MEPA review

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[13] Mary Beth Czaja, a partner at North American Tool did not testify during evidentiary hearings or present any witnesses. Ms. Czaja issued pre-hearing discovery to the Company and conducted cross-examination.

(see Exh. NEC-2, at 1-6). On July 16, 2020, the Company informed the Siting Board that construction of the driveway for the Route 169 Site would require the removal of more than five public shade trees, triggering a MEPA threshold and thus requiring the submission of an Environmental Notification Form ("ENF") for the Project to the MEPA Office. The Company filed its required ENF on July 31, 2020 (Exh. EFSB-G-7(1)(S1)), and the Secretary issued a Certificate on September 10, 2020 (Exh. EFSB-G-7(1)(S2)).[14]

On December 10, 2020, NEC filed a document titled "Updated Interconnection Route Selection Summary Analysis" ("Updated Interconnection Analysis") (Exh. NEC-14). The Updated Interconnection Analysis contained two major changes to the Project as it had been presented in the Original and Amended Petitions, and during hearings. Specifically, the Updated Interconnection Analysis presented a pipeline interconnection route between the Facility and the TGP interstate pipeline, which the Company identified as its new preferred route,[15] and added to the Project the construction of a new meter station, to be located on a site not previously identified or noticed (Exh. NEC-14, at 1). The Updated Interconnection Analysis also indicated that TGP would build the interconnection between the edge of its ROW to its mainline, including the new meter station (Exh. NEC-14, at 2). On January 25, 2021, the Presiding Officer issued a Procedural Order, requiring NEC to provide existing intervenors and limited participants, as well as property owners within one-quarter mile of the new meter station, an opportunity to comment on the Updated Interconnection Analysis. On February 16, 2021, North American Tool and PLAN each filed comments on the Updated Interconnection Analysis.

On March 3, 2021, the Presiding Officer issued a Procedural Order, allowing all intervenors to file discovery regarding the new information contained in the Updated Interconnection Analysis. On March 3, 2021, Siting Board staff also issued a fourth set of

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14 In its MEPA filing, NEC identified a shortened version of Interconnection Alternative 2, with a new meter station location, as its preferred interconnection route; the Company did not file the Updated Interconnection Analysis showing the new interconnection route with the Siting Board until December 2020.

15 The shortened version of Interconnection Alternative 2 was included in the April 26, 2019, notice; however, the new meter station location required was not.

information requests to NEC and issued a first set of information requests to the intervenor Millennium. On March 10, 2021, NEC filed discovery responses ahead of their due date to questions issued by Siting Board staff. On March 11, 2021, NEC filed a motion requesting that the Siting Board amend the procedural schedule to reflect its early submittal of discovery replies. On March 12, 2021, Millennium filed a motion requesting additional time to prepare replies to discovery questions issued by Siting Board staff and also filed a notice that its corporate ownership had changed and its name had been changed to Millennium Power Company, LLC. On March 15, 2021, NEC filed a motion in reply to Millennium's request for an extension and further moving that the Siting Board rescind its information requests to Millennium. NEC argued that Millennium's responses were not required due in part to the fact that NEC is no longer pursuing acquisition of real estate rights from Millennium. On March 19, 2021, the Siting Board issued a ruling on the motions stating in relevant part that the motions from NEC and Millennium to amend the procedural schedule were denied and rescinding the Siting Board's information requests to Millennium. On March 31, 2021, the intervenor North American Tool issued a set of discovery to NEC and a set to the Town. The Company and the Town each filed timely discovery responses.[16] On August 23, 2021, NEC filed a Host Community Development Agreement ("HCA") between it and the Town of Charlton. The evidentiary record of this proceeding consists of approximately 890 exhibits.

The Siting Board scheduled a remote Board meeting using Zoom videoconferencing for October 6, 2021, to receive comments, deliberate, and vote on the Tentative Decision. The Board issued a Notice of Siting Board Meeting, provided an opportunity to submit written comments regarding the Project, and distributed the Tentative Decision in English and Spanish. The Board directed the Company to provide Notice by the following means: (1) translate the Notice into Spanish; (2) publish the Notice in local newspapers; (3) provide a copy of the Notice in English

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16 The Siting Board hereby admits into evidence exhibits filed after the end of the evidentiary hearings: Exhs. NEC-12 to NEC-14; EFSB-G-10 to EFSB-G-14; EFSB-G-7(S1) and (S2); EFSB-CM-34 to EFSB-CM-44; EFSB-LU-4 to EFSB-LU-9; EFSB-W-23 to EFSB-W-32; EFSB-HW-20; EFSB-NO-14; EFSB-T-40; EFSB-Z-29 to EFSB-Z-30; NAT-C-13 to NAT-C-22; NAT-G-1 to NAT-G-12; NAT-TOC-1 to NAT-TOC-7; EFSB-Z-26(S1); EFSB-A-5(S1); EFSB-A-10(S2).

and Spanish to all persons on the service list; (4) mail a copy of the Notice in English and Spanish to all property owners and all U.S. Mail addresses within (i) ½ mile of the fenceline for the Route 169 Site and the Route 20 Site, (ii) 300 feet of all noticed pipeline interconnection routes for both the Route 169 Site and the Route 20 Site, and (iii) ¼ mile of the potential meter station locations for each noticed pipeline interconnection route; (5) post a copy of the Notice to the Company's website; (6) provide a copy of the Notice in English and Spanish to the Town Administrator of Charlton and the Town of Charlton Planning Board to be available for display; and (7) the Presiding Officer sent by email the Notice to a variety of community-based organizations that serve or operate in the vicinity of the Project.

Siting Board staff prepared a Tentative Decision and distributed it to the Siting Board members and all parties for review and comment on September 20, 2021. The parties and limited participants were given until September 27, 2021 to file written comments. The public was given until October 1, 2021, to file written comments. The Siting Board received timely written comments from parties Town of Charlton Planning Board, David Barbale, North American Tool, and NEC; limited participants Gaz Metro, PLAN, Julie Dowen, Joseph Holewa, and Joseph Lawendowski; and public comments from Berkshire Environmental Action Team/No Fracked Gas in Mass., Cashman Preload Cryogenics, Newline Energy, and Charlton residents Joan Metras and Mike Fitzgerald.

The Board conducted a remote public meeting to consider the Tentative Decision on October 6, 2021 and October 21, 2021, at which parties, limited participants, public officials, and the public presented oral comments. Simultaneous interpretation in Spanish was provided at the meeting. After deliberation, the Board voted and directed staff to prepare a Final Decision approving the Amended Petitions, subject to certain conditions set forth in Section XI, below.

C. Jurisdiction and Scope of Review under G.L. c. 164, § 69J

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

environmental protection, and resource use and development policies of the Commonwealth.[17] See Town of Sudbury v. EFSB, 487 Mass. 737, 746-747 (2021). Pursuant to G.L. c. 164, § 69J, a project applicant must obtain Siting Board approval for the construction of proposed energy facilities before a construction permit may be issued by another state agency.

G.L. c. 164, § 69G defines a "facility" to include "a unit, including associated buildings and structures, designed for or capable of the manufacture or storage of gas, except such units below a minimum threshold size as established by regulation." See also 980 CMR 1.01. The proposed Project is a "facility" with respect to Section 69J, and therefore, the Project is subject to Siting Board review under Section 69J.[18]

The Siting Board requires that an applicant demonstrate that its proposal meets the following requirements: (1) that additional energy resources are needed (see Section II, below); (2) that, on balance, the 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); (3) that the applicant has considered a reasonable range of practical facility siting alternatives and that the proposed facilities are sited in locations that minimize costs

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17 G.L. c. 164, § 69J also requires an applicant to demonstrate that its proposed facilities are necessary. See Section II, below.

18 On June 20, 2011, the Siting Board promulgated regulations exempting certain types of natural gas facilities from Siting Board review. The regulations exempt: (1) a unit with a total gas storage capacity of less than 25,000 gallons and a manufacturing capability of less than 2,000 million British thermal units ("MMBtu") per day; (2) a unit whose primary purpose is research, development, or demonstration of technology and whose sale of gas, if any, is incidental to that primary purpose; and (3) a landfill or sewage treatment plant. 980 CMR 1.01(4); Final Decision Adoption of Final Regulation at 980 CMR § 1.01(4), EFSB 09-RM-1 (June 20, 2011). The Project exceeds 25,000 gallons of total gas storage capacity, and therefore, is jurisdictional on that basis. The Project also has LNG liquefaction capability that exceeds 2,000 MMBtu per day; however, the Siting Board has previously determined that liquefaction of natural gas does not alone constitute a gas "manufacturing" activity. See Petition of Boston Gas Company d/b/a National Grid for Jurisdictional Determination Pursuant to 980 C.M.R. § 2.09, EFSB 14-1, at 15 (2014). The Facility is thus jurisdictional to the Siting Board on the basis of the size of the LNG storage tank and not on the basis of its liquefaction capacity throughput.

and environmental impacts while ensuring a reliable energy supply (see Section IV, below); (4) that environmental impacts of the project are minimized and the project achieves an appropriate balance among conflicting environmental concerns as well as among environmental impacts, cost, and reliability (see Section V, below); and (5) that plans for construction of the proposed facilities are consistent with the current health, environmental protection, and resource use and development policies of the Commonwealth (see Section VII, below). The Siting Board has specific regulations relative to siting LNG facilities, which are evaluated in Section VI, below.

II. NEED FOR THE PROJECT

A. Standard of Review

In accordance with G.L. c. 164, § 69J, the Siting Board is charged with the responsibility for implementing energy policies in its statute to provide a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. In carrying out this statutory mandate with respect to proposals to construct natural gas facilities, the Siting Board evaluates whether there is a need for additional natural gas facilities in the Commonwealth to meet reliability, economic efficiency, or environmental objectives. See Colonial Gas Company d/b/a National Grid, EFSB 18-01/D.P.U. 18-30, at 78 (2019) ("Lowell-Tewksbury"); Colonial Gas Company d/b/a National Grid, EFSB 16-01, at 5-6 (2016) ("Colonial Gas (2016)"); Colonial Gas Company d/b/a KeySpan Energy Delivery New England, EFSB 05-2 (2006) ("Colonial Gas 2006"); The Berkshire Gas Company, EFSB 05-1, at 3-4 (2006) ("Berkshire Gas (2006)"). See also The Berkshire Gas Company, EFSB 99-2/D.T.E. 99-17 (1999) ("Whately LNG").

In evaluating the need for new energy facilities to meet reliability objectives, the Siting Board may evaluate the ability of the existing system to accommodate changes in aggregate demand or supply, to serve major new loads, or to maintain reliable service. The Siting Board previously has approved proposals to construct gas facilities to accommodate load growth within a utility's service territory and to transport natural gas to generating facilities. See Lowell-Tewksbury at 7; Colonial Gas (2006) at 13-15; Berkshire Gas (2006) at 9. In such cases, the proponent must demonstrate that additional energy resources are necessary to meet reliability

objectives by establishing that its existing system is inadequate to serve the anticipated load with acceptable reliability. See Lowell-Tewksbury at 7; Berkshire Gas (2006) at 3-4.

B. Need for Proposed Facility

NEC maintains that the Facility is needed in order to provide LNG to National Grid (Company Brief at 26-27). NEC stated that, in order for National Grid to serve its customers on the coldest days, the utility relies heavily on LNG that has long been supplied from the Everett Import Terminal, which now faces significant risks to its continued operation, as described below (Exhs. NEC-2, at 3-4, 3-6; EFSB-1, at 6). In D.P.U. 15-129, the Department approved a Precedent Agreement between NEC and National Grid as part of National Grid's long-term strategy to reduce its reliance on the Everett Import Terminal for LNG (Exh. NEC-2, at 3-1). Under the Precedent Agreement, NEC would provide gas liquefaction, storage, and truck loading services to National Grid for a 15-year period (id. at 1-1; see also D.P.U. 15-129, at 25). NEC contends that the Precedent Agreement will help National Grid satisfy its annual LNG requirements economically and reliably (id. at 3-1).

NEC asserted that National Grid would serve as an anchor customer for the Facility, and its need for liquefaction, storage, and truck loading services demonstrates need for the proposed Project (Exh. NEC-2, at 3-1, 4-0). NEC also stated that there is a need for similar LNG services to other gas distribution companies in Massachusetts, and potentially other merchant customers, which would justify a facility larger than required to serve only National Grid (id. at 3-5 to 3-8). The following sections review National Grid's use of LNG, existing sources of LNG, resource planning, and information about the need for additional LNG in the Commonwealth.

1. Liquefaction and Truck Loading Services for National Grid

a. Use of LNG by National Grid Gas Distribution Companies

National Grid has two principal means of acquiring gas supply needed to serve customers: (1) gas delivered by interstate pipeline, and (2) the vaporization of LNG from its storage facilities (Exh. NEC-2, at 4-0). In D.P.U. 15-129, National Grid explained how LNG is used to serve its gas

distribution customers.[19] National Grid stated that its wholly owned subsidiaries Boston Gas Company and Colonial Gas Company serve approximately 876,000 customers in 129 municipalities of the Commonwealth (Exh. EFSB-1, at 8). To serve these customers, National Grid maintains satellite LNG facilities to serve as on-system peaking resources, capable of injecting vaporized LNG into local distribution systems when demand exceeds available pipeline resources (id. at 11). National Grid uses its satellite LNG facilities to serve approximately 40 percent of design day gas send-out requirements and also to meet hourly fluctuations in demand, balance pressure across distribution systems, and maintain delivery pressure during periods of high demand (id. at 6, 11-13).[20]

NEC recounted that, with the exception of the Commercial Point facility in Dorchester (which has its own liquefaction capability), National Grid's satellite LNG facilities can be refilled only by truck deliveries (Exhs. EFSB-N-36; EFSB-N-38(1) at 5). National Grid's LNG tanks have an aggregate capacity of approximately 4,930,000 MMBtu (equivalent to approximately 59.5 million gallons), which the utility aims to refill annually by December 1 (Exh. EFSB-N-38(1) at 5-6).[21] National Grid stated that the only provider in the Northeast capable of satisfying its full requirement for LNG has been the Everett Import Terminal, a facility once owned/operated by Distrigas and GDF Suez, now owned/operated by Exelon Generation (Exhs. NEC-2, at 3-4;

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19 In its application, NEC quoted from National Grid's filing in D.P.U. 15-129, titled "Petition for Approval of Agreements for Liquefied Natural Gas and Liquefaction with GDF Suez Gas NA, LLC, Northeast Energy, LLC, Gaz Metro LNG, LP, and National Grid LNG." The Siting Board admitted into the record in this case as exhibit "EFSB-1," an excerpt of a National Grid exhibit (Exh. NGRID-EDA/JEA-1) originally submitted in D.P.U. 15-129.

20 National Grid also noted that many of its satellite LNG facilities are located in areas that are fed by a single interconnection with the interstate pipeline system, and therefore LNG provides the only supplemental supply or backup resources in those areas (Exh. NEC-2, at 3-4).

21 National Grid noted that its satellite LNG facilities are in the following locations in the Commonwealth and maximum storage quantities: Dorchester (Commercial Point), 14.4 million gallons; Lynn, 12.6 million gallons; Salem, 12.6 million gallons; Tewksbury, 12.6 million gallons; Haverhill, 5.0 million gallons; South Yarmouth, 2.2 million gallons; and Wareham, 111,000 gallons (Exh. EFSB-N-38).

EFSB-1, at 6, 22). Historically, National Grid refilled its Massachusetts satellite LNG facilities almost exclusively with trucked LNG from the Everett Import Terminal (Exh. EFSB-1, at 13, 19).

NEC noted that the Everett Import Terminal has 40.8 million gallons of storage capacity, 12.0 million gallons per day of vaporization capacity, and a truck loading station (RR-EFSB-8). However, the Everett Import Terminal does not have liquefaction capability (Tr. 1, at 79; RR-EFSB-8).[22] The Everett Import Terminal is co-located with and connected directly by a dedicated pipeline to a 1,600 megawatt ("MW"), gas-fired, electric generating plant known as the Mystic Generating Station; as of 2018, both facilities are owned by Exelon Generation (Exh. NEC-2, at 3-6; Tr. 1, at 77). The Everett Import Terminal is the primary fuel source for the Mystic Generating Station and the Mystic Generating Station is the anchor customer for the Everett Import Terminal (Exhs. EFSB-N-8; Tr. 1, at 86-87).[23]

Trucked LNG from the Everett Import Terminal has historically been the primary source for gas distribution utilities in the Commonwealth and New England to refill satellite storage facilities that do not have liquefaction capabilities (Exhs. NEC-2, at 3-6; EFSB-N-8). However, NEC noted that selling trucked LNG to gas distribution utilities accounts for a relatively small proportion of the Everett Import Terminal's overall capacity and would not be a sufficient market to support the Everett Import Terminal, absent the Mystic Generating Station (Tr. 1, at 85, 91, 93-94).

b. Supply Risks of Existing LNG Resources

i. Everett Import Terminal

In D.P.U. 15-129, National Grid described the Federal Energy Regulatory Commission's ("FERC") 2008 approval of a request by Distrigas (the operator of the Everett Import Terminal at

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22 The Everett Import Terminal is also able to inject vaporized LNG into the local gas distribution network (Tr. 1, at 78).

23 The Siting Board reviewed and approved the construction and operation of Units 8 & 9 and the connecting pipeline in Sithe Mystic Development LLC, EFSB 98-8 (1999). Mystic Generating Station Units 8 & 9 are combined-cycle, natural-gas-fired generating units with a combined capacity of approximately 1,600 MW. Id. The units are connected to the Everett Import Terminal by a 3,000-foot-long 20-inch-diameter pipeline. Id.

the time) for "abandonment of services," thus terminating Distrigas's FERC-regulated tariff and LNG services under that tariff (Exh. EFSB-1, at 19). Following FERC's service abandonment approval and the expiration by 2011 of pre-existing contractual commitments, GDF Suez (a subsequent owner/operator of the Everett Import Terminal) was no longer required to provide LNG to National Grid (id. at 19-20).

After 2011, in order to obtain LNG from the Everett Import Terminal, National Grid negotiated year-to-year market-based contracts with GDF Suez for LNG, and such arrangements reflected rising global LNG prices, rather than conditions in the domestic natural gas market increasingly influenced by abundant, low-cost production of shale gas (id. at 19-21, 25; Tr. 1, at 82). In negotiating market-based contracts, National Grid indicated that it had difficulty securing rates that it considered reasonable (Exh. EFSB-1, at 5, 20). National Grid indicated that, in the winter of 2013/2014, due to limits placed on Everett Import Terminal LNG deliveries by GDF Suez and more lucrative overseas LNG market opportunities, National Grid was unsuccessful in acquiring sufficient LNG to refill its storage tanks (id. at 20-21).[24]

In 2018, Exelon Generation announced plans to retire Mystic Generating Station Units 8 & 9; NEC asserted that, since the Mystic Generating Station is the anchor customer for the Everett Import Terminal, the continued operation of the Everett Import Terminal is uncertain (Exhs. NEC-2, at 3-6; EFSB-N-8). NEC noted that global LNG prices in recent years have been consistently higher and more volatile compared to domestically produced natural gas; as noted above, the imported LNG from the Everett Import Terminal is the primary fuel source for the Mystic Generating Station (RR-EFSB-11). Nevertheless, the Company reported that the Mystic Generation Station is scheduled to stay in operation through May 2024, pursuant to an existing reliability-based cost-of-service agreement with ISO-NE that expires on May 31, 2024 (RR-EFSB-

[24] National Grid reported that to secure even a limited volume it was forced to submit a bid at well above historical pricing (Exh. EFSB-1, at 20). Although National Grid was able to secure an additional 235,000 Dth of LNG from a supplier in New Jersey, National Grid was still unsuccessful in completely filling its tanks before the 2013/2014 winter season (id. at 20-21).

9).[25] NEC anticipates that the retirement of the generating station would threaten the economic viability of the Everett Import Terminal (id.; Exh. EFSB-N-8). As previously noted, the Everett Import Terminal has been the primary source for LNG for local distribution companies in the region, including National Grid, that require trucked LNG to serve their customers (Exhs. NEC-2, at 3-6; EFSB-N-8).

ii. International LNG Imports

NEC asserted that imported LNG, such as that from the Everett Import Terminal, has greater associated environmental impacts, is more expensive, and is less reliably delivered, compared to domestically produced LNG (Exh. EFSB-N-33). NEC claimed that international LNG sources that supply the Everett Import Terminal involve greater environmental impacts due to the long shipping distances and generally less stringent environmental standards where the imported LNG is produced (id.). The Company argued that utility customers have less certainty when securing LNG imports through the Everett Import Terminal due to complex transportation scheduling and logistics, prevailing market conditions, and the LNG procurement practices of the current and recent operators of the Everett Import Terminal (Exh. EFSB-N-8).

National Grid asserted that it has no practical means of mitigating potential disruptions of LNG supply to the Everett Import Terminal such as following the September 11, 2001, terrorist attacks (when LNG deliveries to Boston Harbor were suspended), as well as more recent interruptions of LNG deliveries from Yemen due to terrorism and armed conflict in that country

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[25] To address electric reliability concerns related to the proposed retirement of the Mystic Generating Station, ISO-NE conducted a competitive transmission solicitation process pursuant to FERC Order No. 1000. Constellation Mystic Power, LLC, 172 FERC ¶ 61,144, at 2-3 (2020) (Order Denying Complaint). ISO-NE selected a transmission solution with a proposed in-service date of October 2023, ahead of the retirement of remaining Mystic units on June 1, 2024. Id. at 5. The owners of the Mystic Generating Station filed a complaint with the FERC alleging that ISO-NE violated certain tariff provisions in carrying out the competitive solicitation process and selecting a solution. Id. at 6. In August 2020 FERC issued an order denying the complaint of the Mystic Generating Station owners. Id. at 34-35.

(Exh. EFSB-1, at 22). NEC stated that LNG can also be vulnerable to trade sanctions, which have the potential to make deliveries less dependable (Tr. 1, at 101).

NEC indicated that international LNG is typically indexed to global oil prices that are usually higher and more volatile than natural gas commodity prices in the United States (RR-EFSB-11). NEC claimed that the Everett Import Terminal is a relatively small customer in the global LNG market (with the majority of global LNG being purchased in Asia) with limited ability to negotiate price and terms (id.; Exh. EFSB-N-8). National Grid noted that, in procuring LNG from international suppliers, it faces global price competition from other customers that are willing to pay much higher prices than customers in the U.S., contributing to the utility's difficulty in securing reliable, sufficient quantities of LNG, at reasonable prices (Exh. EFSB-1, at 20). NEC observed that pipelines are the least expensive means of transporting natural gas and that LNG shipped to the Everett Import Terminal would always reflect the cost of vessel transportation from port to port, as well as loading and unloading costs (Tr. 1, at 96-97).

iii. Other Domestic LNG Sources

With respect to relying on domestic liquefaction facilities, NEC argued that existing domestic LNG suppliers are relatively far from Massachusetts customers, and that the added trucking distances and resulting increases in cost and transportation-related emissions would result in a less reliable, more costly, and more environmentally impactful form of service (Company Brief at 36-37, citing Exhs. EFSB-PA-9, EFSB-PA-11, RR-EFSB-16). Based on information compiled by the American Gas Association, the Company indicated that, for distances longer than a few hundred miles, the cost of trucking exceeds the cost of the LNG product itself (RR-EFSB-16).

NEC stated that, given the abundant supplies of low-cost, domestically produced natural gas and improvements in utility-scale liquefaction, the U.S. has become a top exporter of LNG (Tr. 1, at 82). However, the Company argues that obtaining domestic LNG transported by ship to the Everett Import Terminal from other ports in the U.S. is not practicable in the immediate future due to the restrictions associated with 46 U.S.C.A. § 688 (1920), the Jones Act (Company Brief

at 37; RR-EFSB-10).[26] NEC argued that, even if Jones Act-compliant vessels were constructed and available, the vessel's operator would have strong financial incentives to pursue more lucrative international opportunities instead of providing domestic LNG to customers in Massachusetts (Company Brief at 37, citing Tr. 1, at 92-94; RR-EFSB-10).

NEC stated that the Facility's geographic proximity to existing LNG storage facilities in Massachusetts, including those owned by National Grid, would substantially decrease the length of a truck delivery cycle, as compared to more distant providers of trucked LNG (Exh. NEC-2, at 3-5). NEC stated that shortening the truck delivery cycle is an important consideration during extreme cold periods, particularly when the state is faced with harsh weather that limits or restricts the ability of trucks to deliver LNG (Company Brief at 31, citing Exhs. EFSB-N-11, EFSB-N-14, EFSB-N-19).

c. Supply Risks of Other Gas Resources

In further support of its contention that the Project is needed, NEC stated that: (1) interstate natural gas pipeline projects that were proposed to bring incremental capacity to Massachusetts were either cancelled or are unlikely to be completed in a timely manner; (2) although liquid propane is an important peak supply for gas utilities, it is not as flexible,

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[26] The Massachusetts Comprehensive Energy Plan, prepared by the Department of Energy Resources in 2018, states that federal Jones Act requirements in effect preclude shipment of domestic LNG to New England (Exh. EFSB-N-21(1) at 109). The Jones Act, also known as the Merchant Marine Act of 1920, is a federal law regulating maritime commerce in the U.S., that requires that goods shipped between ports in the U.S. be transported on ships that are built, owned and operated by U.S. citizens or permanent residents (id.). There is a relatively small supply of American built, owned and operated vessels compared to the global supply of ships, which combined with a constant to growing demand for goods, means shipping companies charge higher rates shipping within the U.S. because of a lack of competition, with the increased costs passed on to consumers (id.). According to DOER, the issue is magnified with regards to natural gas because the U.S. has cheap and plentiful natural gas, but no Jones Act-qualified carriers (id.). Accordingly, while the U.S. has become a significant exporter of LNG (using foreign-flagged ships), the Everett Import Terminal imports foreign LNG, typically from Trinidad and Tobago (id.). When pipeline natural gas supply is constrained, DOER states that the lack of a fleet of Jones Act-qualified tankers means a bigger price spike due to the need to import LNG from foreign ports (id.).

reliable, or economic as LNG and not useful to the electric generating market need; and (3) that oil resources would not secure any potential economic or gas reliability benefits and would likely detract from environmental goals (Company Brief at 36, n.28, citing Exh. EFSB-PA-13).[27]

d. Precedent Agreement between NEC and National Grid

On May 15, 2015, NEC entered into a 15-year Precedent Agreement with National Grid for liquefaction and delivery service to meet longer-term LNG supply needs in the utility's portfolio (Exh. NEC-2, at 3-3 to 3-4, app. H, at 2 of 16).[28] On August 20, 2015, National Grid filed a

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[27] NEC pointed out that many stakeholders concerned with the costs and impacts of new pipeline projects advocated for a regional liquefaction facility (Exh. NEC-2, at 1-3). For example, NEC stated that the Conservation Law Foundation conducted a study in 2015 and took a position that New England has the key infrastructure to meet natural gas needs, by optimizing and maximizing use of LNG infrastructure rather than building more pipelines (Exh. EFSB-PA-15). The Company quotes Conservation Law Foundation as stating that "[n]ot only is this approach technically feasible, a winter-only LNG 'Pipeline' strategy would provide LNG deliverability throughout New England that would save gas distribution companies and their ratepayers initially over $340 million a year and as much as $4.4 billion over twenty years, as compared to a new pipeline proposal, while providing peak deliverability that will lower winter wholesale electricity prices on a scale comparable to new pipeline capacity additions" (id.). As another example, NEC referred to a 2015 report commissioned by the Massachusetts Attorney General's Office, which concludes that "electricity markets would likely meet any deficiency need through the addition of dual-fuel capability at existing facilities, and/or by contracting for LNG" (id.).

[28] In 2013, due to concerns about the cost, and the uncertainty of LNG supply from the Everett Import Terminal, National Grid prepared a ten-year planning analysis of its customer requirements, as established in D.P.U. 13-01 (Exh. NEC-2, at 3-3). As part of the analysis, National Grid decided to diversify its LNG portfolio so that it would not be reliant on a single, third-party supplier of foreign LNG for the entirety of its requirements in Massachusetts (id.; Exh. EFSB-N-8). National Grid used Department-approved resource screening and comparison methods to review potential resource options and ultimately sought proposals for the development of LNG facilities by third parties (Exh. NEC-2, at 3-3). In D.P.U. 13-01, the Department found that National Grid "developed an appropriate supply planning process that, as a whole, may lead to a least-cost supply plan," and that National Grid had "developed: (1) appropriate criteria for screening and comparing supply-side resources and demand-side resources; and (2) a mechanism to undertake the comparison of resources on an equal basis" (id.).

petition pursuant to G.L. c. 164, § 94A for approval of five agreements for LNG or LNG services, including the Precedent Agreement with NEC, docketed as D.P.U. 15-129 (id. at 3-4).[29]

NEC argued that the Siting Board should rely upon the Department's Order in D.P.U. 15-129, as well as the Company's subsequent updated review of supply alternatives, to find that the Facility is a superior option to supply National Grid and other customers (Company Brief at 35-36).[30] NEC stated that its resource alternatives evaluation stemmed from an iterative planning process undertaken in coordination with its anchor contract customer, National Grid (Exh. NEC-2, at 4-0). NEC stated that National Grid's forecasting and resource planning processes include "appropriate criteria for screening and comparing supply-side and demand-side resources" and a "mechanism to undertake the comparison of resources on an equal basis" (id.).[31]

NEC stated that its Precedent Agreement with National Grid would allow National Grid to fully control the supply, transportation, storage, and delivery of its LNG, improving certainty of supply for a resource that is required during the most demanding and severe weather and market conditions (Exh. EFSB-N-8). NEC further asserted that its service under the Precedent Agreement would improve National Grid's utilization of its existing contracted interstate pipeline capacity (which is already paid for by its customers) and would be advantageous given the recent cancellation of other interstate pipeline projects in the region (Exh. EFSB-N-13). National Grid

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29 National Grid described three of the agreements as short-term "bridge" agreements until the facilities that intended to serve the utility's long-term LNG strategy are operational (Exh. EFSB-1, at 14-15).

30 NEC argues that the Siting Board should find that an appropriate consideration of alternative resources was conducted by the Department, confirmed by the evidentiary presentation in these proceedings, and remains fully valid under current conditions (Company Brief at 38).

31 The Department found in D.P.U. 15-129, based on price and non-price factors, that National Grid's use of a third-party source to meet a significant portion of its LNG needs by liquefying existing pipeline gas supplies, is a key part of an appropriate LNG supply plan (Exh. NEC-2, at 4-0, citing D.P.U. 15-129, at 16-17). Specifically, the Department noted that such a plan is the "most viable, reasonably available alternative" to meet the need of its customer requirements in a least-cost, reliable manner, particularly given the lack of practical capacity or supply resource alternatives. D.P.U. 15-129, at 21.

noted that, with the Project in place, it would be able to utilize its existing capacity during the refill season to access reliable and inexpensive gas supplies sourced from the eastern U.S. (Exh. EFSB-1, at 25). NEC also noted that the Precedent Agreement includes both fixed rates and cost caps that would protect National Grid ratepayers from changes in Project costs (Tr. 1, at 107).[32]

In approving the Precedent Agreement, the Department found that the Facility would enhance National Grid's ability to meet multiple reliability planning standards. D.P.U. 15-129, at 24-25. The Department also found that the Facility would reduce National Grid's reliance on imported LNG and provide access to less expensive gas. Id. at 19. Additionally, the Department found that the NEC Facility would allow for the more efficient use or optimization of existing gas pipeline capacity and that the Precedent Agreement with NEC (among other agreements presented in that proceeding) represented the "most viable, reasonably available alternatives for [National Grid] to meet its customer's requirements in a reliable manner" (Exh. NEC-2, at 3-5). With the successful development of the NEC Project, and an expansion of a National Grid's liquefaction and storage facility in Providence, Rhode Island, National Grid anticipated that it would no longer require imported LNG to meet its customers' needs (Exh. EFSB-1, at 24).

NEC stated that, since National Grid filed its petition in D.P.U. 15-129, National Grid has identified additional suppliers and/or production facilities of LNG, but that such LNG suppliers would not be sufficient for National Grid to meet its full refill requirements (Exh. EFSB-N-39). NEC related that National Grid continues to favor the Project as it would allow the utility to diversify its portfolio and utilize its available interstate pipeline capacity to access reliable and relatively inexpensive gas supplies for liquefaction, and for subsequent use during peak conditions (id.).

NEC indicated that the average lifespan for an LNG facility such as the Project is at least 25 years (Tr. 1, at 140). Once the Precedent Agreement expires in 15 years, NEC indicated that it

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[32] The Department specifically stated that "these provisions will protect ratepayers from possible cost overruns." D.P.U. 15-129, at 20.

would either reinvest in the Facility for continuing operations, or "demobilize [it] if it's not relevant anymore" (id. at 139-140).

2. Additional LNG Market Opportunities in the Commonwealth

NEC proposes to finance and construct liquefaction and storage capacity for the Project beyond the amounts needed to meet its firm commitments to National Grid (Exhs. EFSB-N-2; EFSB-N-3; EFSB-N-6). Specifically, the Company stated that the Project would have approximately 80,000 gallons per day of liquefaction capacity and 1.0 million gallons of LNG storage capacity beyond what is contractually required to serve National Grid (Exhs. EFSB-N-2; EFSB-N-3). Similar to its tolling arrangement with National Grid, NEC indicated that it would not need to obtain its own firm gas transportation capacity or to procure its own natural gas to pursue other merchant LNG market opportunities (Exh. EFSB-N-30).[33]

a. Market Opportunities Related to Gas Distribution Companies

NEC stated that it intends to market the Facility's additional liquefaction and storage capacity to other gas distribution companies in central and western Massachusetts for which the Facility's close proximity could decrease the length of truck deliveries (Exhs. NEC-2, at 3-5; EFSB-N-14; Tr. 1, at 99). NEC stated that reducing the length of truck deliveries is especially important during extreme cold periods, when harsh weather limits or restricts the ability to make deliveries of LNG by truck (Exhs. NEC-2, at 3-5; EFSB-N-14). Figure 2, below, shows the location of potential customer facilities in the Commonwealth relative to the proposed project location in Charlton, as identified by NEC.

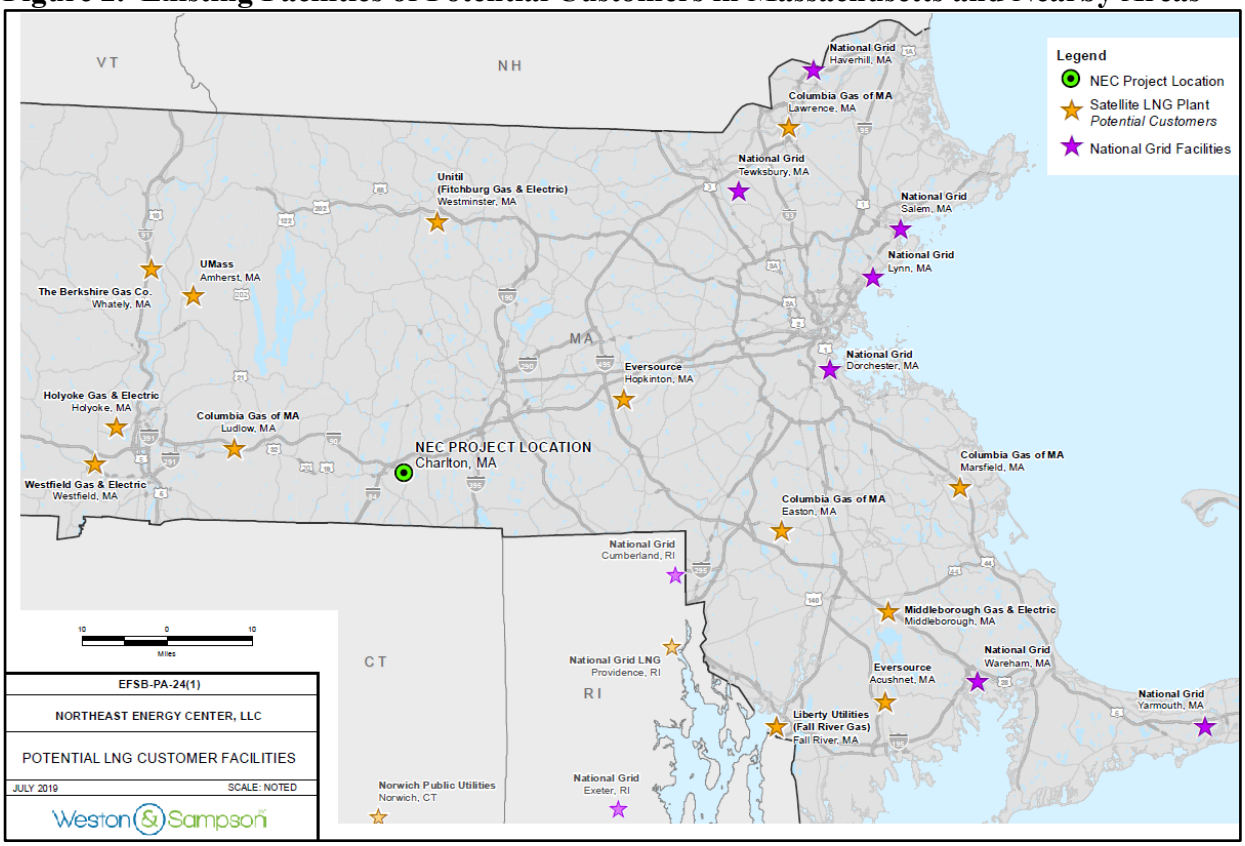
NEC presented that the Massachusetts Comprehensive Energy Plan ("CEP"), prepared by the Department of Energy Resources in 2018, highlighted the importance of LNG as a peaking resource during cold periods of the year when demand for natural gas exceeds the amount that the

[33] NEC noted that, depending on the commercial interests of a particular customer, the customer could procure and arrange delivery of gas to the Facility (Exhs. EFSB-N-30; EFSB-N-31). NEC described this type of transaction as a "tolling" service for its customers (Tr. 1, at 109)

existing pipeline infrastructure can deliver into the region (Exh. EFSB-N-21). According to the CEP, natural gas is used to serve the majority of thermal conditioning needs in the residential, commercial, and industrial sectors of Massachusetts (Exh. EFSB-N-21(1) at 67-69). Even under modeling scenarios contemplating "high renewables and high electrification," the CEP anticipates that natural gas would be required to serve a significant portion of the Commonwealth's thermal conditioning requirements through at least 2030 (Exh. EFSB-N-21(1) at 160-161). As support for the predicted near-term need for natural gas, the most recently approved Forecast and Supply Plans of Boston Gas Company and Colonial Gas Company, each d/b/a National Grid, anticipated growth in customer demand over its forecast period. Boston Gas Company and Colonial Gas Company, each d/b/a National Grid, D.P.U. 18-148, 26-27 (2019); Boston Gas Company and Colonial Gas Company, each d/b/a National Grid, D.P.U. 16-181, 53, 57-58 (2017).[34]

[34] In October 2020, National Grid, petitioned the Department for approval of its next Forecast and Supply Plan for the heating years 2021/2021 to 2024/2025; National Grid anticipates continued customer and gas demand growth over the forecast period. See D.P.U. 20-132, Petition of Boston Gas Company d/b/a National Grid, for review and approval of its five-year Forecast and Supply Plan for the period November 1, 2020, through October 31, 2025, at 98 (October 30, 2020) (pending). The Department has not yet ruled on National Grid's petition.

Figure 2. Existing Facilities of Potential Customers in Massachusetts and Nearby Areas



Source: Exh. EFSB-PA-24(1).

Note: "Columbia Gas of MA" facilities identified on this map in Ludlow, Easton, Marshfield, and Lawrence are now owned and operated by Eversource Energy. See Eversource Energy, NiSource Inc., Eversource Gas Company of Massachusetts, and Bay State Gas Company d/b/a Columbia Gas of Massachusetts, D.P.U. 20-59/19-140/19-141, 69-70 (2020).

According to NEC, only three out of twenty LNG storage facilities in Massachusetts have liquefaction capability, indicating that the remaining satellite facilities are filled only with trucked LNG (Exh. EFSB-N-36). NEC stated that the lack of liquefication capacity relative to the number of storage and vaporization facilities in the Commonwealth represents an attractive market that could be served cost effectively by the Company (Exh. EFSB-N-9). NEC reported that Massachusetts gas distribution companies, such as Fitchburg Gas and Electric Company d/b/a Unitil, NSTAR Gas Company d/b/a Eversource Energy, Berkshire Gas Company, and Columbia

Gas Company have all been previously reliant on the Everett Import Terminal (Exh. EFSB-N-8).[35] NEC reported that its preliminary discussions with some of these entities confirmed its view that additional liquefaction and storage capacity is warranted for the Project (Exhs. NEC-2, at 3-5; EFSB-N-16). NEC indicated that prospective utility customers were interested in diversifying their LNG supply in order to maintain reliable, cost-effective service (Exh. EFSB-N-8). NEC stated that it has received requests for proposals from gas distribution companies in the Commonwealth and New England for firm and spot LNG deliveries including Columbia Gas of Massachusetts, Eversource Energy, Avangrid (UIL), Holyoke Gas & Electric, and Middleborough Gas & Electric (Exh. EFSB-N-11).

b. Market Opportunities Related to the Power Generation Sector and Other Industrial Customers

NEC asserted that the Facility's additional liquefaction and storage capacity could also be useful as a backup gas supply for gas-fired electric generating plants in the Commonwealth (Exh. EFSB-N-3). NEC explained that gas plants may be unable to secure fuel at a reasonable price when pipeline capacity is fully utilized by firm customers (Tr. 1, at 114). Thus, during extreme cold periods, generators with existing fuel reserves on-site, such as a coal- or oil-fired generators, may be dispatched more frequently (id. at 73, 76-77; Exh. EFSB-N-21(S1) at 8-9).[36] NEC asserted that, as many coal- and oil-fired generators have retired in recent years, fuel security has become an increasingly important issue in terms of cost and reliability of electricity service in the Commonwealth and New England (Exh. NEC-2, at 3-6; Tr. 1, at 73-74). NEC also noted that

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35 NEC noted that, although these gas distribution companies could represent potential future business opportunities, the Company has not entered into any agreements with other gas distribution companies at this time (Exh. EFSB-N-8).

36 As an example, during a cold snap lasting from December 26, 2017 through January 9, 2018, NEC reported that the New England electric generation fuel mix was 25 percent natural gas, 28 percent nuclear, 24 percent oil, 7 percent hydroelectric, 12 percent refuse, solar, wind, and wood, and 6 percent coal (Exh. NEC-2, at 3-6). This compares to an average fuel mix during 2017 of 47 percent natural gas, 31 percent nuclear, 8 percent hydroelectric, 11 percent refuse, solar, wind and wood, and the balance, a mix of coal, oil, and other miscellaneous fuels (id.).

coal- and oil-fired generators typically produce more air pollution compared to gas-fired generators (Exh. NEC-2, at 3-7). Therefore, NEC claimed that providing LNG as a backup fuel for the power generation sector would help to address the reliability, economic and environmental concerns associated with the unavailability of pipeline gas during the winter season (Exh. EFSB-N-3).

NEC described a fuel-security program developed by ISO-NE in response to winter-time reliability concerns (following the 2014 "polar vortex") and a request from FERC (Exh. EFSB-N-21(S1) at 8; Tr. 1, at 114-117). NEC indicated that the fuel-security tariff would allow a power generator to recover costs related to securing backup fuel that would help ensure reliable generation (Tr. 1, at 114-115). NEC explained that the tariff does not specify a mechanism for how backup fuel is delivered or stored (id. at 117-118). For example, NEC stated that trucked LNG could be delivered to a gas-fired generator that has either permanent storage and vaporization equipment or a temporary vaporization skid, or by direct vaporization and pipeline connection (id. at 117-118, 125; Exh. EFSB-N-21(S1) at 13).[37]

NEC stated that it views the fuel-security program administered by ISO-NE (under a temporary tariff) as a market opportunity for the Company (Tr. 1, at 122). However, NEC acknowledged that with only a temporary tariff, it may be difficult for companies to justify infrastructure investments that would allow gas-fired generating plants to fully take advantage of LNG as a backup fuel (id.). NEC indicated that it expects ISO-NE to pursue a long-term market-based tariff with FERC, and that such a long-term program would create a natural opening for LNG in the New England fuel-security market (id. at 122, 126).[38]

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37 Although the Project is not proposed with vaporization capacity, NEC indicated that, if vaporization were installed at a later date, the Facility could serve a number of gas-fired generators lacking backup fuel capability that are connected to the TGP mainline (Exh. EFSB-N-21(S1) at 7-11; Tr. 1, at 123-124).

38 On April 15, 2020, ISO-NE submitted a proposal for a long-term tariff to address the need for secure backup fuel at electric generators as part of revisions to the ISO-NE Transmission, Markets and Service Tariff. See ISO New England Inc., 173 FERC ¶ 61,106, at 1 (2020). FERC rejected the tariff as proposed by ISO-NE in an order issued on October 30, 2020. Id. However, FERC left open the possibility that ISO-NE could revise

NEC further noted that LNG is an attractive alternative to diesel in the rail, heavy truck, and marine fuel markets, and for on-road, high-horsepower vehicles, concluding that the Facility could provide cost and environmental benefits in these sectors as well, including reductions in carbon emissions (Exh. NEC-2, at 3-7 to 3-8, 4-1). The Company asserted that the lack of merchant LNG supply and available fueling is a chief bottleneck in the adoption of natural gas-powered trucking, rail, and maritime vehicles, and that the expansion of LNG resources in the Commonwealth could support early adoption of LNG by such large users of diesel (id. at 3-8). During the proceeding, NEC mentioned a number of other potential development opportunities associated with the Project; for example, NEC's HCA with the Town of Charlton states that NEC and the Town would "collaborate in evaluating possible opportunities for provision of natural gas distribution service to customers located within the Town" (Exh. EFSB-Z-26(S1)(1) at 4).[39,40]

C. Positions of the Parties

1. PLAN

PLAN argues that while the Company is proposing to "build a market for its LNG in the transportation sector," LNG is too carbon-intensive to be embraced as fuel for transportation at a time when the Commonwealth seeks to shift towards significantly lower emissions in this sector (PLAN Brief at 4, citing Exh. EFSB-N-5).[41] In addition, PLAN argues that use of LNG in the

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its proposal and stated that, should ISO-NE persist in pursuing a solution to address to this issue, the FERC "encourage[s] [ISO-NE] to explore a market-based reserve product that provides resources sufficient lead time and ability to acquire fuel or take other steps necessary to be able to deliver energy when needed." Id. at 26.

39 Charlton does not currently have natural gas distribution service (Tr. 1, at 158). The Siting Board notes the statutory requirements for establishing a natural gas distribution franchise. See e.g., G.L. c. 164, §§ 30, 34, 55.

40 NEC also indicated that it is contemplating how LNG facilities, including the Project, could be used for biogas and is in the early stages of considering whether its facilities could be used with natural gas created from a methanization process (Tr. 2, at 262-265).

41 In Exh. EFSB-N-5, the Company stated that it "is confident that such capacity can be marketed, on either firm or interruptible basis, to other gas distribution companies,

heating sector as a "stop gap" or "bridge fuel" does not warrant investment in a new, large-scale, permanent facility (PLAN Brief at 4). Justification that gas is better than oil falls short, PLAN argues, because superior clean renewable and demand-side options are available (id. at 5). PLAN also contends that the Company's desire to be the domestic replacement for the Everett Import Terminal is incompatible with decreasing reliance on fossil fuels, and with preferencing renewable energy and storage, coupled with demand-side measures, wherever feasible (id. at 4).

PLAN asserts that the Facility as proposed is unneeded because it is "overbuilt" (id. at 3-4). PLAN states that the current Facility design has a liquefaction capacity that is approximately 50 percent in excess of the Company's firm commitments, and a storage capacity of 1.0 million gallons in excess of its firm commitments, or twice its firm commitments (id.).

PLAN argues that, in light of recent state climate policies including the 2050 Decarbonization Roadmap, the Project "has become an idea whose time has passed" and that the Project is "obsolete" (PLAN February Letter at 4). PLAN submits that demand for natural gas in the Commonwealth will decline over the next decade due to electrification of the space heating sector (id.). PLAN also submits that an increase in renewable generating resources on the grid will diminish the need for LNG as a backup fuel for natural gas fired power plants (id. at 5). PLAN claims that, given the purported decline in demand, the Project could become a stranded asset (id. at 6).

2. Gaz Metro

Gaz Metro submits that the decision of the Siting Board "must not be driven by the reliability of the actual sources of LNG, but solely by the real need of a new LNG facility to support the market needs" (GMLNG Brief at section D.1). Gaz Metro asserts that the aggregate capacity of existing LNG supply sources in the northeast U.S. and eastern Canada is more than capable of meeting the refill requirements of customers in the region without the construction of the Project, referencing information (not in the evidentiary record) about LNG sources outside of New England (id. at section C.2.a). Considering the above, Gaz Metro submits that the Siting

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municipal utilities, gas-fueled power generators and transportation customers in Massachusetts" (PLAN Brief at 4, n.5).

Board must conclude that NEC has not met its burden of proof regarding the need and the reliability of the Facility, considering available alternatives (id. at section D.2).

Gaz Metro disputes NEC's claim that the Project could meaningfully serve the fuel-security market for electric generators in ISO-NE (GMLNG Brief at Section C.2.e-h). Gaz Metro claims that, to its knowledge, there are no gas-fired generators in ISO-NE with LNG storage and vaporization equipment, and therefore it argues that the Project would have no customers to serve in the fuel-security market without vaporization equipment (id. at section C.2.g). Gaz Metro further submits that, even if NEC installed vaporization equipment in the future at the Project location, the Facility's liquefaction and storage capacity is undersized relative to the average daily fuel requirements of a gas-fired generator in the ISO-NE region (id. at section C.2.f). Therefore, Gaz Metro suggests that the Project will not significantly impact the reliability of the region's generation fleet (id.).

3. Company Response

NEC argues that PLAN does not address record evidence of important reliability, economic efficiency, and environmental improvement opportunities resulting from the Project (Company Reply Brief at 4-5). NEC further argues that PLAN ignores the fact that the Facility will likely reduce aggregate natural gas deliveries into the Commonwealth, particularly foreign-sourced LNG, noting that Massachusetts gas utilities and generation plants currently must import substantial quantities of foreign LNG as part of their supplies (id. at 4). The Company argues that PLAN also ignores reductions in greenhouse gas emissions associated with the Facility's design and operation, noting that the Department's Order in D.P.U. 15-129 and the Company's analysis in this case demonstrate that the greater use of domestic, centrally located LNG would reduce greenhouse gas emissions in the delivery of LNG to utilities such as National Grid (id., citing PLAN Brief at 5-6). The Company argues that potential use of LNG instead of oil as a back-up fuel for the electric generation sector could result in substantial emission reductions, pointing to recent cold snaps that required extensive use of back-up oil with high emissions (Company Reply Brief at 4).

In response to Gaz Metro's assertions about the need and the reliability of the Facility, NEC argues that during the course of the Proceeding, the Company provided updated information

about the LNG market and related supply and demand factors (NEC Response to GMLNG at 1). NEC asserts that National Grid confirmed that its contract with NEC (and the Department's prior approval of that contract) remained valid and appropriate, and, in fact, is even more important and needed now (id., citing Company Brief at 30).

NEC argues that there is no evidence in the record of this proceeding to counter National Grid's and NEC's comparative analyses of alternative sources of LNG (NEC Response to GMLNG at 1). Specifically, NEC argues that Gaz Metro can point to no proper evidence to suggest that the Everett Import Terminal will remain viable or that foreign LNG supplies are economic or reliable (id.).[42] On this matter, NEC reiterates its argument made in its Brief (at 36-38) that, compared to other LNG facilities outside of the Commonwealth, its proposed Facility is superior in terms of cost, reliability, the economic utilization of existing gas distribution company assets (i.e., existing natural gas pipeline capacity during off-peak time for feed gas), and environmental attributes (id. at 2). The Company points out further that using existing facilities like Gaz Metro (which is in Montreal) would require long-haul trucking, adding significant costs and increasing vehicular emissions (id. at 1; see GMLNG Brief at Section C.2.1).

In addition, NEC argues that such remote sources are inherently less reliable, particularly during peak demand periods in the winter, in emergencies, in adverse weather, or other adverse traffic conditions (NEC Response to GMLNG at 2). The Company argues that another unique and important benefit reflected in the Precedent Agreement is that National Grid would have control over liquefaction, storage, and trucking and that, unlike other LNG sources, such control provides National Grid with reliability and economic benefits for its customers in a range of market or economic conditions (id.).

In response to Gaz Metro's argument that the Facility is undersized for serving the fuel-security market, NEC counters that reliability-related fuel supplies are not typically required for a 24-hour period (NEC Response to GMLNG at 2). NEC maintains that, in Massachusetts, the

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42 NEC also noted on March 20, 2020, that it was submitting its reply comments coincident with news that the U.S. and Canada had agreed to substantially restrict border crossings in response to the COVID-19 outbreak (NEC Response to GMLNG at 1).

gas system is subject to the greatest demand during critical hours of a peak day, and that the Facility would be well positioned to serve fuel security needs in the generating sector (id.).

D. Analysis and Findings on Need

The record shows that LNG is a critical peaking resource for National Grid and other gas distribution companies in Massachusetts. Satellite LNG facilities serve approximately 40 percent of National Grid's design day send out requirements, when demand for natural gas exceeds the amount that existing pipeline infrastructure can deliver into the region. Most satellite LNG facilities in the Commonwealth, including nearly all of National Grid's, do not have liquefaction capabilities and must be refilled with LNG delivered by trucks. National Grid's most recently approved Forecast and Supply Plan did not anticipate any decrease in customer demand for natural gas, and as indicated by the 2018 CEP, natural gas is expected to remain a key component of the Commonwealth's energy supply for decades, even under aggressive scenarios of increasing space heating and transportation electrification and renewable power generation. Given the dim prospects for major new interstate natural gas pipeline capacity into Massachusetts, the Siting Board concurs with the Department's most recent forecast approvals from 2016 that National Grid will continue to rely on LNG as a peaking resource for the foreseeable future.

The record shows that the Everett Import Terminal is currently the only LNG provider in New England capable of satisfying National Grid's full refill requirements. Although the Everett Import Terminal has long played a key role in providing the necessary volumes of trucked LNG for Massachusetts gas distribution companies, such LNG sales account for a relatively small proportion of the Everett Import Terminal's overall business. Rather, the Everett Import Terminal's anchor customer is the Mystic Generating Station.

Historically, the owner/operator of the Everett Import Terminal sold trucked LNG to National Grid under a FERC-regulated tariff; however, after FERC approved an "abandonment of service" request, and certain favorable long-term contracts expired, National Grid and other LDCs – as well as the Mystic Generating facility – face the prospect of obtaining LNG from the Everett Import Terminal at market-based prices that reflect global LNG market conditions and generally much higher prices than domestic pipeline natural gas supplies. Internationally, LNG is typically

indexed to global oil prices, leading to higher costs and greater volatility compared to domestic natural gas. LNG shipped by vessel also includes additional fixed costs such as delivery from port to port and loading and unloading. As a relatively small customer, the Everett Import Terminal has a limited ability to influence price and terms in the global LNG market, where overseas customers appear to be willing to pay much high prices for LNG than customers in the U.S. As a result of these conditions, the record shows that National Grid has had difficulty securing a sufficient volume of LNG at a price it finds reasonable. Additionally, the Siting Board notes that international LNG shipments to Everett Import Terminal are subject to unique reliability risks, such as trade sanctions or physical disruptions affecting exporting countries.

The record shows that the primary fuel source for the Mystic Generating Station is re-gasified LNG from the Everett Import Terminal; as such, operating the Mystic Generating Station is subject to global LNG prices, which in recent years have been consistently higher than domestic pipeline gas supplies. Considering the relatively high price of its fuel source, the Mystic Generating Station is at a competitive disadvantage compared to other gas-fired power plants that are primarily served by interstate pipelines delivering domestic natural gas.

In 2018, Exelon Generation announced plans to retire the Mystic Generating Station; the plant is currently operating under a reliability-based agreement with ISO-NE through May 2024. Recently, ISO-NE completed a successful competitive transmission solicitation and selected a transmission solution that resolves the reliability need in the Greater Boston area associated with the retirement of the Mystic units on June 1, 2024; the ISO-NE-contracted transmission solution has a proposed in-service date of October 2023. The announced retirement of the Mystic Generating Station, and the likelihood of a competitive transmission solution entering service as an alternative means of ensuring electric system reliability in the Greater Boston area, augments doubts about the long-term viability of the Everett Import Terminal as a source of needed LNG supplies for National Grid, and other LDCs. Without the revenue and LNG purchase volumes from the Mystic Generating Station, the record in this proceeding, and in related Department proceedings, raises significant doubts about the Everett Import Terminal's viability and long-term continued operation as source of LNG supply to LDCs in Massachusetts and New England region.

Given the relative low cost of domestic natural gas supply, the U.S. is now a top exporter of LNG; however, due to vessel requirements imposed by the Jones Act and the relatively limited stock of LNG tankers built in the U.S., the Everett Import Terminal, and by extension the Mystic Generating Station, are unable to take advantage of domestically produced LNG that could otherwise be delivered to Everett by ship. Although National Grid's satellite LNG storage facilities could be refilled by trucks originating from more distant sources, the record shows that, for distances greater than a few hundred miles, the cost of trucking exceeds the cost of the LNG itself. The Siting Board shares the Company's concern that LNG trucked from distant sources carries additional environmental, reliability and safety risks, as well as added costs, particularly during inclement conditions when LNG may be critically needed.

The Siting Board is not convinced that a different plan, such as trucking LNG from liquefaction plants outside New England, or somehow eliminating the peak demand that National Grid serves with satellite LNG storage on the coldest days (as discussed above in Section II.B.1.a), could be achieved as reliably and cost-effectively as the Project would. In particular, the record supports the Company's argument that developing a local supply of LNG would be more reliable, cost-effective, and environmentally beneficial than trucking LNG from more distant suppliers.

In light of the above, National Grid sought to diversify its LNG portfolio and, as part of its long-term LNG strategy, contracted with NEC for liquefaction, storage, and truck loading services. The resulting Precedent Agreement, reviewed and approved by the Department in D.P.U. 15-129, would account for the majority of the Facility's liquefaction and storage capacity and serves as the cornerstone for NEC's Project.

The record shows that, between this Project and another National Grid-led LNG facility development in Rhode Island, National Grid would no longer require LNG from the Everett Import Terminal. Under the terms of the Precedent Agreement, National Grid would fully control the supply, transportation, storage, and delivery of its LNG from the Facility. The Project would improve National Grid's utilization of its existing interstate pipeline capacity (already paid for by its customers) and allow National Grid to access reliable and inexpensive natural gas for the purpose of refilling its own storage facilities. The Siting Board anticipates that this improved utilization would help offset the need for additional interstate pipeline capacity, largely to serve

wintertime peaking needs. Furthermore, the Precedent Agreement includes both fixed rates and cost-caps for services provided to National Grid; thus, NEC bears the financial risk of operations, rather than National Grid and its ratepayers. The Siting Board further observes that, in D.P.U. 15-129, the Department found that the Facility's service would be needed in order for National Grid to be able to meet multiple reliability planning standards.

NEC has taken on and is financing liquefaction and storage capacity beyond the minimum amount needed to meet its firm commitments to National Grid. The record shows that other gas utilities in and around the Commonwealth have used LNG trucked from the Everett Import Terminal and these companies, like National Grid, may need a more reliable source of trucked LNG in the future. The Facility would be centrally located with respect to existing LNG storage facilities and the record indicates that there is commercial interest for NEC to provide such a service.

The record also shows that NEC intends to market its additional capacity to gas-fired electric generators for use as a back-up fuel. Specifically, ISO-NE has implemented a temporary fuel security program and it may pursue a permanent, market-based solution to help ameliorate future electric reliability concerns, particularly during the winter. The fuel security program may incentivize gas fired generators to install equipment to use LNG as a backup fuel during exceptionally cold periods when excess capacity on interstate pipelines is limited or too expensive. If gas-fired generators use LNG as a backup fuel during extreme cold periods, the dispatch of other, less efficient fossil-fuel generators may be avoided. The record also shows that LNG could be used as an attractive alternative to diesel in heavy vehicles and vessels, which has potential for growth.

In light of the above considerations, the Siting Board finds that there is a need for the Facility's liquefaction and storage capacity that would serve the terms of NEC's Precedent Agreement with National Grid in an economic and reliable manner, with less environmental impacts than other alternatives. Furthermore, the Siting Board finds it reasonable for NEC to construct its Facility with additional capacity to pursue merchant opportunities with other gas distribution companies, electric generators, and/or heavy transportation customers. The Siting Board notes that, similar to merchant generators under §69J¼, NEC alone bears the financial risk

for the success or failure of its market-based endeavors – not captive ratepayers. Serving other gas distribution companies that currently rely on the Everett Import Terminal could secure reliability benefits for customers in the Commonwealth. Wintertime electric reliability has been a growing concern in the Commonwealth; providing an additional source of backup fuel could lead to reliability, cost, and environmental benefits for the electric customers in Massachusetts. Given the above considerations, the Siting Board finds that there is a need for additional natural gas facilities, such as the Project, to meet reliability, economic efficiency, and environmental objectives in the Commonwealth.

III. ALTERNATIVE APPROACHES TO MEETING THE IDENTIFIED NEED

A. Standard of Review

General Laws, 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 natural gas; and (3) a reduction of requirements through load management. Lowell-Tewksbury at 19; Colonial Gas (2016) at 11; see also NSTAR Electric Company d/b/a Eversource Energy, EFSB 19-03/D.P.U. 19-15 (2021) ("Andrew-Dewar") at 24; Sudbury-Hudson at 27; NSTAR Electric Company d/b/a Eversource Energy, EFSB 16-02/D.P.U. 16-77, at 13-14 (2018) ("Needham-West Roxbury").[43] In implementing its statutory mandate, the Siting Board requires a petitioner to show that, on balance, its proposed project is superior to alternative approaches in terms of cost, environmental impact, and ability to meet the identified need. Lowell-Tewksbury at 19; Colonial Gas (2016) at 11; Berkshire Gas (2006) at 12-13; see also Andrew-Dewar at 24. In addition, the Siting Board requires a petitioner to consider reliability of supply as part of its showing that the proposed project is superior to alternative project approaches. Lowell-Tewksbury at 19; Colonial Gas (2016) at 11; Berkshire Gas (2006) at 12-13; see also Andrew-Dewar at 24.

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

B. Gas Liquefaction Process and Storage Technology Selection

The Company stated that a "no-build" option would not allow National Grid to meet its resource requirements "and was, therefore, rejected as is reflected in the Department's findings" (Exh. NEC-2, at 4-0).[44] Further, energy efficiency and load management resources, while beneficial and being implemented at substantial and nation-leading levels, would not be able to be realized within a reasonable timeframe to eliminate National Grid's need for LNG to satisfy 40 percent of its projected peak winter day requirement (Company Brief at 36, n.28, citing Exh. EFSB-PA-14).

In its evaluation of Project Need, the Board considered factors such as the availability, costs, and risks associated with other existing sources of LNG or additional pipeline gas (see Section II.B). As discussed above in Section II.D, establishing a regional gas liquefaction, storage, and truck loading Facility is a superior approach compared to other foreign or domestic means of meeting peak sendout requirements of National Grid and other gas distribution companies in the Commonwealth. Therefore, this section focuses on the selection of appropriate liquefaction and storage technologies for the proposed Project.

1. Company Description

The major components of the Facility would include a gas pretreatment system, a gas liquefaction system, an LNG storage tank, an LNG truck-loading system, and a number of ancillary systems, as described in Section I.A, above (Exh. NEC-2, at 2-4). NEC stated that the same components and systems would be used, regardless of the site selected (id.).

NEC explained that, for the liquefaction process to work properly, the limited amount of impurities in the feed gas stream must first be removed, because these impurities could otherwise freeze at cryogenic temperatures within the liquefaction process equipment (id.; Tr. 2, at 227-228). The Company stated that its selected gas pretreatment system is widely used at other LNG facilities and would consist of three primary components: (1) a coalescing filter/separator to remove free particles and water; (2) an amine wash system to remove carbon dioxide from the feed

[44] A no-build option is not expressly mentioned in the Department's approval of the Precedent Agreement in D.P.U. 15-129.

gas to less than 50 parts per million by volume ("ppmv"); and (3) a molecular sieve system to remove any remaining water prior to liquefaction to less than 1 ppmv (Exh. NEC-2, at 2-4).

The treated feed gas would then enter a gas liquefaction system (id.). The gas liquefaction system is designed to produce approximately 250,000 gallons per day of LNG under normal conditions, using gaseous nitrogen as the refrigerant for the system (id.). Liquefaction technology is based on refrigeration cycles, which takes warm, pretreated feed gas and cools it through cryogenic heat exchangers into a liquid product (RR-EFSB-15).

NEC stated that an alternative gas liquefaction technology known as a cascade process is more efficient but also more expensive (RR-EFSB-15). NEC stated that a cascade process is only typical for much-larger facilities, such as a baseload LNG export terminal providing over 500,000 gallons of LNG per day (id.). The Company explained that the cascade process for liquefaction requires separate refrigerants, usually hydrocarbons such as butane, propane, ethylene, and methane for different portions of the LNG cooling cycle (id.). Each refrigerant requires a separate compression, expansion, and heat exchange portion of the liquefaction process (id.). Plants with cascade technology also require on-site storage and processing of flammable refrigerants (id.).

Mixed refrigerant processes are slightly less efficient than cascade processes but are common in small scale applications (id.). A single refrigerant loop is used with a mixture of light hydrocarbons (and sometimes nitrogen) (id.). These facilities also require on-site storage and processing of flammable refrigerants (id.).

Nitrogen recycle processes use technology from the industrial gas business (RR-EFSB-15). Nitrogen recycle process efficiency is slightly less than a mixed refrigerant process and requires additional processing equipment but, for utility-scale peak shaving applications (less than 300,000 gallons per day), the increase in operating costs is more than offset by lower capital costs (id.). An additional safety-related benefit of the nitrogen recycle process is that it uses inert nitrogen as the refrigerant instead of flammable refrigerants (id.). NEC stated that nitrogen recycle liquefaction systems are common in the industrial gas industry and are becoming the norm in smaller LNG facilities such as the Project as well as current LNG projects in Hopkinton, Massachusetts, and in Providence, Rhode Island (id.; Exh. NEC-2, at 2-4, 2-5).

NEC stated that it evaluated three options for the drive system for the nitrogen compressor required for liquefaction: a gas turbine drive, an electric motor drive, and a hybrid system using a smaller gas turbine with an electric motor (Exhs. NEC-2, at 2-9; EFSB-A-10(1)(S2) at 50). NEC described the upfront capital cost and annual operating costs for each option, which are summarized in Table 1, below. NEC estimated annual operating costs of each option based on the liquefaction system operating for 270 days per year for 24 hours per day (Exh. EFSB-A-10(1)(S2) at 50).

Table 1. Cost Comparison of Drive System Options

	Gas Turbine Drive	Electric Motor Drive	Hybrid Drive
Upfront capital cost	$13M	$7M	$13M
Annual operating cost	$2.9M	$8.0M	$3.8M

Source: Exh. EFSB-A-10(1)(S2) at 50

NEC initially considered using a gas turbine drive, despite the upfront capital cost being almost double the capital cost of an electric motor drive (Exh. EFSB-A-10(1)(S2) at 50). The Company explained that the investment would quickly be recovered through reduced operating cost; NEC maintained that the reduced annual operating cost of the gas turbine would provide for a direct savings to NEC's customers in the cost of LNG produced as it is a pass-through cost (id.). NEC reported that the overall energy efficiencies of using a gas turbine system and an electric drive system motor are similar (id.). The Company also reported that the use of the gas turbine drive provides for a higher level of reliability than the electric motor drive because outages on the gas transmission system are less likely than on the electric transmission system (id.).

Over the course of Project development, NEC decided to propose a hybrid drive system that is a combination of a smaller gas turbine with an electric motor (Exh. EFSB-A-10(1)(S2) at 50). The gas turbine would be used as the primary drive for the nitrogen compressor and the electric motor would be used to boost power to full capacity (id.). According to the Company, the advantage of the hybrid system is that it would provide additional operating flexibility to the system by providing further turndown capacity of the liquefaction system (id.). This would allow the gas turbine to run more efficiently because it would normally be fully loaded (id.). Additionally, by choosing a hybrid motor/generator, surplus power from the gas turbine can be used to generate electrical power for Facility loads or for delivery back to the electric grid (id.).

NEC stated that, as indicated in Table 1, above, a hybrid drive system has a capital cost in line with the cost of the larger gas turbine drive but has annual operating costs about 30 percent higher (Exh. EFSB-A-10(1)(S2) at 50). A hybrid system would initially be more expensive than an electric motor, but with annual operating costs about 50 percent lower (id.). Although an electric motor system would not generate emissions at the Facility, NEC noted that the electric grid would need to supply about 9,000 kW of electric power to the Facility, potentially resulting in increased emissions wherever the power is generated (id.). In its air permit application to MassDEP, NEC asserted that, based on the ISO-NE Electric Generator Air Emissions Report from April 2019 and assuming transmission and distribution losses of five percent, net air emissions between the gas turbine system and electric drive system would be comparable (id. at 50-51).

NEC stated that it selected a hybrid drive system to provide a balance of reducing direct Facility emissions by using a smaller turbine and lower annual operating cost (Exh. EFSB-A-10(1)(S2) at 50-51). NEC judged the additional operating cost compared to a gas turbine worthwhile given the reduced local air emissions and the additional operational flexibility of the hybrid drive for the nitrogen compressor (id. at 50). As described in Section V.D.6, MassDEP's Proposed Air Quality Plan Approval states that emissions from the proposed hybrid drive represent the Best Available Control Technology ("BACT") (Exh. EFSB-A-5(1)(S1) at 4).

For storage, NEC selected a single, vertical (i.e., flat-bottomed), low-pressure, full-containment, field-erected LNG storage tank with a net usable capacity of 2.0 million gallons (Exh. NEC-2, at 2-5). The Company indicated that there are three types of flat-bottomed tanks that can store LNG: single-containment; double-containment; and full-containment (Exh. EFSB-PA-4).

NEC indicated that a single-containment tank has an inner tank designed to contain LNG, and an outer housing to house insulation (id.). The Company added that a single-containment tank would require an independent secondary impoundment system such as a diked area (id.).

The Company described a double-containment tank as a single containment storage tank that is surrounded by an additional secondary container, within 20 feet of the inner tank, designed to contain liquid LNG in the event of a spill from the inner tank (Exh. EFSB-PA-4). The Company noted that this secondary container can act as an impoundment system but would be

open to the atmosphere on top and would thus release LNG vapors in the event of a spill from the inner tank (id.).

NEC compared a full-containment storage tank design to a thermos bottle, with its tank-within-a-tank design (Exh. NEC-2, at 2-5). The inner alloy-steel tank would provide the primary containment for the LNG (id.). The outer tank would be constructed of reinforced concrete, with a steel liner on the outside (Exh. EFSB-PA-5). NEC stated that the outer tank will serve two purposes: (1) to contain the vapor pressure of the tank, which is normally only about 1 psig; and (2) to act as the impoundment "dike" specified by the Siting Board's regulations, for the very unlikely case of a leak in the inner tank, capable of containing both LNG and, with controlled venting or flaring, vapor (Exhs. NEC-2, at 2-5; EFSB-PA-4; EFSB-PA-6). See Section VI. Insulation will be between the inner and outer tanks, below the floor of the tank, and above the ceiling of the tank and below the dome roof (Exh. NEC-2, at 2-5).

NEC explained that the full-containment design is state-of-art for LNG storage and compared it favorably to "more traditional" single-containment tanks (Exh. NEC-2, at 2-5). The Company indicated that the design of a full-containment tank allows for a much smaller impoundment structure than a single-containment option (Exh. EFSB-SS-6). The Company acknowledged that because a double-containment tank has an open-air outer tank, the site would be required to have a larger setback to address potential emergencies (id.). The Company noted that, as an additional safety feature to prevent leaks, the inner storage tank will have no piping penetrations below the maximum LNG level of the tank (Exh. NEC-2, at 2-5).

2. Positions of the Parties

The Town of Charlton, during the course of the proceeding, expressed concern about the Company's proposed impoundment system. The Town of Charlton asserted that the impoundment system as proposed in the Original Petitions is more suitable as it provides a large open LNG-spill containment system removed from other site operations and readily accessible by emergency personnel (Exh. EFSB-TOC-6). The Town stated that such a system also provides flexibility to address unanticipated needs without compromising or complicating space assigned to other needs or adjacent uses and would be more accessible for repairs and maintenance (id.). The Town

further opined that such a system is more suitable from a safety and emergency response standpoint since the impoundments would be readily accessible and relatively easy to monitor visually (id.). Charlton noted, however, that the choice of containment is highly influenced by which site is selected (id.).[45]

With execution of the HCA between the Town and NEC, the Town no longer objects to Project at the Route 169 Site, which includes use of a full-containment LNG storage tank (Exh. EFSB-Z-26(S1)(1) at 4-5, 14). Further, the Town and NEC agreed that NEC will do the following, as described in Section V.D.8: NEC will engage with the Town Fire Chief and Fire Department during the design and construction phases to ensure they are informed and can provide meaningful input into the Town's safety needs, including with respect to the design baseline and construction safety plan (id. at 3-4). NEC will also work to ensure that the Fire Chief and Fire Department, and relevant first responders in neighboring municipalities, are periodically informed regarding Project operations and are prepared to respond to any calls related to the Project (id.). NEC will, at its cost, provide specific Project-related education and training opportunities to members of the Fire Department and to first responders in neighboring municipalities (id.). NEC shall periodically review its Operational Safety Plan and any emergency action or disaster recovery plans with the Town Fire Chief (id.).

C. Analysis and Findings on Alternative Approaches

The Company has selected standard means for gas pre-treatment, including an amine system and a molecular sieve, and has selected a low-hazard nitrogen refrigeration system driven

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[45] Assuming similar siting conditions and construction controls, Charlton would generally consider a full-containment system to be more capable of containing LNG vapor in case of a release from the primary tank (Exh. EFSB-TOC-6). The Town believes that the constrained site conditions at the Route 169 Site are likely driving NEC's choice of containment (id.). Considering the Route 169 Site design and containment together, the Town considers the full-containment LNG storage tank as less suitable given its constrained location on site, limited access, proximity to public streets and adjacent activities – and the open-air impoundment system more suitable due to the reduced vessel volume, generally open and accessible area around the tanks, abundance of space from which to launch/stage a response if needed, and the lack of adjacent exposure concerns (id.).

by a hybrid system, which uses a gas turbine and electric motor drive. Regarding a drive system for the nitrogen compressor required for liquefaction, NEC evaluated three options: a gas turbine, an electric motor, and a hybrid system that uses a smaller gas turbine in combination with an electric motor. An electric motor would have a lower upfront capital cost, but its annual operating cost would be more than double that of a gas turbine or hybrid system. The higher upfront capital requirement of a gas turbine or hybrid drive are countered by lower annual operating costs, which would make up for the difference after a few years. Although an electric motor would eliminate a source of emissions at the Facility, such a system would still entail net air emissions associated with electric power generation on the electric grid. The record shows that a hybrid drive would result in lower Facility emissions compared to a gas turbine and would provide additional flexibility for operating the liquefaction system. As such, the Siting Board agrees with the Company that the additional operating cost of a hybrid system is warranted by its additional benefits. The Siting Board also notes that, as described in Section V.D.6, below, MassDEP's Proposed Air Quality Plan Approval states that emissions from the proposed hybrid drive represent BACT.

The record shows that there are options for LNG storage technologies, among which the Company has selected a single, field-built tank with no pipe penetrations below the maximum level of LNG in the tank. Among containment options, the Company has proposed a full-containment tank, which the Siting Board considers more protective than single-wall tanks with an open-air impoundment structure. As noted above, the Town does not object to the Project at the Route 169 Site, which includes a full-containment LNG storage tank.

The Siting Board finds that, on balance, the Project is superior to the other alternatives identified with respect to meeting the identified need and providing a reliable energy supply for the Commonwealth with minimum impact on the environment at the lowest possible cost.

IV. SITE SELECTION

A. Standard of Review

Section 69J requires the Siting Board to review alternatives to planned projects, including "other site locations." In implementing this statutory mandate, the Siting Board requires a

petitioner to demonstrate that it has considered a reasonable range of practical siting alternatives, while seeking to minimize cost and environmental impacts and ensuring a reliable energy supply. Lowell-Tewksbury at 31; Colonial Gas (2016) at 20; Whately LNG at 32. See also Town of Sudbury v. EFSB, 487 Mass. 737, 754-755 (2021); Town of Winchester v. EFSB, 98 Mass.App.Ct. 1101 (2020) (unpublished decision). To do so, a petitioner must satisfy a two-pronged test: (1) the petitioner must first establish that it developed and applied a reasonable set of criteria for identifying and evaluating alternative sites in a manner that ensures that it has not overlooked or eliminated any routes that, on balance, are clearly superior to the proposed route; and (2) the petitioner must establish that it identified at least two noticed sites or routes with some measure of geographic diversity. Lowell-Tewksbury at 31; Colonial Gas (2016) at 20-21; New England Power Company d/b/a National Grid, EFSB 13-2/D.P.U./13-151/13-152, at 38-39 (2014) ("Salem Cables") at 34-35. But see Lowell-Tewksbury at 31; Colonial Gas (2016) at 21, where the Siting Board found the company's decision not to notice an alternative route to be reasonable.

B. The Company's Site Selection Process

NEC stated that its site selection process was designed to identify sites and pipeline interconnection routes that would ensure no clearly superior options were omitted from consideration (Exh. NEC-2, at 4-2; Company Brief at 39). The Company's site selection process included selecting an advantageous area for the Facility ("study area") within southern New England, identifying potential sites within this area, and finally, comparing these sites using a set of environmental, community, and engineering criteria (Exh. NEC-2, at 4-2 to 4-4). After scoring and ranking sites, the Company advanced three sites, and possible pipeline interconnection routes for each site, for closer evaluation of cost, reliability, general environmental benefits, and prospective compliance with applicable regulations, codes, and standards (id. at 4-14 to 4-24). The Company's site selection process is described below.

1. Identification of a Study Area and Potential Sites

NEC stated that the initial phase of its site selection process involved selecting a study area within which the Company could search for suitable sites (Exh. NEC-2, at 4-5). NEC identified

six potential study areas in southern New England: (1) southern New Hampshire "seacoast" area near the Portland Natural Gas Transmission System/Maritimes & Northeast Pipeline "Joint Facilities"; (2) southern New Hampshire off of the TGP Concord Lateral; (3) north-central Connecticut along TGP's 300 line; (4) northern Massachusetts near the interconnection of the Joint Facilities with TGP in Dracut; (5) near the interconnection of TGP and Algonquin Gas Transmission ("AGT") facilities in Mendon; and (6) south-central Massachusetts along the TGP mainline, primarily between Westfield and Charlton (id. at 4-5 to 4-7).

The Company's most critical factor for selecting a study area was whether regional interstate natural gas pipelines in a particular area had access to reasonably secure long-term natural gas supplies with underutilized off-peak transmission capacity (Exh. NEC-2, at 4-5). The Company also considered: (a) whether potential sites would have reasonable proximity to existing utility-owned LNG storage facilities, particularly those of National Grid; (b) whether National Grid has sufficient contracted capacity at a proximate pipeline delivery point; and (c) whether a potential study area has good access to major roads and highways for truck delivery (id.).

NEC stated that south-central Massachusetts is the most attractive region because its principal utility customer, National Grid, maintains contractual rights for capacity on this portion of the TGP mainline, the area is reasonably close to National Grid's satellite LNG facilities, and there are potential sites within a short distance of major highways such as Interstate Routes I-90 and I-84 (Exh. NEC-2, at 4-9).

Within the south-central Massachusetts study area, NEC used the following qualitative feasibility criteria to identify potential sites with their associated interconnection pipelines: proximity to the TGP mainline; adequate space for the Facility; reasonable land acquisition terms; consistency with adjacent land uses; access to major roads and highways; receptiveness of key stakeholders; and reasonable proximity to existing National Grid satellite LNG facilities (Exhs. NEC-2, at 4-9 to 4-10; EFSB-SS-5; EFSB-SS-9).

NEC consulted industry references, data bases, real estate professionals, and representatives of state and local development offices in an effort to identify communities that might be receptive to the Project (Exh. NEC-2, at 4-10). In total, NEC identified ten potentially feasible sites within the towns of Charlton, Southwick, Monson, and Holland (id. at 4-10

fig. 4.6-1). Among these sites, the Company initially identified an attractive site in the Town of Charlton off Route 20 (id. at 4-10). NEC also indicated that, as a result of its stakeholder engagement and outreach activities, it identified the area near an existing gas-fired power plant owned and operated by Millennium on Route 169, in the Town of Charlton, as containing appealing locations for the Project (id. at 4-11).[46] NEC stated that sites near the Millennium facility would have ready access to existing utilities, including the TGP mainline, and convenient highway access (id.).[47]

2. Assessment of Potential Sites

Using its ten candidate sites, NEC conducted a suitability analysis that included 16 criteria for which each potential site was deemed "highly suitable," "suitable," "marginally-suitable," or "not suitable" (Exh. NEC-2, at 4-12, fig. 4.6-1). The Company's suitability analysis included criteria related to community and environmental impacts and constructability; each criterion is described in Table 2, below.

Table 2. Site Suitability Criteria Summary

Primary Criteria	Description
Flood Plain (100 year)	Impact of 100-year flood plain with respect to site
Flood Plain (500 year)	Impact of 500-year flood plain with respect to site

[46] NEC originally chose an alternative site within the area near the Millennium facility (Exhs. NEC-2, at 4-11; NEC-8, at fig. 1.1-2).

[47] The Millennium facility is a 360 MW combined-cycle, gas-fueled power plant, with an existing pipeline interconnection to the TGP mainline (Exh. NEC-2, at 4-11). In its Amended Petition to Construct, NEC contemplated that locating the Project near Millennium could potentially allow for a mutually beneficial business arrangement (id.). NEC stated that providing backup fuel to Millennium would require additional equipment to vaporize LNG and inject the gas back into an interconnection pipeline directly connected to Millennium at sufficient pressure for delivery to the power plant (id. at 2-6). On December 11, 2020, NEC filed Exh. NEC-14 "Updated Interconnection Analysis" in which NEC designated a new preferred pipeline interconnection route that would not enable any direct service to Millennium (Exh. NEC-14, at 1). The Project, as presented, does not include vaporization equipment and the record does not indicate any current or anticipated future business arrangements between NEC and Millennium.

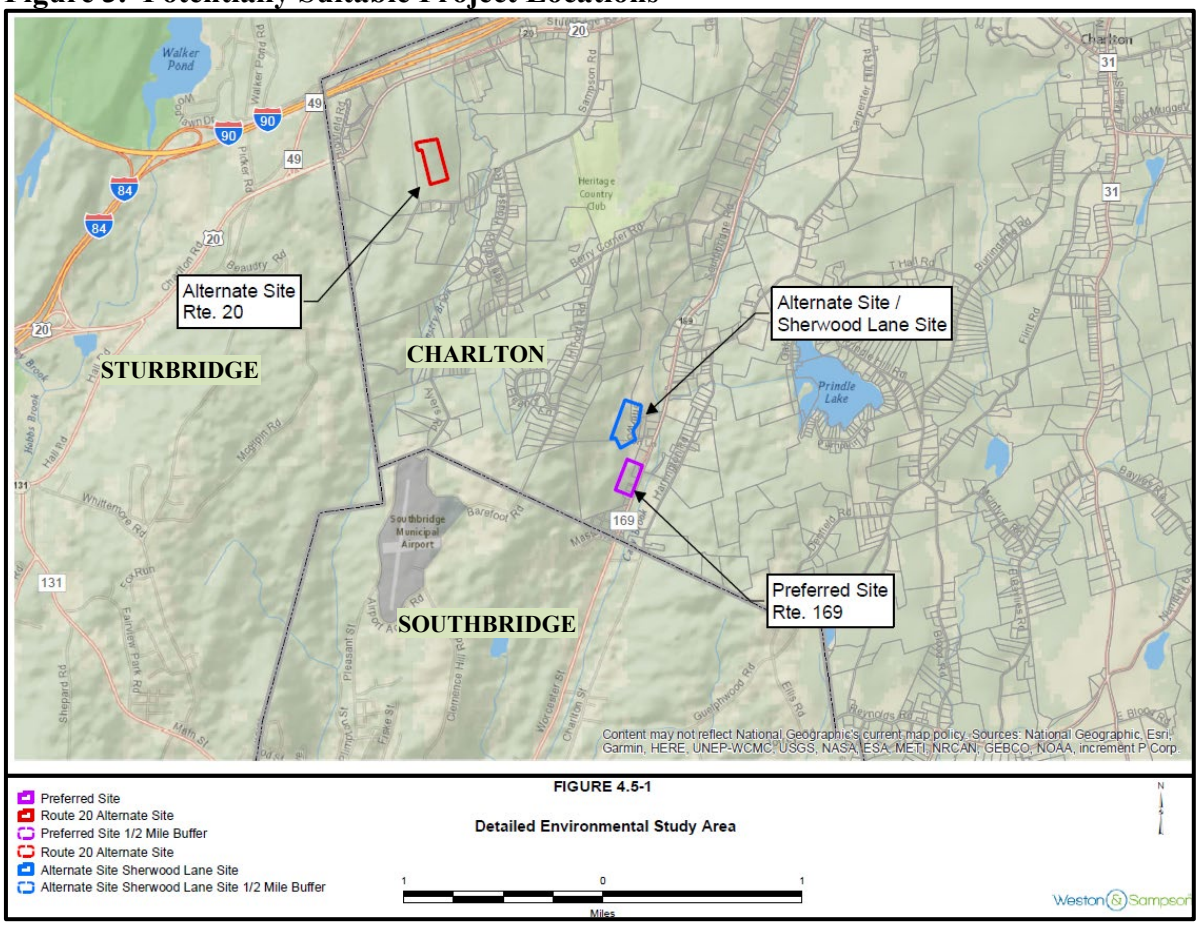
Table 2. Site Suitability Criteria Summary

Primary Criteria	Description
Existing Site Use & Adjacent Activities	Proposed land use and traffic impacts to the surrounding area and abutters; adherence to current zoning classification and land use
Driveway Access Road Constructability	Location, length, and grade of the access road
Wetlands	Wetland impacts, erosion, and potential erosion post-construction
Subsurface Conditions	Site development impacted by ledge and special excavation techniques
Maximum Commercial Lot Size	Number of parcels and landowners required to obtain the site
Archaeological Considerations	Presence of known archaeological considerations and/or need for additional archaeological studies
Site Grading	Impact on costs and schedule due to significant site grading
Highway Access / Traffic	Location related to major roads and highways, impact on local traffic patterns
Utilities	Access to pipeline and Facility required utilities
Vegetation	Heavy vegetation impacts clearing efforts and increases requirements to protect certain species
Visibility	Impact on public during construction period and post construction
Community Acceptance	Acceptance of project by local public officials
Commercial Terms	Availability of land for purchase
Environmental Impact	Overall ability to permit the site based on environmental considerations

Source: Exh. NEC-2, at fig. 4.6-1.

Combining the individual suitability ratings, NEC concluded that the Route 169 Site rated as having the highest degree of "overall suitability" and that the Route 20 Site and the Sherwood Lane Site tied as the next most suitable sites (Exh. NEC-2, at 4-12 to 4-14, fig. 4.6-1). These three locations are shown below on Figure 3, below.

Figure 3. Potentially Suitable Project Locations



Source: Exh. NEC-2, at fig. 4.5-1.

With respect to pipeline interconnections for each site, NEC indicated that it had strong incentives to identify options with lower environmental and community impacts, which NEC viewed as important factors in facilitating orderly economic Project development (Exh. NEC-2, at 4-2). As indicated by the Company's site selection criteria, sites located closer to the interstate pipeline were advantageous, in part due to the need for shorter pipeline interconnection routes (id. at 4-9). NEC also considered reliability factors, such as available capacity and pressure, and cost in evaluating various interconnection options (id. at 4-15; Exhs. NEC-14, at fig. 1; EFSB-SS-23; EFSB-SS-24).

a. Route 169 Site

Following stakeholder outreach concerning potential sites near Millennium, the Company identified the Route 169 Site after having filed the Original Petition to Construct (Exh. NEC-2, at 4-4 to 4-5, 4-13). The Route 169 Site is approximately 11.6 acres, zoned for industrial use, and located in an area that the Company described as actively used for industrial purposes (id. at 4-13; Exh. EFSB-G-7(1)(S1) at 4). NEC noted that the Route 169 Site is attractive for its direct frontage on Route 169 and relatively convenient access to interstate highways (Exh. NEC-2, at 4-13).

NEC identified seven potential pipeline interconnection routes between the Route 169 Site and the TGP mainline, which range in length between 2,500 and 8,200 feet (Exhs. EFSB-G-10(1); NEC-14, at 1-2)).[48] The proposed interconnections include a variety of in-street and off-road routes that originate from different points on either the TGP mainline, the TGP-owned pipeline lateral serving the Millennium facility ("Millennium Lateral"), or the TGP-owned Southbridge Lateral ("TGP Southbridge Lateral") (Exhs. NEC-2, at 2-1 to 2-2; EFSB-G-10(1)). NEC proposed a diverse array of interconnection options to provide sufficient flexibility in permitting and securing easement rights (Exh. NEC-2, at 2-1; RR-EFSB-31(S1)). See Section V.B.1 for detailed descriptions of each interconnection route.

b. Route 20 Site

NEC stated that it initially viewed the Route 20 Site as an attractive location for its size, location, and compatible zoning designation, and thus proposed it as the Company's Preferred Site in the Original Petition to Construct (Exh. NEC-2, at 4-4, 4-10; NEC-8, at 4-10).[49] However, NEC

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48 NEC originally identified six pipeline interconnection routes in its Amended Petition to Construct (NEC-2, at 2-1 to 2-2, fig. 2.1-6).

49 NEC indicated it held an option agreement for this site; however, staff notes that recent MEPA filings indicate a different development proposal for the same location (Exh. NEC-8, exh. 4.6.2, at 3). See MEPA documents for EEA number 16211, published in the following MEPA Environmental Monitor Issues: 2020, Volume 93, Issue 10 (Environmental Notification Form); 2020, Volume 94, Issue 13 (ENF Certificate); and 2021, Volume 94, Issue 15 (Draft Environmental Impact Report Certificate).

designated the Route 20 Site as a noticed alternative, rather than its Preferred Site, in its Amended Petition to Construct, in light of its additional stakeholder outreach and identification of sites near the Millennium facility (Exh. NEC-2, at 4-11, 4-24).

The Route 20 Site is located on the south side of Sturbridge Road (Route 20) in Charlton between Highfield Road and Mayberry Lane; the Route 20 Site is approximately 220 acres, zoned for industrial use, and in a location described by the Company as either underdeveloped or primarily residential (Exh. NEC-2, at 4-11, fig. 2.1-4). NEC stated that the Route 20 Site would have several development challenges that may result in a longer construction schedule and a risk of cost escalation (id. at 4-11, 4-14). The Company explained that the Route 20 Site is located on hill that rises about 125 feet above Route 20; as such, the Route 20 Site would require a substantial amount of preparatory clearing and grading, a relatively long new driveway, new utility connections (e.g., an electric distribution lead line), and a relatively long gas interconnection route (id. at 4-11; Exh. NEC-8, app. A, at fig. NEC-002-C2).

NEC identified two potential pipeline interconnection routes between the Route 20 Site and the TGP mainline, which are 7,100 and 7,000 feet long, respectively (Exh. NEC-2, at 2-3, fig. 2.1-7). The proposed interconnections are both off-road routes that originate at the same point on the TGP mainline but would result in slightly different environmental impacts (id.; Exh. EFSB-W-2). See Section V.B.2 for detailed descriptions of each interconnection route.

c. Sherwood Lane Site

NEC indicated that it identified the Sherwood Lane Site as another potential site near Millennium as a consequence of the Company's ongoing stakeholder outreach after filing the Original Petition to Construct (Exh. NEC-2, at 4-4 to 4-5). NEC stated that the Sherwood Lane Site is located on the west side of Sherwood Lane in Charlton, is approximately eight acres, zoned for industrial use, and is owned by Millennium (id. at 4-14; Exh. EFSB-SS-12). NEC indicated that, similar to the Route 169 Site, the Sherwood Lane Site has the benefit of direct highway access and relatively short pipeline interconnection routes (Exh. NEC-2, at 4-11).

NEC identified two potential pipeline routes that would tap off of the Millennium Lateral and interconnect to the Sherwood Lane Site, at 1,276 and 1,996 feet in length, respectively

(Exh. NEC-2, at 2-3, fig. 2.1-8). One of the interconnection options would proceed west of the Millennium facility and then within the westerly shoulder of Sherwood Lane, while the other interconnection option would proceed east of the Millennium facility before crossing Sherwood Lane and entering the Facility (id.). Both routes would require appropriate easement rights from Millennium (Exh. NEC-2, at 2-3; RR-EFSB-31(S1)).

d. Additional Environmental, Cost, and Reliability Considerations of Candidate Sites

Based on its suitability analysis, NEC stated that it advanced the Route 169 Site, the Route 20 Site, and the Sherwood Lane Site with their interconnections for additional environmental and cost analysis consistent with the approach required by Siting Board regulation 980 CMR 10.02(4) (Exh. NEC-2, at 4-12, 4-15, figs. 4-6.2, 4-6.3, 4-6.4). NEC stated that the additional analysis, described below, served to confirm that the Route 169 Site is the most appropriate location and, therefore, the Company's "Preferred Site" (id. at 4-14 to 4-15).

i. Environmental Analysis

NEC developed a comparative environmental evaluation of the candidate sites, as required by Siting Board regulation 980 CMR 10.02(4) (Exh. NEC-2, at 4-12, fig. 4.6-4). NEC used the environmental evaluation to rank the three sites using scores from one to three (id. at fig. 4.6-4; RR-EFSB-32). The Company scored each site according to the evaluation factors specified in the regulation and then compared the total score for each site to determine the site's overall appropriateness (Exh. NEC-2, at fig. 4.6-4; RR-EFSB-32). The summarized results of the Company's environmental evaluation are shown below in Table 3, with one being the worst and three being the best.

Table 3. Comparison of the Environmental Impacts of Three Sites

Factors	Route 169 Site	Route 20 Site	Sherwood Lane Site
Ease of Acquisition	3	2	1
Climatology	2	2	2
Geology	2	1	3
Hydrology	3	2	1
Transportation Access	3	1	2
Ecological Sensitivity	3	2	1

Table 3. Comparison of the Environmental Impacts of Three Sites

Factors	Route 169 Site	Route 20 Site	Sherwood Lane Site
Socioeconomics	3	1	3
Special Resource Commitments	3	2	1
Other*	1	3	2
TOTAL	23	16	16

* NEC indicated that it used the "Other" category to account for the relative size of buffers between existing residences and the Project.

Source: Exh. NEC-2, at fig. 4.6-4.

NEC reported that the Sherwood Lane Site includes parcels subject to a conservation restriction, the removal of which NEC expects would significantly delay Project development (Exh. NEC-2, at 4-14, 4-20).[50] According to NEC, releasing land from a conservation restriction would require numerous levels of municipal and state approval (Exh. EFSB-SS-13). On the state level, the Project would have to undergo MEPA review for disposition of conservation land per 310 CMR 11.03(1)(b)(3), gain consent by a two-thirds vote of the Massachusetts legislature, and satisfy the Executive Office of Energy and Environmental Affairs' Article 97 Land Disposition Policy, which requires no net loss of Article 97 lands (id.). NEC stated that, due to the complexity of removing the conservation restriction, the Company is not pursuing acquisition of the Sherwood Lane Site (Tr. 3, at 528).

NEC also noted that developing the Project at the Sherwood Lane Site would require filling mapped wetlands and two vernal pools (Exh. EFSB-SS-14). Vernal pools are a protected resource under the Massachusetts Wetlands Protection Act ("WPA") and Sections 404 and 401 of the Massachusetts Clean Water Act (id.). NEC indicated that securing approval to fill the vernal pools at the Sherwood Lane Site would involve increased time, cost, and mitigation requirements – and that, even after the Company presents that there are no other feasible alternatives that avoid filling the vernal pools, agency approval would still be discretionary (id.; EFSB-SS-13).

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50 A conservation restriction, as authorized by G.L. c. 184, § 31-33, limits the use of land in order to protect specified conservation values including the natural, scenic, or open condition of the land (Exh. EFSB-SS-13).

ii. Cost and Economic Analysis

NEC stated that it compared the capital and operating costs of the Route 169 Site, the Route 20 Site, and the Sherwood Lane Site using the format specified in 980 CMR 10.02(4) (Exh. NEC-2, at 4-15 to 4-16, fig. 4.6-2, 4.6-3). Specific aspects of Project costs at the Route 169 Site and the Route 20 Site are described in Section V.E. NEC stated that the Route 169 Site with the associated interconnections would be the least expensive in terms of capital and operating costs, and that the Route 20 Site would be the most expensive (id. at 4-15). For the Sherwood Lane Site, NEC indicated that releasing or amending the conservation restriction would have unique costs related to: (1) legal fees relative to the requisite approvals (e.g., a two-thirds vote of the legislature); (2) cost related to an expected MEPA review; and (3) increased mitigation costs (Exh. EFSB-SS-15).[51]

iii. Reliability Analysis

NEC indicated that the Route 169 Site, the Route 20 Site, and the Sherwood Lane Site with the associated interconnections would each provide reliable service to its principal customer, National Grid, and potentially to other gas distribution customers in Massachusetts (Exh. NEC-2, at 4-16). A more detailed reliability comparison of the Route 169 Site and the Route 20 Site can be found at Section V.F.

3. Selection of the Primary and Noticed Alternative Sites

Based on considerations of environmental impacts, cost, and reliability, NEC selected the Route 169 Site as its Preferred Site and the Route 20 Site and the Sherwood Lane Site as Noticed Alternative Sites (Exh. NEC-2, at 4-24). The Company also presented a range of pipeline interconnection routes for all sites (id.). NEC stated that the Route 169 Site had the highest level of "overall suitability," would likely have the lowest overall environmental impacts, the lowest

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[51] NEC stated that the increased mitigation costs would be driven by the Article 97 Land Disposition Policy's "no net loss" of protected lands requirement (Exh. EFSB-SS-15). As such, NEC anticipated that additional mitigation costs would be incurred to acquire equal acreage with equivalent conservation value to offset the released conservation restriction on the Sherwood Lane Site (id.).

capital and operating costs, and could meet the full range of state and federal LNG siting requirements (id. at 4-21 to 4-24, fig. 4.6-1). Despite NEC advancing the Sherwood Lane Site as a Noticed Alternative Site, Millennium Power stated that "it does not intend to host the Facility on its property or otherwise share infrastructure with the Project" and further stated that the Project "has nothing to do with Millennium Power or the Millennium Power Plant, contractual or otherwise." (Millennium Power Petition for Leave to Intervene, at 4; August 5, 2019, Millennium Power Comment Letter).

For the Route 169 Site, NEC selected a "Preferred Interconnection Route" from among the seven routes it evaluated (Exhs. NEC-14, at 2; EFSB-G-10).[52] NEC's Preferred Interconnection Route follows Route 169 to its interconnection point with the TGP mainline, within the western shoulder of the highway layout. See Section V.B.1.a. NEC indicated that interconnection routes that tap off of the Millennium Lateral would result in a shorter pipeline compared to routes that begin at the TGP mainline, but noted that tapping off of the Millennium Lateral or traversing Millennium property would require appropriate easement rights and approvals (Exh. NEC-2, at fig. 2.1-6; Tr. 3, at 513-514). In its Amended Petition to Construct, NEC presented one such route across Millennium property as its preferred option; however, the Company represented that it was not able to secure an easement for that route (Exh. NEC-14, at 1).

No party argued that the Company's site selection process overlooked a location for the Project that is clearly superior to the Route 169 Site and the Route 20 Site.

4. Application of Design Standards

NEC stated that, as the final step of its site selection process, confirming that each site could be a viable project location, the Company assessed whether the Project could meet the "Performance Standards for Determining Site Sizes" set forth in 980 CMR 10.03 (Exh. NEC-2,

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52 NEC also identified preferred interconnection routes for its Noticed Alternative Sites. For the Route 20 Site, the NEC stated that its preferred route would be the 7,100-foot-long route that was also identified as "Interconnection Preferred" (Exh. NEC-2, at 2-3, fig. 2.1-7). For the Sherwood Lane Site, NEC stated that its preferred route would be the 1,276-foot-long route also identified as "Interconnection Preferred" for that site (id. at 2-3, fig. 2.1-8).

at 4-19). NEC noted that, while there are additional state and federal requirements pertaining to the design and operation of LNG facilities, the Siting Board performance standards focus on providing sufficient site size for a thermal protection zone and a vapor dispersion exclusion zone (id. at 4-19 to 4-20). [53] NEC completed an assessment of the thermal protection zone and vapor dispersion exclusion zones at the Route 169 Site, the Route 20 Site, and the Sherwood Lane Site, and reported that, with proper facility design, each of the three sites would meet the site size performance standards (id. at 4-21). Detailed discussion of compliance with 980 CMR 10.03 is in Section VI, below.

5. Geographic Diversity

NEC stated that it assessed a variety of sites for the Project, and also a number of pipeline routes for each site (Exh. NEC-2, at 4-10). Figure 3 shows the location of the Company Preferred Site and Noticed Alternative Sites. Figure 4 shows the noticed interconnection alternatives for the Route 169 Site. NEC argues that it has fully satisfied the relevant requirements with respect to the consideration of sites, with a measure of geographic diversity (Company Brief at52).

C. Analysis and Findings on Site Selection

The Siting Board requires that applicants consider a reasonable range of practical siting alternatives and that proposed facilities are in locations that minimize cost and environmental impacts. In past decisions, the Siting Board has found various criteria to be appropriate for identifying and evaluating site and/or route options for § 69J jurisdictional energy facilities, including criteria addressing natural resources, land use, community impact, constructability, cost, and reliability. Lowell-Tewksbury at 36, 40-41; NSTAR Electric Company, EFSB 15-4/D.P.U. 15-140/15-141, at 38,65,67 (2018) ("Woburn-Wakefield"); Colonial Gas (2016) at 22, 23, 28; Berkshire Gas (2006) at 25. The record indicates that the NEC used reasonable screening criteria

[53] The thermal protection zone is an exclusion area around a Facility that is designed to be protective in the event of a fire at the top of the secondary containment of an LNG tank (Exh. NEC-2, at 4-20). The vapor dispersion exclusion zone requires that the methane concentration in air not exceed two percent beyond property lines in the event of an LNG spill (id. at 4-21).

to score and rank potential project locations. These criteria included natural resource and community impacts as well as constructability factors and are consistent with the types of criteria that the Siting Board previously has found to be acceptable.[54] The Siting Board has also found similar designs for criteria scoring to be an important part of an appropriate site selection process. Lowell-Tewksbury at 36-38, 40-41; Woburn-Wakefield at 38-47, 65-71; Salem Cables at 38-39; Boston Edison Company, EFSC 89-12A, at 38-42 (1989). The Siting Board accepts the Company's use of the proffered screening criteria to score each site and rank potential project locations.

Given the important considerations of locating the Project where the Company could secure National Grid-owned pipeline capacity reasonably proximate to National Grid's existing LNG storage facilities, the Company appropriately identified south-central Massachusetts as a study area that would encompass reasonable siting options. By scoring and ranking ten sites within the study area according to the above-referenced screening criteria, the Company's evaluation showed that a clearly superior site was not overlooked. Additionally, the Company identified a variety of pipeline interconnection routes for the Route 169 Site, the Route 20 Site, and the Sherwood Lane Site. The Company examined possible sites and interconnection routes with diverse geographic considerations, including sites in distinct areas of the Town of Charlton and interconnection routes which originate at different locations on the TGP mainline and which variously traverse off-road and/or in-street routes to arrive at the Facility.

After narrowing the candidate sites to the highest ranked locations, the Company performed a comparative analysis for the Route 169 Site, the Route 20 Site, and the Sherwood Lane Site using a format and method consistent with 980 CMR 10.02(4). Separately, the Company considered the reliability of each of the three locations. Lastly, the Company confirmed that each of the three sites could comply with the "Performance Standards for Determining Site

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[54] This Siting Board's acceptance of similar methodology for electric transmission route selection was upheld on appeal by the Supreme Judicial Court ("SJC") and the Massachusetts Appeals Court. Town of Sudbury v. Energy Facilities Siting Board, 487 Mass. 737 (2021) ("Sudbury v. EFSB"); Town of Winchester v. Energy Facilities Siting Board, 98 Mass.App.Ct. 1101 (2020) (unpublished decision) ("Winchester v. EFSB").

Sizes" set forth in 980 CMR 10.03, specifically, that each site could provide sufficient area for a thermal protection zone and a vapor dispersion exclusion zone. Upon completion of this analysis, the Company selected the Route 169 Site as its Preferred Site on the basis that the Project would be less costly and impactful than at the Route 20 Site or the Sherwood Lane Site. For purposes of designating a Preferred Site, the Siting Board finds these comparisons reasonable; a more detailed comparison of the Route 169 Site and the Route 20 Site are in Section V, below.

With respect to the Sherwood Lane Site, the Siting Board notes that this site is owned by Millennium and has a conservation restriction, and also contains significant natural resources, including mapped wetlands and vernal pools, and these resources would be adversely impacted by developing the Project at that location. The Route 169 Site and the Route 20 Site have neither conservation restrictions nor vernal pools, which could impede Project development. The Siting Board also notes that the resolution of the conservation restriction and potential mitigation requirements at the Sherwood Lane Site would likely increase the overall cost of the Project and/or significantly delay the Project development schedule. Further, Millennium indicated its lack of interest in providing an easement for the Project needed for the Sherwood Lane Site. The Siting Board recognizes the significant deficiencies of the Sherwood Lane Site not found in the other two sites. Therefore, the Siting Board declines to consider the Sherwood Lane Site further in Section V, below.

The Siting Board finds that the Company has: (1) developed and applied a reasonable set of criteria for identifying and evaluating alternative sites in a manner that ensures that it has not overlooked or eliminated any site that is clearly superior to the Project; and (2) identified a range of practical sites 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 while seeking to minimize cost and environmental impacts and ensure a reliable energy supply.

V. ANALYSIS OF THE ROUTE 169 SITE AND ROUTE 20 SITE

A. Standard of Review

In implementing its statutory mandate under G.L. c. 164, §§ 69H and 69J, the Siting Board requires a petitioner to show that its proposed facility minimizes costs and environmental impacts while ensuring a reliable energy supply. Lowell-Tewksbury at 42-43; Colonial Gas (2016) at 29; see also Town of Sudbury v. EFSB, 487 Mass. at 1165. To determine whether such a showing is made, the Siting Board requires a petitioner to demonstrate that the proposed site or route for the facility is superior to the alternative on the basis of balancing environmental impact, cost, and reliability of supply. Andrew-Dewar at 44-45; Sudbury-Hudson at 78;

The Siting Board first determines whether the petitioner has provided sufficient information regarding environmental impacts and potential mitigation measures to enable the Siting Board to make such a determination. The Siting Board then examines the environmental impacts of the proposed facility and determines: (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. Lowell-Tewksbury at 42-43; Berkshire Gas (2006) at 31; Colonial Gas (2006) at 59-60. Finally, the Siting Board compares the sites or routes to determine which is superior with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. Andrew-Dewar at 44-45; Sudbury-Hudson at 78.

B. Description of Route 169 and Route 20 Sites and Pipeline Routes

1. Route 169 Site

The Route 169 Site consists of parcels including 304 and 314 Southbridge Road (Route 169), Charlton, with direct frontage on Route 169 (Exh. NEC-2, at 4-13; RR-EFSB-33(S1) at 13). The site is located in an area with active industrial use, with Incom Inc. (a fiberoptic materials manufacturer) and Millennium to its north, and a utility-scale solar array (owned by Incom) to the west (Exhs. NEC-2, at 4-13, 5-59, fig. 2.1-3; EFSB-SS-11). The site has sparse forested areas to the west and south and a small commercial property approximately 60 feet to the south (Exh. NEC-2, at 5-4). The total land area to be controlled by the Company is approximately 11.6 acres; all parcels comprising the Route 169 Site are zoned for industrial use (Exhs. EFSB-G-7(1)(S1)

at 4). NEC has secured an option contract that would allow NEC to consolidate and control several parcels that comprise the Route 169 Site (Exhs. NEC-2, at 4-13, fig. 2.1-3, fig. 4.6-4; EFSB-SS-28(4)). Engineering plans indicate that the Route 169 Site is generally sloped to the east, with a prominent north-south ridge running along the western side of the site (Exhs. NEC-2, at 4-13; EFSB-PA-18(S1) at 3). The Project would include two new driveways connecting to Route 169, arranged in a circle-drive configuration (Exh. NEC-2, at 2-7). NEC stated that tree clearing for Facility and driveway construction would result in the removal of more than five public shade trees; therefore, the Company submitted an ENF for review to the MEPA Office on July 31, 2020 (Exh. EFSB-G-7(S1)).[55]

NEC provided notice for seven pipeline interconnection options to connect the Route 169 Site to the TGP mainline. Some of the routes would require easement rights from existing property owners and three of the routes would be an extension of the Millennium Lateral (Exh. NEC-2, at 5-50). NEC noted that, regardless of the route selected, the interconnection pipeline would require a new gas meter station; NEC expects that Kinder Morgan would construct, own, and operate any pipeline meter station constructed for the Project (id. at 2-3; Exh. EFSB-LU-4).[56] According to NEC, Kinder Morgan recommended constructing a new, dedicated interconnection pipeline and meter station to serve the Project, rather than tapping off of the Millennium Lateral (Exh. NEC-14, at 1). NEC represented that, for the Preferred Interconnection Route, it would own the pipeline up to the point that it reaches the existing TGP right-of-way; however, for other routes, the interconnection pipeline could be owned and operated by either NEC or Kinder Morgan (Exhs. NEC-14, at 2; EFSB-G-8).

Figure 4, below, depicts the general area around the Route 169 Site, including the site boundary and noticed pipeline interconnection routes.

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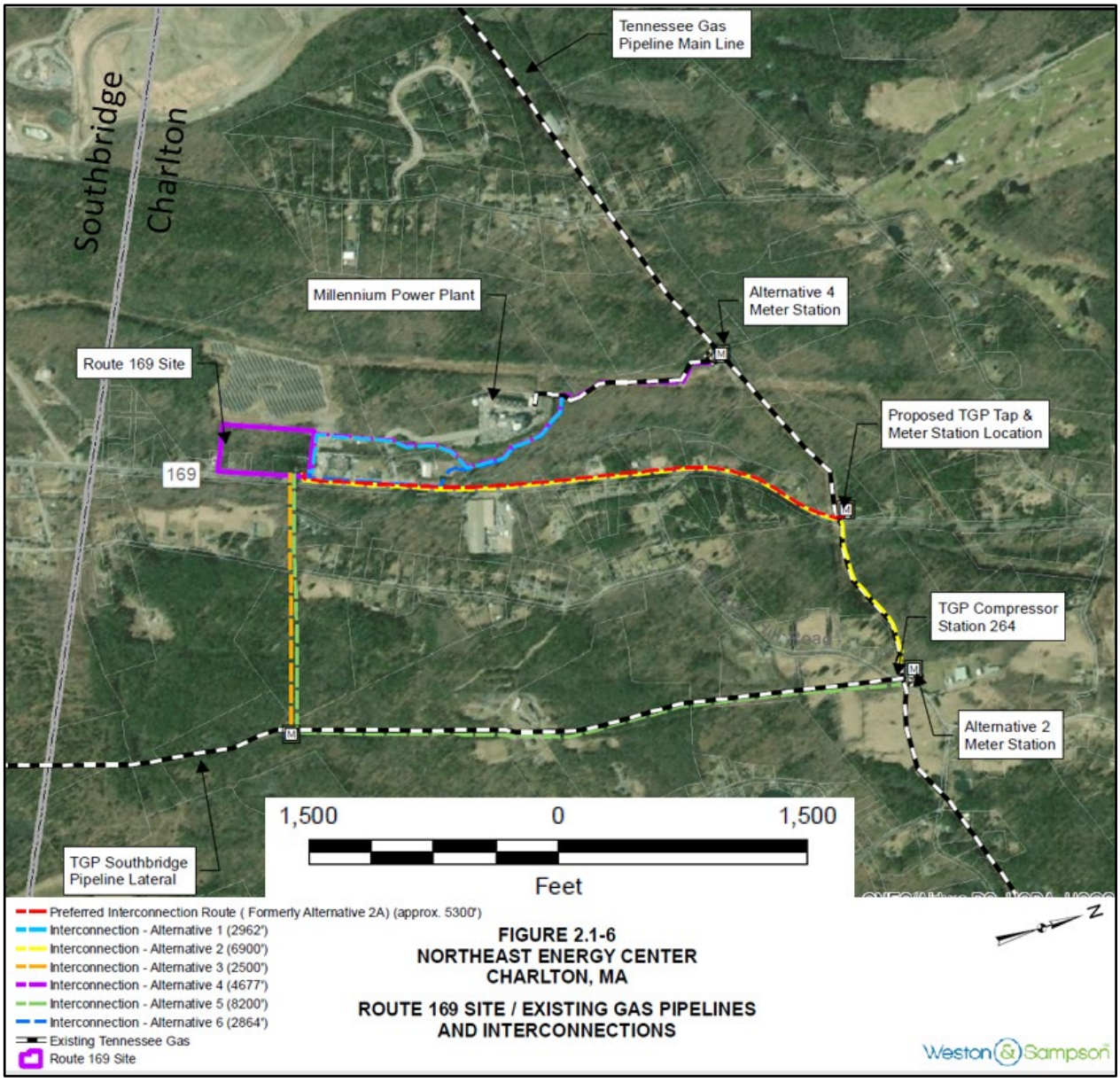
55 On September 10, 2020, the Secretary of the Executive Office of Energy and Environmental Affairs ("EEA") issued a Certificate on the ENF; no EIR was required (Exhs. EFSB-G-7(S1); EFSB-G-7(S2)).

56 Specifically, NEC noted that it is not seeking any zoning exemptions or approvals for the Route 169 Site's Preferred Interconnection Route meter station, as Kinder Morgan will construct the meter station (Exh. NEC-14, at 3).

Figure 4. Proposed Project and Gas Interconnection at the Route 169 Site



Adapted from Source: Exh. EFSB-G-10.

a. Preferred Interconnection Route

The Preferred Interconnection Route, also known as Interconnection Alternative 2A, would begin where the TGP mainline crosses Route 169 and proceed south for approximately 5,400 feet within the western shoulder of the Route 169 highway layout before entering the Route 169 Site

(Exh. NEC-14, at 2, fig. 1). NEC stated that it would own the majority of the Preferred Interconnection Route; however, Kinder Morgan would permit and construct a short segment of the pipeline between the southern edge of the TGP mainline ROW and the gas meter station (id. at 2).[57] The meter station would be located at 190 Southbridge Road immediately north of the TGP mainline and Cady Brook, on the west side of Route 169 (id. at fig. 3, fig. 4; RR-EFSB-33(S1) at 21). The meter station site is bordered by forested areas to the north and west (RR-EFSB-33(S1) at 21). The meter station site would consist of a one-story building housing Kinder Morgan gas management equipment, above ground steel piping, valves, regulation, instrumentation and metering, as well as below-ground inlet and outlet steel piping; the meter station site would be finished with a gravel yard and surrounded by a chain link fence (id. at 20; Exh. NEC-14, at fig. 3).

NEC noted that it presented this route as its preferred option during its MEPA review process and permitting with MassDOT, subsequent to briefing in the Siting Board proceeding (Exhs. EFSB-G-7(S1)(1) at 69; NEC-14, at fig. 1). NEC confirmed that the MassDOT owned right-of-way for Route 169 is sufficiently wide to install the Preferred Interconnection Route within the unpaved shoulder of the roadway (Exh. EFSB-CM-41). The Preferred Interconnection Route would cross Cady Brook twice, Sherwood Lane, and a number of residential, commercial, and industrial driveways (Exh. EFSB-W-25; RR-EFSB-29). NEC stated that the Preferred Interconnection Route would require two horizontal directional drilling ("HDD") operations, one for the southern Cady Brook crossing and Sherwood Lane and a second for the northern Cady Brook crossing (Exhs. EFSB-CM-34; EFSB-CM-35). NEC presented six alternatives to the Preferred Interconnection Route.

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[57] TGP would construct, own, and operate the pipeline between the meter station and its mainline in its ROW (Exh. NEC-14, at 2). NEC stated that, due to the relatively low cost of the meter station, Kinder Morgan could construct it under its existing blanket certificate authority pursuant to 18 C.F.R. §§157.203(b) and 157.208(a) without requiring prior approval from FERC (Exh EFSB-LU-5). Kinder Morgan would report the meter station construction to the FERC in its following annual report of blanket certificate activities (id.).

b. Alternative 1

Alternative 1 would tap off of the existing Millennium Lateral and proceed south through uplands, generally parallel to and east of Sherwood Lane on land owned by Millennium (Exh. NEC-2, at fig. 2.1-6). Where Sherwood Lane turns to the east, Alternative 1 would cross Sherwood Lane and continue south across land owned by Incom before entering the Route 169 Site (id.). Alternative 1 would be approximately 2,960 feet long and would require metering equipment within the fenceline of the Route 169 Site (id.).

c. Alternative 2

Alternative 2 would tap off of the TGP mainline at the outlet of TGP Compressor Station 264 on Carpenter Hill Road in Charlton and proceed west along the existing TGP mainline ROW to the westerly side of Route 169 (Exh. NEC-2, at 2-2, fig. 2.1-6). Alternative 2 would then head south along Route 169, within the Route 169 roadway layout, before entering the Route 169 Site (id. at 2-2). The pipeline route is approximately 6,900 feet long and would have a new meter station near the compressor station (id. at 2-4, 5-8). Alternative 2 would cross Cady Brook in three locations, Sherwood Lane, Route 169, and a number of residential and commercial driveways (Exh. EFSB-G-7(S1)(1) at 69; RR-EFSB-29). The Company stated that portions of Alternative 2, including the Cady Brook and Route 169 crossings, would require HDD (Exhs. NEC-14, at 2; EFSB-CM-44; EFSB-W-31).

d. Alternative 3

Alternative 3 would tap off of the TGP Southbridge Lateral, east of Harrington Road, and proceed directly west across mostly undeveloped upland areas (Exh. NEC-2, at 2-2, fig. 2.1-6). Alternative 3 would cross Cady Brook, Harrington Road, and Route 169 before connecting at the Route 169 Site (id. at 2-2, 5-9). This pipeline route is approximately 2,500 feet long (id. at 5-9). NEC stated that Alternative 3 would require acquisition of easement rights and land clearing for a new ROW (id. at 2-2). Subsequent to filing its Amended Petitions, NEC reported that Kinder Morgan determined that the Southbridge Lateral does not have adequate capacity to support the Project (Exh. EFSB-SS-24). Therefore, the Siting Board declines to further consider Alternative 3 in Section V.D, below.

e. Alternative 4

Alternative 4 would tap off of the TGP mainline near the existing meter station that serves the Millennium Lateral and proceed south within the existing Millennium Lateral ROW (Exh. NEC-2, at 2-2). NEC noted that, although Alternative 4 would require an easement from Millennium, the route does not share any pipeline infrastructure with Millennium and would therefore satisfy Kinder Morgan's requirement for the Project to have a dedicated interconnection (Exh. NEC-14, at 3). At the northern edge of the Millennium facility, Alternative 4 would turn southwesterly and follow the route of Alternative 1 (Exh. NEC-2, at 5-9, fig. 2.1-6). Alternative 4 would be 4,700 feet long and would include a feed gas meter within the fenceline of the Route 169 Site (id. at 2-4, 5-9).

f. Alternative 5

Alternative 5 would tap off of the TGP mainline at the outlet of TGP Compressor Station 264 on Carpenter Hill Road and proceed south along the existing TGP Southbridge Lateral ROW for approximately 5,800 feet (Exh. NEC-2, at 2-2). Alternative 5 would then turn west and follow the same route as Alternative 3 (id. at 2-2, fig. 2.1-6). As previously noted, this portion of the route would require a new, permanent ROW and would cross Cady Brook, Harrington Road, and Route 169 before terminating at the Route 169 Site (id. at 2-2). Alternative 5 is approximately 8,175 feet long and would require a new meter station near the Carpenter Hill Compressor Station (id. at 2-2, 2-4).

g. Alternative 6

Alternative 6, which was the Company's original preferred route for the Route 169 Site, would be an approximately 2,830-foot extension of the existing Millennium Lateral (Exhs. NEC-2, at 2-1, fig. 2.1-6; EFSB-G-10). Tapping off of the Millennium Lateral just north of the Millennium facility, Alternative 6 would proceed southeasterly through uplands along the east side of the Millennium facility on land owned by Millennium, towards Route 169 (Exh. NEC-2, at 2-1 to 2-2, 5-8). The pipeline would then follow the western shoulder of Route 169, within the MassDOT-owned ROW, before entering the northeastern corner of the Route 169 Site

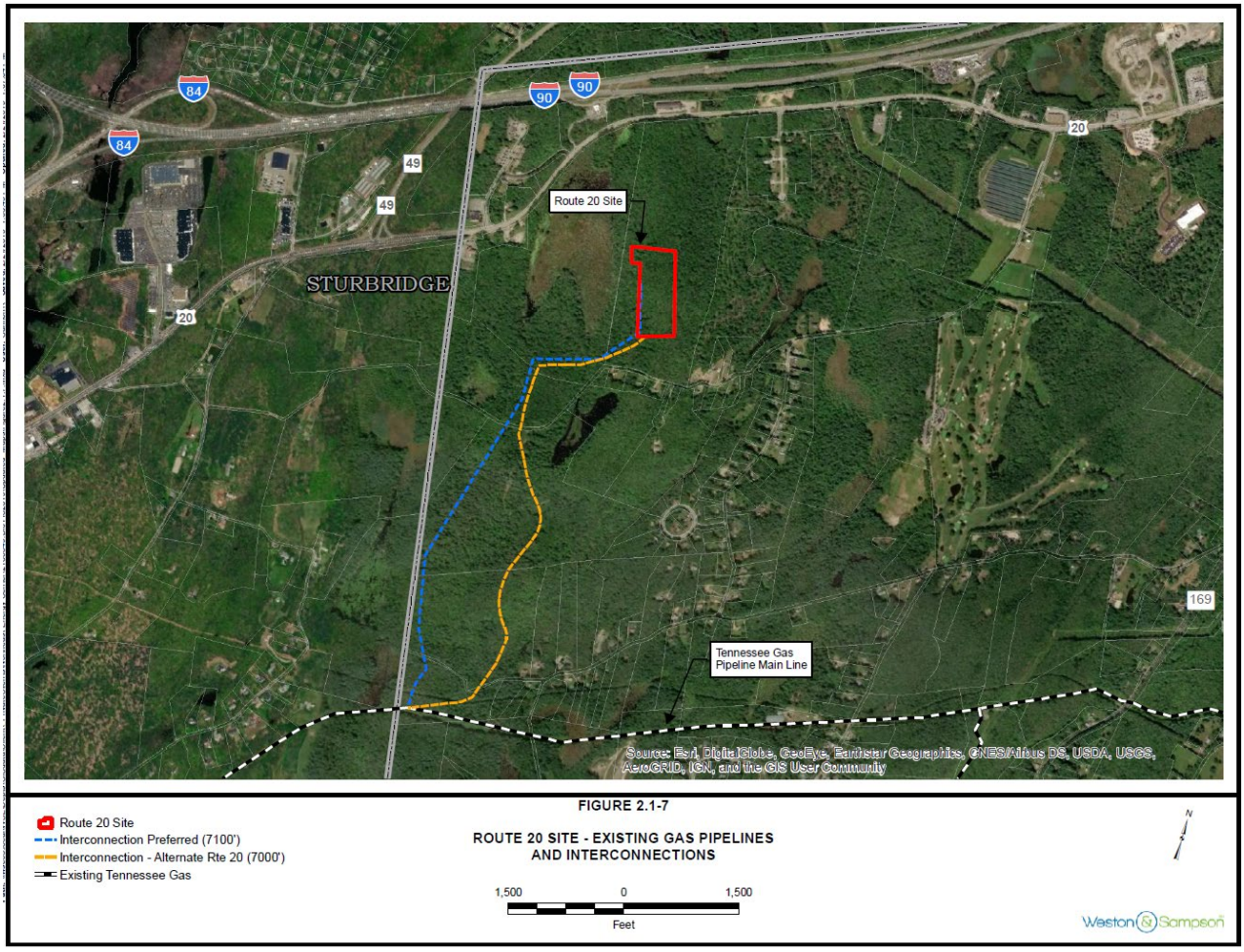
(id. at fig. 2.1-6, 5-8). NEC stated that Alternative 6 would require a feed gas meter within the fenceline of the Facility to differentiate flow to the power plant (id. at 2-3 to 2-4).

2. Route 20 Site

The Route 20 Site is on a 220-acre parcel zoned for industrial use at 249 Sturbridge Road (Route 20) in Charlton (Exh. NEC-2, at 4-11). The area surrounding the Route 20 Site is either undeveloped or residential; NEC characterized the topography of the surrounding area as fairly hilly (id.; Exh. NEC-8, at 5-59). The Project would be developed on a portion of the Route 20 Site which is comprised of an elongated topographic feature, oriented approximately north-south and rising approximately 125 feet above the existing grade of Route 20 (Exh. NEC-8, app. A, at fig. NEC-002-C2). The Facility would be located on the southern portion of the parcel, close to Hill Road (Exh. NEC-2, at 2-8). A steep driveway with a maximum ten percent grade would provide access from Route 20; the driveway would be approximately 1,800 feet long (id. at 2-8, fig. 2.1-4; Tr. 2, at 347). The Facility would be adjacent to a large wetland system to its west (Exh. NEC-2, at 4-30). The Company indicated that the Route 20 Site would exceed at least one MEPA threshold related to total land clearing and the creation of new impermeable areas and therefore would require an ENF (Exh. EFSB-G-7).

Figure 5, below, depicts the general area around the Route 20 Site and its noticed pipeline interconnection routes.

Figure 5. Project Location and Gas Interconnection Alternatives for the Route 20 Site



Source: Exh. NEC-2, at fig. 2.1-6.

a. Route 20 Primary Interconnection

The Company's preferred interconnection route for the Route 20 Site ("Route 20 Primary Interconnection") is a cross country route that starts from the TGP mainline just east of the Charlton/Sturbridge town line and travels northerly to the Facility (Exh. NEC-2, at 2-3). This route is approximately 7,100 feet long (id., at fig. 2.1-7). The new pipeline would require a new pipeline meter station, located west of Berry Corner Road (id. at 2-3). Additionally, this pipeline route would require both new easement rights and a permanently cleared ROW (id.). A driveway

would also be constructed to access the new meter station from Berry Corner Road (id. at 2-7 to 2-8).

b. Route 20 Alternative Interconnection

Starting at the same location on the TGP mainline as the Route 20 Primary Interconnection, the Route 20 Site Alternative Interconnection route would initially proceed for about 850 feet east before turning north for approximately 3,600 feet, mostly parallel to and approximately 1,000 feet to the east of the Route 20 Primary Interconnection (Exh. NEC-2, at 2-3). After that, the alternative comes within 100 feet of the Primary Interconnection route near Hill Road and then enters the Route 20 Site (id.). This route is approximately 7,000 feet long (id., at fig. 2.1-7). The Route 20 Site Alternative Interconnection would also require new easement rights and a permanently cleared ROW (Exh. NEC-8, at 5-51).

C. General Description of Project Construction

1. Facility Construction Methods and Sequencing

NEC reported that Facility construction would take approximately 18 months, depending on when the Project receives Siting Board approval and depending on the site chosen (Exhs. EFSB-CM-1; EFSB-CM-7; Tr. 2, at 299). The Company explained that construction would proceed in two phases, described below (Exh. NEC-2, at 5-47). Phase 1 involves site preparation (e.g., tree clearing, grading, road construction), and Phase 2 involves Facility construction and commissioning (id. at 5-47, app. F, at F-1 and F-2).

NEC anticipates scheduling most construction activities between 7:00 a.m. and 5:00 p.m., Monday through Saturday (Exh. NEC-2, app. F, at F-2). However, the Company explained that certain startup activities, such as testing the liquefaction system and pressure-testing the pipeline interconnection, cannot be stopped once started and therefore would need to continue beyond normal scheduled work hours (id.; Exh. EFSB-CM-33). The Company stated that it plans to inform municipal officials and abutters of commencement of construction activities in writing at least 30 days beforehand (Exhs. NEC-2, at 1-9; EFSB-CM-38). The Company also noted that there are no local bylaws in Charlton regulating construction work hours or noise (RR-EFSB-1).

The HCA between the Town and NEC contemplates mutual cooperation between the parties concerning construction of the Project (Exh. EFSB-Z-26(S1)(1) at 4).

NEC stated that it would prepare an environmental construction plan that specifies environmental protection measures (Exh. NEC-2, at 5-61). The Company also stated that it would hire an independent environmental inspector to ensure compliance with regulations and the construction plan (id.).

a. Phase 1

NEC indicated that Phase 1 construction would include: removal of vegetation; installation of erosion control and stormwater management measures; surface grading; construction of retaining walls; preparation of utilities; and driveway paving (Exh. NEC-2, at 5-47, app. F, at F-1). The Company estimated that Phase 1 would take about six months (Exh. EFSB-CM-8). The Company expects to use dump trucks, bulldozers, excavators, front end loaders, and backhoes during this phase (id.). The Company stated it would use temporary sedimentation basins to collect stormwater during construction (Exh. EFSB-PA-18(S1); Tr. 4, at 596).

For the Route 169 Site, NEC described using retaining walls to terrace areas around the LNG storage tank and process equipment (Exhs. EFSB-PA-18(S1); TOC-37). The Company indicated that, based on its analysis of geotechnical borings, bedrock could be manually excavated using an excavator and hoe ram, and would probably not require blasting (Exh. EFSB-CM-11; Tr. 1, at 39-40).[58] The Company stated that driveways for the Route 169 Site would be relatively simple and direct, and that existing municipal water and electrical infrastructure located along Route 169 could easily be extended to the site (Exhs. EFSB-CM-4; EFSB-CM-7).

Overall, NEC stated that civil preparation work for the Route 20 Site would be more extensive due to the topography of the site, the need for a new approximately 1,800-foot-long driveway, and the lack of existing utility lines (Exhs. NEC-2, at 4-14, 4-16; TOC-13). The Company indicated that it would need to remove the top 30 feet of the hill to accommodate the

[58] Nevertheless, the Company stated that it would comply with 527 CMR 1.00 should it need to blast (Tr. 3, at 446).

Facility (Tr. 1, at 22). NEC also indicated that, to minimize the total amount of site preparation, the Route 20 Site might necessitate more extensive use of retaining walls as compared to the Route 169 Site (Tr. 6, at 1118). The Company estimated that, due to the more extensive work, Phase 1 of site construction for the Route 20 Site could take about 45 days longer than at the Route 169 Site (Exh. TOC-13).

b. Phase 2

NEC estimated that Phase 2 construction would take about 13 months (Exh. EFSB-CM-1). During Phase 2, typical construction vehicles would include concrete trucks, cranes, welding rigs, utility trucks, and electrical vans (Exh. EFSB-CM-8).

Phase 2 would start with the installation of concrete foundations (Exh. NEC-2, app. F, at F-1).[59] The LNG tank installation would begin with installing the foundation and tank floor, followed by assembly and welding of the inner and outer tank panels (id.). With respect to the LNG storage tank, the Company stated that its construction vendor would prefabricate pre-stressed concrete and carbon steel tank panels (id.; Exh. EFSB-CM-15). The roof and insulation would be installed after the inner and outer tanks are installed (Exh. NEC-2, app. F, at F-1).

NEC stated that many of the Facility's main components would be prefabricated off-site and delivered for installation (id.; Exh. EFSB-CM-5). NEC maintained that its use of prefabricated equipment reduces the need for large laydown areas for storage and parking, with equipment delivered when needed (Tr. 1, at 26-27; Tr. 3, at 382). The Company reported that equipment with long lead times would be ordered and prefabricated prior to construction (Exhs. NEC-2, app. F, at F-2; EFSB-CM-33). The Company would install the major prefabricated equipment and then the building structures around them (Exh. NEC-2, app. F, at F-2). Finally, the Company would install electrical service components, and commission the Facility for start-up (id.; Exhs. EFSB-CM-9; EFSB-CM-33).

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[59] The Company stated that the tank and heavy equipment might require deep driven foundations according to the Massachusetts Building Code, 49 CFR Part 193 and NFPA 139A (Exh. EFSB-CM-10; Tr. 1, at 38).

2. Interconnection Pipeline and Meter Station Construction

NEC stated that construction of the pipeline interconnection and meter station would have a shorter duration than Facility construction and that it would occur concurrently with Facility construction (Exhs. EFSB-CM-2; EFSB-CM-28).[60,61] The Company estimated that the Preferred Interconnection Route could be constructed in 20 weeks, with open-trench construction progressing at approximately 60 feet per day (Exh. EFSB-CM-34). The Company reported that for complex crossings, such as Cady Brook and Sherwood Lane, it would employ HDD (id.; Exh. NEC-14, at 2). As noted in Section V.B.1.a, the Route 169 Site's Preferred Interconnection Route would require two separate HDD operations, one for the southern Cady Brook Crossing and Sherwood Lane, and a second for the northern Cady Brook Crossing (Exh. EFSB-CM-34). The Company expects to undertake the two HDD operations simultaneously with the open trench work; the southern and northern HDD operations would be constructed in approximately ten and six weeks, respectively (id.).

Other interconnection construction related activities include contractor mobilization and demobilization, equipment and material staging, erosion control installation, and pipeline testing (Exh. EFSB-CM-34). For interconnection route alternatives that include cross-country segments (i.e., pipeline construction outside of roadway layouts), the Company stated that it would construct within a cleared, 50-foot ROW, acquiring a permanent 30-foot easement and an additional 20-foot temporary construction easement (Exh. EFSB-CM-20; Tr. 1, at 53). NEC represented that, where an interconnection route would pass through wetland resource areas, it would limit land clearing and construction to the permanent 30-foot easement (Exh. EFSB-CM-40). For pipeline sections along Route 169, the Company stated it would limit land clearing to ten feet from the edge of the

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60 Construction and commissioning of the pipeline interconnection would occur before commissioning the LNG Facility, so as to provide the necessary gas supply (Exh. EFSB-CM-2).

61 As previously noted, NEC would construct the majority of its interconnection pipeline; Kinder Morgan would construct a relatively short segment that is within its ROW (Exh. NEC-14, at 2). The Company reported that Kinder Morgan would coordinate its construction with NEC and would not impact the Company's Project construction duration (Exh. EFSB-CM-39).

roadway (id.). NEC would also install temporary erosion control barriers such as silt fences or hay/straw bales to minimize erosion and sedimentation during construction (Exh. NEC-2, at 5-65 to 5-66).

NEC anticipated using a track excavator for normal trenching and a wheeled excavator for trenching along Route 169 (Exh. EFSB-CM-17). The Company stated that the open trenches during construction would be approximately five to eight feet wide and five feet deep (Exh. NEC-2, app. F, at F-3). For safety, the Company committed to keeping no more than 120 feet of trench open at any time (Exh. EFSB-CM-3). The Company indicated that, in paved areas, it would cover open trenches with steel road plates outside of working hours (id.; Tr. 3, at 456). The Company will string sections of pipe along the trenched corridor and weld the pipe sections together onsite (Exh. NEC-2, app. F at F-3; RR-EFSB-33(S1) at 20).

After trench excavation, sand and stone would be placed in the excavation, and then welded segments of pipe would be lowered into the trench (Exh. NEC-2, app. F, at F-3; RR-EFSB-33(S1) at 20). NEC stated that its preferred installation method for open trench portions of the pipeline is the "stovepipe" technique, which requires a shorter length of open trench at one time (Exh. EFSB-CM-42; Tr. 1, at 28-29).[62] The Company committed to working with abutters to minimize the impact of interconnection line construction on driveway access (Exh. EFSB-T-30; Tr. 3, at 405-407). NEC indicated that pipe trenches would be dewatered where groundwater is encountered and that the collected water would be discharged in a controlled manner (Exhs. NEC-2, at 5-64 to 5-65; EFSB-CM-18). After pipeline construction is complete, NEC would repave areas disturbed by the trench excavation (Tr. 3, at 407).

NEC stated that the pipeline would be protected from corrosion by using epoxy-coated pipe segments, by applying a compatible epoxy coating on-site over weld joints, and by installing a cathodic protection system for the pipeline (Exhs. NEC-2, app. F, at F-3; EFSB-CM-22). After welding and applying the protective coating over the welds, the construction crew would lower the pipe sections into the trench and backfill with sand up to the level of the pipe section (Exh. NEC-2,

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62 NEC stated that the "stovepipe" method is the installation of approximately 40 feet of individual pipe sections at a time (Exh. NAT-II-22).

app. F, at F-3). Next, backfill material would be placed above the pipe and compacted, followed by a layer of the previously excavated topsoil (id.). The construction area would be cleaned and restored to preconstruction conditions and contours, as practicable, after construction (id., app. F, at F-4; RR-EFSB-33(S1) at 20).[63]

As previously noted, segments of some pipeline interconnection routes would require HDD. The Company explained that HDD is a trenchless construction method used for complex crossing such as major roadways or environmentally sensitive areas (Exh. NEC-2, app. F, at F-2). For an HDD operation, the Company would require a cleared work area on each side of the crossing, a driving pit and a receiving area, each approximately 100 feet by 100 feet (Tr. 4, at 625-626). NEC explained that HDD pipeline installation is generally accomplished in three stages, beginning with drilling a small diameter "pilot" hole along the designed pipeline path, followed by enlarging the pilot hole to a diameter suitable for installation of the pipeline in a process called "pre-reaming" (Exh. EFSB-CM-19). The final stage involves pulling the pipeline back through the enlarged hole (id.). The Company reported that the pipeline pulling stage would need to be continued once started; pullback activities for each HDD location would take 24 to 48 hours to complete (Exh. EFSB-CM-38).

After installing the pipe for any of the alternative routes, NEC would launch a device known as a cleaning or scarifying "pig" through the installed pipe to remove debris (Exh. NEC-2, app. F, at F-3). The Company stated that it would then pressure test the pipe by filling it with water and maintaining 150 percent of the maximum operating pressure of the pipe for eight hours (Exh. EFSB-CM-25). The Company would then dewater the pipe and run additional "pigs" through the pipe to dry it (Exh. NEC-2, app. F, at F-3). Finally, the Company expected to purge air from the pipeline with natural gas that would be vented or flared (id., app. F, at F-4).

According to NEC, Kinder Morgan's construction of a new meter station would include grading and earthwork, and installation of concrete foundations, interconnection piping, and electrical and instrumentation equipment (Exh. EFSB-CM-28). If an existing meter station is

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63 NEC indicated that large-scale vegetation incompatible with operating a pipeline would not be allowed to regrow in the ROW (Tr. 1, at 58).

upgraded, construction would involve replacement of existing metering equipment and modification of existing piping (id.).

D. Environmental Impacts

Environmental impacts from the Project at the Route 169 Site, the Route 20 Site, and their respective pipeline interconnection options are described below. Below, the Siting Board finds that the Route 169 Site, including the pipeline interconnection constructed along the Preferred Interconnection Route, is superior to the Route 20 Site with respect to providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. The Siting Board also finds that environmental impacts of the Project are minimized with the conditions specified below.

1. Land Use

a. Company Description

NEC described the Route 169 Site as predominantly undeveloped, with mixed deciduous and coniferous woodlands and wetland areas (Exh. NEC-2, at 5-49). The site is located within the Industrial-General Zoning District (id.). The site is approximately 11.6 acres, with frontage on Route 169 (id.; Exh. EFSB-G-7(1)(S1) at 4). NEC indicated that the entire Route 169 Site would be permanently altered for construction and that approximately 0.56 acres would be altered for the Preferred Interconnection Route (Exh. EFSB-G-7(1)(S1) at 10; RR-EFSB-35(S1)). In general, the Route 169 Site is bounded by largely undeveloped land to the west and south (Exh. NEC-2, at 5-49). The Route 169 Site is bordered by a three-megawatt ground-mounted photovoltaic installation to the west, Route 169 to the east, the Incom facility to the north, forested land to the southwest, and residences to the distant south (Exh. NEC-2, at 4-13, 5-49, app. I, at fig. I-1.1; Tr. 1, at 167).

With respect to tree clearing, NEC reported that the Route 169 Site, using the Preferred Interconnection Route, would require removal of 53 public shade trees from the highway layout of

Route 169 (Exh. EFSB-G-7(1)(S1) at 53).[64] Due to the potential for removing more than five public shade trees, NEC was required to submit an ENF to the MEPA Office (Exh. EFSB-G-7(S1)). NEC stated that its ENF included a comprehensive presentation of the project, alternatives, mitigation, and compliance with pertinent regulations, noting that the information presented in the ENF is consistent with the record established in this proceeding (id.). The Company received a Certificate on the ENF indicating that the Project does not require the preparation of an Environmental Impact Report ("EIR") and that the project's permitting process may proceed (Exh. EFSB-G-7(S2)).

The Company plans to demolish existing structures located on parcels which comprise the Route 169 Site (i.e., structures located at 304 and 314 Southbridge Road) (Exh. NEC-2, at 5-49). NEC reported that it is in negotiations with the owners of an engine repair shop at 318 Southbridge Road, a parcel which abuts the Route 169 Site to the south, for purchase of the property (id.).

The Route 169 Site is approximately 190 feet from the closest residential dwelling, an upstairs apartment located in the 318 Southbridge Road engine repair building to the south of the Route 169 Site, located within the Industrial-General Zoning District (RR-EFSB-46). The Company proposes to eliminate this residence and no other residences are within 300 feet of the Route 169 Site fenceline (id.; Exh. NEC-2, at 5-49). Within one-quarter mile of the Route 169 Site, there are a total of 19 residences, three commercial properties, and five industrial properties (RR-EFSB-46). There are no sensitive receptors within a half mile (id.).[65] Industrial and commercial uses, generally along Route 169 to the north of Incom and the Route 169 Site include

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64 Tree inventory figures presented with the ENF indicate that the Facility and driveway construction would result in the removal of twelve public shade trees; the remainder would be removed to construct the Preferred Interconnection Route (Exh. EFSB-G-7(1)(S1) at 45-47). The Company noted that using HDD, instead of open trenching, for the northern Cady Brook crossing would avoid the removal of approximately eleven public shade trees (Exh. EFSB-LU-9).

65 The Company considered nine categories of sensitive receptors in its land use analysis: places of worship, schools (kindergarten to high school, universities, and technical institutes), police stations, fire stations, cemeteries, courthouses, hospitals, long-term care facilities (nursing homes and assisted living centers), and day care facilities (RR-EFSB-45).

Millennium, North American Tool, paper seller L&P Paper, Vehicle Outfitters auto shop, and a doctor's office (Exh. NEC-2, at fig. 2.1-3, fig. 2.1-5, 5-49). Larger facilities between one-half mile and one mile of the Route 169 Site include a Casella Waste Systems solid waste landfill and the Southbridge Municipal Airport to the west (id. at fig. 2.1-2, 5-49, 5-50; Tr. 6, at 1017).

Any interconnection pipeline route would be restored to a maintained, mowed grassland and shrub habitat, where not otherwise planned for use as roadway shoulders, stormwater management basins and Facility perimeters (Exh. EFSB-LU-3).

The Route 20 Site is undeveloped and wooded (Exh. NEC-8, at 5-50, fig. 5.3-2). For the Route 20 Site, the Company would regrade, clear, or otherwise alter a total of 45.3 upland acres (Exh. EFSB-LU-3). Surrounding land uses around the Route 20 Site include an abandoned sand and gravel operation, a waste transfer station, commercial uses, and limited residential areas (Exh. NEC-8, at 1-3). The Route 20 Site fenceline would be 569 feet from the closest residential structure and within one-quarter mile of a total of seven residences (RR-EFSB-46). The closest commercial and industrial properties, and the closest sensitive receptors, are all more than one-quarter mile away (id.). Surrounding land uses around the Route 20 Site include an abandoned sand and gravel operation, a waste transfer station, commercial uses, and limited residential areas (Exh. NEC-8, at 13). The Route 20 Site fenceline would be about 570 feet from the closest residential structure and within one-quarter mile of a total of seven residences (RR-EFSB-46). The closest commercial and industrial properties, and the closest sensitive receptors, are all more than one-quarter mile away (id.). Surrounding land uses are summarized in Table 4, below.

Table 4. Surrounding Land Use Comparison between Route 169 Site and Route 20 Site

Characteristic	Route 169 Site	Route 20 Site
Site Size / Parcel Size	11.6 acres	220 acres
Acres of Upland Altered	11.6 acres	45.32 acres
Zoning of Site	Industrial General zoning dist.	Industrial General zoning dist.
Min. Distance from Facility Structure to Closest Residence	190 feet (building expected to be removed; next is 400 feet)	569 feet
Residences w/in 0.25 miles	19	7
C&I Properties w/in 0.25 mi.	8	0

Sources: Exhs. NEC-2, at 4-11, 4-31, 5-49; EFSB-LU-3; RR-EFSB-46; EFSB-G-7(1)(S1) at 10.

With respect to the pipeline interconnection alternatives, NEC provided information on distances to the closest receptors and counts of receptors within various distance ranges. A

summary is provided in Table 5, below, for the Route 169 Site and the Route 20 Site interconnections.

Table 5. Land Uses Near Noticed Pipeline Interconnections

	Number of Adjacent Residences	Distance to Nearest Residential Structures	Distance to Nearest Sensitive Receptors	Amount of Agricultural Land / Tree Clearing in Easement (acres)	Amount of Commercial / Industrial Land Uses in Easement (acres)
Route 169 Site Interconnections					
Preferred Interconnection Route (Alternative 2A)	2	24 feet	> ½ mile	0 / 0.56	1.16 / 1.14
Alternative 1	0	680 feet	~ ¼ mile	0 / 9.55	0 / 0.94
Alternative 2	3	24 feet	97 feet	0 / 1.4	1.16 / 1.14
Alternative 3**	1	240 feet	> ½ mile	0 / 3.46	0
Alternative 4	0	670 feet	691 feet	0 / 6.49	0 / 6.4
Alternative 5	4	25 feet	~ ½ mile	1.28 / 11.32	0
Alternative 6	0	520 feet	~ ¼ mile	0 / 3.95	0.45 / 0.14
Route 20 Site Interconnections					
Route 20 Primary Interconnection	0	230 feet	>1/4 mile	0 / 16.8 acres	0
Interconnection Alternative	1	220 feet	>1/4 mile	0 / 16.2 acres	0

** Alternative 3 was rejected in Section V.B.1.d above but is included in this table for completeness.

Sources: RR-EFSB-35; RR-EFSB-35(S1) ; RR-EFSB-45; RR-EFSB-45(S1).

NEC noted that, except for the Preferred Interconnection Route, portions of the other interconnection alternatives cross land that the Company does not own; the Company stated that it would secure appropriate easements rights wherever necessary to complete the approved interconnection (Exh. NEC-2, at 5-50, 5-54). In a post-brief filing, NEC stated that it was unable to secure an easement from Millennium for any of the pipeline interconnection routes that would

cross Millennium's property (Exh. NEC-14, at 1).[66] As such, NEC indicated that interconnection routes Alternative 1, Alternative 4, and Alternative 6 (i.e., the Company's previously preferred interconnection) have significant development challenges (id. at 1, fig. 1, at 2; Exhs. EFSB-LU-7).

As previously noted, the meter station for the Route 169 Site's Preferred Interconnection Route would be located north of the existing TGP mainline and west of Route 169, with direct access onto Route 169 (Exh. NEC-14, at fig. 1). NEC stated that it currently holds an option agreement to own the entire parcel on which the meter station would be located (id. at fig. 2; Exh. EFSB-LU-8; RR-EFSB-33(S1) at 13). NEC reported that this meter station site is adjacent to four residences, with the nearest residential structure 310 feet away, and that the nearest sensitive receptor is about 1,460 feet away (RR-EFBS-47(S1)).

Based on an archaeological assessment performed by NEC's consultant, parts of the Project at the Route 169 Site would be located in areas identified as having high archaeological sensitivity (Exh. NEC-2, at 5-48). NEC stated that it would coordinate directly with the Massachusetts Historical Commission ("MHC") regarding the need for additional field surveys and, to the extent necessary, NEC will develop impact avoidance and mitigation plans (id.; Exh. EFSB-G-7(1)(S1) at 36). Potential effects, if any, to archaeological resources will be addressed with the MHC through compliance with Section 106 of the National Historic Preservation Act and the State Register review processes (Exh. NEC-2, at 5-48; see also Exh. EFSB-G-7(1)(S1) at 131).

Based on a cultural resource investigation to identify historic and archaeological resources on or adjacent to the Route 169 Site, NEC concluded that no historic resources are located at the Route 169 Site (Exh. NEC-2, at 5-48). Based on the vegetation and topography surrounding the site, NEC anticipates no visual effects on any nearby historic properties (id.). NEC submitted a revised Project Notification Form and archeological "due diligence" report to the MHC in April and May 2019, receptively (Exh. EFSB-G-7(1)(S1) at 97, 126). The MHC subsequently

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66 NEC represented that "reaching a final agreement has proven to be challenging because of the bankruptcy filing of [Millennium's] direct parent" (Exh. NEC-14, at 1).

determined that use of the Route 169 Site would be "unlikely to affective significant historic or archaeological resources" (id. at 131).

With respect to the Preferred Interconnection Route, NEC indicated its consultant conducted an archeological survey of the alignment and submitted an amended Project Notification Form to the MHC (Exh. EFSB-G-7(1)(S1) at 73). The MHC submitted a comment letter on NEC's ENF stating that the Preferred Interconnection Route has some degree of archeological sensitivity due to its proximity to the Philips Sash Mill, a known site along Cady Brook (Exh. EFSB-G-7(1)(S2) at 11). The MHC requested that, if the Preferred Interconnection Route is selected for the Project, NEC conduct an intensive (locational) archeological survey for sensitive portions of that route (id.). The MHC stated that it would consult with NEC to review the results of the intensive survey and determine strategies to avoid, minimize, or mitigate adverse effects to any significant archeological resources (id.).

With respect to the Route 20 Site, the Company's consultant determined that the Project would impact some areas of high archaeological sensitivity, and that further evaluation in coordination with the MHC may be warranted if the Route 20 Site is selected (Exh. NEC-8, at 5-48). NEC indicated that no known historic resources are located at the Route 20 Site and that there would be no visual effect on any nearby historic properties (id.).

NEC stated that it reviewed the Natural Heritage and Endangered Species Program ("NHESP") database for the Project and reported that the Route 169 Site is within the range of the northern long-eared bat (Myotis septentriolis), a federally listed species that ranges over much of the eastern U.S. (Exh. NEC-2, at 5-19). According to NEC, there are no known hibernacula or maternal roost trees for this species near the Project (id.). In addition, Interconnection Route 4 may intercept habitat for a rare or listed species; however, Massachusetts NHESP had not reviewed this route for potential impacts (id.). NEC stated that the Project, using the Preferred Interconnection Route does not require any permits for rare species or habitat (Exh. EFSB-G-7(1)(S1) at 23). NEC also stated that the Project, including the Preferred Interconnection Route, is not within or adjacent to an Area of Critical Environmental Concern (id. at 70).

NEC maintains that the Facility, particularly at the Route 169 Site, would be consistent with existing and established land uses (Company Brief at 58). The Company notes that during its evaluation of the Route 169 Site, it viewed the compatibility of the Project with existing land uses as an attractive feature (id., citing Exh. NEC-2, at 5-49 to 5-50). The Company contends that the Route 169 Site enjoys substantial buffer area, both to the west and across Route 169 to the east, and that an additional 88 acres of surrounding "potential buffer space" are currently under the same ownership as the Route 169 Site (Exhs. TOC-35; TOC-35(1); Company Brief at 7, 58). The Company views the proposed Facility location as "essentially adjacent" to a 360 MW gas-fired, combined-cycle power plant, gas and electric transmission lines, several manufacturing facilities and an existing, utility-scale solar generation field (Company Brief at 58, citing Exh. NEC-2, at 5-49 to 5-50).

NEC describes the Facility at the Route 169 Site as being near existing commercial, industrial, and residential uses (Company Brief at 58, citing RR-EFSB-45). The Company argues that this distinguishes it from the Route 20 Site "which is within an area that simply has not been developed and consists of open, undisturbed space (currently used for hiking and hunting) that would be far more materially altered by development" (Company Brief at 58).

The Company has also committed to investigate opportunities for the Facility to provide meaningful benefits to the Town of Charlton, Charlton residents and businesses, and neighboring communities, including potential provision of gas distribution service, micro-grid opportunities, or other efficiency and resiliency benefits (Exh. NEC-2, at 1-12; Company Brief at 59). NEC argues that the Siting Board should find that the Facility at the Route 169 Site is consistent with existing land uses and that "the Company is committed to providing additional energy-related or other benefits to the community as part of mitigating land use impacts" (Company Brief at 59).

b. Positions of the Parties

i. Town of Charlton

On brief, the Town of Charlton noted that in the Original Petitions, the Company stated the Route 20 Site "demonstrate[d] that the proposed Project reflect[ed] a proper balance between economic and reliability factors and environmental impact consideration, consistent with state,

federal, and regional energy policies and local community expectations" (Charlton Brief at 2, citing NEC-7, at 1-3). The Town also noted that the Original Petitions asserted that the Route 20 Site "further demonstrate[d] that the Project was selected as a result of an appropriate site and technology selection analysis, and the environmental impacts and costs of the Project are minimized" (id.). Therefore, despite the Company's preference for a site along Route 169 in the Amended Petitions, the Town preferred the selection in the Original Petitions of the Route 20 Site (Charlton Brief at 3).

The Town of Charlton argued that the Route 169 Site is only 11.4 acres (and approximately 95 percent smaller than the Route 20 Site), as well as being close to the road, residences, and a school, and that the Project would cause increased traffic through Charlton (Charlton Brief at 2; Charlton Reply Brief at 2). The Town cited testimony of its engineering consultant contending that the Route 169 Site is too constrained for the size and type of facility (Charlton Brief at 9). In particular, the Town's consultant voiced concern that the Route 169 Site is "extremely constrained by property boundaries and even more so by specific topographic features" and that "these constraints will limit the Projects ability to address outstanding design issues, unforeseen conditions or future improvements, or repairs" (id., citing Exh. TOC-SPR-1). For these "and additional reasons," Charlton objected to the location of the Facility at the Route 169 Site at the time (Charlton Brief at 2). Charlton argued that there were clear quantitative and qualitative differences between the two sites and that it was clear that the Route 20 Site would serve the interests of the Town and its residents far more effectively and with far fewer risks than the Route 169 Site (id. at 12). Charlton concluded that the Project should be located at the Route 20 Site and not at the Route 169 Site (Charlton Reply Brief at 2, 7-8).

While Charlton agreed with the Company that, in contrast to the Route 169 Site, the Route 20 Site is surrounded by only undeveloped or residential uses, Charlton argued that the proper conclusion should be that the Route 20 Site has no surrounding uses that would experience more than a negligible adverse impact from the Project (Charlton Reply Brief at 2). With the execution of the HCA between the Town and NEC, however, the Town no longer objects to the Route 169 Site (Exh. EFSB-Z-26(S1)(1) at 4-5).

ii. Mr. Barbale

Mr. Barbale argues that it makes very little sense to construct the Facility on the Route 169 Site, which he contends is a small parcel of land, with little buffer, in a residential community that would suffer from tanker truck traffic on Route 169 (Barbale Brief at 1). Mr. Barbale argues that the Facility at the Route 169 Site would be located only 245 feet from a busy road (i.e., Route 169) and close to residential houses, an apartment complex, and a number of businesses (id.). Mr. Barbale states that many of his concerns would be eliminated if a substantial buffer zone were present, which contends is not the case at the Route 169 Site due to the limited space available (id.).

iii. Millennium Power

On brief, Millennium stated that NEC should not be permitted to construct any portion of the Project on Millennium's property without Millennium's voluntary approval (Millennium Brief at 1). Millennium notes that NEC did not file a petition for eminent domain under G.L. c. 164 § 69R (authorizing petitioner to use eminent domain) and that NEC committed to obtaining any interests in Millennium's property via voluntary agreement (id. at 3, citing Tr. 3, at 513). Millennium requests that, as a precondition to construction of the Company's previously preferred interconnection (i.e., Alternative 6), Interconnection Alternatives 1 or 4, NEC should be required to submit evidence and documentation that Millennium has voluntarily granted permission to NEC to construct and operate the selected alternative on Millennium's property (Millennium Brief at 3). In the absence of such permission, Millennium argues that NEC should be required to construct an alternative lateral that does not cross Millennium property, such as NEC's proposed Alternatives 2, 3, or 5 (id.).

Additionally, Millennium contends that the Siting Board should exercise authority to impose conditions on the Project even if Kinder Morgan, which is not a co-petitioner in this proceeding, were to construct the interconnection (Millennium Brief at 5). Millennium explained that the Siting Board has asserted jurisdiction over ancillary facilities such as pipeline laterals, regardless of whether the entity that owns or constructs the ancillary facility is an applicant before the Siting Board (id. at 4, citing Sudbury-Hudson, EFSB 17-02/D.P.U. 17-82/17-83 at 3, n.1

(2019)). Millennium states that NEC has indicated, regarding construction of an interconnection by Kinder Morgan, that: (1) Kinder Morgan would not be required to publicly notice the work; (2) the public would not have the opportunity to intervene or protest before FERC; and (3) blanket certification authority can also authorize the use of eminent domain (Millennium Brief at 5).

iv. North American Tool

North American Tool also expressed concerns about what it views as the ill-defined involvement of Kinder Morgan relating to the Project (NAT Reply Brief at 2).

v. Company Response

NEC responds to criticisms related to land use, in which other parties suggest that the Route 20 Site is "somehow superior" to the Route 169 Site, by asserting that these parties did so "without refuting or even commenting on" the Company's "sophisticated site selection and comparison analyses," asserting that this might be because Charlton's consultants did not conduct an on-site inspection of either the Route 169 Site or the Route 20 Site (Company Reply Brief at 6). NEC suggests that this contrasts with its own experts' numerous site visits, detailed site-related analyses, and continuing refinement of Site and Facility design (id. at 7).

NEC contests the various arguments made in opposition to the Route 169 Site, by noting that the total area for the Route 169 Site is in the median range as compared to other regional LNG facilities (Company Reply Brief at 9, citing Exh. NEC-10). NEC also contends that Charlton's arguments ignore the Company's planned concentration and organization of equipment, which NEC contends offers distinct advantages in terms of both operational and emergency response considerations, due to the more compact footprint of the Route 169 Site (Company Brief at 74, citing Tr. 6, at 1111-1112; Company Reply Brief at 9). Beyond the almost-12-acre Route 169 Site itself, NEC asserts that the surrounding area provides additional buffer land, including the large solar array to the west, industrial facilities to the north, and 88 acres of additional buffer land that the Company claims will be controlled to the southwest and east (Exhs. EFSB-SS-31; TOC-35; TOC-35(1); Company Reply Brief at 9, citing Tr. 2, at 270-271, Tr. 6, at 985). The Company contends that the "Siting Board should find that the Route 169 Site is of sufficient size, enjoys

substantial and effective buffers and facilitates the implementation of best practices that further the interests in minimizing impacts, safety and overall efficiency" (Company Reply Brief at 9-10).

c. Analysis and Findings on Land Use

The record shows that neither proposed site is in an area that is predominantly residential, and neither has any concentration of other sensitive receptors. There are residences closer to a new LNG Facility at the Route 169 Site, with 19 homes within one quarter mile, compared to seven homes within one quarter mile of a Facility at the Route 20 Site. However, the Facility at the Route 169 Site would have no immediate residential neighbors within 300 feet, instead being located between a solar PV field, Route 169, and an industrial facility. The Route 20 Site would be somewhat preferable regarding nearby abutters. Both locations are zoned industrial, and it appears that neither site would directly affect historic and/or archeological resources. While adding an industrial facility in a small industrial neighborhood at Route 169 would be a compatible use, the Route 20 Site is not situated amongst other industrial facilities but is buffered by considerable undeveloped land.

The Company would eliminate a greater amount of woodland habitat for the Route 20 Site as compared with the Route 169 Site (45 acres versus 11.6 acres of alteration), mostly due to the longer driveway and longer pipeline interconnection that would be required to reach the more remote Route 20 Site. The Route 169 Site would be preferable regarding to minimizing land clearing.

The Town of Charlton, in its original position, and local intervenors contend that the Route 169 Site is inappropriate, due to its small size and mixed development in the area. The Town of Charlton also argued, from a land use perspective, that the Route 169 Site is too constrained for the size and type of facility, and that the site would not allow NEC to address outstanding design issues or unforeseen conditions. With the adoption of the HCA on August 10, 2021, the Town of Charlton no longer opposes selection of the Route 169 Site. The Siting Board notes that while the Facility at the Route 20 Site would be surrounded by more undeveloped land, the Route 169 Site is large enough to meet site size requirements set forth in 980 CMR

10.03(1),(2), as described in Section VI, below.[67] Nevertheless the larger size of the Route 20 Site would provide additional flexibility in site design. The Siting Board considers each potential location generally suitable with respect to surrounding land uses, and it finds that the Route 20 Site and the Route 169 Site are comparable with respect to land use impacts.

Each site has primary and alternative pipeline interconnection routes, which would require tree clearing. In general, the pipeline interconnection routes for the Route 20 Site are longer than the interconnections for the Route 169 Site, and that is specifically true of the Company's preferred routes, as well. The record shows that, for the Route 20 Site, both the preferred and noticed alternative interconnection routes would, in part, cross land that is not owned by the Company and therefore would require acquisition of appropriate property interests to do so. The Company's Preferred Interconnection Route for the Route 169 Site would be located within the roadway layout of Route 169 and therefore requiring less habitat alteration. This difference is countered by the disadvantage of the Route 169 Site Preferred Interconnection Route being closer to existing residences. Each comparative advantage/disadvantage is significant, but neither is decisive.

Among the noticed pipeline routes for the Route 169 Site, the Preferred Interconnection Route would be located within the roadway layout of Route 169 and therefore would not require acquisition of land rights from any private property owners and, furthermore, would not require the creation of any new, permanently cleared, right of way. Construction of the Preferred Interconnection Route would require the removal of 53 public shade trees from the western shoulder of Route 169; however, this amount of tree removal is relatively small compared to the permanent land clearing that would be required for the other Route 169 Site or Route 20 Site interconnection routes. The record shows that the Preferred Interconnection Route for the Route 169 Site has some archeological sensitivity. The Siting Board therefore directs the Company to conduct the intensive locational archaeological survey requested by MHC for sensitive portions of the route identified by MHC.

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67 The Siting Board notes that any limitations on the flexibility of future site use (as noted by the Town of Charlton) related to the relatively more compact Route 169 Site do not preclude approval by the Siting Board and are known and understood by the Company.

Millennium has requested that any Siting Board approval of the Project have an explicit condition that the Project not be constructed across its land without agreement from Millennium. If the Company wishes to pursue a taking of Millennium's property by eminent domain, determination of rights would be adjudicated in the eminent domain proceeding and does not need to be prejudged in the Board's decision on the Amended Petitions. In any case, the record shows that NEC failed to reach a final agreement for easement rights across Millennium Power and, as a result, is now pursuing the Preferred Interconnection Route, which would not require any property rights from Millennium.

Effects and potential mitigation of visual, noise, traffic, and safety impacts related to surrounding land uses is described in sections below. With compliance with conditions in those sections and with adherence to federal, state, and local regulations, the Siting Board finds that land use impacts of the Project would be minimized.

2. Visual

a. Route 169 Site

The Company performed a viewshed analysis to assess the overall visual impact of the proposed Facility at the Route 169 Site (Exh. NEC-2, at 5-58, app. G). Tall Facility elements include the LNG tank; the gas turbine stack (80 feet tall); and the compressor building (45 feet tall and 125 feet wide) (Exhs. NEC-2, at 5-59; EFSB-PA-18(S1); RR-EFSB-38). During the course of the proceeding, the Company described the height of the LNG tank variously as 88 or 98 feet (RR-EFSB-38).[68] The Company indicated that these tank heights and their corresponding storage tank base heights would result in the top of the storage tank being either 617 or 635 feet above mean sea level, respectively (RR-EFSB-38). Certain Facility elements would be visible along Route 169, but the Company's analysis indicated that local topography and existing tree canopy would screen much of the Facility from nearby locations (id. at 4-14, 5-61). The Company stated

[68] The Company's viewshed analysis used the storage tank height of 98 feet, and corresponding 635 foot absolute elevation above mean sea level (Exh. NEC-2, at 5-59).

that the Project would use unobtrusive colors and materials in construction to minimize any potential visual impacts (id. at 5-61).

The viewshed analysis indicated that the Facility would potentially be visible from some points within an area about a mile wide extending north-northeast and south-southwest of the Facility (i.e., paralleling the valley in which Cady Brook and Route 169 are located) towards the Mass Turnpike in Charlton and through parts of Southbridge (Exh. NEC-2, at 5-58 and app. G, at fig. 1.1-1). The Company explained that there's no visibility from further to the west or east because hills block such views (Tr. 5, at 919). The Company used photo-montage software to superimpose the outlines of major Facility components on digital photos taken from selected points out to 2.5 miles, modeled within the potential viewshed of the Facility (Exh. NEC-2, at 5-60 and app. G). These simulations indicated that the Facility would generally not be visible from such locations due to existing tree cover (id. at 5-58 and app. G).

The Company indicated that Facility elements would be visible from Route 169 itself, adjacent to the Facility, though views of process equipment and buildings would be obscured by an eight-foot fence, a 20-foot sound wall, a vapor fence around the sump area, and landscaping, including trees, to be installed along Route 169 to screen the fence and the Facility from view (Exhs. NEC-2, at 5-58; EFSB-A-10(1)(S1) at 11). Any interconnection to TGP from the Facility would be underground; in the case of the Preferred Interconnection Route, some tree-clearing within the highway layout of Route 169 would be required (Exh. EFSB-G-7(1)(S1) at 74).[69]

As of the time of the evidentiary hearing, NEC had not completed a landscaping plan for the site (Tr. 5, at 915-916). However, the Company stated that its landscape plan will show the spacing, depth, and heights of the proposed plantings, and that the design likely will include a mix of evergreens in the range of five-to-six feet tall at the time of planting (growing to mature heights

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[69] As noted above, the meter station associated with the Preferred Interconnection Route would be located immediately north of the TGP mainline on the west side of Route 169 (Exh. NEC-14, at fig. 3, fig. 4; RR-EFSB-33(S1) at 13). NEC indicated that Kinder Morgan's meter station equipment would be enclosed in a one-story building surrounded by a gravel yard and chain link fence (Exh. NEC-14, at fig. 3, fig. 5). Plans for the meter station indicate that the meter station would be visible from Route 169 (Exh. NEC-14, at fig. 3).

of 15 to 20 feet) (RR-EFSB-42). NEC stated that Charlton would review its vegetation design before its finalized (id.). According to the HCA, NEC will support the use of native plants and local biodiversity to the extent reasonably possible (Exh. EFSB-Z-26(S1)(1) at 5). NEC will work with horticultural experts on the management of non-native invasive species on the Route 169 Site, as well as the selection of native species supporting local fauna on the Route 169 Site (id.). Pursuant to provision (2) of the HCA, NEC further agrees to make an informal submittal to the Planning Board that is generally consistent with the Town's Site Plan Review requirements set forth in Section 7.1.4 of the Charlton Zoning Bylaws, limited to security fencing, perimeter landscape screening, site lines at the driveway and site lighting (id. at 2).

The LNG Facility at either site would have lighting necessary to ensure safe nighttime operation, in compliance with safety regulations such as 49 CFR 193.2911 (Exh. NEC-2, at 2-4 and 5-58). NEC stated that lighting at the Facility will be "dark sky" compliant and flare operations would be limited to daytime and emergencies (id. at 5-58). The Company committed that lighting would be no brighter than necessary for safety and code compliance, would be downward facing, and would be consistent with recommendations of the International Dark-Sky Association unless project requirements dictate otherwise (id. at 5-58, 5-59).

Mr. Barbale expressed visual concerns about the Project based on its proximity to his residence and business (Barbale Brief at 1). No other party addressed visual impacts in its brief.

b. Route 20 Site

As noted above, the Project at the Route 20 Site would include the same components as described for the Route 169 Site (Exh. NEC-2, at 2-4). This would include components comparable to the 88-foot-tall LNG tank; the 80-foot-tall gas turbine stack; and the 45-foot-tall compressor building (see id. at 5-59). Additionally, the Route 20 Site would require a water supply tank, approximately 35 feet tall and 50 feet in diameter (id. at 5-59; Exh. EFSB-S-44).

A topographic map provided by NEC indicates that the Route 20 Site would be situated on top of an elongated hill that is oriented north to south (Exh. NEC-8, app. A, at fig. NEC-002-C2). The base of the hill, near the point where the Route 20 Site driveway would intersect Route 20, has an elevation of approximately 720 feet above sea level, while the peak of the hill has an elevation

of approximately 828 feet (id.). Another topographic map provided by NEC shows that there are slightly higher and slightly lower hilltops within a mile or two of the site (Exh. NEC-2, at fig. 1.1-2). In an analysis of a 77-foot-tall feature, the Company asserted, using photo simulation software, that such a facility feature would be visible from only one of fourteen potential viewing locations (Exh. NEC-8, at 5-60, 5-61, app. G). However, photos taken from some additional of the fourteen points around the Route 20 Site show a hill visible in the middle distance in direction of the Route 20 Site (Exh. NEC-8, app. G). The Company noted "that the relative heights and locations of the proposed Project elements in each [of its photo simulations is] the result of a computer model and are therefore approximate" (Exh. NEC-8, at 5-60).[70] Land clearing would be required for construction of the Facility's 1,800-foot-long driveway or either pipeline interconnection – each about 7,000 feet long; see Section V.D.1.a, Table 5.

c. Analysis and Findings on Visual Impacts

The Facility at the Route 169 Site would be visible to motorists and other passersby on Route 169 and visible from points in the immediate vicinity. Viewshed modeling shows that the Facility would have potential visibility from points northeast and southwest in the valley of Cady Brook and Route 169, but mostly would be obscured by vegetation. The hill near the top of which the Facility would be built at the Route 20 Site appears to be visible in several of the leaf-off photographs provided by the Company in the Original Petition to Construct. The Siting Board notes that the Route 20 Site includes structures up to 106 feet tall atop a hill which would be visible from vantage points with a clear view towards the site. As noted above in Section V.D.1.a using the Route 20 Site would require more land clearing for the Facility, driveway, and pipeline interconnection compared to constructing the Project at the Route 169 Site.

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70 Several of the leaf-off photo simulations shown by the Company show a hill visible in the middle distance (e.g., Locations 4 and 5 along Route 20 to the west; Location 9 on Eleanor Lane, Charlton, to the south and Locations 6 and 13 to the east) in the direction the simulation indicates for the Facility, but show neither clearing of trees on that hill nor the simulated structures being on top of the hill (Exh. NEC-8, app. G).

Visually, the Facility at the Route 169 Site would be a large presence from the closest receptors, which include Incom to the north and motorists on Route 169 but would also be somewhat visible from a small number of additional locations, depending on distance, topography, and intervening vegetation. In contrast, the Facility at the Route 20 Site would not be visible to the closest residents because it is surrounded by dense woods; however, the evidence suggests that at least the taller elements would be visible from a number of more distant viewing points. Thus, there is a trade-off between a small number of impacted properties close to the Route 169 Site which would experience somewhat intrusive views of the Facility, and the greater numbers of receptors who would see the Facility at the Route 20 Site, albeit at a considerable distance. The record shows that Facility lighting at either site would not exceed that required for safety and conformance with regulations. Accordingly, the Siting Board finds that the Route 20 Site and the Route 169 Site are comparable with respect to visual impacts.

At the time of hearings, the Company's Route 169 Site landscaping plans had neither been completed nor reviewed by the Town of Charlton. To assure adequacy of Facility landscaping, the Siting Board directs the Company to provide to the Siting Board, prior to the completion of construction, (a) its final landscaping plan; (b) artists' renditions of a view of the Facility from Route 169 both with plantings as installed and at a mature growth stage; and (c) all documented review comments from the Town of Charlton relative to site landscaping. The Siting Board directs the Company to seek consultations with the Town on the appearance of the sound wall, if not otherwise required by provision (2) of the HCA (see Exh. EFSB-Z-26(S1)(1) at 2). The Siting Board also directs that the LNG storage tank shall be constructed at the lesser of a maximum height of 106 feet (including the dome of the tank) or a maximum elevation of the top of the tank (including the dome of the tank) at 635 feet above mean sea level. Further, the volume of the tank shall not exceed two million gallons of LNG. With its compliance with dark-sky lighting recommendations, the sound wall condition, and the landscaping plan condition, the Siting Board finds that visual impacts of the Project at the Route 169 Site would be minimized.

3. Wetlands and Water Resources

a. Route 169 Site

i. Wetlands

NEC identified several wetlands and waterways in the vicinity of the Route 169 Site through field delineation (Exh. NEC-2, at 5-6). The Charlton Conservation Commission approved the Company's wetland delineation boundaries and issued an Order of Resource Area Delineation in June 2019 (Exh. EFSB-W-6). The order described some state-jurisdictional bordering vegetated wetlands ("BVW") and water channels (Exh. EFSB-W-6(1) at 2). The Company represented that while the Project would not fill any delineated BVW, parts of the Facility would be within the riverfront area ("RFA") and 100-foot buffer zone of a BVW (Exh. NEC-2, at 5-7 to 5-8; RR-EFSB-33(S1) at 19). The Company also presented that, while the Route 169 Site would not cause waterway impacts, it would affect 1.48 acres of waterway buffer zone related to an ephemeral stream north of the site (Exhs. NEC-2, at 5-1; EFSB-W-2).[71]

The Company stated that, in accordance with the Massachusetts WPA, construction work occurring within resource area buffer zones would be subject to review by the local conservation commission (Exh. NEC-2, at 5-11 to 5-12; Tr. 4, at 575-576). The Company explained that, in any case, the Massachusetts WPA itself does not require mitigation for impacts to wetland and waterway resource area buffer zones (Tr. 4, at 575-576). The Company submitted its Notice of Intent to the Town of Charlton Conservation Commission on March 2, 2021; the Charlton Conservation Commission issued an approval and corresponding Order of Conditions on July 6, 2021 (Exh. EFSB-W-23; RR-EFSB-33(S1) at 1).[72]

The Company would fill an approximately 2,310-square-foot isolated vegetated wetland ("IVW") in the southeast corner of the site (Exhs. EFSB-G-7; EFSB-W-7). The Company noted that IVWs are generally not jurisdictional under the WPA, and therefore not subject to review by

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[71] The Company reported that the Route 169 Site does not contain any land that is part of a 100-year floodplain (RR-EFSB-34).

[72] NEC indicated that the Town of Charlton does not have its own wetland bylaws (Exh. NEC-2, at 5-12; Tr. 2, at 283).

the Charlton Conservation Commission (Exh. NEC-2, app. D, at 5). However, the Company indicated that IVWs are jurisdictional under Section 404 of the Federal Clean Water Act and Section 10 of the Rivers and Harbor Act, both administered by the U.S. Army Corps of Engineers ("USACE") (id.). In accordance with General Condition 3 of the Massachusetts General Permit (2018) issued by the USACE New England District, the Company stated that it would provide in-lieu fee mitigation (Exh. EFSB-W-7).[73]

The northeasterly portion of the site is located within the 750-foot buffer of a potential vernal pool habitat for amphibians (Exh. NEC-2, at 5-19). The Company stated that while USACE best management practices suggest avoiding permanent development within the buffer, the potential vernal pool is located east of Route 169, which means that there would only be limited movement by amphibians between the vernal pool and the Project construction area (Exhs. NEC-2, at 5-19; EFSB-SS-14).

ii. Drinking Water Supplies

NEC stated that the Route 169 Site is not located within any Massachusetts Department of Environmental Protection ("MassDEP") designated Zone I or Zone II wellhead protection areas (Exh. NEC-2, at 5-12).[74] The Company stated that the closest water resource is a private well about one third of a mile from the site (id.).[75] Nevertheless, NEC explained that an LNG spill

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73 The Company stated that its choice of mitigation was informed by approaches listed in the Massachusetts General Permit issued by the USACE New England District (Exh. EFSB-W-7). "In-lieu fee" mitigation occurs in circumstances where a permittee provides funds to an in-lieu fee sponsor instead of either completing project-specific mitigation or purchasing credits from a mitigation bank approved under the Banking Guidance. https://www.fws.gov/habitatconservation/Corps%20In-lieu-fee%20guidance.pdf.

74 Zone I and Zone II radius areas are associated with individual wells and determined by the pumping rate for these wells (Exh. NEC-2, at 5-12).

75 NEC considered community and non-community groundwater sources analogous to wells (Exh. EFSB-W-5). The Company obtained its information from the Bureau of Geographic Information and did not approach the Town of Charlton for information on private wells (id.).

would have a low potential for impacting the environment because spilled LNG would predominately evaporate rather than seeping into the ground and the LNG would not mix with water (Exh. EFSB-S-13). The Company would use potentially hazardous materials during construction and operation of the Facility. See Section V.D.7 for detailed discussion of hazardous materials handling.

iii. Stormwater

The Project would create approximately 1.5 acres of impervious surface (Exh. EFSB-G-7(1)(S1) at 71). NEC stated that it would comply with MassDEP regulations pertaining to stormwater management (310 CMR 10.05(6) and 314 CMR 9.06(6)) and the Massachusetts Stormwater Handbook to maintain existing, pre-construction stormwater discharge rates (Exhs. NEC-2, at 5-16; EFSB-W-14; RR-EFSB-33(S1) at 5, 26). To treat stormwater runoff from paved areas of the Facility, the Company stated that it would use a hydrodynamic separator, a subsurface chamber system, an infiltration basin, and two detention basins (Exh. EFSB-G-7(1)(S1) at 71). At the Route 169 Site, stormwater would be conveyed to infiltration basins or detention basins by open swales or a closed storm drain system (Exh. EFSB-PA-18(S1) at 9). The Company stated that the bottoms of the infiltration and detention basins would be at least two feet above seasonal high groundwater levels, as required by the Massachusetts Stormwater Handbook (Exh. EFSB-W-14; Tr. 4, at 568-570). The Company claimed that its stormwater management system would allow the Project to maintain the site's pre-development groundwater infiltration rates and off-site stormwater discharge rates (Exh. EFSB-G-7(1)(S1) at 71).

NEC indicated that, to optimize available space, it would install a subsurface stormwater chamber for additional infiltration capacity to manage anticipated stormwater discharge (Tr. 4, at 565-568). The Company explained that the hydrodynamic separator would act as pre-treatment by removing sediments, hydrocarbons, and trash from stormwater prior to discharge or infiltration (Exh. EFSB-G-7(S1)(1) at 71). As part of the Order of Conditions approval process, the Company submitted several "peer review" stormwater analyses for the Project to the Charlton Conservation Commission (RR-EFSB-33(S1) at 13-14). Consequently, the Commission found in the Order of

Conditions that the Project stormwater system would mitigate peak runoff rates such that the post-development runoff rates will not exceed pre-development runoff rates (RR-EFSB-33(S1) at 27).

With respect to controlling and minimizing sedimentation, deep-sump, hooded catch basins or similar structures, would meet the relevant standards for removing total suspended solids from stormwater prior to being discharged off site (Exh. NEC-2, at 5-17; Tr. 4, at 583-584). NEC stated that, during normal operations, industrial products (e.g., chemicals or oil-containing materials) would not be exposed to precipitation; therefore, the Facility would not require National Pollutant Discharge Elimination System ("NPDES") authorization for ongoing stormwater discharges after construction is completed (Tr. 4, at 569-570).

During construction, NEC would be subject to a NPDES Construction General Permit and would develop a Stormwater Pollution Prevention Plan ("SWPPP") to comply with that permit (Exh. NEC-2, at 5-18; Tr. 4, at 578-579). NEC would immediately notify the Town of Charlton Conservation Commission should dewatering be required from excavations of the pipeline trench (RR-EFSB-33(S1) at 28). NEC also indicated that it would maintain a separate stormwater management document that details compliance specifically for the Massachusetts WPA (Exh. NEC-2, at 5-18).

The Company also provided plans for storage of snow on site (Exh. EFSB-PA-18(S1) at 6). The Company indicated that it could use waste heat to heat the northern Facility driveway, instead of using salt, to melt snow and ice, which would reduce snow storage volume requirements (Tr. 6, at 1097-1098). In an ENF comment letter submitted to the MEPA Office, MassDEP stated that the Company should comply with its general guidance regarding snow management (Exh. EFSB-G-7(1)(S2) at 21).

iv. Water Use

NEC estimated that it would require less than 300 gallons of water per day for sanitation purposes and anticipated obtaining the water from the municipal supply (Exhs. NEC-2, at 5-12 to 5-13; EFSB-W-5). The Company added that it would only require a small amount of process water, less than four gallons per day, to make up water lost from the amine system and water-glycol cooling system (Exh. NEC-2, at 5-12). The Company plans to have delivered 250-gallon

tote containers of demineralized and deionized water for these purposes (id. at 5-13). The Company explained that, based on two "fire water flow tests," the existing municipal water supply could serve the on-site fire water supply for the Route 169 Site (Exh. EFSB-W-8(1) at 2). As such, the Company's fire protection consultant indicated that a firewater storage tank would only be required if the Town of Charlton did not permit use of the municipal water system (id.).

NEC expects to treat sanitary wastewater produced with an on-site septic system that complies with 310 CMR 15 (Exhs. NEC-2, at 5-14; EFSB-HW-12). Operations would generate less than ten gallons per day of oily process wastewater; NEC stated it would contain such wastewater in a tank to be removed by a licensed environmental disposal contractor (Exhs. NEC-2, at 5-13 to 5-14; EFSB-HW-12). NEC does not expect to send oily wastewater to the local wastewater treatment plant (Exh. EFSB-HW-12).

b. Route 169 Site Pipeline Interconnections

NEC indicated that pipeline interconnection construction would cause only temporary wetland and waterway alterations (Exh. EFSB-W-2). The Company reported that the Preferred Interconnection Route would cross Cady Brook at two locations and an intermittent stream conveyed in a culvert under Route 169 (Exh. EFSB-W-25). With respect to the intermittent stream, NEC would support the culvert during construction and install the pipeline underneath the culvert (id.). The Company would avoid direct alteration to vegetated wetlands or watercourses, regulated by the WPA as Land Under Water and Inland Bank, by using HDD (Exh. EFSB-W-24). The Preferred Interconnection Route would cross under 100-year flood plains associated with the two crossings at Cady Brook, which are jurisdictional resource areas under the WPA as Bordering Land Subject to Flooding ("BLSF") and would require approval in the form of an Order of Conditions (Exhs. NEC-14, fig. 1, at 2; EFSB-W-32).[76]

The Preferred Interconnection Route would also be located within the 750-foot critical terrestrial habitat buffer associated with potential vernal pools (Exh. NEC-14, fig. 1, at 2). The

[76] As noted above, the Charlton Conservation Commission issued an Order of Conditions approving the Project on July 2021 (RR-EFSB-33(S1)). The Order of Conditions also approved the use of HDD to avoid direct alteration of resource areas (id. at 20).

Company noted that guidance provided by USACE indicates permanent development within the 750-foot buffer should be limited; however, given that the impacts from the interconnection pipeline would be temporary, the Company would not be required to provide mitigation for the buffer zone impacts (Tr. 4, at 623-624).

NEC explained that water used for pressure testing the pipeline interconnection after construction would come from a hydrant located near the Route 169 Site (Exh. EFSB-CM-25). The Company testified that, because it would use municipal water within a clean new pipe, the test water would not be subject to any disposal requirements (Tr. 4, at 607-608). NEC noted that, following a hydrostatic pressure test, the resultant discharge would be directed into an energy dissipative device located at least 50 feet away from wetlands or waterways (id. at 613; Exh. EFSB-CM-25).

NEC stated that construction of the proposed meter station for the Preferred Interconnection Route would not impact vegetated wetland areas but would alter 0.014 acres of RFA (Exh. EFSB-W-29). The Company explained that the RFA would be altered by site grading, landscaping, seven feet of retaining wall, and 220 feet of security fencing (id.). The Company stated that the meter station stormwater management system would primarily compose of an infiltration trench leading to an infiltration basin (RR-EFSB-33(S1) at 27). The alteration of the RFA was noted in the Charlton Conservation Commission's Order of Conditions approving the Project (RR-EFSB-33(S1) at 26).

The other interconnection options require a number of waterbody crossings: Alternative 1 requires two intermittent and one perennial streams crossings, Alternative 2 requires four intermittent stream crossings, Alternative 5 requires two perennial stream crossings and three intermittent streams crossings, while Alternative 6 requires one intermittent stream crossing (Exh. NEC-2, at 5-8 to 5-10). The Company stated that most of these crossings would employ open trench methods, with temporary culverts to convey the streams across the trenches; related wetland impacts would likely be temporary (id., app. F, at F-2; Exh. EFSB-W-1; Tr. 4, at 619).

Alternative 4 is located in a NHESP Priority and Estimated Habitat, which would require the Company to confer with NHESP staff and either construct the pipeline outside of a time-of-year restriction or create a mitigation plan (Exhs. NEC-2, at 5-20; EFSB-W-28). Alternative 5

would cross a BVW, while Alternatives 1 and 6 would run along RFAs for Cady Brook (Exh. NEC-2, at 5-8 to 5-10). Alternative 2, Alternative 5, and Alternative 6, also extend through 100-year flood plains (id.). Alternatives 1, 2 and 5 extend through the 750-foot upland buffer zones of potential vernal pools (id.).

Although Alternatives 5 and 6 would cross designated Zone II wellhead protection areas, NEC noted that there are no restrictions on gas pipelines crossing a Zone II wellhead protection area (Exh. NEC-2, at 5-12).

The amount of temporary wetland and waterway impacts by area for all the pipeline configurations for each site are shown in Table 6, below.

Table 6. Temporary pipeline interconnection wetland and waterway impacts (excluding meter stations)

	Area Impacted (square feet)	
Route 169 Site Interconnections	**Wetland**	**Waterway**
Preferred Interconnection Route	0	0
Alternative 1	7,841	3,484
Alternative 2	0*	0
Alternative 3**	7,841	6,970
Alternative 4	9,583	3,920
Alternative 5	10,019	8,712
Alternative 6	0	871
Route 20 Site Interconnections		
Route 20 Primary Interconnection	741	436
Interconnection Alternative	0	3,485

* NEC reported that while it had identified unmapped vegetated wetlands along the TGP-owned ROW east of Route 169, the Company had not verified these resources in the field.

** Alternative 3 was rejected in Section V.B.1.d above but is included in this table for completeness.

Adapted from Exhs. EFSB-W-2; EFSB-W-24.

c. Route 20 Site and Pipeline Interconnections

The new access road driveway to the Route 20 Site would be located within the buffer zone of a large wetland system to the west (Exh. EFSB-W-1).[77] Table 7, below, compares the two sites with respect to permanent impacts to wetland and water resource areas.[78]

Table 7. Permanent site wetland and waterway impacts, including new driveways

	Area Impacted (square feet)	
Site Option	**Wetland**	**Waterway**
Route 169 Site	3,049*	0
Route 20 Site	2,614	436

* The Company noted that all of the 3,049 square feet of impacted wetland is related to the on-site IVW.

Adapted from Exhs. EFSB-W-2; EFSB-W-20.

NEC reported that the Route 20 Site is approximately half a mile from the closest private well and is thus not located within any water protection zone (Exh. EFSB-W-11(2)). The Company estimated that use of the Route 20 Site would create about twelve acres of impervious surface (Exh. EFSB-W-18). The Company stated that stormwater management features (e.g., detention basins) for the Route 20 Site would be sized accordingly (id.; Tr. 4, at 581).

NEC estimated identical water and wastewater requirements for the Route 20 Site and the Route 169 Site; however, the source of potable water would differ (Exhs. NEC-2, at 5-12 to 5-14; NEC-8, at 5-9 to 5-10). The Company indicated that it would obtain potable water for sanitary purposes at the Route 20 Site from an on-site well, to be installed (Exhs. NEC-8, at 5-9; EFSB-W-16). The Company explained that, otherwise, extending municipal water lines would add time to construction (Exh. EFSB-CM-4). The Company stated that the Route 20 Site would also require a 500,000-gallon fire water tank; the fire water tank would initially be filled with

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77 NEC would be required to obtain approval from the Town of Charlton Conservation Commission to work within a buffer zone in the form of an Order of Conditions (Exh. NEC-2, at 5-11).

78 NEC noted that, for the Route 20 Site, providing necessary sight distance looking west from the proposed driveway would require approximately 3,000 square feet of vegetation clearing within wetlands (RR-EFSB-25).

trucked-water and then be replenished with water from the on-site well (Exh. EFSB-S-44; Tr. 4, at 602-603).

The Route 20 Primary Interconnection route would cross a wetland and an intermittent stream (Exh. EFSB-W-1). NEC represented that while the Route 20 Site and proposed new meter station would not impact any wetlands or waterways, the new driveway to the meter station would result in permanent impacts to a BVW east of the meter station, and cross McKinstry Brook (a perennial stream) and an intermittent stream (id.).

NEC stated that it would create replacement vegetated wetland for the BVW filled by the meter station driveway at a minimum ratio of 1:1 (id.). The Company would also try to minimize the area of wetlands disturbed, by constructing relatively steep side slopes for the new driveway (Exh. EFSB-W-1; Tr. 4, at 616-617). The Company reported that the road would likely cross McKinstry Brook with a newly constructed bridge or with a culvert (id.; Tr. 4, at 616-617).

NEC asserted that the wetland and waterway impacts associated with constructing either pipeline interconnection would be temporary and would be restored in-situ after construction (Exh. EFSB-W-1). Nonetheless, in order to minimize impacts, the Company noted that the Route 20 Primary Interconnection would cross the wetland where the wetland is narrowest (id.). Similarly, the Company stated that construction impacts to the intermittent streams would be minimized by crossing the channel when streamflow is relatively low or non-existent (Tr. 4, at 619).

d. Positions of the Parties

i. Town of Charlton

On brief, the Town of Charlton cited pre-filed testimony of Mr. Reardon, its expert witness on civil and environmental engineering, and questioned whether the size of the Route 169 Site allows the Company enough space for unforeseen contingencies that could require adjustments to the proposed design (Charlton Brief at 9-10, citing Exh. TOC-SPR-1). Specifically, Charlton described the site as being constrained by "developed parcels and protected wetland resource areas" to the north and south, as well as a solar facility and "substantial grade change," and Route 169 to the west and east of the property, respectively (Charlton Brief at 10).

During the evidentiary process, Charlton raised concerns about the Company's stormwater management system at the Route 169 Site. Charlton alleged that the proposed drains and culverts at the Route 169 Site may be undersized relative to anticipated stormwater discharges at the site (Exh. TOC-SPR-1, lines 101-103; Tr. 5, at 894). Specifically, Charlton questioned whether the Company accounted for potential runoff from the solar array east and uphill of the site in its stormwater management (Tr. 5, at 894). Finally, Charlton expressed concern that stormwater basins proposed in the Company's preliminary plans would not be able to meet required separation distances from groundwater due to relatively shallow groundwater levels (Exh. TOC-SPR-1, at lines 155-170). On brief, Charlton indicates that the constrained nature of the Route 169 Site does not afford the Company any flexibility to refine or otherwise adjust the proposed stormwater management system (Charlton Brief at 10). Charlton also contended that the Company's plan for snow storage illustrates the lack of flexibility afforded by the Route 169 Site (Tr. 5, at 870-871). Conversely, Charlton characterized the positioning of stormwater basins in the site plan for the Route 20 Site as acceptable (Exh. TOC-SPR-1, at lines 254-257).

With execution of the HCA between the Town and NEC, the Town no longer objects to the site plan of the Route 169 Site (Exh. EFSB-Z-26(S1)(1) at 4-5, 16).

ii. North American Tool

North American Tool argues that the subsurface impacts of construction, such as for groundwater, were unknown because geotechnical and seismic studies had not been completed (NAT Brief at 2). North American Tool states that routes Alternatives 2 and 6 for the Route 169

Site are very close to its septic system and indicates that, if its septic system were damaged during construction, North American Tool may need to cease its business operations for a time (id. at 2).[79]

iii. Company Response

NEC states that it incorporated some suggestions from the Town of Charlton regarding stormwater management in its design (Company Brief at 58; Tr. 1, at 12-13). Nevertheless, the Company argues that Charlton did not dispute that the Company would abide by MassDEP regulations for stormwater management (Company Brief at 57). The Company also affirms that, contrary to Charlton's claim, the Company had carried out a detailed study of the additional stormwater load from the solar array (id.). During evidentiary hearings, the Company presented updated designs of the grading and drainage site plan that it indicated was responsive to earlier criticism by Charlton and accorded with the Massachusetts Stormwater Handbook (id.; Tr. 1, at 12-13). As a result of testimony by Charlton about the possibility for the retention basin liners being dislodged by rising groundwater, the Company reported that it had removed the liners from its original design (Company Brief at 58; Tr. 5, at 883-884).

NEC notes that – in what it considers the unlikely event of damage to property in the vicinity of pipeline construction – it would address such matters with affected landowners (Company Brief at 18, n.14, citing Exhs. EFSB-NO-5; EFSB-NO-6; Tr. 3, at 461-464; RR-NAT-NEC-3). Specifically, NEC states that it would provide notices of construction in the vicinity of NAT both 30 and five days in advance and ensure no adverse impacts to NAT's septic system or business operations (Company Reply Brief at 15). The Company's most recent design plans showing the HDD alignment indicate that it would remain within the highway layout of Route 169,

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[79] Since North American Tool's brief, the Company selected a new preferred route (Preferred Interconnection Route), performed geotechnical borings within the MassDOT Route 169 ROW adjacent to Cady Brook, and decided to use HDD for the portion of the route that passes the North American Tool building (Exhs. EFSB-W-26; NAT-C-13). The Company contended that, by using the HDD construction technique, it could eliminate the potential for interfering with North American Tool's septic system since the interconnection pipeline would not pass close to the septic system (Exh. EFSB-W-26). Nonetheless, the Company committed to working with North American Tool to address the latter's concerns with potential septic system damage (Exh. NAT-C-21).

approximately 30 feet below ground surface, for the portion in front of NAT's property (Exh. EFSB-W-23(1) at 159).

e. Analysis and Findings on Wetlands and Water Resources

The record shows that construction at the Route 169 Site and at the Route 20 Site would cause comparable permanent impacts to wetlands and waterways, as measured by the direct footprint of the Project. The Route 169 Site would have a more extensive footprint within the buffer zones of wetlands and waterways; however, buffer zone impacts do not require mitigation under the Massachusetts WPA. Constructing the Project at the Route 169 Site would result in the filling an IVW. Although filling an IVW does not require resource area mitigation under the Massachusetts WPA, IVWs are also jurisdictional wetlands under the Federal Clean Water Act, and the Company would provide mitigation through USACE's in-lieu fee program. The Charlton Conservation Commission issued an Order of Conditions approving the Project at the Route 169 Site. The record shows that the Project at the Route 169 Site would create approximately 1.5 acres of impervious surface while the Project at the Route 20 Site would create approximately 12 acres. The Siting Board thus finds that the Route 169 Site is preferable in terms of minimizing impervious surfaces created as a result of the Project.

Developing the Project at the Route 20 Site with associated driveway would result in direct fills of BVW that would require wetlands mitigation at a one-to-one replacement ratio. The record also shows that the Company would attempt to minimize or avoid wetland impacts by using steep side slopes where driveways need to be constructed adjacent to wetland areas.

The record shows that, while the interconnection alternatives and corresponding meter stations for the Route 169 Site would have no direct wetland and waterway impacts, there would be some buffer zone alterations and a portion of the Preferred Interconnection Route meter station would be within RFA. These buffer zone and RFA impacts were approved, subject to conditions, by the Order of Conditions issued by the Charlton Conservation Commission. The interconnection routes for the Route 20 Site would entail permanent wetland and/or waterway impacts related to a meter station driveway. Otherwise, the impacts due to the pipeline construction would be temporary for all configurations and be restored to pre-construction

conditions. Nonetheless, the Siting Board observes that the Route 169 Site Preferred Interconnection Route would have the least total area of impact to wetland and waterway resources. The record shows that, the Company will use HDD to avoid construction impacts to resource areas along the Preferred Interconnection Route associated with Cady Brook. The path for the HDD would remain within the highway layout of Route 169 and, for the portion in front of NAT's property, would be approximately 30 feet below ground surface; therefore, the HDD path would not likely intersect North American Tool's septic system. In any case, NEC has committed to addressing their concerns.

The record shows that constructing an interconnection pipeline would require the pipeline to be pressure tested using an amount of water proportional to the length of the route. Thus, shorter pipelines would be preferable to longer routes, in regard to water requirements of pressure testing. In any case, water used during a pressure test would not require any special disposal requirements and would be discharged in a "controlled manner." To minimize the impact of discharging test-water, the Siting Board directs the Company to discharge the test-water through a filter bag onto an upland area, outside of any wetland resource area buffer zones.

The sanitary and fire water needs would be comparable between the Route 169 Site and the Route 20 Site. The record shows that the Route 169 Site would utilize the existing municipal water supply, whereas the Route 20 Site would require an on-site well for potable water and a fire water tank.

During the course of the proceeding, the Siting Board received a few iterations of stormwater management designs for the Project at the Route 169 Site. An element of the iterations appears to stem from an attempt to place a stormwater retention basin at an elevation that is close to groundwater. Comparatively, the Company would need to construct a larger stormwater management system for the Route 20 Site because of its greater amount of new impervious surface, associated with the longer site access driveway.

Regarding whether the proposed stormwater management system is adequate, the Siting Board notes that the Town of Charlton did not specifically state that the proposed stormwater management system would not comply with the Massachusetts Stormwater Handbook. Although Charlton alleged that certain stormwater management structures would be ineffective, Charlton did

not provide any evidence to support how it reached such a conclusion. Subsequent to briefs, as part of the Order of Conditions, the Charlton Conservation Commission found that the proposed stormwater management system would ensure that post-development runoff rates would not exceed pre-development runoff rates. The Siting Board directs the Company to conduct sufficient hydrologic analysis to verify whether existing site conditions are conducive to maintaining pre-construction stormwater discharge rates. The Board further directs the Company to report on the results and conclusions of the additional hydrologic analysis and any associated actions taken as a result of the additional analysis.

On the basis that both sites are similar with respect to direct wetland impacts, water use requirements, and stormwater management systems, the Siting Board finds that the Route 169 Site and the Route 20 Site are comparable in wetland and water resource impacts. Additionally, with adherence to the proposed conditions regarding the management of pressure-test-water and additional analysis of soil conditions, the Siting Board finds that wetland and water resource impacts would be minimized.

4. Traffic

The Company stated that the Route 169 Site and Route 20 Site were chosen in part for their proximity to major interstate highways to facilitate access for trucking of LNG (Exh. NEC-2, at 4-3 to 4-4, 5-45). The Company assessed potential traffic impacts related to Facility construction and operations for the Route 169 Site and the Route 20 Site, specifically analyzing access to interstate highways, driveway egress characteristics, and operational aspects of key intersections (id. at 5-44 to 5-48; Exhs. NEC-8, at 5-40 to 5-47; EFSB-T-1(1) at 2). Regarding intersection operations, NEC identified a study intersection for each site, modeled the potential changes to the respective level-of-service ("LOS"), volume-to-capacity ratios ("v/c ratios"), and

queue times, and presented historical traffic accident rates (Exhs. EFSB-T-1(1) at 2; NEC-8, app. E, at 20-21).[80,81]

NEC indicated that during operations traffic volumes generated by site employees and LNG tanker trucks would be the same whether the Project were constructed at the Route 169 Site or the Route 20 Site (RR-EFSB-21). The Company reported that Facility operations would require a maximum of five employees on any shift (id.). NEC stated that its customers, including National Grid, would be responsible for arranging LNG trucking from the Facility (Tr. 2, at 270). NEC would work with its customers to ensure that LNG trucking contractors followed direct routes to the interstate highways system (id. at 330-331).

NEC indicated that LNG truck traffic is necessarily limited by the number of truck loading bays at the Facility and the time required to fill an LNG truck (Exh. EFSB-T-24). As previously stated, the Facility would be equipped with two LNG transfer pumps, each serving two truck loading bays (id.). NEC represented that, theoretically, it could fill a maximum of four 9,000-gallon LNG trucks in one hour (id.).[82] However, NEC stated that it intends to operate only one transfer pump at a time, allowing two LNG trucks to be filled simultaneously while the second LNG transfer pump is maintained as a "standby" or spare unit (id.). NEC expects to fill a maximum of 32 LNG trucks per day (Exhs. NEC-2, at 5-44; NEC-8, at 5-42 to 5-43; RR-EFSB-21).

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80 NEC explained that LOS is a qualitative measure describing operational conditions within a traffic stream; LOS A represents the best operating conditions, LOS F represents the worst operating conditions (Exhs. EFSB-T-1(1) at 71).

81 NEC stated that operational analyses of study intersections was completed in accordance with the Transportation Research Board's Highway Capacity Manual, 2010 ("HCM"), using the software program Synchro 9, developed by TrafficWare (Exhs. EFSB-T-1(1) at 71; NEC-8, app. E, at 20). NEC represented that the HCM is the industry standard for analysis of traffic conditions and that Synchro 9 is a nationally recognized computer software package for analyzing capacities, LOS, and queueing (Exh. EFSB-T-1(1) at 71).

82 NEC stated that a scenario of filling four trucks per hour for 24 hours is a theoretical maximum that should not be considered a realistic or likely scenario (Exh. EFSB-T-38).

NEC stated that the Facility could, if conditions warranted, fill LNG tankers anytime of the day or night; however, the Company expects that filling tankers would not normally occur during the overnight hours (Exh. EFSB-T-14). NEC stated that it eliminated one of the four truck scales from the Facility's design to improve access around the truck station at the request of local officials (Exh. EFSB-PA-18(S1); EFSB-PA-18(S1) at 6). NEC stated that it would fill an LNG truck at the fourth loading bay only in the event that LNG is urgently needed (Tr. 2, at 305).

a. Route 169 Site

NEC reported that Route 169 is a two-lane roadway classified by MassDOT as an Urban Principal Arterial roadway under MassDOT jurisdiction (Exh. EFSB-T-1(1) at 2). NEC characterized the segment of Route 169 between the site and Route 20 as passing through a mix of residential, industrial, and commercial land uses (id.). The posted speed limit adjacent to the Route 169 Site is 50 miles per hour ("mph") (id.). Using traffic data collected over a 48-hour period, NEC reported 85th percentile speeds of 53 mph northbound and 54 mph southbound, and an average daily traffic ("ADT") of 11,476 vehicular trips (id. at 4). NEC stated that connecting the Route 169 Site driveways into the highway layout would require MassDOT approval via a Highway Access Permit, and that, as part of the permit review process, MassDOT could require additional safety measures or modifications to the proposed driveways (Tr. 2, at 312-315).[83]

i. Access to Interstate Highways

NEC stated that LNG trucks would primarily follow the most direct route between the Facility and interstate highways, which uses Route 169 and Route 20 to approach the intersection of I-84 and I-90 (Exhs. NEC-2, at 5-45, EFSB-T-36). LNG trucks exiting the Facility would turn left onto northbound Route 169 and continue to the signalized intersection of Route 169 and Route 20, then turn left onto westbound Route 20 toward the I-84/I-90 interchange (Exhs. NEC-2, at fig. 5.3-3; EFSB-T-1(1) at 11). This route between the Facility and I-84 is 7.5 miles

[83] For example, the Company indicated that MassDOT may require that the southbound shoulder of Route 169 be widened by ten to twelve feet to accommodate LNG trucks entering the Facility (Tr. 2, at 311-312).

(Exh. NEC-2, at fig. 5.3-3). NEC stated that, from the intersection of Route 169 and Route 20, LNG trucks could also turn right onto eastbound Route 20 toward the intersection of Interstate Route 395 and I-90 (11 miles total, proceeding through North Oxford and Auburn); however, westbound Route 20 provides is a more direct route to interstate highways (id. at 5-45; Exhs. EFSB-T-37; EFSB-PA-24(1)).

NEC stated that, in the event of a situation that makes northbound travel on Route 169 impassable, the Company would expect to stop shipping LNG (Exh. NEC-2, at 5-45). However, in the event that Route 169 northbound were impassable and there was a critical need for LNG, the Company indicated trucks would follow Route 169 south into Southbridge and then Route 131 west to I-84 in Sturbridge (id.). To prevent LNG trucks from exiting the Facility onto southbound Route 169 during normal circumstances, NEC stated that it would instruct LNG truck drivers on allowable routes and provide on-site signage (id.). NEC also indicated that National Grid would require its LNG trucking contractor to exit the Facility onto northbound Route 169 (Tr. 2, at 330).

ii. Key Intersection Impacts

NEC assessed the potential impact of Facility-related traffic on the nearest major intersection, which the Company identified as Route 169 at Route 20, approximately three miles north of the Route 169 Site (Exh. EFSB-T-1(1) at 3). NEC described Route 169 at Route 20 as a signalized "T" intersection (id.). At its intersection with Route 169, Route 20 is a three-lane roadway with one eastbound lane and two westbound lanes (id. at 45). The Route 20 speed limit through the intersection with Route 169 is 40 mph; elsewhere on Route 20 the speed limit is 50 mph (id. at 45). Route 169 is a two-lane road up to its intersection with Route 20, where northbound Route 169 divides into a left-turn lane with a signal and a channelized right-turn lane with a yield sign (id. at 45). Approaching the intersection on northbound Route 169, the speed limit slows from 50 mph to 30 mph; on southbound Route 169 the speed limit is 50 mph (id. at 45).

NEC modeled the impact of Facility-related traffic on intersection LOS, v/c ratio, and queue time during morning and afternoon peak hour conditions anticipated for 2020 and 2025

(Exh. EFSB-T-1(1) at 14, 17-18).[84] For its model, NEC assumed that the Facility would contribute 18 vehicle trips during both the morning and afternoon peak traffic hours (Exhs. EFSB-T-38(1) at 1; EFSB-T-35).[85] NEC assumed that employees entering and leaving the Facility would travel both to the north and to the south (Exh. EFSB-T-1(1) at 10, 12). LNG trucks were all assumed to approach the Facility on Route 169 from the north and exit left onto northbound Route 169 (id. at 10-11).

NEC stated that its modeling shows that the Facility's traffic contribution to the intersection of Route 169 and Route 20 would not affect the intersection LOS during a morning or afternoon peak traffic hour in 2020 or 2025 (Exhs. EFSB-T-38; EFSB-T-38(1) at 8). NEC characterized the Facility's potential impact to intersection peak hour v/c ratios and queue times as negligible for anticipated conditions in 2020 and 2025 (Exhs. EFSB-T-38; EFSB-T-38(1) at 8).

In support of its traffic analysis for the Route 169 Site, NEC provided a recent road safety audit that included safety and crash analysis for the intersection of Route 169 at Route 20 (Exh. EFSB-T-1(1) at 7).[86] According to the road safety audit, the intersection of Route 169 at Route 20 was identified as having a high frequency traffic accidents in the Central Massachusetts Regional Planning Commission area, based on MassDOT data from 2013 to 2015 (id.).[87] The road safety audit characterized intersection site distances for Route 169 at Route 20 as "poor" and purported that "[h]igher speeds along Route 20 coupled with poor intersection sight distance for vehicles entering Route 20 from South Sturbridge Road or Route 169 create[d] an uncomfortable

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84 For anticipated traffic conditions in 2025, the Company assumed a traffic growth rate of 1.0 percent per year (Exh. EFSB-T-1(1) at 7). NEC conducted its traffic impact study in February 2019 to model traffic conditions for the intersections of State Route 169 and Route 20 and of Route 20 and Route 31 (id. at 4).

85 NEC explained the breakdown of 18 vehicle trips as: four LNG trucks entering, four trucks exiting, five employees entering, and five exiting (Exh. EFSB-T-38(1) at 1).

86 The road safety audit was prepared for MassDOT by Toole Design (Exh. EFSB-T-1(1) at 40). NEC was not party to the road safety audit; however, the report was submitted to the record as an attachment to the Traffic Impact Study for Route 169 (Tr. 2, at 333-334).

87 According to the road safety audit, 62 crashes were reported at the study intersection from 2015 to 2017 (Exh. EFSB-T-1(1) at 7).

environment at this intersection" (id. at 52). The majority of intersection crashes involved rear-end accidents in the channelized right turn lane of Route 169 (id. at 7).

The road safety audit recommended several potential safety enhancements for the intersection and classified the potential enhancements by their safety payoff, time frame, cost, and jurisdiction (Exh. EFSB-T-1(1) at 62-64). At the time of evidentiary hearings, the Company stated that it was not aware of whether any of the potential safety enhancements would be implemented (RR-EFSB-22). The Company also stated that it had engaged in numerous discussions with Town of Charlton representatives regarding the general safety of LNG truck traffic at this intersection (RR-EFSB-23).

iii. Driveway Egress Characteristics

NEC stated that its proposed driveways would allow vehicles to enter and exit the Facility from a section of Route 169 which the Company described as a flat and straight two-lane roadway (Exh. EFSB-T-33). To assess whether safe egress could be provided, NEC measured stopping sight distances ("SSDs") and intersection sight distances ("ISDs") and compared the measured sight distances to criteria established by the American Association of State Highway and Transportation Officials ("AASHTO") (Exh. NEC-2, at 5-46).

NEC explained that an SSD represents the minimum distance required for a vehicle traveling at a certain speed to stop safely before reaching a stationary object in the road (Exh. NEC-2, at 5-46). An ISD represents the minimum distance required for a motorist to turn onto a major street without being overtaken by an approaching vehicle reducing its speed from the design speed to 70 percent of the design speed (Exh. NEC-2, at 5-47). The Company maintained that an SSD is generally more important as it represents the minimum distance required for safe stopping, while an ISD is based only upon acceptable speed reductions to the approaching traffic stream (id.). Project SSDs and ISDs for the proposed Route 169 driveway are shown below in Table 8.

Table 8. Sight Distance Evaluation for the Proposed Route 169 Driveway

Intersection	Minimum Required* (feet)	Desirable** (feet)	Measured (feet)
Stopping Sight Distance			
Route 169 Northbound	425	495	> 1,200
Route 169 Southbound	425	570	> 1,200
Intersection Sight Distance			
Looking right from the driveway	555	610	> 1,200
Looking left from the driveway	555	665	> 1,200

* Required sight distances correspond to the posted speed limit of 50 mph (Exh. NEC-2, at 5-47).

** Desirable sight distances north of the driveway correspond to the average observed speed of 55 mph; desirable sight distances south of the driveway correspond to the average observed speed of 60 mph (Exh. NEC-2, at 5-46, app. E at 6-7).

Source: Exh. NEC-2, app. E at 6-7.

As illustrated in Table 8, NEC reported that available sight distances for the proposed Route 169 Site driveway would exceed the minimum and desirable SSD and ISD requirements for safe operation (Exh. NEC-2, at 5-47; RR-EFSB-20). NEC stated that landscaping or fencing near the driveways would not impede the available sight distances (Exh. NEC-2, at 5-47). Additionally, the Company's traffic consultant made the following recommendations: (1) vegetation trimming on the easterly edge of Route 169 and south of the proposed driveway; and (2) installing advanced vehicle traffic warning signs at Route 169 approaching the driveway (Exh. NEC-2, app. E, at 9).

NEC reported that, based on publicly available traffic accident data from 2014-2016, 32 accidents occurred on Route 169 between the Southbridge town line and Route 20 (Exh. EFSB-T-1(1) at 7, 68-69). NEC stated that these data correspond to an average crash rate of 0.79 crashes per million vehicle miles traveled (id.). NEC reported that, for the same years, the statewide average for an Urban Principal Arterial roadway is also 0.79 crashes per million vehicles miles traveled (id. at 7, 68).

iv. Facility Construction

NEC indicated that construction related traffic would include the arrival and departure of personal vehicles, and, throughout the day, the delivery of equipment, materials, and earth moving

machinery (Exh. EFSB-CM-9). The Company indicated that Project construction would typically involve 24 round-trip vehicle arrivals and departures per day for approximately 18 months (id.; Exh. EFSB-CM-1(1)). Earth moving machinery such as bulldozers, excavators, and backhoes would remain on-site until site work was completed (Exh. EFSB-CM-8). The Company stated that construction workers would normally arrive at 7:00 a.m. and depart at 4:00 p.m. (Tr. 3, at 385). NEC identified off-site areas that could be used for contractor parking if space is not available on-site (Exh. EFSB-CM-9(1)). NEC indicated that, if off-site contractor parking is necessary, workers would be shuttled to the site each day (Tr. 3, at 382).

NEC stated that it would work with the Charlton Police Department to coordinate police details during construction, and that over-sized equipment deliveries would be coordinated with local officials (Exh. NEC-2, at 5-47; Tr. 2, at 361; Tr. 3, at 422-23). The Company also noted that a Highway Access Permit from MassDOT would require the Company to develop traffic management plans and could specify additional traffic mitigation measures, such as the use of roadway flaggers for construction (Tr. 3, at 409-410, 413).

For the Route 169 Site, the Company assessed the potential impact of construction traffic on the operation of the Route 169 and Route 20 intersection (Exh. EFSB-T-39). Specifically, NEC modeled the intersection LOS, v/c ratio, and queue time during morning and afternoon peak hour, using trip generation (i.e., the number of construction workers and number of deliveries) for Phase 1 and Phase 2 of site construction (Exhs. EFSB-T-39(1) at 1, 6-8; EFSB-T-39(2) at 1, 6-8). The Company's traffic modeling indicated that the respective intersection levels of service are not expected to change (Exh. EFSB-T-39). The Company also characterized the potential impact to intersection v/c ratios and approach queues as very minor (id.).

Regarding pipeline construction, the Company stated that the Preferred Interconnection Route and portions of Interconnection Alternative 2 and Alternative 6 would use the western shoulder of Route 169 (Exhs. EFSB-CM-16; EFSB-T-30). The Company stated that the Preferred Interconnection Route and the in-street portion of Alternative 2 would involve 5,300 feet of roadside construction completed over 84 days; Alternative 6 would require approximately 1,400 feet of roadside construction, completed over 24 days (Exh. EFSB-G-7(S1)(1) at 69; RR-EFSB-28). NEC maintained that roadside pipeline construction would only require closure of

the breakdown lane, with the north and southbound travel lanes of Route 169 remaining open (Exh. EFSB-T-30; Tr. 3, at 408-409). NEC stated that the HDD operations proposed for the Preferred Interconnection Route could require a lane closure to provide adequate space between traffic and the work zone (Exh. EFSB-T-40).[88] If a lane is closed, NEC stated that work would be completed during daylight hours outside the morning and afternoon peak hours utilizing flaggers/police officer control (id.). The Company noted that installing a pipeline within the Route 169 roadway layout would require a Utility Access Permit from MassDOT, and that MassDOT could specify any traffic mitigation and safety requirements it deemed necessary as part of the permit approval (id.; Exh. EFSB-CM-16; Tr. 2, at 312; Tr. 3, at 410). In addition, the Company testified that it would also confer with the Charlton Police Department regarding its roadside construction plans (Tr. 3, at 410).

Where a pipeline interconnection alternative would cross commercial or residential driveways, the Company testified that it would coordinate with landowners to minimize potential disruptions from pipeline construction (Exh. EFSB-T-30; Tr. 3, at 405). At a minimum, the Company stated that access to and from the property would be maintained by the placement of steel plates or backfilling the trench with gravel (Tr. 3 at 405, 407). The Company indicated that, based on its anticipated pipeline construction rate, construction across any driveway would take less than one day (id. at 405).[89]

b. Route 20 Site

According to the Company, Route 20 is an Urban Principal Arterial roadway under MassDOT jurisdiction, with a posted speed limit of 50 mph (Exh. NEC-8, at 5-40). Using traffic data collected over a 48-hour period, NEC reported 85th percentile speeds of 61 mph eastbound

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88 As noted in Section V.C.2, NEC stated that HDD operations for the southern and northern Cady Brook crossings would take approximately ten and six weeks, respectively (Exh. EFSB-CM-34).

89 The Company's most recent design plans indicate that it would use HDD to install the segment of the Preferred Route in front of the NAT property and that this segment would be approximately 30 feet below ground surface (Exh. EFSB-W-23(1) at 159).

and 60 mph westbound, and an ADT of 15,255 vehicular trips (id., app. E, at 11). In the area of the proposed driveway intersection, Route 20 is a four-lane highway (id., app. E, at 6-7).

i. Access to Interstate Highways

The Company stated it selected the Route 20 Site for consideration in part because it provides ready access to an existing truck route and interstate highways (Exh. NEC-8, at 5-40). LNG trucks exiting the Facility could turn left onto westbound Route 20, toward the I-84/I-90 interchange or turn right onto eastbound Route 20 toward the I-395/I-90 interchange (id. at fig. 5.3-4a). NEC stated it would not prohibit LNG trucks from using eastbound Route 20; however, the Company noted that turning west on Route 20 is the most direct route to interstate highways (id. at 5-40; Tr. 3, at 392-393). NEC indicated that the Route 20 Site is approximately two miles from the I-84/I-90 interchange and 11 miles from the I-395/I-90 interchange (Exhs. NEC-8, at fig. 5.3-4a; EFSB-PA-24(1)).

ii. Key Intersection Impacts

NEC assessed the potential impact of the Facility operations on the nearest major intersection, which the Company identified as Route 20 at Route 49 (Exh. NEC-8, app. E, at 6). NEC described Route 20 at Route 49 as a three-way, signalized, "T" intersection, with Route 20 traffic approaching from the east and west and Route 49 traffic approaching from the north (id.). The Company reported that Route 49 is also classified as an Urban Principal Arterial roadway (id.). The posted speed limit on Route 20 in the vicinity of the study intersection and Route 20 Site is 50 mph; the speed limit of Route 49 is 35 mph (id.).

NEC modeled the impact of Facility-related traffic on intersection LOSs, v/c ratios, and queue times during morning and afternoon peak hour conditions anticipated in 2025, assuming a traffic growth rate of 1.0 percent per year (Exh. NEC-8, at 5-44, app. E, at 14, 24). NEC assumed that, during the morning and afternoon peak traffic hour, four LNG trucks would enter the Facility, four tankers would exit, six employees would enter, and six employees would exit, resulting in a total contribution of 20 vehicle trips (id., app. E, at 16). NEC assigned the direction of vehicle

trips based on existing traffic patterns, knowledge of the surrounding area, and engineering judgment (id.).

Based on model results comparing 'no-build' to 'build' conditions in 2025, NEC characterized Facility's impact on peak hour LOSs, v/c ratios, and intersection queues as negligible (Exh. NEC-8, app. E, at 24, 26). The Company maintained that the roadway network surrounding the Route 20 Site has and would continue to have the capacity to accommodate the peak vehicle traffic generated by the proposed Project (id., app. E, at 26).

iii. Driveway Egress Characteristics

NEC stated that the proposed driveway would intersect a four-lane section of Route 20, just east of a horizontal roadway curve (Exh. NEC-8, app. E, at 23, fig. 7). NEC stated that it measured SSDs and ISDs at the proposed driveway location and compared the available sight distances to sight distance criteria established by the AASHTO (Exh. NEC-8, app. E, at 22-23). The SSDs and ISDs for the proposed Route 20 driveway are provided below in Table 9.

Table 9. Sight Distance Evaluation for the Proposed Route 20 Driveway

Intersection	Minimum Required* (feet)	Desirable** (feet)	Measured (feet)
Stopping Sight Distance			
Route 20 Eastbound	425	570	500
Route 20 Westbound	425	570	800
Intersection Sight Distance			
Looking right from the driveway	555	665	800
Looking left from the driveway	555	665	556

* Required sight distances correspond to the posted speed limit of 50 mph for this stretch of Route 20 (Exh. NEC-8, at 5-47)

** Desirable sight distances correspond to the observed eastbound 85th percentile speed of 61 mph and observed 85th percentile westbound speed of 60 mph (Exh. NEC-8, app. E, at 11; RR-EFSB-25).

Source: Exh. NEC-8, app. E, at 11, 22-23.

NEC reported that available sight distances at the proposed Route 20 driveway would exceed the minimum SSD and ISD requirements for the posted speed limit of 50 mph, as indicated in Table 9 (Exh. NEC-8, app. E, at 23). However, Table 9 indicates the available sight distance

looking left from the proposed driveway does not meet the desired ISD of 665 feet, which corresponds to the observed 85th percentile westbound speed of 60 mph (id., app. E at 11, 22-23; RR-EFSB-25). NEC explained that the existing sight line looking left from the proposed driveway is obstructed by vegetation south of Route 20 (Exh. NEC-8, app. E, at 23). NEC indicated that it would need to clear vegetation west of the proposed driveway and south of Route 20 to provide an ISD of at least 665 feet (RR-EFSB-25).[90] Additionally, Company's traffic consultant recommended the installation of an advanced driveway warning sign for eastbound Route 20, west of the proposed driveway (Exh. NEC-8, app. E, at 26).

NEC stated that connecting the Route 20 Site driveway into the highway layout would require MassDOT approval via a Highway Access Permit (Tr. 2, at 343). NEC indicated that MassDOT would likely require some widening of the roadway shoulder to accommodate LNG trucks turning into the driveway (id. at 343-344). NEC performed a traffic signal warrant analysis for the intersection of the proposed driveway and Route 20 based on procedures outlined in the Federal Highway Administration's Manual on Uniform Traffic Control Devices ("MUTCD") (Exh. NEC-8, app. E, at 25). The Company stated that the driveway intersection does not meet any of the traffic signal warrant criteria set forth in the MUTCD and contended that a signal would not be allowed (Exh. NEC-8, app. E, at 25; RR-EFSB-24).

Citing driveway intersection issues at other businesses located Route 20, NEC testified that MassDOT could potentially prohibit vehicles from exiting the Facility and turning left onto westbound Route 20 (Tr. 2, at 344, 393-394).[91,92] NEC indicated that MassDOT would make a

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90 NEC noted that providing the necessary ISD looking left from the proposed driveway would require approximately 3,000 square feet of vegetation clearing within wetlands (RR-EFSB-25; RR-EFSB-25(1)). The Company testified that, although this vegetation management would require approval from the Charlton Conservation Commission, the clearing would be considered a wetland cover-type conversion and would not constitute a loss of wetland (Tr. 2, at 351-355).

91 NEC stated that MassDOT recently prohibited left hand turns for vehicles exiting the Tree House Brewing Company, which is also located on Route 20 in Charlton (Tr. 2, at 344).

92 The Company did not specifically assess the potential impact on the operation of Route 20 at Route 169 assuming all vehicles turn right out of the Route 20 Site. However, in the

determination regarding permissible vehicle egress as part of the highway access permit review process (id. at 343-344).

NEC stated that it reviewed publicly available crash data for the Route 20 roadway segment between Route 49 and Mayberry Lane (a cul-de-sac located approximately one quarter mile east of the proposed driveway) (Exh. NEC-8, app. E, at 9). NEC reported that, according to crash data available from MassDOT, this 1.5-mile-long roadway segment experienced a total of six crashes for the years 2013, 2014, and 2015 (id.). The number of accidents on this stretch of road, in combination with Route 20's ADT of 15,255 and the segment length of 1.5 miles indicate that the roadway segment crash rate would be 0.24 crashes per million vehicle miles traveled (id.; Exh. EFSB-T-1(1) at 68).[93] NEC reported that the statewide average for an Urban Principal Arterial roadway, for years of 2014 to 2016, is 0.79 crashes per million vehicles miles traveled (Exh. EFSB-T-1(1) at 7).

iv. Facility Construction

NEC indicated that constructing the Facility at the Route 20 Site would generally follow the same progression as at the Route 169 Site; however, Route 20 Site work would be more extensive and require additional workers and additional time to construct (Tr. 1, at 22). NEC stated that it would work with the Charlton Police Department to coordinate any necessary police details during construction, and that large equipment deliveries would be coordinated with local officials (Exh. NEC-8, at 5-47; Tr. 2, at 361; Tr. 3, at 422-23). The Company also noted that a Highway Access Permit from MassDOT would require the Company to develop traffic

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event that MassDOT prohibited left turns out of the Route 20 Site, NEC asserted that, based the Company's knowledge from the Route 169 traffic study, it is unlikely that vehicle trips from the Facility would adversely affect the operation of Route 20 at Route 169 (Tr. 3, at 395).

93 The MassDOT segment crash rate worksheet, submitted as Appendix B of the Route 169 Site Traffic Impact Study, provides the following formula for calculating a crash rate: $RATE = (A \times 1{,}000{,}000)/(L \times V \times 365)$ where: (A) is the average number of crashes per year; (L) is the roadway segment length in miles; and (V) is the average daily traffic volume (Exh. EFSB-T-1(1) at 68).

management plans and could specify additional traffic mitigation measures, such as the use of roadway flaggers for construction (Tr. 3, at 409-410, 413). The Company stated that the proposed pipeline interconnections for Route 20 would not require roadside construction and would not cross any residential or commercial driveways (RR-EFSB-28; RR-EFSB-29).

c. Positions of the Parties

i. Town of Charlton

On brief, the Town of Charlton argued that constructing and operating the Facility at the Route 20 Site would create fewer traffic impacts as compared to the Route 169 Site (Charlton Brief at 11-12). Charlton submitted that Route 169, between the Route 169 Site and Route 20, is more populated with businesses and residences than Route 20, which the Charlton planning director characterized as a "main corridor" (id. at 11, citing Tr. 5, at 751). Charlton also noted that the Route 169 Site is approximately six miles farther from the I-84/I-90 interchange than the Route 20 Site, and would require LNG trucks to drive past Tree House Brewing Company, a local business in Charlton with existing traffic problems (Charlton Brief at 11; Charlton Reply Brief at 7-8).

Charlton also argued that, if the Project is built at the Route 169 Site, traffic from the Facility would exacerbate what the Town referred to as a "bottleneck situation" at the intersection of Route 169 and Route 20 (Charlton Brief at 12). Charlton also suggested that the Company may have misrepresented typical intersection conditions by conducting traffic counts during the month of February, a month which Charlton alleged is widely known in the area to have less traffic (id. at 11, citing Tr. 5, at 749). With regard to construction traffic, Charlton argued that the Company had not provided adequate detail for how and when construction workers would be shuttled to the Route 169 Site (Charlton Brief at 11, citing Tr. 2, at 383-385).

With execution of the HCA between the Town and NEC, the Town no longer objects to the Route 169 Site (Exh. EFSB-Z-26(S1)(1) at 4-5).

ii. Mr. Barbale

Citing traffic safety concerns, Mr. Barbale argues that constructing the Facility at the Route 20 Site would avoid what he characterized as hazardous driving conditions on Route 169;

therefore, the Project would result in fewer overall traffic impacts (Barbale Brief at 1). Mr. Barbale submits that, based on his substantial experience driving in the area, intersection conditions at Route 169 and Route 20 are at times dangerous, especially when traffic is diverted off of I-90 (Tr. 5, at 906-907). Mr. Barbale maintains that adding LNG truck traffic to the Route 169/Route 20 intersection would increase the potential for serious accidents (Barbale Brief at 1). Additionally, Mr. Barbale described Route 169 as a winding, two-lane-road, which he submits contributes to hazardous driving conditions (Tr. 5, at 908). Mr. Barbale advocates for the Route 20 Site on the basis of avoiding difficult driving conditions on Route 169 (Barbale Brief at 1).

iii. Mr. Lawendowski

Mr. Lawendowski argues that LNG tanker truck (and service vehicle) traffic into and out of the Facility should be capped at twelve round trips per day, with strict fines imposed for violation of such a limit (Lawendowski Brief at 3).

iv. Company Response

In response to the position of the Town of Charlton and Mr. Barbale that the Route 169 Site is inferior to the Route 20 Site with respect to traffic impacts, the Company maintains that using the Route 169 Site for the Project would only result in "extremely limited" traffic impacts (Company Reply Brief at 11, citing Exh. EFSB-T-19). Regarding the Town's concern that LNG trucks leaving the Route 169 Site would normally travel through the intersection of Route 169 and Route 20 and pass the Tree House Brewing Company, NEC maintains that LNG trucks leaving the Route 20 Site may well be required to pass the same locations (Company Reply Brief at 11-12). Specifically, if MassDOT prohibited left-hand turns from the Route 20 Site, the Company points out that LNG trucks would instead exit onto eastbound Route 20, thus driving past the same Tree House Brewing Company that the Town of Charlton is concerned about and through the same intersection of Route 169 and Route 20 (id. at 11). If, on the other hand, MassDOT does not restrict the direction of traffic exiting the Route 20 Site, then LNG truck drivers would need to decide between a potentially dangerous left-hand turn – crossing traffic which could be heavy, fast, or both – or choosing the considerably longer route east (i.e., through North Oxford and Auburn)

to access the I-395/I-90 interchange rather than I-84/I-90 interchange (id. at 11-12, citing Tr. 3, at 392-394).

Further with respect to Charlton's safety concerns regarding the intersection of Route 169 and Route 20, NEC maintains that the intersection gives better access onto Route 20 due to the presence of traffic signals and the lane-tapered roadway layout of Route 20 through the intersection, which the Company maintains substantially slows traffic through the intersection (relative to other locations on Route 20) (Company Reply Brief at 12). Therefore, the Company maintains that developing the Project at the Route 169 Site would provide the overall greatest level of traffic safety while resulting in negligible traffic impacts to the surrounding highway network (Company Brief at 65).

d. Analysis and Findings on Traffic Impacts

Regarding operational traffic impacts, the record shows that the Project at either the Route 169 Site or the Route 20 Site would result in LNG trucks using State highways to access interstate highways. For either site, LNG trucks would normally follow the most direct access to Interstate highways by using the I-84/I-90 interchange, rather than the I-395/I-90 interchange. For the Route 169 Site, LNG trucks would travel approximately 7.5 miles on Route 169 and Route 20 to access I-84 or I-90. For the Route 20 Site, LNG trucks would travel two miles on Route 20 to access I-84 or I-90. The Siting Board acknowledges the valid concerns expressed by the Town of Charlton and by Mr. Barbale about the additional driving distance for the Route 169 Site, where LNG trucks would be required to traverse areas with more residential use as compared to the Route 20 Site. However, the Siting Board also notes that, based on precedent, MassDOT could prohibit left-hand turns from the Route 20 Site, which would put the Route 20 Site at a disadvantage with respect to interstate highway access. Although the Town and Mr. Barbale submit that the Project at the Route 169 Site would have a deleterious effect on the intersection of Route 169 at Route 20, neither party submitted specific analysis or evidence beyond general testimony to support this claim. In contrast, the intersection level-of-service analysis conducted by NEC is consistent with Siting Board precedent for assessing traffic impacts, and the Siting Board accords that analysis

considerable weight. With execution of the HCA between the Town and NEC, the Town no longer objects to the Route 169 Site.

The record shows that the Project at either site would have a negligible impact on operational characteristics of key intersections. At either site, the Facility would require five employees and would be equipped with four LNG loading bays. Thus, during a peak traffic hour, the Facility could generate 18 total vehicle trips. Specifically, the Company's traffic studies indicate that key intersections for each site (i.e., Route 169 at Route 20 for the Route 169 Site, and Route 20 at Route 49 for the Route 20 Site) would continue to operate at the same levels of service and with similar v/c ratios and queue times as the intersections would under 'no build' conditions. The record also shows that, even assuming a hypothetical maximum daily output, Facility-generated traffic volumes would be small compared to the average daily traffic observed on Route 169 and Route 20. Therefore, the Siting Board concludes that the Project at either site would have a negligible impact on operational characteristics of key intersections.

For safe vehicle egress from the Facility, driveways must provide adequate visibility with respect to oncoming traffic. The record shows that the Route 169 Site driveway would comfortably satisfy the minimum and desirable AASHTO criteria for stopping site distance and intersection site distance. By contrast, the Route 20 Site is located east of a horizontal roadway curve on a four-lane section of Route 20. The record shows that the proposed Route 20 drive would meet minimum, but not desirable, SSD and ISD criteria.

The Siting Board observes that, although the Route 20 Site driveway location could satisfy minimum SSD and ISD criteria by clearing existing vegetation, the Company would be faced with several challenges to provide an adequate margin of safety for vehicle egress. Providing site distances that meet desirable criteria (which correspond to actual typical vehicle speeds rather than the speed limit) would require that the Company clear approximately 3,000 feet of vegetation within a wetland. Although the Company could install warning lights to notify oncoming traffic of vehicles exiting the driveway, the record shows that installing an actuated traffic signal is highly unlikely to be allowed because the location does not meet any MassDOT traffic signal warrant criteria.

Additionally, the record shows that roadway characteristics adjacent to the Route 169 Site are generally more conducive to LNG truck egress compared to those of the Route 20 Site. Specifically, Route 169 has lower overall speeds, lower average daily traffic volumes, and LNG trucks turning left onto Route 169 would only need to cross one lane of southbound traffic. By comparison, there is a curve immediately west of the Route 20 Site driveway, and LNG trucks turning left out of the Route 20 Site need to cross two lanes of eastbound traffic before fully merging into a westbound lane.

Regarding construction-period traffic impacts, the record shows that, for the Route 169 Site, the anticipated number of construction workers and deliveries would not adversely affect traffic at the intersection of Route 169 and Route 20. Although construction at the Route 20 Site would follow the same general progression as the Route 169 Site, the record indicates that the more extensive site work would require a greater number of workers on site for that phase. For the Route 169 Site, constructing the Preferred Interconnection Route, Alternative 2, or Alternative 6 would result in temporary traffic impacts where pipeline construction is parallel to Route 169. The Preferred Interconnection Route has the longest portion of in-street construction, as compared to other alternatives; however, the record indicates that, with the exception of the HDD operations, pipeline construction along Route 169 would be limited to the shoulder of the roadway and would not require a lane closure.

The record shows that, as part of the Project's permitting, MassDOT would require NEC to develop a traffic control plan and can specify any traffic mitigation and safety requirements that MassDOT deems necessary. The record also shows that NEC would coordinate roadside construction activities with the Charlton Police Department. The pipeline interconnection routes for the Route 20 Site would not require in-street construction. Although the Route 169 Site's Preferred Interconnection Route would have some temporary traffic impacts, these are small compared to the long-term traffic safety considerations of the Route 20 Site.

In conclusion, the Siting Board finds that the Route 169 Site is preferable with respect to traffic impacts, including consideration of access to interstate highways, key intersection operations, and driveway egress characteristics. The Siting Board notes that the Company's traffic modeling assumed that, if all four truck-loading bays were occupied, no additional LNG trucks

arrive and queue outside of the gate or along the shoulder of Route 169. Therefore, the Siting Board directs the Company to, during operations, coordinate the scheduling of National Grid's and other customers' LNG truck arrivals in a manner that will avoid excess LNG trucks arriving at the Facility and queueing along the shoulder of Route 169 while the truck-loading bays are occupied. The Siting Board further directs the Company to report on compliance with this directive on a quarterly basis for the first three years of commercial operation of the Facility. Regarding vehicle egress, the Siting Board directs the Company to: (1) maintain vegetation on its property and with frontage on Route 169 in a manner that does not obstruct sight lines for vehicles entering or exiting the Facility; and (2) install a reactive driveway warning light system, as recommended by the Company's traffic consultant, north and south of the Facility driveways. With the implementation of the conditions above and any conditions imposed by MassDOT, the Siting Board finds that traffic impacts of the Project would be minimized.

5. Noise

The Company indicated that, although equipment for the Project would not differ between the Route 169 Site and the Route 20 Site, noise impacts of the Project are a function of both sound sources and the surrounding land uses (see Exh. NEC-2, at 5-35). NEC provided representative sound power levels for equipment at the site; these data indicate that the most significant noise sources would be related to the gas-fired turbine and other equipment related to the gas liquefaction process (Exh. NEC-2, at 5-41 to 5-42).

a. Operational Noise, Route 169 Site

NEC stated that operational sound from Facility equipment would comply with MassDEP

standards at all residential receptors (Exh. NEC-2, at 5-30).[94,95] The Company collected background sound measurements and performed computer modeling, concluding that, during the quietest time period, noise impacts at residences would be no more than seven A-weighted decibels ("dBA") above measured ambient levels (id.; Exh. EFSB-NO-1). The Company stated that the Project would therefore not violate the MassDEP policy of not increasing broadband sound pressure by more than 10 dBA above ambient conditions (Exh. NEC-2, at 5-30). According to the Company, the Project would use buildings, enclosures, and silencers to minimize noise impacts (id.).

In establishing the ambient noise level, the Company measured sound levels over the course of eight days at three long-term measurement locations (Exh. NEC-2, at 5-34 to 5-40). Average daily minimum 1-hour 10th-percentile sound levels ("L_{90}")[96] varied from 37 to 44 dBA during the day and from 33 to 42 dBA at night (Exh. NEC-2, at 5-37, 5-38). At an additional six sound measurement locations around the Route 169 Site, short-term measurements (20 minutes each) showed L_{90} sound levels ranging from 40 to 59 dBA during the day and from 29 to 42 dBA at night (Exh. NEC-2, at 5-35 to 5-40).

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94 MassDEP's regulations at 310 CMR 7.10 prohibit "unnecessary emissions" of noise. MassDEP Division of Air Quality Control ("DAQC") Policy Statement 90-001 (February 1, 1990) ("MassDEP Noise Policy") (Exh. NEC-2 at 5-31). MassDEP set a policy that a new noise source must be mitigated if it would cause the broadband sound level at a residence or building housing sensitive receptors to exceed ambient background by more than 10 dBA. https://www.mass.gov/files/documents/2018/01/31/noise-interpretation.pdf.

95 In addition, NEC stated that the proposed Facility would meet USEPA noise guidelines, i.e., that the Project would exceed neither a day-night sound level ("L_{dn}") guideline of 55 dBA, set to "protect the public health and welfare with an adequate margin of safety," nor a 24-hour equivalent sound level ("L_{eq}") guideline of 70 dBA, set to avoid adverse effects on public health and safety at publicly accessible property lines or extents of work areas where extended public exposure is possible (Exh. NEC-2, at 5-30 to 5-31). With respect to local rules, the Company stated that the Town of Charlton does not have a noise bylaw or any specific noise regulations (Exh. NEC-2, at 5-32).

96 The L_{90} is a statistical parameter that is the sound level exceeded during 90 percent of a measurement period, and is the metric used by MassDEP to define "ambient" (Exh. NEC-2, at 5-33).

The Company performed acoustic sound modeling to evaluate Project noise impacts. Sound mitigation methods assumed in the acoustic model included:

- Positioning turbine air inlet on the western side of the compressor building;
- Using sound attenuating walls and roofing on the compressor building;
- Using a turbine air inlet silencer capable of achieving an additional 15 dBA of sound attenuation compared to the standard Mars100 inlet silencer or equivalent;
- Using a turbine exhaust stack silencer capable of achieving an additional 18 dBA of sound attenuation compared to the standard exhaust silencer; and
- Installing a 20-foot-tall sound wall along the eastern edge of the site
- Both with and without installing a 14-foot-tall sound wall along the southern edge of the site, which is subject to a special condition specified in the Facility's Proposed Air Quality Plan Approval (See EFSB-A-5(1)(S1) at 24).

(Exhs. NEC-2, at 5-44; EFSB-A-5(1)(S1) at 8; Tr. 6, at 975-978).

The Company's acoustic sound modeling for the Route 169 Site projected that sound at neighboring locations from Facility operation would vary from 20 to 49 dBA, resulting, when combined with daytime ambient levels, in sound increases of daytime sound level ranging from less than 1 to 9 dBA (Exh. NEC-2, at 5-42, 5-43). Nighttime ambient levels would increase to total sound levels ranging from 30 to 49 dBA (id. at 5-43). Without the southern sound wall, modeled noise exceedance over nighttime background were 13 dBA at receptor location LT-2 (southern property line between 314 and 318 Southbridge Road)[97] and 11 dBA at receptor location LT-3 (western property line; solar farm) (id. at 5-36, 5-43). The Company's modeling for other receptor locations showed noise exceedance over background at 7 dBA (Incom property line to the north, and the nearest corner of a Harrington Road residence) or less (id. at 5-36, 5-43; Exh. EFSB-NO-1). Sound modeling results presented in the Proposed Air Quality Plan Approval

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97 NEC indicated that it was taking measures to take control of the property immediately south of the Route 169 Site (318 Southbridge Road), and that it would eliminate the existing residential use of the structure there (Tr. 6, at 985-986). NEC reported that, although 318 Southbridge Road is zoned for industrial use and has been operated as an engine repair shop, there was a residential apartment on the second floor of the structure (Exh. NEC-2, at 5-49; RR-EFSB-46).

indicate that, if a sound wall is constructed on the southern property line, the incremental sound level would be no more than 5 dBA at receptors to the south of the Route 169 Site (Exh. EFSB-A-5(1)(S1) at 9-10). For industrially developed areas, the Company has obtained a written sound increase waiver from the industrial property owners at the industrial locations where sound levels are predicted to exceed MassDEP limits (Exh. NEC-2, at 5-43 to 5-44).

NEC noted that, with its proposed noise mitigation, several noise sources would contribute similarly to the total Project noise level at sensitive receptors (Exh. EFSB-NO-2; RR-EFSB-57). According to the Company, this result of its acoustic noise modeling means that further sound reduction at any one noise source would make for very little change in total sound level toward the east (RR-EFSB-57). MassDEP reviewed NEC's noise modeling as part of the air plan approval process for the Project (Exh. EFSB-A-5(1)(S1) at 8-10). The Proposed Air Quality Plan Approval, issued by MassDEP for the Route 169 Site, includes a condition (specifically, Table 6 Condition 8) directing NEC to conduct a sound survey after the Facility commences operation; the same condition requires NEC to construct the southern sound wall depending on results of the sound survey and depending on whether NEC is able to purchase certain properties to the south of the Route 169 Site within nine months of commencing operation (Exh. EFSB-A-5(1)(S1) at 10, 24). The Proposed Air Quality Plan Approval also states that "including sound mitigation measures and facility sound level impacts the design of the Facility incorporates sound suppression and sound transmission prevention elements that constitute necessary equipment, service and maintenance, and necessary precautions to prevent unnecessary sound emissions, as required by 310 CMR 7.10" (id. at 10).

b. Operational Noise at the Route 20 Site, Comparison Between Sites

NEC stated that background noise measured at the Route 20 Site was dominated by nearly continuous traffic noise – i.e., at all hours – predominantly from the Massachusetts Turnpike to the north and secondarily from Route 20 (Tr. 6, at 973). NEC indicated, however, that background noise levels are comparable at the two sites (id. at 972-974). With respect to comparing the Route 20 and Route 169 sites, the Company noted that while a 7 dBA total noise increase was predicted for each location, the specific location with a 7 dBA increase for Route 169 was an actual

residence on Harrington Road, but the residential property location with a 7 dBA increase for Route 20 is a distance from a residential property line, not an actual residential structure (id. at 974-975).

c. Construction Noise

For either site, NEC stated that typical work hours would be 7:00 a.m. to 5:00 p.m., Monday through Saturday (Exh. NEC-2, app. F, at F-2). NEC reported that equipment and machinery would generate noise levels in the range of 70 and 93 dBA at a distance of 50 feet (Exh. NEC-2, at 5-63). The Company stated that it would make every reasonable effort to minimize noise impacts during Facility construction, including, but not limited to: using appropriate mufflers on all equipment, using muffling enclosures on continuously operating, stationary equipment (e.g., air compressors, welding generators), and turning off idling equipment (id. at 5-64). The Company stated that some work, particularly during the startup and commissioning of the Facility, might be scheduled at night or throughout a weekend (Exh. NEC-2, app. F, at F-2). Work to perform pressure testing and purging and packing of the pipeline might also require an extended work schedule; commissioning and testing the liquefaction system includes processes and tests which cannot be interrupted; also, to minimize traffic impacts, deliveries of over-sized equipment may be scheduled outside of normal construction hours (id.; Exh. EFSB-CM-33).

Potential pipeline interconnection alternatives for the Route 169 Site would traverse a mix of land uses, including commercial and residential properties that would likely be within an audible distance of pipeline construction (RR-EFSB-45). Regarding the proposed HDD operations for the Route 169 Site's Preferred Interconnection Route, NEC stated that operating the HDD rig would generate noise similar to other diesel-powered construction equipment (Exh. EFSB-NO-14). NEC noted that noise from the HDD operations would be limited to work areas around the rig; these areas are expected to be: Incom's southern parking lot for the southern Cady Brook crossing; and just north of where the TGP right-of-way crosses Route 169, for the northern Cady Brook crossing (id.). NEC asserted that an HDD would result in less noise in areas where bedrock

would otherwise need to be mechanically removed (i.e., by using a hoe ram) during open trench construction (id.).

Compared to the Route 169 Site interconnections, the interconnections alternatives for the Route 20 Site traverse less developed areas with fewer receptors (RR-EFSB-45). However, the Company indicated that the nearest residential property would still likely be within an audible distance of pipeline construction noise (id.).

d. Vibration

NEC identified vibratory rollers, hoe rams, and large bulldozers as typical construction equipment for site development activities that would be the most significant potential sources of vibration during Project construction (Exh. EFSB-NO-6). For the closest residence to the Route 169 Site, located approximately 200 feet from the construction site, the Company estimated an effect of 77 vibration decibels ("VdB") for the vibratory roller and 70 VdB for the hoe ram and large bulldozer, which it stated is lower than the typical annoyance impact level for infrequent events for residences where people sleep, 80 VdB (id.).[98]

With respect to the non-residential building located approximately 75 feet southeast of the Route 169 Site, NEC stated that the building may experience vibration around 90 VdB from vibratory roller work, but that vibratory roller work in this area is unlikely (id.). According to the Company, at a distance of 150 feet (or more) from the site, vibration levels are expected to be less than guidance levels established to prevent annoyance (id.).

NEC stated that vibration dampening will be designed into the foundation systems and piping systems of major equipment at the Facility in order to maintain Facility reliability during operation (Exh. EFSB-NO-7). The Company anticipates that vibration at a representative distance of 300 feet away from major operating equipment at the Facility such as the gas turbine would be well below 72 VdB, which it identified as the typical annoyance limit for residences subjected to frequent events (id.). The Company stated that vibration levels near highways are usually 65 VdB

98 The Company used threshold vibration levels from the Federal Transit Administration ("FTA") report titled "Transit Noise and Vibration Impact Assessment," agency report number FTA-VA-90-1003-06, dated May 2006 (Exh. EFSB-NO-12).

or lower if the road surface is relatively smooth with no major potholes or irregularities, but that a bus or truck going over a bump could cause vibrations of about 72 VdB at a 50-foot distance (RR-EFSB-58; RR-NAT-NEC-3). The Company quotes the FTA document "Transit Noise and Vibration Impact Assessment" as stating that the background vibration velocity level in residential areas is usually 50 VdB or lower (RR-EFSB-58).

The Company provided the following threshold vibration levels suggested by the FTA in FTA-VA-90-1003-06:

Table 10. FTA Interpretation of Vibration Criteria

Criterion Curve[1] (See Figure 8-1)	Max L_v (VdB)[2]	Description of Use
Workshop	90	Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas.
Office	84	Feelable vibration. Appropriate to offices and non-sensitive areas.
Residential Day	78	Barely feelable vibration. Adequate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night, Operating Rooms	72	Vibration not feelable, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power optical microscopes (100X) and other equipment of low sensitivity.
VC-A	66	Adequate for medium- to high-power optical microscopes (400X), microbalances, optical balances, and similar specialized equipment.
VC-B	60	Adequate for high-power optical microscopes (1000X), inspection and lithography equipment to 3 micron line widths.
VC-C	54	Appropriate for most lithography and inspection equipment to 1 micron detail size.
VC-D	48	Suitable in most instances for the most demanding equipment, including electron microscopes operating to the limits of their capability.
VC-E	42	The most demanding criterion for extremely vibration-sensitive equipment.

1 The listed criteria include (a) international standards for the effects of vibration on people in buildings, related to annoyance and interference with activities, and (b) industry standards for vibration-sensitive equipment (FTA-VA-90-1003-06, at 8-6).

2 VdB measured over the frequency range of 8 to 80 hertz (by 1/3-octave bands).

Source: Exh. EFSB-NO-12, citing FTA-VA-90-1003-06.

NEC stated that, as of September 2019, it had not determined whether blasting would be required but indications were that any rock removal required to construct the Project could be performed using only mechanical equipment, such as a hoe ram, as described above (Exhs. NAT §1.A.-1; NAT §1.B.-10). The Company stated that operational interruptions for

businesses within 250 yards of the Facility, including for any blasting, would be minimal and that the Company would seek to coordinate its schedule when possible to mitigate any impacts associated with construction (Exh. NAT §1.B.-17).

Regarding the use of HDD for construction of the Preferred Interconnection Route, NEC stated that HDD would generate less vibration compared to open trench construction in areas where bedrock is encountered because it is a less invasive construction technique with the majority of the work along the route performed underground (Exh. EFSB-NO-14).[99]

e. Positions of the Parties

i. North American Tool

North American Tool expressed concern about the potential effects of vibration on its precision manufacturing processes and equipment. North American Tool states it has no objection to the operation of an LNG Facility at the Route 169 Site but does have objections to the construction of four of the possible pipeline interconnections (NAT Brief at 1). The Company's Preferred Interconnection Route, and Alternative 2 [also, Alternative 6; see Figure 4] would run in front of North American Tool's property along Route 169 and Alternatives 1 and 4 would run along the property line behind the North American Tool building (id.). North American Tool notes that full geotechnical and seismic studies have not been performed (id. at 2, citing Exh. NEC-2, at Section 4.8.2). North American Tool therefore questions how construction would impact bedrock (as well as its groundwater supply and septic systems, as described in Section V.D.3.d, above) (NAT Brief at 2).

In addition, North American Tool argues that using a hoe ram to construct any of the four interconnections would cause "excessive, ongoing vibrations" at its facility (id., citing RR-NAT-NEC-3). North American Tool maintains that vibrations can negatively affect the calibration of its precision CNC [computer numerical control] machines, causing parts to be manufactured out of tolerance, and vibrations may also cause direct damage to the CNC equipment or crack the floors (NAT Brief at 2). North American Tool alleges further that cracked floors "would be the worst

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[99] NEC stated that vibrations from an HDD operation would be similar to that of drilling a water well (Exh. NAT-C-16).

possible scenario" because its customers would go elsewhere during the month and a half, minimum, required for repair (id.). North American Tool claims that a two week shut-down is sustainable but anything longer is not (id. at 2, 5). North American Tool then requests that the Siting Board award specific monetary compensation for days NEC is constructing near its facility and for recalibration of machinery, should any one of the four interconnection alternatives identified by North American Tool be selected (id. at 3, 5).

North American Tool argues that if the Company believed North American Tool's concerns are unfounded, NEC "would have agreed to our terms long ago because if they prove that [North American Tool] will be unaffected and no damage is done, [NEC] will pay nothing" (North American Tool Reply Brief at 3-4). North American Tool argues that NEC does not want to be held financially responsible (id.).

North American Tool responded to NEC's designation of a new preferred interconnection route (see Exh. NEC-14) in a comment letter submitted to the Siting Board on February 16, 2021 ("NAT Feb. 2021 Letter"). North American Tool maintains that construction of NEC's Preferred Interconnection Route or Alternative 4 could negatively impact its business and property, alleging that NEC still had not adequately investigated bedrock conditions along either route (NAT Feb. 2021 Letter). North American Tool expressed specific concern about the likelihood of encountering shallow bedrock along Interconnection Alternative 4 and the potential for business disruptions or damage during its construction (NAT Feb. 2021 Letter). North American Tool stated that, despite having numerous conversations with NEC, North American Tool is not reassured that NEC will make North American Tool "whole" if North American Tool experiences "any burdens associated with the construction or operation of this Facility" (NAT Feb. 2021 Letter). Pursuant to the Presiding Officer's March 3, 2021 Procedural Order, North American Tool issued discovery to NEC, including questions about pipeline construction methods.

ii. Company Response

NEC estimated that, in the event it uses hoe ramming in conjunction with open trench construction of an interconnection line to the Route 169 Site, vibration levels in the vicinity of North American Tool would range between approximately 66 and 79 VdB, depending in part on

the route selected, for a period likely to be four days or less (RR-NAT-NEC-3; RR-NAT-NEC-3(1); RR-NAT-NEC-3(2)). The Company stated that such vibrations would only occur during hoe ramming, which would only be a portion of the total time that work is occurring near North American Tool (RR-NAT-NEC-3). On this basis, the Company commits to ensuring that incremental vibration from any ledge removal would be both minimal and monitored; further the Company argues that – in what it considers the unlikely event of damage to property in the area – it would address such matters with affected landowners (Company Brief at 18, n.14, citing Exhs. EFSB-NO-5; EFSB-NO-6; Tr. 3, at 461-464; RR-NAT-NEC-3). On brief, the Company commits to providing notices of construction in the vicinity of North American Tool both 30 and five days in advance (to address driveway access issues) and "as appropriate, to develop a comprehensive vibration mitigation plan in consultation with North American Tool and to ensure no adverse impacts to its septic system or business operations" (Company Reply Brief at 15). On brief, NEC states that it "appreciates the thoughtful participation of North American Tool in these proceedings" as well as North American Tool's statement that it does not object to the Facility at the Route 169 Site or the primary interconnection (Company Reply Brief at 14, citing NAT Brief at 1-2). Specifically, NEC states that it appreciates, understands, and respects North American Tool's concerns regarding potential impacts to its critical business operations that are associated with interconnection options that theoretically could affect North American Tool's on-site machinery (Company Reply Brief at 14, citing NAT Brief at 3). Nevertheless, NEC argues that North American Tool's suggested conditions [with respect to commercial compensation] are "somewhat overbroad, unnecessary and inappropriate" (Company Brief at 14-15).

In April 2021, NEC replied to information requests from North American Tool about its planned pipeline construction methods and the potential for vibratory impacts to North American Tool. Regarding the use of HDD to install portions of the Route 169 Site's Preferred Interconnection Route, NEC pointed out that the southern HDD operation would drill underground between the Incom parking lot and a point north of North American Tool's property, thereby obviating the need for open trench construction (including the use of hoe rams and/or blasting) in the vicinity of North American Tool (Exhs. NAT-C-16; EFSB-CM-36(1) at 1-2). NEC stated that, "[s]pecifically, for North American Tool[,] the use of the HDD technique in the vicinity of their

location will minimize the potential impact to their operations by reducing construction related noise and vibration, and not creating access issues to their property" (Exh. EFSB-NO-14). NEC further stated that vibration generated during the southern HDD operation would be mitigated by the distance between the HDD drill rig and North American Tool's building (approximately 1,000 feet) and the depth of overburden above the actual drill path (Exhs. NAT-C-16; NAT-C-19). NEC reported that its recent geotechnical analysis along the Preferred Interconnection Route confirmed the feasibility of using HDD and indicated that hoe rams and/or blasting would not be required for any of the portion installed by open trench construction methods (Exhs. NAT-C-15; NAT-G-6). Finally, NEC stated that it is willing to install jersey barriers or other protection methods at North American Tool's property line, as acceptable by North American Tool, during the construction of the interconnection pipeline (Exh. NAT-C-20).

f. Analysis and Findings on Noise Impacts

Noise impacts of a particular project are a function of the project-related noise sources and the surrounding land uses. The most significant noise sources would be related to the gas-fired turbine and other equipment related to the gas liquefaction process. In order to determine the effect of operational noise, the Company modeled Project operational noise and compared it to long-term and short-term field measurements of existing ambient noise levels. Operational noise from the Project at the Route 169 Site is expected to raise noise levels at the west and south property lines by 13 dBA and 11 dBA, respectively. However, these adjacent properties do not now and are not expected in the future to have residential or other use sensitive to noise. The record shows further that, for the Route 169 Site, operational noise would not cause an increase of more than 7 dBA at nearby residences. Thus, with consideration of reasonable and likely waivers for adjacent industrial properties, noise produced by the Facility would not exceed MassDEP's noise policy (or USEPA guidelines).

The modeling was performed assuming incorporation of several noise mitigation design specifications, including placing the compressor inside a building, use of air inlet and stack silencers, orientation of Facility elements, and installation of a significant sound wall on the

Route 169 side of the Facility. The record shows that, as part of the Company air plan review with MassDEP, NEC conducted additional noise modeling for the Route 169 Site that included an additional 14-foot-tall sound wall along the southern property line. Results of this modeling indicate that including this sound wall would reduce noise impacts for properties south of the Route 169 Site. The Siting Board notes that Table 6 Condition 8 of MassDEP's Proposed Air Quality Plan Approval directs NEC to conduct a sound survey after the Facility commences operation; the same condition requires NEC to construct the southern sound wall depending on results of the sound survey and depending on whether NEC is able to purchase certain properties to the south of the Route 169 within nine months of commencing operation. The Siting Board concurs with MassDEP's approach for adding additional sound mitigation at the Route 169 Site.

The Siting Board directs NEC to submit to the Siting Board for review and further action, as necessary, the final Air Quality Plan Approval identifying any substantive changes from the Proposed Air Quality Plan Approval. Within one year of starting commercial operation, the Siting Board directs NEC to submit to the Siting Board (1) all results of the MassDEP-required sound survey required by Table 6 Condition 8 of the Proposed Air Quality Plan Approval, and (2) a report describing how the Company has complied with Table 6 Condition 8 of the Proposed Air Quality Plan Approval (see Exh. EFSB-A-5(1)(S1) at 24). With the Company's proposed mitigation measures, including the sound wall to the east and implementation of the above condition, the Siting Board concludes that operational noise from the Project at the Route 169 Site would be minimized.

The record shows that the same approximate level of 7 dBA would be achieved at potential residential property lines (and levels would presumably be lower at the residences themselves) for the Route 20 Site. The Company's modeling thus shows that the larger Route 20 Site parcel affords the opportunity for more noise attenuation between the Facility and neighbors. Therefore, the Siting Board concludes that the Route 20 Site would be preferable to the Route 169 Site with respect to operational noise.

Construction for the Route 20 Site involves considerably more length of driveway construction and pipeline construction than the Route 169 Site, a portion of which is likely to be within audible distance of residences. The noise impacts from this more extensive site preparation

work is diminished by the generally greater distances between construction and residences. On this basis, the Siting Board concludes that the Route 20 Site and the Route 169 Site are comparable with respect to construction noise.

The record shows that the Project would result in noise impacts at and around construction sites during typical construction hours of 7:00 a.m. to 5:00 p.m., from Monday through Saturday, and at other times for pressure testing and purging and packing of the pipeline, for processes and tests during commissioning and testing the liquefaction system that cannot be interrupted, and potentially for deliveries of over-sized equipment. The Siting Board recognizes that various aspects of Project-related construction, including noise, will likely impact surrounding areas. The Company shall, in consultation with the Town of Charlton, develop a comprehensive outreach plan for the Project. The outreach plan should describe the procedures to be used to notify the public about: (1) the scheduled start, duration, and hours of construction in particular areas; (2) the methods of construction that will be used in particular areas (including any use of nighttime construction); and (3) anticipated street closures and detours. The outreach plan should also include information on complaint and response procedures; Project contact information; and the availability of web-based project information. In addition, the Siting Board directs the Company to maintain a website with regular updates about Project construction (e.g., construction phases and progress, significant deliveries, roadway/lane closures). The website shall include contact information for a Company representative capable of addressing questions, complaints, or other issues from stakeholders.

The Siting Board directs the Company to limit construction to Monday through Saturday during the hours between 7:00 a.m. and 5:00 p.m., except by request of the Town of Charlton or of any agency with oversight of operations potentially affected by the Project, such as MassDOT. Work requiring longer duration than normal construction hours (e.g., deliveries of oversized equipment, pressure-testing, purging, and packing of the pipeline, processes and testing during commissioning of the liquefaction system that cannot be interrupted) is exempted from this condition. Should the Company need to extend construction work beyond the above-noted hours and days, with the exception of emergency circumstances on a given day necessitating extended hours, the Company shall seek written permission from the relevant municipal authority before the

commencement of such work, and to provide the Siting Board with a copy of such permission. If the Company and municipal officials are not able to agree on whether such extended construction hours should occur, the Company may request prior authorization from the Siting Board and shall provide the relevant municipal authority with a copy of any such request.

A neighbor to the Route 169 Site and party in the case, North American Tool, has expressed concern about vibration from constructing a pipeline interconnection adjacent to its facility at 278 Southbridge Road. Evidence in the case indicates that people would not feel vibrations from such work – in the range of 66 and 79 VdB if a hoe ram is used, for instance – at the distance of North American Tool. However, the Company provided information on equipment sensitivity that indicates vibrations could affect sensitive equipment such as high-power optical microscopes, microbalances, optical balances, and other sensitive equipment. The Siting Board recognizes the potential that such vibrations could affect operation of precision machine tool equipment, and therefore the possibility that North American Tool might need to suspend operations for about four days in the event that open trench excavation for a pipeline interconnection occurs near North American Tool.

The record shows that NEC now proposes to use HDD, instead of open trench construction, to install Route 169 Site's Preferred Interconnection Route from the southern Incom parking lot to a point north of North American Tool's property. This HDD operation would obviate the need for using a hoe ram and/or blasting to remove bedrock for open trench pipeline construction near North American Tool. Although an HDD operation would likely result in less vibration for North American Tool, the Company has already committed to developing a comprehensive vibration mitigation plan in consultation with North American Tool and to ensure no adverse impacts to North American Tool's septic system or business operations. The Siting Board directs NEC to prepare a comprehensive vibration mitigation plan in consultation with North American Tool, taking into consideration specific factors related to HDD operations and the timing of construction in the vicinity of North American Tool. NEC shall submit to North American Tool and to the Siting Board at least 60 days prior to the start of construction a comprehensive vibration mitigation plan that includes provisions for addressing any damage to North American Tool's facility that occurs as a direct result of the pipeline construction. In addition, the Siting Board

directs NEC to notify North American Tool both 30 days and five days in advance of construction commencement in the vicinity of North American Tool. With implementation of an appropriate vibration mitigation plan, the Siting Board concludes that the Route 20 Site and the Route 169 are comparable with respect to vibration.[100]

On the basis that the Route 20 Site is preferable with respect to operational noise, and both sites are comparable with respect to construction noise and vibration, the Siting Board finds that the Route 20 Site is preferable to the Route 169 Site with respect to the overall category of noise impacts. Additionally, with adherence to forecast noise impacts, compliance with regulations, and conformance with the above condition with respect to construction hours, the Siting Board finds that noise impacts of the Project would be minimized.

6. Air

a. Applicable Regulations

NEC stated that the primary federal (USEPA) and state (MassDEP) regulatory requirements pertaining to air emissions include: (1) National Ambient Air Quality Standards ("NAAQS"); (2) Massachusetts Ambient Air Quality Standards ("MAAQS"); (3) New Source Performance Standards ("NSPS"); (4) the National Emission Standards for Hazardous Air Pollutants ("NESHAPs"); and (5) the Massachusetts Air Plan Approval process through MassDEP (Exh. NEC-2, at 5-22 to 5-26).

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100 The Siting Board notes that damages that are pecuniary in nature are outside the Siting Board's jurisdiction. See Tofias v. Energy Facilities Siting Board, 435 Mass. 340 (2001) (alleged impacts of a jurisdictional facility were purely economic, and outside of the Siting Board's mandate); Sudbury-Hudson, EFSB 17-02/D.P.U. 17-82/17-83, Presiding Officer Scoping Order Concerning Issue of Property Values (September 15, 2017) (potential economic consequences, such as adverse property value impacts, are considerations outside of the Siting Board's Sections 69H and 69J statutory mandate). In addition, the Department may not make any monetary damage award for adverse value impacts. See Mezitt v. Department of Public Utilities, 354 Mass. 692 (1968) (the Department may not make any award for concomitant damages to property). To the extent that North American Tool might seek compensation for damages caused by NEC, it could pursue such damage claims in court.

The USEPA has developed NAAQS for six air contaminants, known as criteria pollutants, for the protection of public health and welfare: sulfur dioxide ("SO_2"), particulate matter with a diameter of ten microns or less ("PM_{10}") and particulate matter 2.5 microns or smaller ("$PM_{2.5}$"), nitrogen dioxide ("NO_2"), carbon monoxide ("CO"), ozone, and lead (Exh. NEC-2, at 5-22).[101,102] The Company noted that the MAAQS were updated in 2019 and are now identical to the NAAQS (Exh. EFSB-A-1).[103]

The USEPA designates every area of the country as attainment, nonattainment, or unclassifiable with respect to the NAAQS for each criteria pollutant (Exh. EFSB-A-10(1)(S1) at 27). In an attainment area, air quality with respect to the pollutant is equal to or better than the NAAQS (Exh. NEC-2, at 5-23). In nonattainment areas, individual criteria pollutants exceed NAAQS, and action must be taken to improve air quality (Exh. NEC-2, at 5-23). Areas with limited air quality data are unclassifiable and treated as attainment for regulatory purposes (id.). The Company indicated that Worcester County, and thus Charlton, is presently designated as attainment or unclassified for SO_2, PM_{10}, $PM_{2.5}$, NO_2, CO, ozone, and lead (Exhs. EFSB-A-2(2) at 5-6; EFSB-A-10(1)(S1) at 27).

The NSPS regulates the air emissions from certain new sources, including newly constructed industrial or commercial equipment (Exh. NEC-2, at 5-25). NEC stated that applicable NSPS are set forth at 40 CFR 60 Subpart KKKK Standards of Performance for

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101 NEC explained that primary and secondary NAAQS have been developed for both short-term and long-term exposure durations (Exh. NEC-2, at 5-23). Primary NAAQS are protective of human health, including sensitive populations such as asthmatics and the elderly; secondary standards are protective of public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (Exh. NEC-2, at 5-23). Short term exposure periods are 24-hours or less; long term level usually refer to pollutant levels that cannot be exceeded for exposures averaged typically over one year (id.).

102 The Company explained that, to account for other forms of nitrogen oxides ("NO_X") that may chemically convert to NO_2 in the atmosphere, USEPA considers total NO_X emissions as relevant to meeting the NO_2 ambient air standards (EFSB-A-2(2) at 6).

103 See 310 CMR 6.00: Ambient Air Quality Standards for the Commonwealth of Massachusetts.

Stationary Combustion Turbines (for NO_X and SO_2) and Subpart JJJJ, Standards of Performance for Spark Ignition Internal Combustion Engines (id.). The Project would meet NSPS Subpart KKKK limits for NO_X and SO_2 by imposing emission rate limits and using pipeline quality natural gas (Exh. NEC-2, at 5-25, 5-27). NEC would comply with NSPS Subpart JJJJ by purchasing certified engines and by implementing operating hour limits and appropriate work practices (id. at 5-25; Exh. EFSB-A-10(1)(S1) at 29).[104]

Hazardous Air Pollutants ("HAPs") refer to pollutants regulated by the Clean Air Act, including organic compounds and trace metals for which the USEPA has not established ambient air quality standards (Exh. NEC-2, at 5-26).[105] NEC stated that the Facility would be a non-major source of HAPs since emissions would be less than 10 tons per year ("tpy") of any single HAP and less than 25 tpy cumulative HAPs (id.; Exhs. EFSB-A-11; EFSB-A-11(1)). NEC reported that, as a non-major source of HAPs, the Facility would be exempt from NESHAP standards of 40 CFR 63, Subpart YYYY (for stationary combustion turbines) and 40 CFR 63, Subpart ZZZZ (for stationary reciprocating internal combustion engines) (Exh. NEC-2, at 5-26). NEC stated that the potential HAP emissions would be compared to Threshold Exposure Levels ("TELs") and Allowable Ambient Levels ("AALs") that have been promulgated by MassDEP (id.; Tr. 6, at 1013).

MassDEP regulations (310 CMR 7.02) require Air Plan Approval prior to Project construction (Exh. NEC-2, at 5-25 to 5-26, 6-3). NEC noted the following key requirements of 310 CMR 7.02(j)1-8: (1) emissions would not result in air quality exceeding the NAAQS or MAAQS; (2) the Project would meet all applicable Massachusetts and federal air emission limits and operating requirements; and (3) emissions sources would meet BACT requirements (id.

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104 NEC indicated that work practices relied on for complying with NSPS Subpart JJJJ would include operating and maintaining the engines and control devices according to the manufacturer's emission-related instructions (Exh. EFSB-A-10(1)(S1) at 29).

105 HAPs are defined within 42 U.S.C. 7412, as modified in 40 CFR 63, Subpart C and are regulated by the USEPA for various source categories under the NESHAP program (Exh. NEC-2, at 5-26).

at 5-26 to 5-27). NEC also noted that compliance with NSPS would be reviewed as part of the Air Plan Approval process (id. at 5-25; Exh. EFSB-A-5).

b. Route 169 Site

i. Projected Air Emissions

The Project would generate air emissions from natural gas combustion in the following sources: the nitrogen recycle compressor turbine, heaters, control devices, flares, and gas-fire electric generators (Exh. EFSB-A-10(1)(S1) at 19). NEC stated that the Facility is designed to operate annually for 270 days or 6,480 hours (Exhs. NEC-2, app. A at A-2; EFSB-A-13). NEC noted that it conservatively assumed flare system operating hours to be much higher than the actual expected operation time for the flare, which is used to prevent over-pressurization (Exhs. EFSB-A-2(2) at 9; EFSB-A-13).[106] The gas-fired electric generators would combust boil-off gas whenever the Facility is not liquefying (Exh. EFSBA-10(1)(S1) at 17; Tr. 6, at 1033-1036).[107] NEC estimated potential air emissions assuming that the liquefaction system would operate at full load with ten or fewer start-ups and stops per year (Exh. EFSB-A-2(2) at 8). The Facility's combustion sources are summarized in Table 11, below.

Table 11. Combustion Source Summary

Source	Capacity (MMBtu/hr)	Fuel	Operating Hours (hours/year)
Combustion Turbine	103	Natural gas	6,480
Amine Reboiler	12.7	Natural gas	6,480
Regeneration Gas Heater	4.4	Natural gas	6,480
Flare System	816	Natural gas	72
Gas Fired Electric Generators (2)	305 kWe* (~3.7 MMBtu/hr,	Natural gas	4,370

106 In the Proposed Air Quality Plan Approval, MassDEP stated that: "the flare is an emergency device that mitigates safety risks and CO_2e impacts by avoiding an uncontrolled release scenario. The flare mitigates the risk of the uncontrolled release by combusting the methane into CO_2 and water vapor; CO_2 is an inert gas that is 25 times less potent of a greenhouse gas than methane" (Exh. EFSB-A-10(1)(S1) at 63).

107 NEC stated that the two gas-fired electric generating units would power the existing site electrical load and net meter excess power back to the grid (Exh. EFSB-A-10(1)(S1) at 17).

	each)		

* kilowatt-equivalent

Source: Exhs. EFSB-A-10(1)(S1) at 22; EFSB-A-11(S1).

NEC estimated worst-case emissions based on combustion sources, operating hours, and fuel sources and concluded that the Project would not exceed thresholds for federal air permitting (Prevention of Significant Deterioration ("PSD," 40 CFR 52.21)) or additional state permitting under the Massachusetts New Source Review program ("NSR," 310 C.M.R. 7, Appendix A) (Exhs. NEC-2, at 5-26 to 5-27; RR-EFSB-49). NEC stated that visible emissions are not expected, and that the Facility would comply with MassDEP opacity regulations (Exh. EFSB-A-10(1)(S1) at 32; Tr. 6, at 1042-1043). Estimated emissions of key pollutants are compared to PSD and NSR permitting thresholds in Table 12, below.

Table 12. Potential Worst-case Facility Emissions Compared to PSD and NSR Permitting Thresholds

Pollutant	Facility Annual Emissions (tpy)	PSD Major Source Threshold (tpy)	NSR Major Source Threshold (tpy)
VOCs	10.0	250	50
CO	26.4	250	Not applicable
PM	3.0	250	Not applicable
NO_X	15.9	250	50
SO_2	0.87	250	Not applicable

Source: RR-EFSB-49.

NEC stated that the Facility would have potential greenhouse gas ("GHG") emissions of approximately 49,570 tpy carbon dioxide equivalent ("CO_2e") and therefore does not trigger mandatory MEPA review on the basis of GHG emissions (Exhs. EFSB-A-21(S1); EFSB-A-10(1)(S1) at 35).[108] NEC also noted that the Project would have less than 25 MW of nameplate electric generating capacity and therefore is not subject to Regional Greenhouse Gas Initiative ("RGGI") program requirements, as implemented by 310 C.M.R. 7.70 (Exh. EFSB-A-10(1)(S1) at 32). Nevertheless, the Company indicated that the use of LNG as a

[108] The Company noted that Facility's CO_2e estimate is based on emission factors from 40 CFR Part 98 Tables A-1, C-1, and C-2 (Exh. EFSB-A-10(1)(S1) at 57). The MEPA threshold of 100,000 tpy CO_2e requires an ENF and mandatory EIR (Exh. EFSB-A-10(1)(S1) at 35).

back-up fuel for power plants (e.g., instead of oil) could result in reduced electric generation sector GHG emissions (Exh. NEC-2, at 3-6, 4-18 to 4-19). The Company indicated that it would minimize fugitive natural gas emissions through implementation of a Leak Detection and Repair ("LDAR") program, in accordance with 40 CFR 60, Subpart OOOOa (Exh. EFSB-A-5(S1)(1) at 3).

ii. Ambient Air Quality and Dispersion Modeling

NEC used air dispersion modeling to assess the potential impacts of Facility emissions on ambient air quality (Exhs. NEC-2, at 5-29; EFSB-A-2(2)). NEC developed its modeling approach in accordance with federal and state guidance and was reviewed by MassDEP as part of the Air Plan Approval process (Exh. NEC-2, at 5-29; Tr. 6, at 1011-1012).[109] The Company used air quality data from MassDEP and USEPA to establish ambient conditions for the dispersion model (Exh. EFSB-A-2(2) at 4-5). NEC noted that air quality data from the MassDEP Quabbin Reservoir monitoring site in Ware provided the best balance of proximity and representative conditions; the most recently available monitoring reports were for the years 2016 to 2018 (id. at 4).[110,111]

NEC's dispersion modeling, as presented in the Proposed Air Quality Plan Approval, incorporated emissions from the Millennium generating station, TGP Compressor Station on Carpenter Hill Road in Charlton, and the landfill in Southbridge, to account for emissions that may not be captured in the background monitoring data (Exhs. EFSB-A-26; EFSB-A-5(S1)(1) at 5-6).

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109 NEC used the USEPA-developed AERMOD (Version 19191) for dispersion modeling (Exhs. EFSB-A-2(2) at 7; EFSB-A-5(S1)(1) at 5). The Company noted that AERMOD incorporates multiple facility sources and stack heights, building-induced downwash, meteorological data, surrounding land uses, and surrounding topography (Exh. EFSB-A-2(2) at 7-14; Tr. 6, at 1022).

110 The Company noted that all applicable criteria pollutants, aside from CO, are monitored at the Quabbin Reservoir site (Exh. EFSB-A-2(2) at 4). Air quality data for CO was obtained from the Summer Street monitoring site in Worcester (id.).

111 NEC indicated that MassDEP agreed with the selection of monitoring data from the Quabbin Reservoir monitoring site (Tr. 6, at 1012-1013).

Model-predicted emissions from these additional sources were added to background levels to predict total potential air quality impacts, including from the Facility, for comparison to the NAAQS (Exh. EFSB-A-5(S1)(1) at 5-6). Air toxic modeling assessed the incremental impact from project emissions only (Exh. EFSB-A-5(S1)(1) at 7-8). Air dispersion modeling results presented in MassDEP's Proposed Air Quality Plan Approval indicate that operating the Facility would not result in air quality exceeding NAAQS, TELs, and AALs (id. at 6-8).

iii. Air Plan Approval Process

NEC stated that, based on the estimated worst-case Facility emissions, the Project is not a major source of air emissions and, therefore, a non-major Comprehensive Plan Application ("nmCPA") is required (Exhs. NEC-2, at 5-27; EFSB-A-8). NEC explained that, pursuant to nmCPA requirements in 310 CMR 7.02(5), it would demonstrate compliance with emissions limits and select BACT for each emissions source (Exh. EFSB-A-8). NEC followed MassDEP Top Case BACT guidance to meet the requirements for each emissions source (id.).[112] The Company anticipates meeting applicable BACT requirements through a combination of good combustion controls, good operating practices, fuel-efficient processes, and use of natural gas as fuel (id.).[113]

The Company stated that, at the time of evidentiary hearings, it had completed a draft nmCPA and was in the process of revising the application based on feedback and discussions with MassDEP (Exh. EFSB-A-10(S1)). Through the nmCPA process, Facility emissions will be limited by MassDEP (on an hourly basis, yearly basis, per-unit-energy basis, and, in some cases, volumetrically) (id. at 63-65). In July 2021, MassDEP issued a Proposed Air Quality Plan Approval for the Project (Exh. EFSB-A-5(S1)). MassDEP held a public hearing on the proposed

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112 NEC explained that, as established by MassDEP and USEPA guidance documents, top-down BACT analysis involves five basic steps: (1) identify all control technologies; (2) eliminate technically infeasible options; (3) rank remaining control technologies by control effectiveness; (4) evaluate most cost-effective controls and documents results; and (5) select BACT (Exh. EFSB-A-10(1)(S1) at 36-37).

113 NEC reported that pipeline-quality natural gas is a relatively clean burning fuel, with lower quantities of fuel bound nitrogen and sulfur, and a lower potential for particulate matter (Exh. EFSB-A-10(1)(S1) at 22-25).

air permit on July 29, 2021, and the deadline for submitting public comments on the draft was August 9, 2021 (id.).

According to the Proposed Air Quality Plan Approval, MassDEP concurred with the Company's BACT analysis for each emissions source the analysis was required (Exh. EFSB-A-5(S1)(1) at 4-5). Regarding the combustion turbine, which would have the highest thermal capacity (in terms of MMBtu/hr) among potential emission sources at the Facility, NEC submitted a supplemental BACT analysis to MassDEP specifically analyzing the use of an electric motor drive versus a mechanical drive combustion turbine to power the refrigeration system (id. at 3-4).[114] According to the Proposed Air Quality Plan Approval, MassDEP determined that, with the use of low-NO_X burners, clean fuels, and good combustion practices, emission rates for the combustion turbine represent BACT (id. at 4).

c. Route 20 Site

NEC stated that air emissions from the Facility would not change if the Route 20 Site were used for Project (Tr. 6, at 1016-1017). The Company stated that regulatory requirements would be the same for the Route 20 Site; however, some details of the air modeling protocol would necessarily differ (id.). For example, MassDEP could require a different monitoring station for background air quality data, a different source for meteorological data, or different emissions sources for cumulative air modeling (id. at 1016-1019). Additionally, certain model inputs such as terrain and surrounding land uses would be specific to the Route 20 Site and could affect the dispersion modeling (id. at 1020-1021). In any case, the Company stated that operating the Facility at the Route 20 Site would not result in any violations of applicable air quality standards (id. at 1028).

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[114] As describe in Section III.B.1, NEC evaluated two options for the drive system for the nitrogen compressor required for liquefaction (a gas turbine drive or an electric motor drive) and ultimately proposed a hybrid drive system that is a combination of a smaller gas turbine with an electric motor (Exhs. NEC-2, at 2-9; EFSB-A-10(1)(S2) at 50).

d. Construction Air Quality Impacts

The Company stated that constructed related air impacts would be mitigated by implementing the following requirements: non-road construction vehicles would use ultra-low-sulfur diesel ("ULSD"); all non-road engines would meet exhaust emissions standards per 40 CFR 89.112; all diesel-powered non-road construction equipment would comply with US EPA Tier IV emissions standards, or have federally verified emission control devices installed if they are rated at 50 horsepower or above and operated for 30 or more days for the Project; and minimizing engine idling (Exh. NEC-2, at 5-61 to 5-62). The Company stated that it would take the following measures to minimize construction dust: spraying water on earthwork and other dust-causing activities, sweeping pavements of adjacent roadway surfaces close to entrances, covering exposed soil piles, and installing sediment tracking pads and gravel construction entrances (id. at 5-62).

e. Positions of the Parties

i. Mr. Barbale

Mr. Barbale argues that air emissions from the Facility would affect fewer receptors if the Project were developed at the Route 20 Site, as compared to the Route 169 Site (Barbale Brief at 1; Tr. 6, at 1058-1059).

ii. Company Response

The Company reiterates that the Facility would not cause or contribute to the exceedance of any applicable air quality standard (Company Brief at 61, citing Exh. NEC-2, at 5-22). The Company also submits that the potential opportunity to supply electric generating facilities with LNG for use as a backup fuel when pipeline supplies are constrained could provide substantial opportunities to reduce emissions from electricity generation (Company Brief at 62, citing NEC-2, at 4-17).

f. Analysis and Findings on Air Impacts

The record shows that the Project at either the Route 169 Site or the Route 20 Site would result in air emissions related to the use of natural gas as a fuel source and that direct Facility emissions would be the same at either location. The Project is subject to a range of federal and

state regulatory requirements pertaining to air emissions from new sources of which the primary requirements are reviewed under the MassDEP Air Plan Approval process. To that end, NEC submitted draft air modeling protocol to MassDEP and prepared a draft nmCPA for submittal. The Company proposes to minimize air emissions by meeting applicable BACT requirements through a combination of good combustion controls, good operating practices, fuel-efficient processes, and use of natural gas. Additionally, through the Air Plan Approval process, the Facility will be subject to emissions limits for criteria pollutant related emissions. MassDEP issued a Proposed Air Quality Plan Approval in July 2021. The record shows that the emission sources at the Facility would meet BACT requirements and that the Proposed Air Quality Plan Approval would impose various operating emissions limits and conditions. The Proposed Air Quality Plan Approval presents ambient air quality and dispersion modeling which indicates that the Project, in addition to ambient air quality and nearby sources of air emissions, would not exceed NAAQS, TELs, or AALs.

With respect to Facility construction, the record shows that the Company would control dust by limiting off-site dust and soil migration from the construction site by wetting exposed soils as needed and installing trackpads or gravel site entrances. The record also shows that the Company would limit vehicle idling and use ULSD fuel to reduce air emissions and that diesel-powered non-road construction equipment would comply with US EPA Tier IV emissions standards or have federally verified emission control devices.

The Siting Board finds that the Route 169 Site and Route 20 Site are comparable with respect to air impacts. With the proposed measures to minimize air emissions from the Facility during operations and to minimize dust and air emissions from construction equipment, the Siting Board finds that potential air impacts from the Project would be minimized.

7. Hazardous and Solid Waste

NEC stated that, during construction, equipment fuels (i.e., diesel and gasoline) and drilling mud used for HDD would be potential sources of environmental impacts if spilled (Exhs. EFSB-

HW-9; EFSB-HW-20).[115] The Company committed to implementing a Spill Prevention, Control, and Countermeasure ("SPCC") Plan during construction (Exhs. NEC-2, at 5-67; EFSB-HW-16). . The Company stated it would comply with regulations pertaining to spill prevention and control for HDD operations (Exh. EFSB-HW-20). The Company drafted an "Inadvertent Release Contingency Plan for Horizontal Directional Drilling," which it submitted to the Charlton Conservation Commission (RR-EFSB-33(S1) at 14, 27). As part of the Order of Conditions, the Commission required that the Company submit a final version of the plan for review and acceptance by the Commission prior to commencing any activity on the site (RR-EFSB-33(S1) at 32). The Company added that pumps used during construction would have secondary containment (Exh. EFSB-S-45). The Company does not foresee storing large quantities of diesel or gasoline on-site (Exh. EFSB-HW-9).

NEC indicated that, while there was no known subsurface contamination at the Route 169 Site or along the interconnection routes, it would perform an investigation prior to the first phase of construction to confirm this (Exhs. NEC-2, at 5-18; EFSB-HW-8; EFSB-HW-18). The Company reported the same for the Route 20 Site and its interconnections (Exh. NEC-8, at 5-13). Nonetheless, the Company committed to notifying MassDEP if it encounters any hazardous materials above reportable concentrations during construction (Exh. EFSB-HW-8). NEC presented that its contractor would be responsible for managing solid waste during construction, including separation of recyclable materials (Tr. 5, at 924-925).

NEC stated that the Facility would be classified as a Very Small Quantity Generator of hazardous waste, indicating that the Facility would produce less than 220 pounds of hazardous waste per month and would not accumulate more than 2,200 pounds of hazardous waste on site (Exh. EFSB-HW-7; see 310 CMR 30.353). The Company also committed to creating a SPCC Plan according to federal regulation 40 CFR Part 112 to document how hazardous materials are stored and handled, and outline procedures that the Company would follow in the event of a release of hazardous materials (Exhs. NEC-2, at 5-14; EFSB-HW-16). The Company stated that it

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115 The Company indicated that HDD drilling mud is typically composed of 95 percent water and 5 percent bentonite clay – a natural, non-toxic substance (Exh. EFSB-HW-20).

would install permanent curbing and/or construct secondary containment measures around primary storage containers and equipment in order to contain any oil leaks or spills, in accordance with 40 CFR Part 112 (Exh. NEC-2, at 5-14).[116]

NEC stated that the Facility would use the following potentially hazardous materials during operation: (1) amines, (2) heat transfer oils, (3) antifoam, (4) lubricating oil, (5) ethylene glycol, (6) transformer oils (non-PCB), and (7) propylene glycol (Exh. NEC-2, at 5-14). As described in Section III.B, above, NEC reported that its selection of nitrogen, an inert gas, for liquefaction instead of flammable hydrocarbon gas refrigerants reduces the potential for fire (id. at 2-9). For characteristics of LNG in the event of a spill during Facility operation, see Section VI.

a. Positions of the Parties

i. Town of Charlton

The Town of Charlton did not make any specific argument with respect to how the Company would store, handle, or dispose of hazardous waste. However, on brief, Charlton requested that the Siting Board require provisions related to the storage of combustible and hazardous materials in an HCA between the Company and the Town (Charlton Reply Brief at 19). The Board notes that this issue is not addressed in the HCA.

b. Analysis and Findings on Hazardous and Solid Waste

The record shows that for its handling of hazardous materials at the Facility during construction and operation, NEC has committed to complying with the appropriate federal and state regulations (including 40 CFR Part 112 and 310 CMR 30.353, respectively). The Company will also comply with applicable regulations pertaining to spill prevention and control of drilling mud for HDD operations for interconnection construction. The record shows that the Company prepared an "Inadvertent Release Contingency Plan for Horizontal Directional Drilling," which it

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116 The Company stated that it would additionally implement secondary containment for all substances and process equipment (Exh. NEC-2, at 5-14). The truck loading area would have spillways connected to an impoundment sump normally for LNG (Exh. EFSB-PA-18(S1) at 6).

submitted to the Charlton Conservation Commission. As part of the Order of Conditions approving the Project, the Commission required that the Company submit a final version of the plan to the Commission before the start of any activity on the site. The Siting Board directs the Company to include in its final contingency plan: (1) the operational measures the Company will put in place to minimize the risk for drilling fluids to inadvertently return to the surface; and (2) the immediate steps the Company would take in responding to the incident and reporting it to appropriate regulatory authorities (e.g., MassDEP, Charlton Conservation Commission). NEC shall submit the HDD construction contingency plan to the Siting Board at least 30 days prior to the start of Project construction.

The record shows that neither the Route 169 Site nor the Route 20 Site have instances of known sub-surface contamination where the Facility would be developed or along the potential pipeline routes. If contaminated soil is encountered during construction, the Siting Board observes that the Company would notify MassDEP. The Siting Board notes that the Town of Charlton's concerns regarding the storage of combustible and hazardous materials appear to be directly addressed by NEC's compliance with 40 CFR Part 112.

The record does not show any difference in the processes or substances that the Project would use, depending on the site selected. The Siting Board therefore finds that the Route 169 Site and the Route 20 Site are comparable with respect to hazardous waste and soil management impacts. The Siting Board finds that the Company, by meeting existing requirements for hazardous waste management, hazardous waste and soil management impacts would be minimized.

8. Site Layout and Emergency Response

The Company stated that the layout of the Facility at either the Route 169 Site or the Route 20 Site would enable the predictable, efficient, and safe movement of personnel, operating equipment, and emergency equipment, as required by the setback and location specifications set forth in applicable federal and state codes and standards (Exh. NEC-2, at 2-7). The two sites are described, below, with respect to staging space for emergency response vehicles, site access, internal roadways, and visibility for first responders. Aspects of site layout as related to

emergency response operations are also described below. See Section VI for a detailed discussion of the Facility's compliance with applicable LNG siting and safety regulations, codes, and requirements.

a. Route 169 Site

During evidentiary hearings, the Town of Charlton explained that, during an emergency, first responders need adequate space from which site conditions can be safely assessed, and where vehicles and fire apparatuses can be parked off of the highway; the Charlton generally referred to such an area as "staging space" (Tr. 5, at 777-778). Regarding staging space at the Route 169 Site, NEC stated that vehicles, including fire apparatuses, could be staged on the southern driveway in the space between the highway and the Facility gate (Exh. EFSB-PA-18(S1); Tr. 1, at 13).[117,118] During evidentiary hearings, Charlton's fire inspector, Mr. Dennis Carlson, testified that, depending on the requirements of a particular emergency, Route 169 could be temporarily closed to through traffic and used for additional staging space (Tr. 5, at 779).

NEC stated that, during an emergency, first responders could access the Route 169 Site from the northern or southern driveway (Exh. NEC-2, at 2-7). NEC indicated that the Facility's internal roadway would have appropriate widths and turning radii for LNG trucks and that emergency response vehicles were also taken into consideration in designing the Facility's internal (Exh. EFSB-PA-18(S1); Tr. 6, at 1084). Specifically, the Company maintained that the internal roadway would provide sufficient space for emergency vehicles to stage, maneuver, and, if necessary, conduct firefighting activities (Exh. EFSB-PA-18(S1); Tr. 4, at 678).

Design plans indicate that, due to the generally sloped nature of the Route 169 Site, retaining walls would be used to create a level area for process equipment in the center of the site (Exh. EFSB-PA-18(S1) at 9; Tr. 6, at 1112-1113). The Company indicated that the proposed retaining walls would range in height from less than one foot to four feet and explained that the

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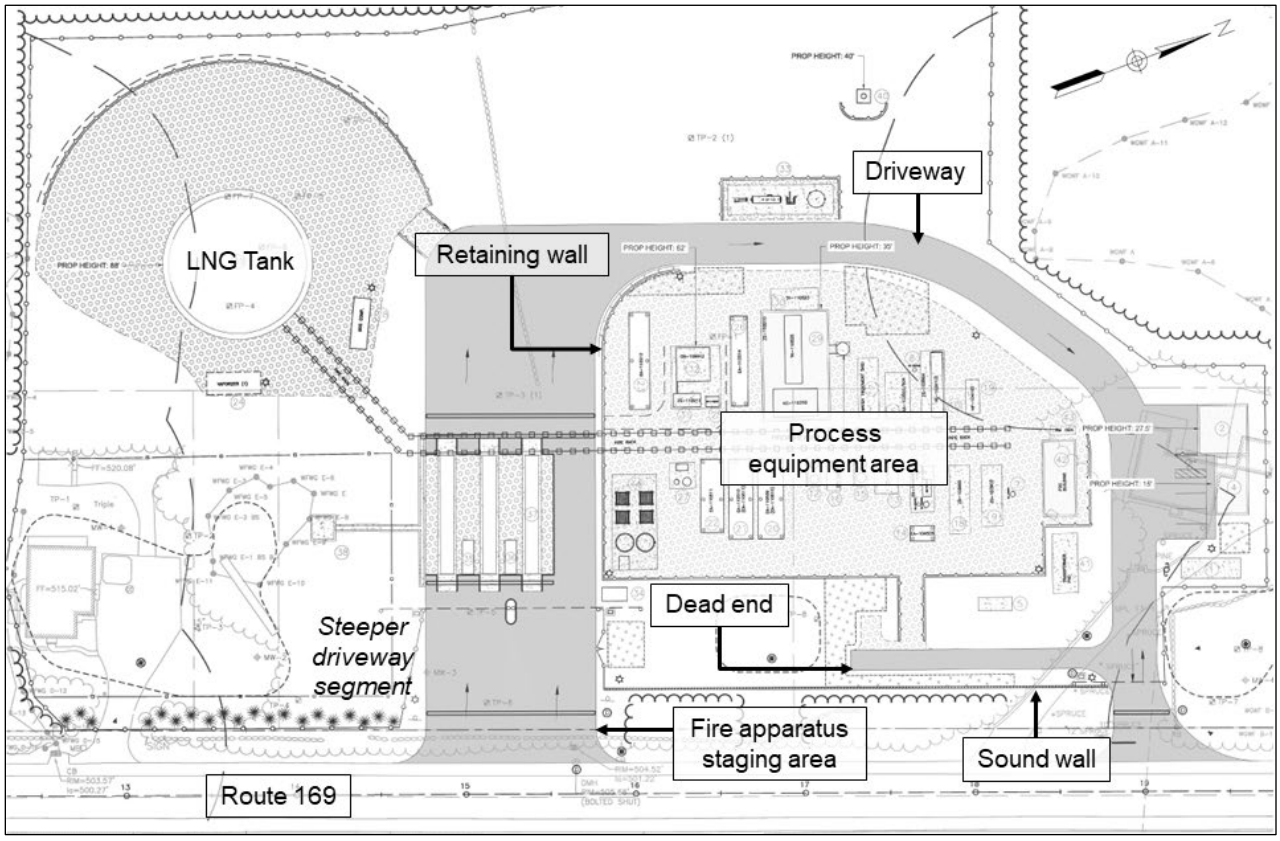
117 The Town of Charlton's fire inspector explained that fire apparatus and fire truck are synonymous terms (Tr. 5, at 771-772).

118 Design plans indicate that the area between the Facility gate and the highway is approximately 100 feet by 91 feet (Exh. EFSB-PA-18(S1) at 6).

process equipment area could be accessed from the west, where the internal roadway is at-grade with the process equipment area, and also from the east via an access ramp (Exh. EFSB-PA-18(S1) at 6, 9; Tr. 4, at 678). Design plans also indicate that drainage swales would be located between the access road and a portion of the central process area (Exh. EFSB-PA-18(S1) at 9). NEC asserted that the retaining walls would not hinder first responders from spraying water or foam onto equipment located in the central area from any location on the internal roadway (Tr. 4, at 678). The Company further conjectured that, in its experience, a compact site layout could make certain contingences easier to address (Tr. 6, at 1111).

Figure 6. Route 169 Site Layout for Emergency Response



Adapted from: Exh. EFSB-PA-18(1)(S1) at 6.

b. Route 20 Site

With respect to the Route 20 Site, NEC stated that the primary driveway from Route 20 would be approximately 1,800 feet long, with an average slope of approximately nine percent, and wide enough for two-way traffic (Exh. NEC-2, at fig. 2.1-4; Tr. 2, at 347). The Company stated that it would also construct an emergency driveway from Hill Road, providing first responders a second access point from the south (Exh. NEC-2, at 2-7). Hill Road is a residential street in Charlton, which the Company characterized as a narrow, secondary town road with very limited shoulders (Exh. NEC-2, app. I, at fig. I-1.2; Tr. 3, at 391). NEC asserted that, in the case of an emergency, the relatively long and steep primary driveway could be problematic in terms of Facility access, clear lines of sight, and vehicle staging (Tr. 6, at 1119). Although detailed site engineering has not been developed for the Route 20 Site, the Company expressed that, due to the significant grade changes of the site, retaining walls would probably be necessary for that design as well (id. at 1118). A preliminary site plan indicates that the internal roadway would allow vehicles to circulate around the LNG storage tank and truck loading area and also around the entire perimeter of the process equipment area (Exh. NEC-2, at fig. 2.1-4).

c. Positions of the Parties

i. Town of Charlton

Citing testimony from the Charlton fire inspector, Dennis Carlson, and Charlton's expert engineering witness, Sean Reardon, Charlton argued on brief that the Route 169 Site would be too constrained and therefore not conducive to safe or effective emergency response (Exh. TOC-SPR-1, at lines 17-37; Charlton Brief at 8, citing Exh. TOC-DMC-1, at 16-30). With respect to the Route 169 Site access, Mr. Carlson testified that the angle-of-approach of the southern driveway would be too steep for a fire apparatus to traverse without "bottoming out" on the front or rear bumper; thus, a fire apparatus may not be able to enter the Facility (Charlton Brief at 9, citing Tr. 5, at 770, 774). Mr. Carlson indicated that, if a Town fire apparatus could not access the property, first responders would instead need to rely solely on the Facility's on-site fire hydrants and fire suppression equipment (Tr. 5, at 808-809, 812). With regard to staging and directing a response, Mr. Carlson indicated that Route 169 would need to be closed to provide sufficient space for personnel and vehicles (Charlton Brief at 9, citing Tr. 5, at 778-779).

Mr. Carlson expressed concern that the central process equipment area could not be accessed from any point of the internal roadway due to the presence of retaining walls (Tr. 5, at 781-783). Mr. Carlson also indicated that the retaining walls could be a hindrance to spraying water or foam into the process equipment area from the Facility's internal roadway (id. at 783-784). Finally, Mr. Carlson indicated that the Charlton Fire Department does not currently have sufficient equipment for responding to emergencies at an LNG plant (id. at 791). Mr. Carlson expressed that the Fire Department would need to assess the specific hazards presented by the Facility with the Company and acquire appropriate firefighting equipment (e.g., appropriate quantities and type of firefighting foam, along with firehoses and nozzles rated to deliver foam or water from a fire apparatus) (id. at 790-794).

Mr. Carlson and Mr. Reardon both testified that the lack of open access around the Facility could hinder egress during an emergency (Tr. 5, at 780, 856). Specifically, Mr. Carlson and Mr. Reardon expressed disfavor for the dead-end segment of the internal roadway located east of the process equipment area, which could be problematic if blocked (id. at 780). Regarding vehicle circulation, Mr. Carlson also commented that, although the internal roadway is likely wide enough for two-way traffic under normal conditions, he was concerned that staging a large fire apparatus could block safe vehicle circulation (id. at 799-801).

Charlton also expressed concern that there would be poor visibility into the Facility from Route 169 (Charlton Brief at 10, citing Tr. 5, at 857-858). Charlton stated that, because the Facility would be located 10 to 12 feet above Route 169, first responders would not be able to visually assess conditions without entering the Facility (Charlton Brief at 10, citing Tr. 5, at 782-783, 857-858). By comparison, Charlton claimed that the relatively long driveway proposed for the Route 20 Site would provide better visibility for first responders approaching the Facility (Tr. 5, at 802-803). Additionally, Charlton noted that the Route 20 Site driveway could accommodate vehicle staging, thus eliminating potential hazards associated with staging on Route 20 (id. at 802-805). Beyond these specific advantages, the Charlton contended that the significantly larger area and remote nature of the Route 20 Site provides an undeniable safety benefit compared to the Route 169 Site (Charlton Brief at 11).

With execution of the HCA between the Town and NEC, the Town no longer objects to the Route 169 Site (Exh. EFSB-Z-26(S1)(1) at 4-5). With regard to the Route 169 Site, provision (6) of the HCA addresses safety, with specific reference to emergency response (id. at 3-4). According to the HCA, NEC will engage with the Town Fire Chief and Fire Department during the design and construction phases to ensure they are informed and can provide meaningful input into the Town's safety needs, including with respect to the Facility's design baseline (id.). NEC will also work to ensure that the Fire Chief and Fire Department, and relevant first responders in neighboring municipalities, are periodically informed regarding Project operations and are prepared to respond to any calls related to the Project (id.). NEC will, at its cost, provide specific Project-related education and training opportunities to members of the Fire Department and to first responders in neighboring municipalities (id.). Additionally, NEC will periodically review its Operational Safety Plan and any emergency action or disaster recovery plans with the Town Fire Chief (id.).

ii. Mr. Barbale

Mr. Barbale argues that the Route 169 Site is undersized and would not provide an adequate buffer between the Facility and adjacent receptors including residential properties, commercial businesses, and Route 169 (Barbale Brief at 1). Mr. Barbale contends that the relatively large area of Company-controlled land around the Route 20 Site would provide a substantial buffer and, therefore, confers a safety advantage compared to the Route 169 Site (id.).

iii. Mr. Lawendowski

Mr. Lawendowski also argues that the Route 169 Site is undersized and would not provide an adequate buffer between the Facility and adjacent receptors (Lawendowski Brief at 1).

iv. Company Response

On brief, the Company reiterated that the Project at the Route 169 Site would fully comply with all applicable state and federal regulations and disputes the notion that the Route 169 Site is too constrained for the proposed Project (Company Brief at 66, 73-75). As noted above, the Company submits that the condensed organization of equipment at the Route 169 Site offers

distinct advantages for operations and emergency response by providing ready access to Facility components from the Facility's internal roadway (Company Reply Brief at 9, citing Tr. 6, at 1111-1112; Tr. 4, at 678). Additionally, the Company reports that the total area for the Route 169 Site is in the median range as compared to regional LNG facilities (Company Reply Brief at 9, citing Exh. NEC-10). With regard to staging emergency response vehicles, the Company notes the Town's acknowledgement that that Route 169 could be closed to provide additional space, should it be necessary (Company Brief at 74, citing Tr. 5, at 779).

Despite contrary testimony from the Town of Charlton, NEC maintains that Charlton's fire apparatuses could traverse the proposed driveways without "bottoming out" (Company Brief at 74, citing RR-EFSB-61, RR-EFSB-62; Company Reply Brief at 11). The Company reports that National Fire Protection Association ("NFPA") 1901: Standard for Automotive Fire Apparatus stipulates that automotive fire apparatuses must have a minimum of 8.0 inches of ground clearance and that the vehicle approach and departure angle (i.e., the change in slope expressed as an angle) must be at least 8.0 degrees (Company Reply Brief at 11, citing RR-EFSB-61). The Company explains that a NFPA-1901-compliant fire apparatus would therefore not "bottom out" unless traversing a changed-in-slope, expressed as a percent, greater than 14 percent (Company Reply Brief at 11, citing RR-EFSB-61). The Company claims that, based on a review of the Charlton Fire Department's website and manufacturer information, it appears that Charlton's fire apparatus does comply with NFPA 1901, although NEC did not specify which fire apparatus it was referring to (RR-EFSB-61). By comparison, the Company states that the steepest and shortest driveway grade is 8.67 percent and the next steepest grade is 6.15 percent at the Route 169 Site (RR-EFSB-61).

NEC claims that first responders would have adequate visibility into the Route 169 Site, particularly from the driveway entrances north and south of the sound wall (Company Brief at 74; Company Reply Brief at 10).[119] NEC argues that, conversely, the steep grade of the Route 20 Site

[119] The proposed sound wall would extend between the two driveways and be 20 feet tall (Exh. EFSB-A-10(1)(S1) at 11; Tr. 5, at 913-915).

driveway would hinder, rather than improve, visibility for those approaching the Facility (Company Reply Brief at 10).

With regard to the Charlton's stated preference for the Route 20 Site, NEC notes that the length of the Route 20 Site driveway would exceed the 500-foot limit set by the Town's own Subdivision Rules pertaining to new access roads; NEC argues that local regulations limiting driveway length have historically been imposed for safety related reasons (Company Brief at 74, citing Exh. NEC-13, at §4.16). NEC also observes that Town witnesses did not conduct an on-site inspection of the Route 20 Site and suggests that the Town witnesses appeared to lack a general familiarity with the Route 20 site and its layout (Company Brief at 74, citing Tr. 5, at 860, 888; Company Reply Brief at 6-7).[120]

d. Analysis and Findings on Site Layout and Emergency Response

The record shows that the ability to conduct a safe and effective emergency response depends on a number of complex factors related to the layout of the site. These factors include staging emergency response vehicles, site access, internal roadways, and visibility for first responders.

The record shows that both the Route 169 Site and the Route 20 Site would allow emergency response vehicles to be staged off of Route 169 or Route 20, respectively. At the Route 169 Site, emergency vehicles could be staged within the southern driveway approach, between the Facility gate and the highway. At the Route 20 Site, emergency vehicles could be staged along the proposed almost 1,800-foot-long driveway. Although the Route 20 Site driveway would provide more area for staging vehicles between the Facility and the respective highway, the usefulness of the driveway to the Route 20 Site for staging is limited given its steep grade. The record shows that Route 169 could be closed to through traffic and used as additional space for emergency response staging, potentially alleviating the comparatively reduced on-site space.

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120 In the Company's account, "one witness indicated that he favored the Route 20 Site because emergency responders could see 'into' that site as they approached, apparently not realizing the substantial grade of the potential access road leading to the Facility for that site, and another had no idea about the significant elevation change along the access road" (Company Brief at 74, citing Tr. 5, at 858).

On this basis, the Siting Board concludes that Route 169 Site and the Route 20 Site are comparable with respect to the space available for staging emergency response vehicles.

Regarding vehicle access and circulation, both sites would provide two driveways for entrance or egress during an emergency. The record shows that vehicle circulation at the Route 169 Site would be facilitated by relatively short driveways which both provide direct highway access. The Charlton Fire Department may be justifiably reluctant to drive onto the dead-end segment of the internal roadway, but there remain two short routes of entry and egress to the Facility. At the Route 20 Site, both driveways would be relatively long, with the primary driveway providing direct highway access and the emergency driveway accessing a relatively remote and narrow residential street. The Siting Board acknowledges the dead-end segment roadway segment as a demerit of the Route 169 Site; however, when weighed against the proposed Route 20 Site driveways, which are relatively long and only provide one point of direct access to a major roadway, the Siting Board finds that the Route 169 Site and the Route 20 Site are comparable with respect to vehicle access and circulation.

Although the Charlton proffers that a fire apparatus would "bottom out" on the relatively abrupt change-in-grade of the Route 169 Site's southern driveway, the record shows that a fire apparatus which complies with NFPA 1901 could traverse the proposed angle-of-approach between the highway and southern driveway entrance at the Route 169 Site. The Siting Board notes that NEC did not provide documentation to support its claim that at least one Charlton-owned fire apparatus appears to comply with NFPA 1901, nor did NEC state which Charlton-owned fire apparatus it reviewed. Therefore, the Siting Board directs the Company to verify and ensure that the Town of Charlton owns sufficient and appropriate fire apparatuses that comply with NFPA 1901 and which are able to traverse the proposed driveways at the Route 169 Site, and to submit this information to the Siting Board prior to starting construction.

At the Route 169 Site, the process equipment area in the center of the site would be accessible from the west, where the central area is at-grade with the internal roadway, and from an access-ramp on the east. Elsewhere, the process equipment area would be bordered by retaining walls, ranging in height from less than one foot to four feet tall, or a drainage swale. Regarding the Route 20 Site, it is likely that retaining walls would also be used to minimize the overall

grading requirements, although engineering has not been advanced for that site. The record shows that the use of retaining wall at either site might hinder the ability of a fire apparatus to spray foam or water onto equipment in the case of an emergency; therefore, the Siting Board finds that the Route 169 Site and the Route 20 Site are comparable in this regard.

The record also shows that the degree to which retaining walls could limit the effectiveness of spraying foam or water from a fire apparatus depends on factors specific to the contingency and the equipment that is available to first responders. The Siting Board directs the Company to work collaboratively with the Town of Charlton to conduct a map-based analysis of the Route 169 Site to determine whether the necessary procedures, equipment, and materials (e.g., water and foam) are available such that appropriate firefighting materials can be distributed to all areas of the site.

With respect to visibility for first responders approaching the Facility, the record shows that the Route 169 Site would not be broadly visible from the road due to the presence of the proposed sound wall. While portions of the Route 169 Site could be visible from the driveway entrances, the Siting Board notes that the grade change between Route 169 and key areas of the Facility (e.g., the process equipment area or storage tank) could prevent first responders from assessing Facility conditions without entering the property. The Company's argument that there would greater visibility into the Route 169 Site from vantage points at either driveway is not well supported in the record. Although the Charlton submits that visibility would be superior at the Route 20 Site, the Siting Board observes that visibility of the Facility would be similarly limited or even non-existent from Route 20, and that the degree of visibility from the latter portions of driveway would depend on the final design of the driveway and final site grades.

In conclusion, the Siting Board finds that the Facility layouts proposed for the Route 169 Site and the Route 20 Site are comparable with respect to staging emergency response vehicles, vehicle access and circulation, and visibility for first responders. With conformance with the above conditions regarding the assurance the Town of Charlton has NFPA 1901 compliant fire apparatuses and the assurance that appropriate firefighting materials can be distributed to all areas of the site, the Siting Board finds that potential site-layout-limitations related to emergency response at the Route 169 Site would be minimized.

9. Site Size Requirements

NEC did not present compliance with site size requirements as a component of its comparison between the Route 169 Site and the Route 20 Site (i.e., Section 5 of the Amended Petition to Construct). The Siting Board places such a comparison in this section to consider site size as related to the overall issue of safety – a significant issue in the view of the Town of Charlton. Site size requirements set forth in 980 CMR 10.03, relate separately to thermal protection and vapor dispersion. The regulations require an applicant to control property within these protective zones in the unlikely event of certain emergencies, are described below. See Section VI.B for further discussion on the applicable federal and state regulations for constructing and operating an LNG facility.

a. Thermal Radiation Protection Zone

NEC explained that, in accordance with 980 CMR 10.03(1), an applicant is required to own or control a sufficient area around the Facility that would include a thermal radiation protection zone, which is determined geometrically from a modeled fire at the top of the secondary containment of an LNG tank (Exh. NEC-2, at 4-20). See 980 CMR 10.03(1). NEC noted that the Project would use a full-containment LNG storage tank design where the outer pre-stressed concrete tank will act as the required secondary containment or "dike" structure required by 980 CMR 10.04(1); thus, the Company stated that it calculated the thermal radiation protection zone for the Route 169 Site and the Route 20 Site using the outer tank of the full-containment tank design as the compliance structure (Exh. NEC-2, at 4-20). NEC stated that, for the Route 169 Site and the Route 20 Site, the Company would control the property in the thermal radiation protection zone established by the Siting Board's regulations and no receptors would be located within this zone (id., app. I, at I-4 to I-9; Exh. EFSB-SS-28(1)). See Section VI.C for additional detail regarding compliance of the Route 169 Site with the thermal protection requirements established in 980 CMR 10.00.

b. Vapor Dispersion Exclusion Zone

NEC also assessed whether the Route 169 Site and the Route 20 Site could each provide sufficient area for a vapor dispersion exclusion zone in accordance with 980 CMR 10.03(2), such

that an LNG-vapor cloud with methane concentration in air above two percent would not disperse beyond property lines (Exh. NEC-2, at 4-21, app. I, at I-6 to I-7). NEC stated that the vapor dispersion exclusion zone calculation was based on vapor generation equal to the maximum constant rate of discharge from failed transfer piping from the LNG storage tank to the truck loading station (id. at 4-21). The Company stated that, because its selected storage tank is a full-containment tank with no penetrations below the maximum liquid level, the tank would not be a source for LNG leaks (id., app. I, at I-6; Exh. EFSB-S-8). NEC explained that, in the event of such a "design spill," spilled LNG would be directed to the impoundment sump (Exh. NEC-2, at 4-21, app. I, at I-6). NEC stated that, with the use of a typical vapor fence surrounding the sump area, the modeled vapor dispersion exclusion zone would be wholly contained within the property line of the Facility for the Route 169 Site or the Route 20 Site (id. at 4-21, app. I, at fig. I-4.1, I-4.2). See Section VI.D for additional detail regarding compliance of the Route 169 Site with the vapor exclusion requirements established in 980 CMR 10.00.

c. Positions of the Parties

i. Town of Charlton

On brief, the Town of Charlton argued that, although it did not oppose the Project in general, the Route 20 Site would provide a greater measure of safety due to the significantly larger area surrounding the Facility that would be controlled by the Company (Charlton Brief at 6-7, 12). Specifically, Charlton argued that the Route 20 Site would have practical advantages compared to the Route 169 Site with respect to meeting Siting Board regulations for determining minimum site size (id. at 12). Regarding the vapor dispersion exclusion zone, Charlton submitted that the Route 20 Site is large enough that a vapor fence would not be required around the LNG sump to prevent an LNG-vapor cloud with methane concentration in air above two percent from dispersing beyond property lines (id. at 12, citing Exh. TOC-TWG-1).[121] The Town suggested that the ability of the Route 20 Site to provide a vapor dispersion exclusion zone without the need for a vapor fence is indicative of the higher degree of safety afforded by the relatively larger area of that site

[121] In its initial brief, the Town of Charlton appears to have conflated a vapor dispersion exclusion zone with a thermal radiation protection zone (see Charlton Brief at 12).

(Charlton Brief at 12). Charlton also suggested that the Route 20 Site would allow for greater distances between potential off-site receptors and the source of thermal radiation during an LNG fire (id.).

However, with execution of the HCA between the Town and NEC, the Town no longer objects to the Route 169 Site (Exh. EFSB-Z-26(S1)(1) at 4-5).

d. Company Response

The Company reiterated that constructing the Project at either the Route 169 Site or the Route 20 Site would meet the site size performance standards set forth in 980 CMR 10.03 (Company Brief at 7, n.4, 8). The Company further argues that the Siting Board should not discredit the Route 169 Site for using vapor fencing to comply with the vapor dispersion zone requirement, because the Siting Board had previously accepted vapor fencing as a measure to limit vapor dispersion (Company Brief at 68-69, citing Whately LNG at 73).

e. Analysis and Findings

In designing and constructing the Project, NEC is required to meet site size requirements set forth in 980 CMR 10.03, related separately to thermal radiation protection and vapor dispersion in the unlikely event of certain emergencies. The record shows that the Route 169 Site or the Route 20 Site would each meet the requirement of a thermal protection zone because the applicant would control property that completely contains the thermal protection zone and because no receptors would be located within a thermal radiation protection distance calculated in accordance with 980 CMR 10.03(1). Regarding the vapor dispersion exclusion zone requirement of 980 CMR 10.03(2), the record also shows that NEC would use a vapor fence around the LNG sump if the Project were constructed at either the Route 169 Site or the Route 20 Site. By using a vapor fence around the LNG sump, the LNG vapor cloud resulting from a design spill would be wholly contained within the property line of the Facility for the Route 169 Site or the Route 20 Site. Thus, both sites would comply with 980 CMR 10.03(2). The Siting Board finds that the Route 169 Site and the Route 20 Site are comparable with respect to the potential thermal and vapor exposure of off-site receptors, in the unlikely event of an emergency.

E. Cost

NEC stated that the Project would cost more than $100 million at either the Route 169 Site or the Route 20 Site (Exh. NEC-2, at 2-9; RR-EFSB-3). However, the Company indicated that the Project at the Route 20 Site would cost about $20 million more to build than at the Route 169 Site (RR-EFSB-3). The Company indicated that the costs used for comparison were accurate within a margin of –/+ 10 percent (Exh. EFSB-SS-19).[122] The Company also estimated that the Route 20 Site has a "higher risk" of exceeding its estimated budget because of more extensive civil work required (Exh. NEC-2, at 4-16). Nevertheless, the Company noted that its cost estimates include contingencies for potential unknowns encountered during construction (Tr. 4, at 636).

NEC reported that the cost for on-site structures, such as the compressor and control room buildings, would be similar for the Route 169 Site and Route 20 Site (Exh. NEC-2, at fig. 4.6-2; RR-EFSB-3). To facilitate a comparison of project development costs between the two sites, NEC provided cost differentials for various aspects of the Project, such as land acquisition, driveway construction, site preparation, and pipeline interconnection construction (RR-EFSB-3). The comparison of project development costs is summarized in Table 13, below.

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122 NEC stated that its estimates for major equipment (e.g., the storage tank) are based on pricing from selected vendors; NEC indicated that the main pricing risk is from site construction work and the balance of plant materials (Exh. EFSB-SS-19).

Table 13. Added Capital Cost of the Route 20 Site, Relative to the Route 169 Site

Development category	Additional Cost ($ million)
Land acquisition and site preparation	14.3
Structures and improvements	0
LNG process equipment	0
Pipeline interconnection and meter station (for primary interconnections)	5.8*
Facility driveway	2.1
Total cost differential:	22.2

* This incremental cost pertains to Alternative 6 for the Route 169 Site; the cost difference compared to the Preferred Interconnection Route for the Route 169 Site would be somewhat less (see Exh. NEC-14).

Source: RR-EFSB-3.

Regarding a pipeline interconnection for the Route 169 Site, NEC provided direct cost estimates for the Preferred Interconnection Route, Alternative 2, Alternative 4, and Alternative 6 (Exhs. NEC-14, at fig. 1; EFSB-G-13). NEC stated that cost estimates for the Preferred Interconnection Route and Interconnection Alternative 6 are based on actual budgetary estimates received from the Company's vendors, while estimates for Alternatives 2 and 4 were developed using a general construction estimate of $1,400 per linear foot (Exhs. NEC-14, at fig. 1, n. 3; EFSB-G-13).[123,124] Construction cost estimates for the various interconnection routes are summarized below in Table 14.

[123] NEC noted that the actual cost of routes estimated on a per-foot basis could increase due to the need for higher cost construction techniques in areas of more complex terrain (Exh. NEC-14, at fig. 1).

[124] Earlier in the evidentiary proceeding, NEC only provided the incremental cost of each route compared to Alternative 6 (NEC's then preferred route) (RR-EFSB-5). To review cost estimates for Alternatives 1 and 5 on a more equal basis, staff added the incremental costs reported in RR-EFSB-5 to the cost of Alternative 6, $3.58 million, reported in Exh. EFSB-G-13.

Table 14. Pipeline Interconnection Cost Estimates for the Route 169 Site

Route	**Estimated Cost** ($ million)
Preferred Interconnection Route	$3.50*
Alternative 1	$4.15
Alternative 2	$9.66
Alternative 4	$6.58
Alternative 5	$11.47
Alternative 6	$3.58

* The Company indicated that its vendor estimate for the Preferred Interconnection Route was only for the NEC portion of the line (Exh. NEC-14, at fig. 1, n. 3). Kinder Morgan would construct approximately 80 linear feet of line within its ROW (id.)

Sources: Exhs. NEC-14, at fig. 1; EFSB-G-13; RR-EFSB-5.

Note: NEC did not provide a cost estimate for Alternative 3 because that option lacks sufficient capacity to adequately support the Project (Exh. EFSB-SS-24; RR-EFSB-5).

As previously stated, regardless of the route selected for the Route 169 Site, the pipeline interconnection would require new gas metering equipment; NEC expects that Kinder Morgan would construct, own, and operate any gas meter station constructed for the Project (Exhs. NEC-2, at 2-3; EFSB-LU-4).[125] The Company stated that it would reimburse Kinder Morgan for construction of the meter station, about $2.8 million for the Preferred Interconnection and Alternatives 2 and 4 (Exhs. NEC-14, at fig. 1; EFSB-G-14). NEC estimated that the cost of a meter station would be higher for pipeline interconnection routes that tap off of the Millennium Lateral (i.e., Interconnection Alternatives 1 and 6), due to the need to relocate certain equipment (Exh. EFSB-G-13).

With respect to operations, NEC claimed that the Route 20 Site would cost $1.5 million more, per year, than the Route 169 Site (Exh. EFSB-SS-20; RR-EFSB-4). The Company explained that the Route 169 Site would have lower property taxes and has the potential for

[125] In its February 16, 2021, comment letter, PLAN asserted that the Company should not exclude the costs of the facilities to be constructed by Kinder Morgan, as Kinder Morgan would be able to add its Project costs to charges to local distribution companies, which can then be passed on to ratepayers (PLAN February Letter at 7). However, as noted, the Company will incur the cost of Kinder Morgan's construction and Project costs will not affect prices paid by National Grid ratepayers (Exhs. EFSB-G-14; EFSB-N-26).

existing operations staff at the neighboring Millennium facility being retained to perform certain specified services (Exhs. NEC-2, at fig. 4.6-3; EFSB-SS-20; EFSB-S-26). The Company indicated that it could do so by using the same operations and maintenance service company, NAES Corporation, as Millennium, potentially lowering labor costs (Exh. EFSB-SS-35).[126] Mr. Lawendowski, argues that the Company is selecting sites based on the lowest cost to the exclusion of safety and environmental considerations (Lawendowski Brief at 1). PLAN argues that the proposed Facility runs the risk of becoming a costly stranded asset (PLAN Brief at 6; PLAN February Letter at 6).

NEC stated that, under the Precedent Agreement where National Grid pays a fixed rate for its portion of gas, National Grid ratepayers are protected from any changes in Project development costs;[127] additionally, the Company asserted that customers could benefit from lower Project costs in the form of lower prices passed down from distributors' purchase of the remaining gas (Exhs. NEC-2, at 2-9; EFSB-N-26).

The record shows that the Route 169 Site would cost approximately $22 million less to construct and potentially less expensive to operate compared to the Route 20 Site. The Siting Board finds that the Route 169 Site is preferable to the Route 20 Site with respect to cost.

F. Reliability

NEC evaluated the ability of the Route 169 Site and Route 20 Site to provide reliable service to National Grid and other gas utilities in the Commonwealth according to their access to interstate highways and existing utilities (Exhs. NEC-2, at 4-16 to 4-17; Tr. 3, at 509-510). According to the Company, taking such factors into consideration, the Project would be able to

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126 With respect to NEC's proposal to share operational manpower with Millennium Power Partners, L.P., noted above, Millennium stated in a comment letter that it had not had any discussions with NEC about sharing labor (Millennium Comment Letter, August 5, 2019). Millennium also underscored that it was not party to negotiations between NEC and NAES Corporation (Millennium Comment Letter, August 5, 2019).

127 Specifically, the Department Order approving the Precedent Agreement states that "these provisions will protect ratepayers from possible cost overruns." D.P.U. 15-129, at 20.

operate reliably whether constructed at the Route 169 Site or Route 20 Site (Exhs. NEC-2, at 4-16 to 4-17; NEC-7, at 4-24; Company Brief at 36). The Company explained that local electrical service would have to be extended together with the 1,800-foot-long access driveway for the Route 20 Site, asserting that this gives the Route 169 Site, which is closer to existing electrical utility lines, a slight reliability edge (Exhs. EFSB-CM-4; TOC-13; Tr. 3, at 510-511). The Company also attributed higher reliability to the Route 169 Site because of the improved access associated with its direct frontage on Route 169 (Exh. NEC-2, at 4-13, 4-16).

As noted, the Company claimed the Route 169 Site has a slight advantage because it would have a relatively short driveway. However, while the Route 169 Site is closer to a major road, it is further away from the Interstate Highway System. In addition, the Company claims the fact that the Route 169 Site is closer to an existing electrical utility line is a reliability advantage. However, the Company did not demonstrate that a long private electric connection is more vulnerable to interruption than electric utility distribution lines along streets. The Siting Board finds that Project reliability is comparable between the Route 169 Site and the Route 20 Site.

In terms of pipeline interconnections, NEC asserts that shorter interconnection pipelines provide an advantage in terms of reliability (Exh. NEC-2, at 4-16). The pipeline interconnections for the Route 169 Site range in length from 2,500 to 8,200 feet (id. at 2-3 to 2-5, fig. 2.16). The pipeline interconnections for the Route 20 Site are approximately 7,000 feet long (id., at fig. 2.1-7). The Siting Board finds that, while a shorter pipeline would in theory have an incremental reliability advantage, the difference in length between the interconnection alternatives is not a sufficiently substantial consideration to conclude that any one of the routes is preferable to the others with respect to reliability.

In its Updated Interconnection Analysis, submitted to the Siting Board after briefs, the Company indicated that Kinder Morgan advises a dedicated interconnection and meter station for the Project, as opposed to shared infrastructure with Millennium (Exh. NEC-14, at 3). NEC explained that sharing a meter station with Millennium could adversely affect the reliability of gas service to the Facility because a third party would exercise operational control between TGP and NEC (Exh. EFSB-G-12). The Siting Board finds that a direct pipeline interconnection with a dedicated meter station would provide more reliable gas service from TGP to NEC, resulting in

more reliable service from NEC to National Grid. The Company's Preferred Interconnection Route, Alternative 2, Alternative 4, Alternative 5 and all Route 20 interconnection routes would all originate from dedicated meter stations (Exhs. NEC-2, at 2-4, 5-10; NEC-14, at 3).

G. Conclusion

The Siting Board found, above, that the Route 169 Site is preferable to the Route 20 Site with respect to traffic impacts; that the Route 20 Site is preferable to the Route 169 Site with respect to noise impacts; and that the two sites are comparable with respect to site characteristics related to emergency response, site size requirements, water and wetlands, land use, visual, hazardous waste, and air impacts. The relative environmental impacts for each category assessed in Section V.D are summarized in Table 15, below.

Table 15. Environmental Impacts Comparison Summary

Impact Category	Route 169 Site Preferrable	Route 20 Site Preferable	Sites are Comparable
Land Use			=
Visual			=
Wetlands and Water Resources			=
Traffic	+		
Noise		+	
Air			=
Hazardous and Solid Waste			=
Air			=
Site Layout and Emergency Response			=
Site Size Requirements			=

The Route 169 Site is preferable with respect to traffic impacts, while the Route 20 Site is preferable with respect to noise impacts. Of the two impact categories, the difference in traffic impact is more significant, which is mostly due to the difference in driveway egress between the two site alternatives. The Route 169 Site is preferable because it is located on a relatively straight segment of highway. In contrast, just east of a curve on Route 20, drivers of filled LNG trucks from the Route 20 Site would have a choice between turning left across two lanes of westbound traffic or turning right for the longer route through Auburn to reach the interstates. The difference in noise impacts, meanwhile, is relatively small, and will be mitigated with a sound wall on the east and, if necessary, on the south. Additionally, there are no significant advantages to pipeline

interconnections for the Route 20 Site, relative to potential pipeline interconnections for the Route 169 Site. Therefore, the Siting Board considers the Route 169 Site to be superior to the Route 20 Site with respect to environmental impacts.

The Route 20 Site has higher estimated costs primarily due to the longer driveway, the longer pipeline interconnections, and the more extensive site preparation and grading. Therefore, the Siting Board considers the Route 169 Site to be superior to the Route 20 Site with respect to cost. No significant differences between the sites were identified with respect to the reliability of operation. Therefore, the Siting Board considers the two sites to be comparable with respect to reliability.

Regarding a pipeline interconnection for the Route 169 Site, Alternative 1 and Alternative 6 require sharing pipeline infrastructure, including a meter station, with Millennium, which could result in less reliable service from the Facility. Additionally, the Siting Board observes that NEC's use of the Alternative 1, Alternative 4, or Alternative 6 are each dependent on securing appropriate land rights from Millennium, which the Company has not been able to secure. Therefore, the Siting Board considers Alternative 1, Alternative 4, and Alternative 6 to be inferior to the remaining pipeline interconnection routes.

The Preferred Interconnection Route, Alternative 2, and Alternative 5 would each use a dedicated meter station and does not rely on securing land rights from Millennium. Alternative 5 is much longer than the Preferred Interconnection Route and Alternative 2, and concomitantly would have higher environmental impacts, as shown the comparisons of, for example, tree clearing and wetland impacts, as well as higher construction costs. See Table 5, Table 6, Table 14. While the construction of the Preferred Interconnection Route or Alternative 2 would both involve HDD to minimize environmental impacts to wetlands and North American Tool, Alternative 2 is 1,600 feet longer than the Preferred Interconnection Route and would require additional crossings of Route 169 and Cady Brook. The Siting Board therefore also considers Alternative 2 and Alternative 5 to be inferior to the Preferred Interconnection Route for the Route 169 Site.

The Siting Board finds that the Route 169 Site, including the Preferred Interconnection Route, is preferable to the Route 20 Site, including either of the noticed interconnection routes,

with respect to environmental impacts and cost,[128] and that the two sites are comparable with respect to reliability. The Siting Board therefore finds that the Route 169 Site, including the pipeline interconnection constructed along the Preferred Interconnection Route, is superior to the Route 20 Site 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 environmental impacts and potential mitigation measures 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 provided, the Siting Board finds that, with the implementation of the mitigation and conditions specified, and given compliance with all local, state, and federal requirements, the temporary and permanent environmental impacts of the Project would be minimized. The Siting Board finds that the Project at the Route 169 Site, with the Preferred Interconnection Route, would achieve an appropriate balance among conflicting environmental impacts, as well as among environmental impacts, reliability, and cost.

VI. SAFETY COMPLIANCE

A. Standard of Review

In this section, the Siting Board addresses safety requirements set forth in 980 CMR 10.00, "which implements the Siting [Board's] statutory mandate under G.L. c. 164 . . . and sets forth regulatory standards for the siting of intrastate LNG facilities proposed for construction." 980 CMR 10.01(1). The Siting Board requires an applicant to demonstrate that its proposed facility will comply with the Board's regulations governing the siting of LNG facilities, as set forth at 980 CMR 10.00. See Whately LNG at 63-64.

B. Applicable State and Federal Regulations

The Siting Board sets regulatory standards for the siting of intrastate LNG storage facilities within Massachusetts at 980 CMR 10.00. However, the Board's regulations do not address the

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[128] Section V.D includes a comparative analysis of site features related to emergency response and site size requirements.

design, construction, operation, and maintenance of an LNG facility. The Board's regulations specifically state that the Department has the authority "to assure safe and prudent design, construction, operation, and maintenance of LNG facilities" proposed for construction in Massachusetts. 980 CMR 10.01. The Department enforces its own regulations, as well as the federal pipeline safety regulations for LNG facilities, and both sets of regulations include requirements for the siting, design, construction, operation, and maintenance of LNG facilities. 220 CMR 112.00; 49 CFR Part 193. In its regulations, the Siting Board recognizes the legal authority and responsibility of the Department to enforce the federal and state LNG safety regulations.

The Department's regulations incorporate portions of federal safety standards for LNG facilities, 49 CFR Part 193 [Liquefied Natural Gas Facilities: Federal Safety Standards], which incorporates by reference sections from NFPA 59A [National Fire Protection Association 59A: Standard for Production, Storage, and Handling of Liquefied Natural Gas (LNG)].[129] 220 CMR 112.10. NEC has referenced 220 CMR 112.00; 49 CFR Part 193; and NFPA 59A as being applicable to the Project (Exh. NEC-2, at 4-19).

NEC stated that it would construct, operate, and maintain its pipeline interconnection in accordance with 49 CFR Part 192 [Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards], 220 CMR 101.00, and 220 CMR 109.00 (Exh. EFSB-S-36). As described above, the Company would construct and own the majority of the Preferred Interconnection Route and Kinder Morgan would construct and own a short section within TGP's ROW as well as the new meter station (Exh. NEC-14, at 2).[130]

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[129] NEC stated that it assessed compliance relative to the 2001 and 2006 editions of NFPA 59A, which are incorporated by reference in 49 CFR Part 193 (Exh. NEC-2, at 4-19, 4-21).

[130] The Company indicated that Kinder Morgan-owned pipeline facilities would be subject to federal regulations at 49 CFR Part 192 (Exh. EFSB-S-36).

C. Thermal Safety Requirements

The Siting Board's regulations at 980 CMR 10.00 address the design safety of LNG facilities, and include two separate provisions relating to thermal flux from a fire.[131] 980 CMR 10.02(2)(a)(4) requires that an applicant provide map(s) which show three modeled zones for different heat fluxes: 2,000 BTU/ft^2-hr; 1,000 BTU/ft^2-hr; and 460 BTU/ft^2-hr, as part of a set of "mapping requirements."[132] Separately, 980 CMR 10.01(2) requires that land area owned or controlled by an LNG facility operator be of sufficient size to include a thermal radiation protection zone – which is determined geometrically from a modeled fire at the top of the secondary containment of an LNG tank (Exh. NEC-2, app. I, at I-5).[133]

For each site, NEC provided maps depicting the three heat flux zones pursuant to the mapping requirements of 980 CMR 10.02(2)(a) (Exhs. NEC-2, app. I, fig I-4.2; EFSB-SS-28(2)). The calculated heat flux zones for the Route 169 Site are not all contained within the site property (Exh. EFSB-SS-28(2)).[134] The Company noted that the Siting Board had previously approved a

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131 Thermal flux, or heat flux, is expressed as the rate of thermal radiation occurring on a unit surface area over a period of time (see Exh. EFSB-S-46).

132 Other than the requirement to provide the maps, the Siting Board notes that the regulation does not require an applicant to control all the territory within the three mapped zones. 980 CMR 10.02(2)(a). The regulation does, however, require information about land uses and specific features within the three zones; also, the outermost flux zone is used for identifying the distance for which Facility alarms must be heard. See Section VI.E. NEC interpreted the purpose of the mapping regulation as helping to "identify and consider special or sensitive 'off-site' receptors that could theoretically be affected by the construction or operation of an LNG facility" (Exh. NEC-2, app. I, at I-2).

133 As noted above, 980 CMR 10.03(1), "Thermal Radiation Protection," states in part that: (a) the area of the property must be sufficiently large to provide a thermal protection zone; (b) within the protection zone, the dike constructed to impound the LNG may not be located closer to targets listed in 980 CMR 10.03(1)(d) than distance "d." The regulation also includes a figure for geometrically determining protection distance "d."

134 As a way of providing context, the Company noted that the lowest of the three heat flux values – for the widest mapped flux zone, 460 BTU/ft^2-hr – is equivalent to heat flux exposure from midday summer sunshine (Exh. EFSB-S-46).

design where heat flux zones extended outside the property line (Company Brief at 70, citing Whately LNG at 77).

NEC provided diagrams showing how it developed the thermal radiation protection distance and indicating that the thermal radiation protection distance will be contained within the Facility boundary for the Route 169 Site (Exhs. NEC-2, app. I, at I-7 to I-8; EFSB-SS-28(1)). NEC stated that the thermal protection distance calculation was performed based on the outer wall of the full containment LNG tank being the impoundment dike (Exh. NEC-2, app. I, at I-5). The Company indicated that the site and immediate surroundings are zoned for industrial use, which require a shorter thermal radiation protection distance than non-industrial zones under the Siting Board's regulations (Exh. NEC-2, app. I, at I-5; see 980 CMR 10.03(1)(d)). Facilities that qualify for using this shorter distance are required to conduct a safety consultation with the local planning board and each property owner within the affected portion of the industrial zone after consulting with the Department on the "scope and content" of the meetings. 980 CMR 10.03(1)(e). The Company indicated that it will confer with the Department about the scope and content of safety consultations with the town and abutters (Tr. 3, at 483-484). Subsequently the Company would carry out the required safety consultation session with the Town of Charlton's planning board and property owners within the affected portion of the industrial zone under parameters outlined by the Department (Tr. 3, at 483-484).

With respect to federal requirements pertaining to thermal radiation from a fire, NEC stated that the Facility will also comply with 49 CFR Part 193 and, section 2.2.3.2 of NFPA 59A-2001 (Exhs. NEC-2, app. I, at I-3; EFSB-SS-33). NEC explained that 49 CFR Part 193 and section 2.2.3.2 of NFPA 59A-2001 require an LNG facility to be designed in a manner that will prevent certain heat flux intensities from being exceeded at the following limits:

- 1,600 Btu/hr-ft^2 at a property line that can be built upon assuming the ignition of a design spill (as specified by section 2.2.2.1 of NFPA 59A-2001); and also at the nearest point located outside the owner's property line that, at the time of facility siting, is used for outdoor assembly by groups of 50 or more persons assuming a fire over an LNG tank impounding area;

- 3,000 Btu/hr-ft^2 at the nearest point of the building or structure outside the owner's property line that is in existence at the time of facility siting and used for occupancies classified by NFPA 101 Life Safety Code as assembly, educational, health care, detention and correction, or residential assuming a fire over an LNG tank impounding area; and
- 10,000 Btu/hr-ft^2 at a property line that can be built upon assuming a fire over an LNG tank impounding area.

(Exh. NEC-2, app. I, I-3).

On this basis, NEC states that it will meet all federal siting and mapping requirements for an LNG facility (Company Brief at 71, 77-78; Exhs. NEC-2, app. I, I-3; EFSB-SS-33).

D. Vapor Dispersion Safety Requirements

The Siting Board's regulations also require that the site be of sufficient size, in the event of an LNG spill, to prevent dispersion of an LNG-vapor cloud with methane concentrations in air above two percent by volume beyond the property line. 980 CMR 10.03(2)(b). See Section VI.I, regarding characteristics of LNG. NEC asserted that the air dispersion limit of two percent methane by volume is conservative because vaporized LNG poses an ignition hazard only at concentrations between 5 to 15 percent in air (Exhs. EFSB-S-2; EFSB-S-35). The Board's regulation requires evaluation of two different vapor generation scenarios resulting from a leak either from a damaged LNG storage tank on-site or from process piping. 980 CMR 10.03(2). The Company stated that, because its selected storage tank is a full-containment tank with no penetrations below the maximum liquid level, the tank would not be a source for LNG leaks; therefore, NEC based the vapor generation rate on discharge from failed process transfer piping (Exh. NEC-2, app. I, at I-6). The Company modeled vapor dispersion resulting from operating both truck-filling LNG pumps for a ten-minute period, on the assumption that the largest transfer pipe has failed and the LNG is spilling into the impoundment sump (id., app. I at I-6; Tr. 4, at 699-701). NEC maintained that the Facility's hazard detection system would detect the leak and shut the pumps off well before ten minutes (Tr. 4, at 699-701).

The Company performed vapor dispersion modeling and provided a map showing that the vapor dispersion zone would be confined within the Route 169 site (Exhs. NEC-2, app. I, at I-13; EFSB-SS-28(1)). The Company stated that, for the Route 169 Site, the proposed vapor fence around the impoundment sump would limit a vapor cloud from the sump from traveling outside the site at a concentration exceeding two percent in air, and thereby the Facility meets Siting Board requirements (Exh. NEC-2, at 4-21, app. C, at C-8).[135] NEC explained that a vapor fence works by limiting the effect of wind blowing the vapor off-site, and by promoting vertical dissipation of the vapor cloud (id., app. C, at C-8). The Company maintained that the vapor fence approach had previously been approved by the Siting Board (Company Brief at 69, citing Whately LNG at 73).

E. Ancillary Requirements

The Siting Board's regulations require that each LNG storage tank at an LNG facility be contained within a separate containment dike that can contain at least 150 percent of the volume of the tank. 980 CMR 10.04(1). The Company stated that its proposed LNG storage tank design meets the Board's requirement with its full-containment tank design (Exh. EFSB-SS-28). NEC stated that the outer tank will consist of a pre-stressed concrete wall with a structural steel liner on the outside face and will be able to withstand the full hydrostatic pressure of LNG from the inner tank (Exh. NEC-2, app. A, at A-5). The Company stated that its tank fabrication would meet requirements in federal codes 49 CFR Part 193 and NFPA 59A, and thereby ensure the quality of the tank (Tr. 2, at 224).[136]

The Siting Board's regulations require that the storage tank area be designed for predictable movement of personnel, maintenance equipment, and emergency equipment within and

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135 The Company stated that the vapor fence would be a twelve-foot-tall chain link fence with aluminum slats (Tr. 4, at 668).

136 As described in Section I.A above, the Company's tank will also have a carbon steel dome roof. The tank roof provides an additional safety benefit by containing LNG vapors (Exhs. NEC-2, app. A, at A-5; EFSB-PA-5). To address any potential of over pressurization, the design of the outer tank and roof incorporates pressures relief valves that would release LNG vapors in a controlled manner and a "frangible" roof seam design as secondary protection (Exh. EFSB-PA-6; Tr. 4, at 690-691).

around the facility. 980 CMR 10.04(2). NEC stated that its equipment layout would meet the 980 CMR 10.04(2) and that the Facility layout as a whole is designed to meet setback requirements governed by NFPA 59A (Exh. NEC-2, app. A, at A-9). See Section V.D.8.

The Siting Board's regulations require annual inspection and certification of storage tank insulation and sealant. 980 CMR 10.04(3). NEC stated that it would provide for annual inspections in its operation and maintenance manual (Exh. NEC-2, app. C, at C-1). The Company added that it would maintain records of its insulation inspections for a minimum of five years, which NEC noted was consistent with accepted Siting Board precedence (id., app. C, at C-2; Company Brief at 75, citing Whately LNG at 74-75).

The Siting Board's regulations require a plan for removal of rain, ice, and snow from the diked area surrounding a storage tank. 980 CMR 10.04(4). Both the inner and outer tank proposed by NEC would be enclosed by a single roof (Exh. EFSB-PA-5; EFSB-S-40(1) at 3). Therefore, the Company asserted that the precipitation removal requirement from the tank impoundment would not be applicable for a full-containment storage tank (Exh. EFSB-S-40(1) at 3). Relatedly, however, the Company prepared a precipitation removal plan for the LNG sump impoundment area, referencing 49 CFR 193.2173 (id.).

The Siting Board's regulations require the Company submit a safety plan that describes actions to be taken by Company personnel and public safety officials in the event of any accident. 980 CMR 10.04(5). The Company is working with the Charlton Fire Chief and Fire Department on an "Operational Safety Plan" as required by provision (6) of the HCA (Exh. EFSB-Z-26(S1)(1) at 3-4; Tr. 4, at 660; Tr. 5, at 785, 809-810). Further, in accordance with the HCA, the Company commits to engage with the Fire Chief during the design and construction phase as well as during operation in order to obtain meaningful input as to the Town's safety needs (Exh. EFSB-Z-26(S1)(1) at 3-4). The Company indicated that while the plan would be close to completion when construction begins, the Company would continue to develop it with feedback from the Fire Chief iteratively and provide the updated versions to the Fire Chief (Tr. 4, at 662-665). The Company committed to filing the final safety plan with the Siting Board and the Department prior to commencement of Facility operation, which NEC noted was consistent with approved Siting

Board precedent (Company Brief at 77, citing Whately LNG at 76). See Section VI.G, below for more details on the Company's fire safety measures.

The Company committed to conducting annual safety consultations with adjacent property owners, as required by 980 CMR 10.04(5) (Exh. NEC-2, at 2-10). The Company also committed to providing the safety plan for review and input to public fire and safety officials, and adjacent property owners (id.; Tr. 4, at 666-667).

The Siting Board's regulations require an alarm system that must sound simultaneously with the alerting of the fire department of an accident. 980 CMR 10.04(6). The Company explained that activation of the fire detection system at the Facility would provide an automatic notification to the Town of Charlton's emergency dispatch center (Exh. EFSB-S-22). The alarm must also be loud enough to reach persons out to and including the most distant of the three mapped heat flux zones from 980 CMR 10.02(2)(a) (460 BTU/ft^2-hr) or the vapor dispersion zone boundary, whichever is farther. 980 CMR 10.04(6). The Company committed to complying with this requirement (Tr. 4, at 652). The regulations further require that the Company notify the Siting Board "that persons within these zones have been acquainted with the systems" and that the systems are periodically tested. 980 CMR 10.04(6). The Company committed to notifying the Siting Board prior to operation of the Facility that it has acquainted appropriate landowners with the operation of the alarm system (NEC Brief at 77-78).

F. Construction Safety Plan

NEC also provided preliminary a construction safety plan in its Amended Petition to Construct (Exh. NEC-2, app. B). NEC stated that the final construction safety plan would define project safety policy and safe work practices prepared with reference to 29 CFR Part 1926 [Safety and Health Regulations for Construction] by the Occupational Safety and Health Administration ("OSHA") (id., app. B, at B-1). The Company stated that it would require all construction personnel to follow the construction safety plan (id.).

G. Fire Safety

NEC stated that, prior to commissioning and commercial operations of the Facility, it would develop safety manuals for operations, maintenance, security, emergencies, fire safety and precipitation removal, among other items (Exhs. NEC-2, app. C, at C-1). NEC stated that it will conduct a fire study in the final design phase of the Project that will inform its fire safety plan, and ensure that the fire protection, safety, and hazard detection systems at the Facility comply with federal and Department requirements (id., app. C, at C-2). The Company stated that a fire protection engineer would design a fire suppression system to ensure the Facility meets 220 CMR 112.00 and NFPA 59A requirements (Exh. EFSB-S-22).

NEC stated that the Facility would have extensive fire suppression equipment, including on-site fire hydrants, booster pump, water-based nozzle sprinklers, and portable dry chemical fire extinguishers (Exhs. NEC-2, app. C, at C-9; EFSB-S-22; Tr. 4, at 712). NEC noted that the municipal water system would supply the on-site hydrants and booster pump (Exh. EFSB-S-22). In addition, NEC would install a high-expansion foam system to reduce the vaporization rate of a spill collected in the LNG impoundment sump adjacent to the truck loading area (id.; Exh. NEC-2, app. C, at C-9).

NEC stated that, upon activation, an automated fire and gas detection system would automatically activate the Facility's emergency shutdown system which would safely shutdown the Facility operations and isolate the sources of LNG and high-pressure natural gas (Exhs. EFSB-S-22; EFSB-SS-32). The Company stated that the system would be triggered by cryogenic temperatures, combustible gas, flame, heat, or smoke depending on location (Exh. NEC-2, app. C, at C-9). NEC stated that its emergency shutdown system would have audible and visual alarms (Exh. NEC-2, app. A, at A-8). The Company maintained that the on-site fire detection and protection equipment, in addition to the Charlton Fire Department's apparatuses, would be adequate to ensure site safety during an emergency (Tr. 4, at 716-717).

The Company added that it would provide regular orientation to local emergency responders, including those from the Town of Southbridge, about the on-site firefighting equipment (Exhs. EFSB-S-22; TOS-2). NEC also committed to sponsoring emergency personnel from Charlton and "selected personnel" from the towns of Southbridge and Sturbridge for LNG

firefighting training at the Massachusetts Fire Academy in Stow (Exhs. EFSB-S-22; TOS-2). The Company noted that it has discussed training provisions with the Charlton Fire Department (Tr. 4, at 716).

NEC indicated that it anticipates mutual aid provisions for the Facility would not differ in kind from current mutual aid agreements between Charlton and neighboring communities for other emergencies (Exh. TOS-1).

H. Site Safety and Security

NEC stated that, in the event that electric service is lost, a standby generator running on natural gas would provide power (Exhs. NEC-2, at 1-8; Tr. 6, at 1035-1037). This generator would ensure that critical components like hazard detection, protection and security systems, emergency lighting, boil-off gas compression, control and SCADA systems, and instrument air would still be able to operate (Exh. EFSB-S-1).

According to the Company, it expects a total of nine operators a day over separate shifts when liquefaction is in operation (Exh. NEC-2, at 2-10). The Company stated that its operating staff would also perform security-related services for the Facility (Exh. EFSB-S-26). The Company explained that its operators would be able view real-time video surveillance of the perimeter fence, LNG storage tank, process areas, and truck loading areas (Exhs. NEC-2, at 2-10; EFSB-S-38). The Company added that operators on-site would communicate with local emergency dispatchers and other on-duty security personnel (Exh. NEC-2, at 2-10). As previously noted, if the fire detection system at the Facility is activated, the Town of Charlton's emergency dispatch center would be automatically notified (Exh. EFSB-S-22).

When the Facility is not liquefying gas, the Company expects that staff would not regularly be on-site, with staff returning for activities such as snow removal (Exh. NEC-2, at 2-11). The Company stated that it would employ remotely located personnel to monitor Facility activities in real-time in the absence of on-site operators (id.). The Company added that it would ensure that operators are on-call to respond to an event within 30 minutes (Exh. EFSB-S-26). The Facility would have an eight-foot-tall barbed wire security fence equipped with security cameras and motion sensors (Exh. NEC-2, at 2-10, app. A, at A-9).

I. Characteristics of LNG

The Company stated that LNG itself is not flammable but explained that an LNG vapor cloud could present ignition, cold, and/or asphyxiation hazards under specific conditions (Exhs. NEC-2, app. C, at C-6; EFSB-S-2; EFSB-S-4). Furthermore, the Company indicated that, while potentially flammable, LNG vapor and natural gas are only explosive in enclosed spaces (Exhs. NEC-2, app. C, at C-5). The Company stated that the Facility is designed such that enclosed spaces (e.g., storm drains, culverts) are away from areas where LNG is handled (Exh. EFSB-S-3).

The Company stated that its Facility design eliminated ignition sources as required by code, e.g., by using spark-free electrical equipment (Exhs. NEC-2, app. C, at C-8; EFSB-S-2). The Company also stated that it has located the LNG impoundment sump away from the property line in accordance with NFPA 59A (Exh. EFSB-S-41). Furthermore, the Company stated that it would have a high-expansion foam system to reduce vaporization rates from the sump should LNG spill into the sump (Exh. NEC-2, app. C, at C-9). To prevent cold burns from contact with an LNG vapor cloud, NEC will provide appropriate personal protective equipment ("PPE") on-site (Exh. EFSB-S-2). To prevent asphyxiation hazards, the Company stated that it would implement enclosed space protocols and training for staff (id.). Additionally, enclosed buildings on-site would have gas detectors, and local and remote alarms in compliance with 49 CFR Part 193 (Exh. EFSB-S-3).

NEC stated that in the event of a spill, LNG would rapidly vaporize and dissipate (Exhs. NEC-2, app. C, at C-3; EFSB-S-13). NEC explained that no site cleanup is required after an LNG spill because most of the product would evaporate without seeping into the ground and because LNG would not mix with water nor harm aquatic life (id.). The Company also asserted that transporting LNG is safer than the transportation of other liquid hydrocarbon fuels, as evidenced by lower insurance rates for the transportation of LNG (id.). The Company indicated that an LNG tank truck is typically sturdier than other fuel trucks due to the requirement for double-walled construction (id.). The Company stated that the filling system for the LNG trucks

would be controlled by weight as another safety measure to prevent overweight trailers from leaving the Facility (Exhs. NEC-2, app. A, at A-6; EFSB-PA-22).

J. Positions of the Parties

1. Town of Charlton

The Town of Charlton argued that the Route 20 Site is more favorable because the three discrete heat flux zones, described by 980 CMR 10.02(4) (i.e., the mapping requirements for a proposed facility), would be located completely in land that would be controlled by NEC, as opposed to the Route 169 Site (Charlton Brief at 12). Charlton also asserted that the Company's thermal radiation and vapor dispersion models did not consider the effects of the sloped grade at the Route 169 Site, which Charlton argues could hasten the spread of an LNG vapor cloud, in the event of a spill (id. at 12). When asked to describe how these models could be modified to consider site topography, Charlton provided examples of the CHARM (Complex Hazardous Air Release Model) and computational fluid dynamics ("CFD") models applied to LNG vapor clouds in academic studies (Exh. EFSB-TOC-9).

Charlton further argued that the Siting Board's review process was hampered by the incompleteness of Project information (Charlton Brief at 7-8). On brief, Charlton specifically highlighted lack of progress with respect to a safety plan and an HCA as items it found unsatisfactory (id. at 8). Charlton also argued that the Company has not adequately addressed the Town's safety concerns, noting that the two parties had not secured agreements on provisions such as emergency response training, necessary emergency apparatus, and mutual aid with neighboring towns (id. at 7). Charlton argued that, despite the Company indicating that its forthcoming final designs would address the Town's concerns, Charlton was not assured that its concerns would be resolved (id. at 7-8).

The Charlton fire inspector, Dennis Carlson, stated that a safety plan between the Company and the Town should include agreements to provide appropriate training, specify appropriate fire apparatuses, and describe mutual aid provisions for emergency situations (Tr. 5, at 787). On brief, Charlton characterized the discussions between the Charlton Fire Chief and the Company on the plan as inadequate (Charlton Brief at 8, n. 4). Charlton asserted that its fire department is not large

enough to field sufficient apparatus and personnel to respond to an incident at the Facility (id. at 8). Charlton explained that mutual aid discussions would have to involve the Company and neighboring communities and could result in amendments or add-ons to its existing mutual aid agreements (Tr. 5, at 789-790). The Town of Charlton requests that emergency personnel from Charlton and its mutual aid partners attend training at a specialized school for LNG firefighting training (located in Texas) (Exh. EFSB-TOC-10).

With the adoption of the HCA, NEC will ensure that the Fire Chief, Fire Department, and relevant first responders in both local and neighboring municipalities are periodically informed regarding Project operations so as to be prepared to respond to any calls related to the Project and, at its cost, provide specific Project-related education and training opportunities to members of the Fire Department and to first responders in these municipalities (Exh. EFSB-Z-26(S1)(1) at 4). The HCA also requires that NEC periodically review its "Operational Safety Plan" and any emergency action or disaster recovery plans with the Town Fire Chief (id.).

2. Mr. Lawendowski

Mr. Lawendowski proposes that the Company post a bond to cover the cost of any response to emergencies or pollution at the site (Lawendowski Brief at 1). Mr. Lawendowski also argues that the Company should pay for LNG training for the entire Charlton fire and police departments, as well as "a significant number of personnel from Southbridge and Sturbridge" (id. at 4).

3. Company Response

NEC rejects the Town of Charlton's assertion that the Route 169 Site is not able to contain the requisite thermal radiation protection and vapor dispersion zones, as the zones were shown by the Company to be within the Facility fenceline (Company Reply Brief at 10, n. 8).

The Company notes that the models that it used for thermal radiation and vapor dispersion zones are recognized by the Siting Board and claims that the Town's witness had failed to demonstrate that the alternative models were more suitable (Company Brief at 70). In hearings, the Company stated that the simple two-dimensional models it employed are intended to be conservative (Tr. 4, at 673-674). Company witness, Christopher Barros explained further that in

the design process of another recent LNG facility, his team compared the vapor dispersion calculated from a three-dimensional flame acceleration simulator model ("3D CFD FLACS model") and a two-dimensional process hazard analysis software model ("2D PHAST model"); he indicated that the "vapor dispersion [zone] was about half of what had [been] addressed with the [2D] PHAST model" (Company Brief at 71; Tr. 4, at 674-676). NEC also claims that the pollutant dispersion models proposed by Charlton are not commonly used in the LNG industry; however, the Company intends to, in the final phase of design, validate the Project's design using an appropriate three-dimensional model (Tr. 4, at 674).

Finally, NEC argues that based on testimony by Charlton's Fire Chief and the ongoing process of discussions, the Company anticipates that it will be able to complete an appropriate safety plan for the Route 169 Site (Company Brief at 76-77).

K. Analysis and Findings on Safety Compliance

The Siting Board evaluated the Project's compliance with Siting Board regulations regarding LNG facilities, 980 CMR 10.00. As described below, the record shows that, using the Route 169 Site, the Facility will meet the requirements of 980 CMR 10.00. Notably, 980 CMR 10.03 requirements for determining the suitable site size to meet specific emergency scenarios, have been met: the thermal radiation protection zone and the vapor dispersion zone do not extend beyond the perimeter of the Route 169 Site. See also Section V.D.9, above. NEC views the full-containment, tank-within-a-tank design, in which the outer tank can contain 150 percent of the maximum liquid content of the inner tank, as compliant with the Siting Board's requirement for a "dike" as defined in 980 CMR 10.04(1).[137] In addition, the outer tank will consist of a pre-stressed concrete wall with structural steel liner, that will be able to withstand the full hydrostatic pressure of LNG from the inner tank. While the Siting Board's regulations describe such containment as being a separate dike around the LNG tank, which is typically detached from the tank, the Siting

[137] 980 CMR 10.01(2) defines a "dike" as a structure surrounding an LNG storage tank which may consist of natural geological formation, compacted earth, concrete, or other material and must be of sufficient size to contain a minimum of 150 percent of the maximum liquid content of the tank.

Board finds that the Company's design is also an acceptable and compliant approach of achieving the safety benefits of secondary containment required by 980 CMR 10.04(1).[138] Furthermore, the record shows that the Company's tank design also complies with 49 CFR Part 193 and NFPA 59A. The Facility at the Route 169 Site, as designed with a vapor fence around the LNG sump, complies with the vapor dispersion requirement.

The Siting Board finds that the size of the Route 169 Site complies with the thermal radiation protection zones outlined in 980 CMR 10.03. Regarding the three heat flux zones from the mapping requirements in 980 CMR 10.02, referenced by Charlton, the Board notes that these flux zones are used for identifying certain land use characteristics adjacent to the Facility and the regulations do not require the Company to control or own land within these zones.

During hearings, Charlton argued that the two-dimensional model used by NEC is inadequate for modeling the vapor dispersion zone. The Siting Board agrees that a three-dimensional model could provide a more granular vapor dispersion prediction and notes that the Company claimed that the three-dimensional model would in fact be less conservative. The record shows that Company will use a three-dimensional model during the final design phase; therefore, the Board directs the Company to provide a summary of the results of the three-dimensional vapor dispersion modeling prior to commissioning of the Facility.

While the proposed Project as designed for the Route 169 Site satisfies the requirements for thermal radiation protection and vapor dispersion set forth in 980 CMR 10.03, the Siting Board regulations also require the Company to confer with the Department on "scope and content" of the required safety consultation with the town planning board and Facility abutters with respect to thermal radiation protection distance.

The Board's regulations also have ancillary requirements for LNG facilities at 980 CMR 10.04. The Board finds that the proposed Project as designed for the Route 169 Site satisfies all of the requirements set forth in 980 CMR 10.04, excepting delivery of a final post-construction safety

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138 The tank roof will be constructed of carbon steel, which provides an additional safety benefit by containing LNG vapors from the inner and outer tanks. In the event of over-pressurization, the relief valves on the roof would release LNG vapor in a controlled manner.

plan, as required by 980 CMR 10.04(5). The Board notes that NEC is collaborating with the Charlton fire chief and the State fire marshal on an "Operational Safety Plan," as required by the HCA. During the proceedings, both the Charlton Fire Department and the Company stated that they were conducting ongoing discussions with respect to achieving a plan acceptable to both parties. The Board finds that upon submission to the Board of a final and comprehensive safety plan prior to commencement of Facility operation, as described above, the Company will meet the requirements of 980 CMR 10.04(5). The Siting Board directs the Company to submit its safety plan to the Siting Board and the Department of Public Utilities Pipeline Safety Division 30 days prior to commencement of Facility operation.

On brief, Charlton and Mr. Lawendowski have also requested specific commitments from NEC regarding safety training and financial assurances. The Town of Charlton specifically requested that emergency personnel from Charlton and its mutual aid partners attend training at a specialized school in Texas for LNG firefighting training. The Board directs the Company to provide appropriate emergency personnel from Charlton and its mutual aid partners the opportunity to attend said training (or its equivalent). In committing to reaching a conclusion regarding safety training with the fire department, and in light of the requirement for the Company to produce a safety plan and the commitments it has made regarding its contents, the Board finds that the Company would be able to address Charlton's and Mr. Lawendowski's specific concerns regarding safety training and a safety plan, thereby helping to ensure that the Facility is safe.

The Siting Board notes that NEC discussed the hazards presented by an LNG spill, and described mitigating design features, such as installing a high-expansion foam system and vapor fence to limit vapor migration, locating enclosed spaces away from LNG handling areas, and locating the LNG sump away from the property line. In addition, NEC would equip the Facility with extensive fire detection and fire suppression measures, including gas detectors, smoke detectors, water-based sprinklers, and on-site fire hydrants. The Siting Board acknowledges that certain fire-prevention and fire-fighting agents have, in the past, contained hazardous chemicals referred to as per- and poly-fluoroalkyl substances ("PFAS").[139] To avoid future harm to the

[139] See https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas

environment, the Siting Board directs NEC to employ non-PFAS high-expansion foams at the Facility, to the extent such products are commercially available, efficacious, and compliant with the relevant requirements of 310 CMR 112. The Siting Board finds that with the proposed mitigation measures, hazards associated with an LNG spill would be minimized. The record also shows that an LNG spill to the environment would not present a pollution hazard, and that the transportation of LNG is less hazardous than the transportation of similar fuels.

The Siting Board finds that NEC has demonstrated that its plan to site the Project at the Route 169 Site, with compliance with the conditions herein, is consistent with 980 CMR 10.00. The Company also identified federal and Department regulations that the Company will follow with respect to LNG facility design, construction, and maintenance. The Siting Board recognizes that the Department will enforce these regulations once the Facility has been built.

VII. CONSISTENCY WITH POLICIES OF THE COMMONWEALTH

A. Standard of Review

G.L. c. 164, § 69J requires the Siting Board to determine whether plans for construction of the applicant's new facilities are consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth. Lowell-Tewksbury at 72; Andrew-Dewar at 106-107; Sudbury-Hudson at 181.[140]

B. Company Description

NEC states that the Project is consistent with the current health, environmental protection, and resource use and development policies adopted by the Commonwealth, as required for Project approval by the Siting Board pursuant to G.L. c. 164, § 69J (Exh. NEC-2, at 6-1; Company Brief at 78-80).

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[140] G.L. c. 164, § 69J requires consistency with environmental protection policies of the Commonwealth but does not explicitly recognize energy policies. However, the Siting Board accomplishes its statutory mandate to ensure reliable energy supply with minimum impact on the environment at the lowest possible cost within the context of current energy policies of the Commonwealth. G.L. c. 164, § 69H.

1. Health Policies

a. Siting Board Statutes

NEC notes that Section 69J of the Siting Board statute provides, in pertinent part, that the Siting Board is to review proposed energy projects to "provide a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost" (Company Brief at 78). NEC states that the Project will provide clean-burning natural gas to customers with increased reliability and at lower cost, thereby enhancing the safety, health, and welfare for the Commonwealth's citizens and economy (Exh. NEC-2, at 6-1). NEC maintains that the Project is consistent with the policies reflected in Section 69J, which the Company describes as expressing "the Legislature's view that an adequate, economical, and reliable supply of energy is critical to the state's citizens and economy" (id.; Company Brief at 78-79).

b. Restructuring Act

The Company states the Project is consistent with, and will advance, health policies of the Commonwealth contained in the Restructuring Act, St. 1997, c. 164 (Company Brief at 79). In support, the Company cites to language in the Restructuring Act that: "electricity is essential to the health and well-being of all residents of the Commonwealth" and that "reliable electric service is of the utmost importance to the safety, health, and welfare" of the Commonwealth's citizens" (id., citing St. 1997, c. 164; Exh. NEC-2, at 6-1). NEC suggests that, by providing an enhanced and more reliable source of natural gas, the Project will contribute to the maintenance of a reliable source of electricity, thus contributing to the health and well-being of Massachusetts citizens (Exh. NEC-2, at 6-1). Similarly, NEC asserts that the Project will assist National Grid in meeting that utility's public health and safety obligations, particularly during peak demand periods (id.). The Company asserts that by providing LNG supplies to National Grid, the Project will help ensure reliable gas distribution service, a key goal of the Restructuring Act (Company Brief at 79).

As described above (see Section II.B.2.b), NEC stated that it intends to market the Facility's additional liquefaction and storage capacity as a backup gas supply to gas-fired electric generating plants in the Commonwealth (Exh. EFSB-N-3). During periods of extreme cold, when there is little or no excess capacity on interstate natural gas pipelines, generators with existing fuel reserved on-site are dispatched more frequently (Exh. EFSB-N-21(S1) at 6; Tr. 1, at 73, 76-77).

NEC stated that it views fuel security as an emergent market opportunity for services potentially offered by the Project's extra capacity (Tr. 1, at 122).

c. Other Health Policies

The Company asserts that the Project will comply with Massachusetts health protection policies set forth in the Siting Board regulations governing LNG facilities (980 CMR 10.00), and in the Massachusetts Natural Gas Safety Code regulations (220 CMR 101.00) (Company Brief at 79, citing NEC-2, at 6-1). The Company also asserts that the Facility will comply will all state and local safety and emergency planning procedures (Exh. NEC-2, at 6-1; Company Brief at 79).

The Company notes that the Project will comply with health policies beyond those contained in Massachusetts law and policy (Exh. NEC-2, at 6-1). The Company states that "all design, construction and operation activities associated with the Project [will] accord with applicable governmental and industry health and safety standards such as those contained in the federal Occupational Safety and Health Administration ("OSHA") and its regulations; federal Department of Transportation ("DOT") regulations; federal Pipeline and Hazardous Materials Safety Act ("PHMSA") regulations; and National Fire Protection Association ("NFPA") codes and standards (id.; Company Brief at 79).

2. Environmental Protection Policies

NEC states that the Project is consistent with the Commonwealth's environmental protection policies (Exh. NEC-2, at 6-2). NEC states that the Company will obtain all necessary environmental approvals required by state, federal, and local agencies, and that the Facility will be constructed and operated to comply with all Massachusetts state and local environmental laws and policies (id. at 6-2 to 6-5; Company Brief at 79).

a. Global Warming Solutions Act

NEC states that construction and operation of the Project would be consistent with the 2008 GWSA and climate change policies that EEA has issued subsequent to enactment of the GWSA, including the Clean Energy & Climate Plan for 2020, issued in December of 2010 (Company Brief at 80, citing Exh. NEC-2, at 6-5). NEC notes that the GWSA established GHG emissions

reduction targets of 25 percent from 1990 levels by 2020 and 80 percent from 1990 levels in 2050 (Exh. NEC-1, at 6-5; Company Brief at 80). The Company states that, among other things, the GWSA obligates administrative agencies such as the Siting Board, "in considering approvals and permits, to consider reasonably foreseeable climate change impacts such as additional GHG emissions, and related effects, such as effects on sea level" (Company Brief at 80, citing Exh. NEC-2, at 6-5).

NEC maintains that, because the Project will help enable National Grid and, potentially, other gas utility customers to satisfy demand for oil-to-gas conversions, the Project could reduce future emissions of CO_2 per year (Company Brief at 80, citing Exh. NEC-2, at 6-6). In addition, NEC asserts that the opportunity to provide service to the electric generating sector could reduce emissions in that sector as well (Exh. NEC-2, at 6-5). As noted in Section V.D.6.b the Project does not trigger mandatory MEPA review on the basis of GHG emissions; NEC maintains that construction, testing, and commissioning would have minimal GHG emissions (Exhs. EFSB-A-21(S1); EFSB-A-10(1)(S1) at 35; Company Brief at 80). Finally, NEC indicated that it is contemplating how LNG facilities, including the Project, could be used for biogas and is in the early stages of considering whether its facilities could be used with natural gas created from a methanization process (Tr. 2, at 262-265). Therefore, NEC states that the Facility will have no adverse climate change impacts or negative effects on sea levels (Company Brief at 80, citing Exh. NEC-1, at 6-5).

b. Environmental Justice Policy

NEC noted that the Commonwealth's Environmental Justice Policy, as promulgated by the agency predecessor to EEA and updated by then-Governor Patrick through Executive Order #552 signed on November 25, 2014, included requirements for enhanced public outreach when specific MEPA-related project thresholds are met (Company Brief at 80, citing Exh. NEC-2, at 6-2). NEC stated that the Project did not exceed a relevant MEPA threshold and therefore did not require enhanced public participation or enhanced analysis of impacts and mitigation (id.). Regardless, NEC stated that it "has and will continue to pursue an inclusive community outreach and consultative plan to facilitate the meaningful opportunity to participate by all" (id. at 6-2 to 6-3).

c. Massachusetts Environmental Policy Act

NEC asserted in its Original and Amended Siting Petitions that the Project did not meet any MEPA thresholds and therefore did not require MEPA review (see, e.g., Exh. NEC-2, at 6-2). During a subsequent permitting review with MassDOT, NEC realized that MEPA review was required, due to the potential for removing more than five public shade trees at the Route 169 Site, and the Company submitted an ENF to the MEPA Office (see Section V.D.1.a) (Exh. EFSB-G-7(S1)). The Company submitted its ENF on July 31, 2020; the Secretary of Energy and Environmental Affairs issued a Certificate on the ENF on September 10, 2020, indicating that the Project did not require the preparation of an EIR and that the Project's permitting process could proceed (id.; Exh. EFSB-G-7(S2)).

3. Resource Use and Development Policies

NEC states that that the Project will be constructed and operated in compliance with Massachusetts policies regarding resource use and development (Company Brief at 81, citing Exh. NEC-1, at 6-6). In support, the Company states that "the Project will liquify, store and supply LNG that will be used to enhance, strengthen, and better utilize the Commonwealth's already established natural gas supply system and more efficiently operate its natural gas and potentially electric generating resources, thereby enhancing the safety, health and welfare of the Commonwealth's citizens and economy" (Exh. NEC-2, at 6-6).

The Company also argues that the Facility is consistent with state and regional planning documents, including Executive Order 385, "Planning for Growth," which it states expressly seeks to promote sustainable economic development in the Commonwealth, and the Central Massachusetts Regional Planning Commission's "Central Thirteen Prioritization Project" issued in 2012 (Exh. NEC-2, at 5-54 to 5-55). In particular, the Company contends that the Project is consistent with the document's focus on community-based priorities and strategies, integrating those priorities into regional development and preservation strategies, providing a direction for public investments that conserve the intrinsic qualities of the region while capitalizing on its

economic strength, and fostering development in a manner that is respectful to open space resources, transportation networks, and water resources in the region (id.; Company Brief at 59).

C. Positions of the Parties

Generally, the other parties did not directly address the overall issue of the Project's consistency with state policies. However, PLAN did address the Company's compliance with specific statutes. PLAN asserts that the Project would constitute an increase in fossil fuel infrastructure in the Commonwealth, which is not consistent with the policies reflected in G.L. c. 164, § 69H (PLAN Brief at 5). Citing the SJC's decision in Kain v. Department of Environmental Protection, 474 Mass. 278 (2016), PLAN asserts that approval of the Project would contravene the policies embedded in the GWSA, "which requires greenhouse gas emission reductions, not increases" (id.). PLAN asserts that regulatory agencies "can no longer ignore the climate impacts of the decisions they make" and that approval of the NEC Facility would be "antithetical to complying with our GWSA mandates" (id. at 6).

NEC responded by pointing out that the Project could reduce aggregate natural gas deliveries into the Commonwealth, particularly foreign-sourced LNG and that use of domestic, centrally located LNG would reduce greenhouse gas emissions in the delivery of LNG to utilities such as National Grid (Company Reply Brief at 4). The Company also argues that the potential use of LNG as a backup fuel instead of oil for the generation sector could secure substantial savings in terms of emissions, addressing, for example, the horrendous emission levels during recent cold snaps (id. at 4-5).

D. Analysis and Findings

1. Health Policies

The Siting Board's mandate requires that it review projects so as to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G.L. c. 164, § 69H. In addition, the Restructuring Act noted the fundamental importance of reliable electric service to public health in declaring 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 St. 1997, c. 164; see also Town of Sudbury v. EFSB, 487 Mass. at 748, 756-757; Lowell-Tewksbury at 73. In Section II.D the Siting Board found that the Facility's liquefaction and storage capacity is needed to serve the terms of NEC's Precedent Agreement with National Grid in an economic and reliable manner, with less environmental impacts than other alternatives. During certain winter peak days, demand for natural gas can exceed the capacity of interstate gas transmission supplies; during those periods gas distribution companies rely on LNG to meet customer sendout requirements and the electric generating sector may face fuel security challenges. As reliable gas distribution and electric distribution services are essential to the health, safety, and welfare of residents of the Commonwealth, an improvement in reliability, as provided by the Project, will produce health and safety benefits for the public. See Lowell-Tewksbury at 73. Such benefits are of particular importance in Environmental Justice communities where residents may already bear disproportionate adverse health impacts. See 2017 EJ Policy at 7.

The Company has committed that all design, construction, and operation activities will comply with applicable governmental and industry health and safety standards including the Siting Board's regulations governing LNG facilities (980 CMR 10.00), Massachusetts Natural Gas Safety Code regulations (220 CMR 101.00), federal requirements from agencies including OSHA, DOT, and PHMSA, and relevant codes and standards from the NFPA. In Section V.D, the Siting Board finds that the Project's land use, visual, wetland and water resource, traffic, noise, air, hazardous and solid waste impacts, and site layout limitations have been minimized and that the Project would comply with relevant site size requirements.

In addition to the Siting Board's conditions, the Company is required to obtain all environmental approvals and permits required by federal, state, and local agencies and must be constructed and operated according to those permits and approvals. Accordingly, subject to the Company's specified mitigation and the Siting Board's conditions set forth in Section XI, 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

a. Global Warming Solutions Act

The GWSA, enacted in August 2008, is a comprehensive statutory framework to address climate change in Massachusetts. St. 2008, c. 298. The GWSA mandates that the Commonwealth reduce its GHG emissions by 10 to 25 percent below 1990 levels by 2020, and by at least 80 percent below 1990 levels in 2050. G.L. c. 21N, §3(b). More recent policy developments, following the hearings and briefs in this proceeding, have both increased and accelerated the Commonwealth's GHG emissions reduction targets.[141]

The Siting Board notes that the Company, in its 2019 Amended Petition to Construct, relies exclusively on the 2008 GWSA and EEA's original 2020 Clean Energy and Climate Plan ("2020 CECP") in support of its assertion that the Project is consistent with Commonwealth environmental protection policies.[142] The Company's analysis stops short of addressing subsequent, significant, state climate-change related policies and legislation, including the following developments:

- On April 22, 2020, pursuant to the GWSA, the Secretary issued a "Determination of Statewide Emissions Limit for 2050" ("Determination"), which established a "net zero" level of statewide greenhouse gas emissions. The Determination defined net zero as "A level of statewide greenhouse gas emissions that is equal in quantity to the amount of carbon dioxide or its equivalent that is removed from the atmosphere and stored annually by, or attributable to, the Commonwealth; provided, however, that in no event shall the level of emissions be greater than a level that is 85 percent below the 1990 level" (Determination at 4).
- On December 30, 2020, the Secretary issued an "Interim Massachusetts Clean Energy and Climate Plan for 2030" (the "Interim 2030 CECP") for public comment. In the Interim 2030 CECP, the Secretary set the 2030 statewide GHG emissions limit at 45 percent below 1990 levels. EEA plans to hold public

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141 The Siting Board officially notices the following recent policies of the Commonwealth: "Determination of Statewide Emissions Limit for 2050" dated April 22, 2020; "Interim Massachusetts Clean Energy and Climate Plan for 2030" dated December 30, 2020; and "Massachusetts 2050 Decarbonization Roadmap" dated December 30, 2020. 980 CMR 1.06(7).

142 In 2015, EEA issued an update to the 2020 CECP ("Updated 2020 CECP").

meetings in the fall and winter of 2021 to offer additional opportunities for stakeholders and the public to participate, before issuing a final 2030 CECP.

- Also on December 30, 2020, the Secretary issued the "Massachusetts 2050 Decarbonization Roadmap" ("2050 Roadmap"). Based on its analysis of a range of potential pathways, the 2050 Roadmap finds that the most cost-effective, low-risk pathways to net zero GHG emissions share core elements, including a balanced clean energy portfolio anchored by a significant offshore wind resource, more interstate transmission, widespread electrification of transportation, building heat and hot water, and cost-effective replacement of equipment, infrastructure, and systems that use fossil fuels (2050 Roadmap at 21-26).
- The state legislature enacted and, on March 26, 2021, Governor Baker signed new, comprehensive, climate change legislation: "An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy" ("Climate Roadmap Act"). The Climate Roadmap Act requires "a 2050 statewide emissions limit that achieves at least net zero statewide greenhouse gas emissions" and that "in no event shall the level of emissions in 2050 be higher than a level 85 per cent below the 1990 level." G.L. c. 21N, § 3(b).

The Siting Board notes that none of the above policies or legislation were in effect at the time the Company filed its Amended Petition to Construct in February 2019. However, the Siting Board also acknowledges the significant policy shift in Massachusetts regarding decarbonization that is reflected in the 2050 Roadmap and the Climate Roadmap Act.

The overriding goal and policy of the Climate Roadmap Act is the reduction of GHG emissions in the Commonwealth over time, to the point where, in 2050, Massachusetts will achieve net zero GHG emissions. The Act envisions implementation of that goal primarily through decarbonization of major sectors of the economy, such as transportation and residential heating, that currently rely on fossil-fueled energy sources such as oil and gas. The 2050 Roadmap describes pathways the Commonwealth could take to achieve the goal of reaching net zero emissions in 2050, stating that policy strategies are needed "to carefully manage ongoing and future investments in the gas distribution system […] and manage the orderly and equitable drawdown of fossil fuel use and infrastructure […] needed to ensure equitable outcomes." However, the 2050 Roadmap also notes that "[h]igher costs cannot be borne by the consumers

least able to pay, and steps must be taken to provide for an orderly and equitable transition" (2050 Roadmap at 53).[143]

The 2050 Roadmap specifically notes that there will continue to be significant economic and certain environmental benefits associated with the limited use of natural gas-fired generation facilities when intermittent renewable resources are insufficient to meet increasing electric generation demands – even with the attainment of net zero carbon emissions in 2050. 2050 Roadmap at 63-65. While the record casts significant doubt on both the policy consistency and likelihood of future expansions of interstate natural gas pipeline capacity serving Massachusetts, the Project provides a means of using existing interstate pipeline capacity more efficiently, and thereby further diminishing the prospect of future interstate pipeline capacity growth in the Commonwealth. In the immediate future, the continued conversion of oil heating customers, to either natural gas, or optimally, heat pump technologies, will help to achieve carbon reduction benefits. In the longer term, as end-users fully embrace heat pump technologies, and other forms of electrification, LNG can continue to complement efforts to achieve net zero by providing reliable fuel supplies for the limited amount of gas-fired electric generation that the 2050 Roadmap envisions will still be useful and economic to maintain for reliability purposes when intermittent renewable generation is insufficient, and not easily or cost-effectively remedied by energy storage technologies. 2050 Roadmap at 64.

The record in this proceeding shows (see Section II.B) that the Project can be expected to provide fossil-fuel (natural gas) services to Massachusetts utility customers in the relatively near-

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143 The Board notes that the Department is considering this transition in D.P.U. 20-80. The Department has stated that it opened its inquiry to examine the role of Massachusetts gas local distribution companies ("LDCs") in helping the Commonwealth to achieve its 2050 climate goals. Specifically, the Department will explore strategies to enable the Commonwealth to move into its net-zero greenhouse gas emissions energy future while simultaneously safeguarding ratepayer interests; ensuring safe, reliable, and cost-effective natural gas service; and potentially recasting the role of LDCs in the Commonwealth. The Department's Order requires that an independent consultant identify a number of qualitative factors in the transition, including public safety, reliability, economic development, equity, emissions reductions, and timing. Investigation by the Department of Public Utilities, D.P.U. 20-80, Vote and Order Opening Investigation (October 29, 2020).

term; the contract period for the National Grid Precedent Agreement is 15 years. The Company has testified that, should market conditions or relevant state policies change by that time, the Company will shoulder the responsibility for re-purposing or even decommissioning the Facility. The Siting Board notes that, as a merchant facility, the Facility's decommissioning would be absorbed financially by NEC, not by Massachusetts ratepayers. The Siting Board further notes that the Company's HCA with the Town of Charlton provides that, "within 60 days following the 15th anniversary of achievement of commercial operations by the Facility, NEC shall provide the Town with a reasonable form of financial security to guarantee the eventual decommissioning of the Facility," unless similar bond requirements are imposed by another agency. Additionally, NEC is considering possibilities for how its Facility could be used with other source of methane, such as biogas. The Siting Board notes that the Climate Roadmap Act itself contemplates that natural gas will remain a necessary component of the state's energy resources in the near-term, as the state transitions over the next three decades to a net-zero GHG emissions economy.

In addition to providing a needed and reliable, temporary, energy "bridge" during the state's transition away from a fossil-fuel-based economy, the record shows that the Project will provide other likely benefits to the Commonwealth that are consistent with, and supportive of, the policy aims of the Roadmap Act. As the Department found in D.P.U. 15-129, the Facility will allow National Grid to maximize the use and efficiency of its existing gas supply infrastructure, as compared to constructing new gas infrastructure with its associated cost and environmental impacts. The record also shows that the Facility can be expected to reduce the state's reliance on foreign sources of natural gas, with attendant cost, fuel security, and reliability benefits. Finally, the Facility could, to some degree, serve as an alternative to the use of oil by electric generators and other customers, thereby providing environmental benefits. Furthermore, the Project would minimize emissions through the use of gas with appropriate combustion controls and would maximize energy efficiency through the selection of a hybrid drive combustion turbine/electric motor system (See Section III.B and V.D.6.).

Based on the record, the Siting Board finds that approval of the Project would be consistent with the climate change and emissions reduction policies of the Commonwealth in effect during the period of time in which this proceeding was initiated and heard. The Siting Board also finds

that approval of the Project is consistent with pathways the Commonwealth could take to achieve net zero emissions by 2050, as described in the 2050 Roadmap and Climate Roadmap Act, and will promote progress toward the 2050 net zero emissions target.

b. Environmental Justice Policy

NEC filed its Original Petitions, in August 2018, and its Amended Petitions, in February and April 2019. The Company did not, however, carry out its EJ consistency analysis beyond issuance of Executive Order 552 in 2014. In the time since issuance of that Executive Order and the filing of the Petition, both EEA and the state legislature have advanced the Commonwealth's environmental justice policies and requirements.

In January 2017, EEA updated its Environmental Justice Policy ("2017 EJ Policy") and, as noted above, the Climate Roadmap Act was enacted in March 2021. The Climate Roadmap Act sets forth environmental justice principles to protect rights to a clean and healthy environment, regardless of race, color, income, class, handicap, gender identity, sexual orientation, national origin, ethnicity or ancestry, religious belief, or English language proficiency. To promote that goal, the Climate Roadmap Act requires the meaningful involvement of environmental justice populations and requires additional measures to improve public participation, such as providing translation services and public notices in English and any other language spoken by a significant number of the affected environmental justice population. St. 2021, c. 8, § 60. The environmental review process conducted by the MEPA Office will be revised to reflect additional focus on environmental justice populations.[144] On June 24, 2021, EEA revised the 2017 EJ Policy,

144 The Climate Roadmap Act requires MEPA to promulgate regulations to implement sections of the Act within 180 days after the effective date of the Act. The Act further provides that new requirements relating to EIR near EJ Populations apply to new projects filed with MEPA after the effective date of these regulations. St. 2021, c. 8, §§ 102A, 102B.

consistent with the Climate Roadmap Act ("2021 EJ Policy").[145,146] The EJ Policy applies to the Siting Board. Winchester v. EFSB, 98 Mass.App.Ct. at 1101 ("Both the current version of the [Environmental Justice] policy, promulgated in 2017, and the prior version, which was in effect at the start of the original proceeding, apply to the [S]iting [B]oard").

The Siting Board notes that the Climate Roadmap Act was not in effect at the time that NEC filed its Original Petitions, in August 2018, its Amended Petitions, in February and April 2019 (or before evidentiary hearings, conducted in November and December 2019). However, the 2017 EJ Policy was in effect when NEC filed its petitions with the Siting Board and when the Company completed its MEPA review. As stated above in Section V.D.1, NEC submitted an ENF to the MEPA Office due to the expected removal of more than five public shade trees. The Project did not exceed an ENF threshold for air, solid or hazardous waste, or wastewater and sewage sludge treatment and disposal and therefore did not trigger enhanced public participation or enhanced analysis of impacts and mitigation under the 2017 EJ Policy.[147,148] The MEPA Office

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145 The 2021 EJ Policy provides that Projects, such as the present one, that have filed an ENF prior to the issuance of said policy are not subject to the enhanced analysis or enhanced participation provisions of the updated policy. 2021 EJ Policy at 11 n.3. Provisions specific to the Siting Board under the 2021 EJ Policy (i.e., Section 20, Enhanced Public Participation and Analysis of Impacts and Mitigation Under the Energy Facilities Siting Board) did not change compared to the 2017 EJ Policy. See 2021 EJ Policy at 12; 2017 EJ Policy at 11.

146 https://www.mass.gov/doc/environmental-justice-policy6242021-update/download

147 Siting Board staff note that, when NEC filed its petitions with the Siting Board, neither the Route 169 Site nor the Route 20 Site were located within areas defined as EJ neighborhoods under the 2017 EJ Policy. Consistent with the Climate Roadmap Act, the 2021 EJ Policy includes a revised definition for EJ populations. The Siting Board Staff observes that, using EEA's EJ Viewer mapping application, which reflects the revised definition for EJ populations and uses American Community Survey 2015-2019 five-year-estimates for demographic data, it appears that Route 169 Site and the Route 20 Site are both located within areas with EJ Populations. The Siting Board notes that the Company did provide additional language access for this Project.

148 The Company asserts that its Project is consistent with environmental policies due to its MEPA review, which the Company completed and for which the Secretary issued a Certificate.

did not require an EIR. Therefore, the Project did not trigger the 2017 EJ Policy's provisions for enhanced public participation (Section 16) and/or enhanced analysis of impacts and mitigation (Section 17) under MEPA's review. Relatedly, the Project did not trigger Section 20 of the 2017 EJ Policy, otherwise requiring for enhanced public participation and/or enhanced analysis of impacts and mitigation under the Siting Board's review.

In addition, consistent with established Siting Board practice and the Commonwealth's Language Access Policy, the Siting Board staff examined the linguistic composition of the affected Project area. As described in Section I.B.3, above, the Siting Board required NEC translate into Spanish and publish the Public Notice in a Spanish language newspaper, the record shows that the Company did so.

The Siting Board finds that this proceeding, in which the proposed NEC Project was reviewed, was conducted in accordance with, and thus is consistent with, environmental justice policies in effect during the course of the proceeding.

3. Resource Use and Development Policies

In 2007, pursuant to the Commonwealth's Smart Growth/Smart Energy policy, EEA 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; (3) protecting environmentally sensitive lands, natural resources, critical habitats, wetlands and water resources and cultural and historic landscapes; and (4) increasing the quantity, quality, and accessibility of open spaces and recreational opportunities.

In Section V.D, above, the Siting Board analyzed potential impacts associated with construction and operation of the Project, including land use impacts. The Siting Board found that land use impacts would be minimized. Based on the foregoing, the Siting Board finds that construction and operation of the Project would be consistent with resource use and development policies of the Commonwealth.

4. Conclusion

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 health, environmental protection, and resource use and development policies of the Commonwealth.

VIII. INDIVIDUAL ZONING EXEMPTIONS

Pursuant to G.L. c. 40A, § 3, the Company filed its Amended Zoning Petition seeking individual and comprehensive zoning exemptions from the zoning bylaws of the Town of Charlton for the Company's Project.[149] NEC states that the exemptions are necessary in order to allow for the timely, efficient and consistent construction of the Project (Exh. NEC-3 (supp.) at 11).

A. Standard of Review

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

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

Thus, a petitioner seeking exemption from a local zoning bylaw under G.L. c. 40A, § 3 must meet three criteria.[150] First, the petitioner must qualify as a public service corporation.

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149 Because the Company is not constructing the meter station on the Preferred Interconnection Route, it is not requesting any exemption from zoning requirements for the meter station (Exh. NEC-14, at 2).

150 G.L. c. 40A, § 3 applies to the Department. The Department refers zoning exemption cases to the Siting Board for hearing and decision pursuant to G.L. c. 25, § 4. In accordance with G.L. c. 164, § 69H, when deciding cases under a Department statute, the Siting Board applies Department and Board standards "in a consistent manner." Thus, the Siting Board the Department implement G.L. c. 40A, § 3 using consistent standards of review, and this Decision cites to both Siting Board decisions and Department orders interpreting G.L. c. 40A, § 3.

Save the Bay, Inc. v. Department of Public Utilities, 366 Mass. 667, 6680 (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. Lowell-Tewksbury at 77; Sudbury-Hudson at 193; Vineyard Wind at 132. Finally, the petitioner must establish that it requires exemption from the zoning ordinance or bylaw. Lowell-Tewksbury at 77; Sudbury-Hudson at 193; Tennessee Gas Pipeline Company, D.T.E. 01-57, at 3-4 (2002).

Additionally, the Siting Board favors the resolution of local issues on a local level whenever possible, to reduce concern regarding any intrusion on home rule. The Siting Board believes that the most effective approach for doing so is for a petitioner to consult with local officials regarding its project before seeking zoning exemptions pursuant to G.L. c. 40A, § 3. Lowell-Tewksbury at 77-78; Sudbury-Hudson at 193; Russell Biomass LLC, EFSB 07-4/D.P.U. 07-35/07-36, at 61-62 (2009) ("Russell"). Thus, the Siting Board encourages petitioners to consult with local officials, and in some circumstances, to apply for local zoning permits, before seeking zoning exemptions from the Department under G.L. c. 40A, § 3. Lowell-Tewksbury at 77-78; Sudbury-Hudson at 193; Russell at 68.

B. Public Service Corporation

1. Standard of Review

In determining whether a petitioner qualifies as a public service corporation for the purposes of G.L. c. 40A, § 3, the SJC has stated:

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

On September 19, 2018, the Chair of the Department referred the Company's Zoning Petition to the Siting Board for review and decision pursuant to G.L. c. 25, § 4.

Save the Bay, 366 Mass. at 680; Sudbury-Hudson at 194; Berkshire Power Development, Inc., D.P.U. 96-104, at 26-36 (1997) ("Berkshire Power").[151]

2. Analysis and Findings

NEC states that it is a Delaware limited liability company with a principal place of business in West Conshohocken, Pennsylvania (Exh. NEC-3, at 2). NEC asserts that it is a public service corporation for the purposes of G.L. c. 40A, § 3 (id.).

The Company states that it will provide gas to utilities in the Commonwealth, and potentially other customers, with a source of long-term LNG services, "akin in many respects to the services provided by power generating facilities" (id. at 6). The Company notes that "there is substantial Department precedent that an entity operating a generating facility to serve the Massachusetts electric distribution companies is considered a public service corporation" (id., citing USGen New England, D.T.E. 03-83, at 15 n.9 (2004)). The Company notes further that the Massachusetts Supreme Judicial Court has upheld the Department's designation of an LNG facility operator as a public service corporation, despite the fact that the entity was not organized under G.L. c. 164 and did not operate under a franchise (id. at 6, citing Save the Bay, 366 Mass. at 681,

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[151] The Department interprets this list not as a test, but rather, as guidance to ensure that the intent of G.L. c. 40A, § 3, will be realized: i.e., that a present or proposed use of land or structure that is determined by the Department to be "reasonably necessary for the convenience or welfare of the public" not be foreclosed due to local opposition. Berkshire Power at 30; Save the Bay, 366 Mass. at 685-686; Town of Truro v. Department of Public Utilities, 365 Mass. 407, 410 (1974) ("Town of Truro"); Exelon West Medway, LLC and Exelon West Medway II, LLC, EFSB 15-01/D.P.U. 15-25, at 135 n. 117 (2016); New England Power Company d/b/a National Grid, D.P.U. 15-44/15-45 at 5-6 (2016) ("MVRP"). 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; MVRP at 6; see also Dispatch Communications of New England d/b/a Nextel Communications, Inc., D.P.U./D.T.E. 95-59B/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 public service corporation status. Berkshire Power at 31; MVRP at 6; NSTAR Electric Company, D.P.U. 15-02 (2015) at 4-5.

NSTAR Electric Company d/b/a Eversource Energy, D.P.U. 15-02, at 5 (2015), Berkshire Power at 31). NEC states that the Company "proposes to develop and operate its LNG Facility subject to all relevant regulations and requirements" (Exh. NEC-3, at 6).

In Section II, the Siting Board found that there is a need for additional natural gas facilities, such as the Project, to meet reliability, economic efficiency, and environmental objectives in the Commonwealth. Therefore, the Siting Board finds that NEC will provide a needed public service to the Commonwealth, principally serving National Grid's reliability needs in addition to other uses. The Siting Board notes that the Department has found (and the SJC has upheld) companies providing LNG services to be public service corporations. See Save the Bay v. Department of Public Utilities, 366 Mass. 667 (1975) (New England LNG Company) ("it appears that New England LNG will, like the facility in the Mezitt case, supply gas to gas companies for distribution to the public in the Commonwealth and New England. That is of primary importance in preserving its status as a public service corporation"); Mezitt v. Department of Pub. Util., 354 Mass. 692 (1968) (Hopkinton LNG Company). In addition, the Company will be required to operate the Facility pursuant to multiple regulations and substantial governmental oversight. See e.g., 980 CMR 10.00; 220 CMR 112; 49 CFR Part 193. This regulation is another factor weighing towards public service corporation status. Accordingly, the Siting Board finds that NEC qualifies as a Massachusetts public service corporation for the purposes of G.L. c. 40A, § 3.

C. Public Convenience or Welfare

1. 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, 366 Mass. at 685; Town of Truro, 365 Mass. at 407. Specifically, the Department is empowered and required to undertake "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964) ("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 petitioner. Save the Bay, 366 Mass. at 685; NY Central Railroad, 347 Mass. 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;[152] 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. Sudbury-Hudson at 195; Vineyard Wind at 136-137; Tennessee Gas Company, D.T.E. 98-33, at 4-5 (1998).

2. Company Position

The Company asserts that it "will provide a substantial public benefit" to the Commonwealth by providing natural gas service "as part of an approved . . . comprehensive plan by a large gas utility to enhance its LNG resources in order to secure cost and reliability benefits for Massachusetts customers" (Exh. NEC-3, at 7). The Company points specifically to D.P.U. 15-129, in which, the Company asserts, the Department determined that "the Facility will contribute to the availability of a stable and reliable source of LNG and reduce the Commonwealth's reliance on imported LNG" (id.). The Company notes that the public benefit provided by the Facility is consistent with the benefits provided by other public service corporations (id.).

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[152] 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, 347 Mass. at 591.

3. Town Position

The Town asserts that NEC's petition for zoning exemptions should be denied (Charlton Brief at 14). The Town clarifies that it does not oppose the Project, but rather, it opposes the location of the Facility on the Route 169 Site instead of the Route 20 Site (Charlton Brief at 2). The Town states that the approval of the Facility on the Route 169 Site "will not be consistent with the public interest" because "the environmental impact, civil engineering, traffic, safety, and logistical operations of the Facility have not been properly vetted" (id.). The Town asserts that the Project is being rushed through the permitting process (id.). The Town contends that use of the Route 169 Site is not reasonably necessary for the public convenience or welfare, "since the Route 20 Site is far superior and less impactful to the Town of Charlton and its residents" (id. at 14).

With the adoption of the HCA, the Town no longer objects to the zoning exemptions requested by NEC for the Route 169 Site (Exh. EFSB-Z-26(S1)(1) at 4).

4. Analysis and Findings

With respect to the need for, or public benefits of, the Project, the Siting Board found in Section II that there is a need for the Facility's liquefaction and storage capacity that would serve the terms of NEC's Precedent Agreement with National Grid in an economic and reliable manner and that there is a need for additional LNG resources in the Commonwealth to serve other gas distribution companies with LNG storage facilities or potential opportunities in the fuel-security and transportation markets. In Section III, the Siting Board analyzed different technology approaches that the Company might use to design its Facility and concluded that the proposed approach is superior to other approaches. The Siting Board also reviewed the Company's site selection process in Section IV and has found that the Company demonstrated that it: (1) examined a reasonable range of practical siting alternatives and (2) identified locations which would minimize cost and environmental impacts while ensuring a reliable energy supply.

In Section V, the Siting Board compared the impacts of the Route 169 and Route 20 Sites. The Siting Board has concluded that the Route 169 Site with the Preferred Interconnection Route

is superior to the Route 20 Site in providing a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. Regarding Project impacts, in Section V.D, the Siting Board evaluated the environmental impacts of the Project and found that, although the Project may result in some local adverse impacts, the environmental impacts of the proposed Project would be minimized with the implementation of mitigation measures directed by the Siting Board and described in this Decision. Further, the Siting Board finds that the need for the Project on balance outweighs identifiable adverse local impacts associated with the construction and operation of the Project.

In Section VI, the Siting Board evaluated the safety requirements set forth in 980 CMR 10.00, the Siting Board's regulatory standards for siting of intrastate LNG storage facilities, for the Route 169 Site.[153] The Board concluded that NEC has demonstrated that its plans to site the Project at the Route 169 Site is consistent with 980 CMR 10.00. Notably, developing the Project at the Route 169 Site would meet the site size requirements set forth in 980 CMR 10.03 (i.e., the thermal radiation protection zone and the vapor dispersion zone do not extend beyond the perimeter of the Route 169 Site).

Accordingly, the Siting Board finds that the proposed Project is reasonably necessary for the convenience or welfare of the public.

D. Individual Exemptions Required

1. Standard of Review

In determining whether an exemption from a particular provision of a zoning bylaw is "required" for purposes of G.L. c. 40A, § 3, the Department determines whether the exemption is necessary to allow construction or operation of the petitioner's project. Sudbury-Hudson at 197;

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[153] As noted in Section VI.B, the Siting Board's regulations specifically state that the Department has the authority "to assure safe and prudent design, construction, operation, and maintenance of LNG facilities" proposed for construction in Massachusetts. 980 CMR 10.01. The Department enforces its own regulations, as well as the federal pipeline safety regulations for LNG facilities, and both sets of regulations include requirements for the siting, design, construction, operation, and maintenance of LNG facilities. 220 CMR 112.00; 49 CFR Part 193. In its regulations, the Siting Board appropriately defers to the Department to enforce the federal and state LNG safety regulations.

Vineyard Wind at 139; Tennessee Gas Company, D.P.U. 92-261, at 20-21 (1993). The Petitioner bears the burden to identify the individual zoning provisions applicable to the project and establish on the record that exemption from each of those provisions is required:

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

Sudbury-Hudson at 197; Vineyard Wind at 139; New York Cellular Geographic Service Area, Inc., D.P.U. 94-44, at 18 (1995).

2. Individual Exemptions Requested

The Route 169 Site is in the IG (Industrial General) District; the Preferred Interconnection Route is in the IG and A (Agricultural) District (Exh. NEC-3, exhibit A). For its Route 169 Site and Preferred Interconnection Route, the Company seeks individual exemptions from the Town of Charlton Zoning Bylaw, as follows.

Table 16: Requested Zoning Exemptions for the Preferred Interconnection Route.

Section of the Zoning Ordinance	**Available Relief**	**Why Exemption is Required: Company's Position**
Section 200-6	Special Permit	Requires Special Permit for filling, excavation or transfer of earth within a Floodplain District. Legal uncertainty in obtaining a Special Permit. Potential for adverse interpretation, delay, burden, and undue expense associated with local permitting process and appeal therefrom.
Section 200-3.2.B.8	Variance	Accessory uses. No specific authorization for pipelines necessary for natural gas distribution facilities and therefore a variance may be needed. Also, line will be located on land not owned by Facility operator and may need a variance. Variances are a disfavored form of relief, and even if granted are susceptible to appeal.

Table 16: Requested Zoning Exemptions for the Preferred Interconnection Route.

Section of the Zoning Ordinance	Available Relief	Why Exemption is Required: Company's Position
Section 200-3.2.B (6)(s)	Variance, Special Permit	Requires site plan review for natural gas pipelines. Also, recent amendment to Bylaw now allows "gas piping" in an IG District with a Special Permit. Requires all portions of a natural gas distribution line to be at least 300 feet from any residential structure. Requires distribution stations to be subsurface. All lines within 300 feet of a residential structure will be underground. Requiring a 300-foot setback would substantially burden the Project and add significant time and costs. Legal uncertainty in obtaining a variance or special permit. Variances are a disfavored form of relief, and even if granted are subject to appeal.

Source: Exhs. EFSB-Z-29(1); NEC-3 (Supp.), Table D.

Table 17: Requested Zoning Exemptions for Use of the Route 169 Site.

Section of the Zoning Ordinance	Available Relief	Why Exemption is Required: Company's Position
Section 200-3.2.C(2)	Variance	Requires 20-foot landscaped buffer along lot frontage on a road. Requires a 100-foot landscape buffer between the IG and A Districts. There may not be adequate buffer on all sides, requiring a variance. The Company plans to leave existing natural buffer, employ screening fencing and complete vegetative screening plans. Variances are a legally disfavored form of relief and even if granted are susceptible to appeal.
Section 200-3.3.B(4)	Variance	Prohibits accessory buildings in front, rear, or side yards of parcels. Facility will have several accessory structures, requiring a variance. Variances are a legally disfavored form of relief and even if granted are susceptible to appeal.
Section 200-4.1	Variance	Performance standards for construction and operation of structures.

Table 17: Requested Zoning Exemptions for Use of the Route 169 Site.

Section of the Zoning Ordinance	Available Relief	Why Exemption is Required: Company's Position
		Energy infrastructure facilities are unique and heavily regulated by comprehensive state and industry standards, and compliance with these requirements will better allow the Project to be completed in a timely, safe and reliable manner. Variances are a disfavored form of relief, and even if granted are susceptible to appeal.
Section 200-2.1	Variance	Requires accessory buildings to be located on the same lot as the primary building. Route 169 Site will be located on a single parcel, but all gas lines and meter stations will, in part, be located on property not owned by NEC, over which NEC will have an easement or license. Variances are a disfavored form of relief, and even if granted, are susceptible to appeal.
Section 200-3.3.B(3)	Variance	Prohibits structures within 30 feet of the normal bank of a perennial stream or river. The Project will require a stream crossing for an interconnection route, which may require a variance. Variances are a disfavored form of legal relief and even if granted are susceptible to appeal.
Section 200-3.3.C(1)	Variance	Requires that where two or more principal structures are constructed on the same lot, the minimum lot area, width and frontage shall be the sum of the requirements for each structure and minimum distance between the structures must be the height of the taller building. The Facility may not comply with these requirements, thus requiring a variance. Variances are a disfavored form of relief, and even if granted, are susceptible to appeal.

Table 17: Requested Zoning Exemptions for Use of the Route 169 Site.

Section of the Zoning Ordinance	Available Relief	Why Exemption is Required: Company's Position
Section 200-3.3.C(3)	Variance	Limits projections from structures to no more than three feet in setback areas. Project components may exceed the setback requirement, requiring a variance. Variances are a disfavored form of relief, and even if granted, are susceptible to appeal.
Section 200-3.2.D (frontage)	Variance	Requires lots in the A District to have 175 feet of frontage. A new meter station may be constructed on the parcel identified as the Station 264 Compressor on Figure 3-1, and there is not 175 feet of frontage, requiring a variance. Variances are a disfavored form of relief, and even if granted, are susceptible to appeal.
Sections 200-7.1.D(1)(a) and 200-3.2.B(6)(s)	Variance	Requires site plan review for natural gas distribution facilities. Because of time constraints, the legal uncertainty and the potential for adverse interpretations, delay burden and expense associated with the site plan review process and appeals therefrom, the Company would need to seek a variance. Variances are a legally disfavored form of relief and, even if granted, are susceptible to appeal.
Section 200-3.2.B (6)(s)	Variance	Requires all storage tanks at a natural gas distribution facility be located below-ground. The Facility will have an above-ground two-million-gallon gas storage tank. To operate the Facility properly, economically, and consistent with relevant design requirements, the storage tank needs to be above-ground, which would require a variance. Variances are a legally disfavored form of relief and, even if granted, are susceptible to appeal.
Section 200-3.2.D and Intensity Use Schedule	Variance/Special Permit	Bylaw now limits height of structures to 50 feet (previous limit was 36 feet).

Table 17: Requested Zoning Exemptions for Use of the Route 169 Site.

Section of the Zoning Ordinance	Available Relief	Why Exemption is Required: Company's Position
(height)		The Project will include several structures between 36 and 50 feet in height, requiring a Special Permit, and three structures that exceed 50 feet in height, requiring a variance. In final design, other structures may exceed the height restrictions. The Company cannot change the height of these structures. Specifically, the Company seeks height exemptions for: the liquefaction building (45 feet), the liquid nitrogen tanks (44 feet), and the flare stack (40 feet). The Company also requests exemptions for: the water storage tank (expected to be 35 feet), and the control building (20 feet). Additionally, the Company may possibly need exemptions for the LNG tank, the cold box, the gas turbine stack, and the noise barrier. Variances are a legally disfavored form of relief and, even if granted, are susceptible to appeal. Special Permits are subject to legal uncertainty, and the potential for adverse interpretations, delay, burden, and undue expense associated with the special permit process and appeals therefrom.
Section 200-3.2.D (setback)	Variance	Requires front setback of 40 feet; side setback of 35 feet; rear setback of 70 feet since part of the Facility abuts an A District. The Facility cannot meet these setback requirements, due to numerous site constraints and regulatory requirements, thus requiring a variance. Variances are a disfavored form of legal relief and even if granted are susceptible to appeal.
Section 200-3.3.B(4)	Variance	Prohibits accessory buildings within required yard setback. Some of the Facility buildings may be located in setback areas, thus requiring a variance. Variances are a disfavored form of legal relief and even if granted are susceptible to appeal.
Section 200-4.2.B	Variance	Requires off-street parking as a function of use. Recent amendments to the Bylaw may require the

Table 17: Requested Zoning Exemptions for Use of the Route 169 Site.

Section of the Zoning Ordinance	Available Relief	Why Exemption is Required: Company's Position
		Facility to have one parking space per 1000 square feet of floor area. If this Section applies to the Facility, the Facility cannot comply, thus requiring a variance. Variances are a legally disfavored form of relief and even if granted are susceptible to appeal.

Sources: Exhs. EFSB-Z-29(2); NEC-3 (Supp.), Table A.

3. Analysis and Findings Regarding Individual Exemptions

a. Preferred Interconnection Route

With respect to the use of NEC's Preferred Interconnection Route, the Company seeks exemption from four provisions of the Town of Charlton Zoning Bylaw: Section 200-6 (Special Permit requirement for earth excavation or filling in an Floodplain District); Section 200-3.2.B.8 (no specific authorization for natural gas pipelines as accessory uses); and Section 200-3.2.B(6)(s) (requiring site plan review and a Special Permit for pipelines, and requiring a 300-foot setback of pipelines from residences). See Table 16. Absent an exemption from these provisions, the Company would be required to seek and obtain two Special Permits and two variances to use the Preferred Interconnection Route to interconnect the Facility to the TGP mainline.

b. The Route 169 Site

The Company seeks exemption from numerous provisions of the Charlton Zoning Bylaw to permit its use of the Route 169 Site for the Facility. See Table 17. Absent an exemption from these provisions, each would require the Company to obtain a variance; one provision would require the Company to obtain both a variance and a Special Permit (Exh. EFSB-Z-29).

Specifically, unless exempted, the Company would be required to seek and obtain variances with respect to site setback, landscaping, frontage, and buffering requirements (Sections 200-3.2.C(2), 200-3.2.D, 200-3.3.B(3), 200-3.3.C(1); 200-3.3C(3)); height restrictions (Section 200-3.2.D); site plan review (Sections 200-7.1.D(1)(a), 200-3.2.B(6)(s)); provision of off-street parking (Section 200-4.2.B); required undergrounding of LNG storage tanks (Section 200-

3.2.B(6)(s)); performance standards (Section 200-4.1); and locational requirements for accessory buildings (Sections 200-2.1 and 200-3.3.B(4)). Absent an exemption from Section 200-3.2.D, the Company would be required to obtain both a variance and a Special Permit.

c. Conclusion on Individual Exemptions Requested

The Siting Board finds that the Company has established that exemptions from the provisions of the Town of Charlton Zoning Bylaw set forth in Tables 16 and 17 and reflected in Exh. EFSB-Z-29 for the Route 169 Site and the Preferred Interconnection Route are required within the meaning of G.L. c. 164, § 3.

E. Consultation with Local Officials and Community Outreach

1. Company Position

NEC states that it has sought to work informally and collaboratively with Town of Charlton officials, "particularly with respect to the function typically related to its site plan review" (Exhs. NEC-3, at 11; EFSB-Z-5). The Company stated that it met with the Town's building inspector, town administrator, and interim town planner to discuss the zoning exemption process (Exh. NEC-Z-3). NEC states that it has offered to follow an informal process generally akin to the Town's site plan review process (Exhs. EFSB-Z-5; EFSB-Z-8). Specifically, the Company states that it will provide Town officials with the materials normally presented for site plan review (Exhs. EFSB-Z-5; EFSB-Z-8). NEC states further that it is willing to attend Planning Board meetings to describe the Project, and receive Planning Board and public comment, and will adhere to any appropriate and reasonable conditions requested by the Planning Board on the site plans (Exhs. EFSB-Z-5; EFSB-Z-8).

The Company states that it engaged in ongoing, good faith discussions with the Town over a number of months regarding the execution of an HCA with the Town (Exh. EFSB-Z-5). The Company states that it prepared drafts of an HCA, which it forwarded to the Town for review and comment (NEC Reply Brief at 12).

2. Town Position

On brief, the Town pointed out that the Siting Board favors the resolution of local issues on a local level whenever possible, to reduce concern on any intrusion on home rule (Charlton Brief at 16). The Town noted further that the Siting Board "believes that most effective approach for doing so is for a petitioner to consult with officials regarding its project before seeking zoning exemptions" (id. at 16-17). The Town asserted that, "to balance Project need with the Town's valid safety concerns, a Host Community Agreement properly protecting local interests should be a condition of any zoning exemption that is granted" (id.).

The Town argued that, if the Siting Board were to approve the Project, the Final Decision must contain a condition requiring an HCA between the Company and the Town (Charlton Brief at 18). The Town argued that an HCA "is necessary to ensure formal collaboration, cooperation, and information-sharing between NEC and the Town" (id.). The Town listed four conditions that the Siting Board should include in the HCA (id. at 18-19). These conditions pertain to: (1) mitigation for construction-related impacts; (2) mitigation of impacts on public health, safety, welfare, and the environment; (3) provision of an executed Fire Safety Plan that includes Fire Department training, purchase of necessary equipment, and an evacuation plan; and (4) provisions for the storage of combustible and hazardous materials, noise restrictions, and protocols for complaints, operational safety, and reporting of leaks or other events to the Town (id. at 18-19).

As stated previously, the Company and the Town entered into an HCA on August 10, 2021 which addresses certain areas of concern illustrated in this section (Exh. EFSB-Z-26(S1)(1)).[154]

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[154] The Siting Board notes that an HCA is a private contract between two parties. See Woburn-Wakefield at 94 (interpreting analogous Host Community Agreement). The Board traditionally does not incorporate an HCA per se into a decision nor does the Board enforce the terms of such an HCA. Woburn-Wakefield at 94. See Town of Hopkinton v. Department of Public Utilities, 97 Mass.App.Ct. 1102 (2020) (unpublished opinion). See also NRG Canal 3 Development LLC, EFSB 15-06/D.P.U. 15-180, at 5 (2017); Exelon West Medway, LLC and Exelon West Medway II, LLC, EFSB 15-01/D.P.U. 15-25, at 6 (2016).

3. Conclusion on Consultation with Local Officials

The Department and the Siting Board continue to favor the resolution of local zoning issues on a local level whenever possible to reduce concern regarding any intrusion on home rule. Vineyard Wind at 132; Oak Bluffs at 65; K Street at 40; Russell Biomass at 60-65. The Department and the Siting Board believe that the most effective approach for doing so is for petitioners to consult with local officials regarding their projects before seeking zoning exemptions pursuant to G.L. c. 40A, §3. Oak Bluffs at 65; NSTAR Belmont at 41.

The development plans for the NEC Project have changed materially over the course of this proceeding. Based on the record, however, the Siting Board finds that Town officials had notice of the Project at an early point in the development process; that there were frequent interactions between the Company and Town officials regarding the Project over the course of its development; and that, after the Company filed its Amended Petitions and the Siting Board conducted a second public comment hearing regarding the Project, both Town officials and potentially affected Town residents had sufficient notice of the Project to allow them to participate in this proceeding in a meaningful way.

Originally, the Town argued that the Siting Board should require an executed HCA as a pre-condition for the Board's approval of the Project. The Siting Board notes that the parties were able to execute an HCA, which includes a framework for cooperation on issues of safety, construction, and operation of the Project. Although the parties were able to execute an HCA, the Siting Board notes that completing such an agreement was not a pre-requisite for the grant of zoning relief. See, Hopkinton LNG, D.P.U. 17-114, at 53 n.44; Town of Hopkinton vs. Department of Public Utilities, 97 Mass.App.Ct. 1102 (unpublished opinion) (2020).

F. Conclusion on Request for Individual Zoning Exemptions

As described above, the Siting Board finds that: (1) NEC is a public service corporation; (2) the proposed use is reasonably necessary for the public convenience and welfare; and (3) the specifically identified zoning exemptions set forth in Tables 16 and 17 are required for purposes of G.L. c. 40A, § 3. Additionally, we find that the Company engaged in good faith negotiations with the Town of Charlton. Accordingly, the Siting Board grants all of the individual zoning

exemptions the Company has requested in Tables 16 and 17, above, subject to the conditions set forth in this Decision.

IX. REQUEST FOR COMPREHENSIVE ZONING EXEMPTION

A. Standard of Review

The Company requests a comprehensive zoning exemption from the operation of the Charlton Zoning Bylaws in its entirety for the Route 169 Site and Preferred Interconnection Route (Exh. NEC-3, at 14-17; Company Brief at 13-18).

The Siting Board grants such requests on a case-by-case basis where the petitioner 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. Sudbury-Hudson at 215; Vineyard Wind at 153; East Eagle at 161-162.

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 proposed project contributes to a reliable energy supply for the Commonwealth; (2) the project is time sensitive; (3) the project involves multiple municipalities that could have conflicting zoning provisions that might hinder the uniform development of a large project spanning these communities; (4) 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 (5) the affected communities do not oppose the issuance of the comprehensive exemption. Sudbury-Hudson at 215; Vineyard Wind at 153; East Eagle at 161-162. See Town of Hopkinton v. DPU, 97 Mass.App.Ct. 1102 (2020) (unpublished opinion).

B. Positions of the Parties

1. Company Position

The Company asserts that because "there is substantial uncertainty" in the application of zoning requirements to energy infrastructure facilities, the granting of a comprehensive zoning exemption for such facilities is necessary and appropriate (Exh. NEC-3, at 14). Additionally, the Company asserts that the heavy regulation of such facilities under state law and industry standards operates to ensure that these facilities are safely and reliably operated, and that application of local

zoning requirements may lead to unnecessarily burdensome requirements that may be inconsistent with the applicable state and industry standards (id. at 15-16).

The Company asserts that the Project "is needed to address an immediate reliability need" (id. at 16). The Company maintains that seeking zoning permits and variances at the local level could result in denials, delays, excessive cost and/or redundancy of processes (id.). The Company concludes that if it were required to seek zoning relief for the Project, timely construction and operation of the Facility could be frustrated (id.).

2. Town Position

The Town of Charlton asserts that the Company has failed to demonstrate a need for a comprehensive zoning exemption (Charlton Brief at 13). The Town states that comprehensive exemptions "must necessarily be exceptional and warranted only by public convenience and necessity which, the Town asserts, NEC has not established here (id.). The Town states that a comprehensive exemption is warranted only to avoid substantial public harm, a stricter standard of review than the standard of review required for individual zoning exemptions (id.). The Town no longer opposes NEC election to address zoning matters in conjunction with NEC's application for zoning exemptions (Exh. EFSB-Z-26(S1)(1) at 4-5).

C. Analysis and Findings

The Siting Board found in Section II that there is a need for the Facility's liquefaction and storage capacity that would serve the terms of NEC's Precedent Agreement with National Grid in an economic and reliable manner, and that there is a need for additional LNG resources in the Commonwealth to serve other gas distribution companies with LNG storage facilities or potential opportunities in the fuel-security and transportation markets. The Siting Board notes that the Town no longer opposes the grant of a comprehensive zoning exemption. The Siting Board finds that issuance of a comprehensive zoning exemption for the Project would operate to reduce regulatory uncertainty; promote timely construction and operation of the Project and, accordingly, would prevent the type of substantial public harm that could result from an inadequate or unreliable supply of natural gas for customers in the Commonwealth. The Siting Board grants the

Company's request for a comprehensive exemption from the Town of Charlton Zoning Bylaw for the Route 169 Site and the Preferred Interconnection Route.

X. SECTION 61 FINDINGS

MEPA provides that "[a]ny determination made by an agency of the Commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." G.L. c. 30, § 61. Pursuant to 301 CMR 11.01(3), these findings are necessary when an EIR is submitted by a petitioner to the Secretary of EEA and should be based on such EIR. Where an EIR is not required, G.L. c. 30, § 61 findings are not necessary. 301 CMR 11.01(3).[155]

In this case, the record indicates that NEC filed an ENF for the Project on July 31, 2020, and the Secretary issued a Certificate on the ENF on September 10, 2020, stating that the Project does not require an EIR (Exh. EFSB-G-7(1)(S2)). Accordingly, Section 61 findings are not necessary in this case.

XI. 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 there is a need for additional natural gas facilities, such as the Project, to meet reliability, economic efficiency, and environmental objectives in the Commonwealth.

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[155] The Siting Board generally is not required to make a G.L. c. 30, § 61 finding in a G.L. c. 164, § 69J proceeding, as Siting Board action is exempt by statute from MEPA. G.L. c. 164, § 69I. However, the Board must comply with MEPA with respect to action under G.L. c. 40A, § 3, which is under the Department's jurisdiction.

In Section III, above, the Siting Board finds that, on balance, the Project is superior to the other alternatives identified with respect to meeting the identified need and providing a reliable energy supply for the Commonwealth with minimum impact on the environment at the lowest possible cost.

In Section IV, above, the Siting Board finds that the Company has: (1) developed and applied a reasonable set of criteria for identifying and evaluating alternative sites in a manner that ensures that it has not overlooked or eliminated any site that is clearly superior to the Project; and (2) identified a range of practical sites 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 while seeking to minimize cost and environmental impacts and ensure a reliable energy supply.

In Section V, above, the Siting Board finds that the Company provided sufficient information regarding environmental impacts and potential mitigation measures 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 provided, the Siting Board finds that, with the implementation of the mitigation and conditions specified, and given compliance with all local, state, and federal requirements, the temporary and permanent environmental impacts of the Project would be minimized. The Siting Board finds that the Project at the Route 169 Site, with the Preferred Interconnection Route, would achieve an appropriate balance among conflicting environmental impacts, as well as among environmental impacts, reliability, and cost.

In Section VI, above, the Siting Board finds that NEC has demonstrated that its plan to site the Project at the Route 169 Site, with compliance with the conditions herein, is consistent with 980 CMR 10.00.

In Section VII, above, the Siting Board finds that subject to the specific mitigation and the conditions set forth in this Decision, the Company's plans for construction of the Project are consistent with the current health, environmental protection, and resource use and development policies of the Commonwealth

In addition, the Siting Board finds, pursuant to G.L. c. 40A, § 3, that individual exemptions from certain provisions of the Town of Charlton Zoning Bylaw are required to construct and

operate the Project, and that a comprehensive exemption from the Zoning Bylaw as a whole could avoid substantial public harm.

Accordingly, the Siting Board approves pursuant to G.L. c. 164, § 69J, the Company's Amended Petition to Construct the Project using the Preferred (Route 169) Site and the Preferred Interconnection Route, as both are described herein, and approves pursuant to G.L. c. 40A, § 3, the Company's Amended Zoning Exemption Petition, both approvals subject to the following Conditions A through V.

A. The Siting Board directs the Company to conduct the intensive locational archaeological survey requested by MHC for sensitive portions of the route identified by MHC.

B. The Siting Board directs the Company to provide to the Siting Board, prior to the completion of construction, (a) its final landscaping plan; (b) artists' renditions of a view of the Facility from Route 169 both with plantings as installed and at a mature growth stage; and (c) all documented review documents from the Town of Charlton relative to site landscaping.

C. The Siting Board directs the Company to consult with the Town on the appearance of the sound wall, if not otherwise required by provision (2) of the HCA.

D. The Siting Board directs that the LNG storage tank shall be constructed at the lesser of a maximum height of 106 feet (including the dome of the tank) or a maximum elevation of the top of the tank (including the dome of the tank) at 635 feet above mean sea level. Further, the volume of the tank shall not exceed two million gallons of LNG.

E. The Siting Board directs the Company to discharge the test-water through a filter bag onto an upland area, outside of any wetland resource area buffer zones.

F. The Siting Board directs the Company to conduct sufficient hydrologic analysis to verify whether existing site conditions are conducive to maintaining pre-construction stormwater discharge rates. The Board further directs the Company to report on the results and conclusions of the additional hydrologic analysis and any associated actions taken as a result of the additional analysis.

G. The Siting Board directs the Company to, during operations, coordinate the scheduling of National Grid's and other customers' LNG truck arrivals in a manner that will avoid excess LNG trucks arriving at the Facility and queuing along the shoulder of Route 169 while truck-loading bays are occupied. The Siting Board further directs the Company to report on compliance with this directive on a quarterly basis for the first three years of commercial operation of the Facility.

H. The Siting Board directs the Company to: (1) maintain vegetation on its property and with frontage on Route 169 in a manner that does not obstruct sight lines for vehicles entering or exiting the Facility; and (2) install a reactive driveway warning light system,

as recommended by the Company's traffic consultant, north and south of the Facility driveways.

I. The Siting Board directs NEC to submit to the Siting Board for review and further action, as necessary, the final Air Quality Plan Approval identifying any substantive changes from the Proposed Air Quality Plan Approval.

J. The Siting Board directs NEC to, within one year of starting commercial operation, submit to the Siting Board (1) all results of the MassDEP-required sound survey required by Table 6 Condition 8 of the Proposed Air Quality Plan Approval, and (2) a report describing how the Company has complied with Table 6 Condition 8 of the Proposed Air Quality Plan Approval.

K. The Company shall, in consultation with the Town of Charlton, develop a comprehensive outreach plan for the Project. The outreach plan should describe the procedures to be used to notify the public about: (1) the scheduled start, duration, and hours of construction in particular areas; (2) the methods of construction that will be used in particular areas (including any use of nighttime construction); and (3) anticipated street closures and detours. The outreach plan should also include information on complaint and response procedures; Project contact information; and the availability of web-based project information. In addition, the Siting Board directs the Company to maintain a website with regular updates about Project construction (e.g., construction phases and progress, significant deliveries, roadway/lane closures). The website shall include contact information for a Company representative capable of addressing questions, complaints, or other issues from stakeholders.

L. The Siting Board directs the Company to limit construction to Monday through Saturday during the hours between 7:00 a.m. and 5:00 p.m., except by request of the Town of Charlton or of any agency with oversight of operations potentially affected by the Project, such as MassDOT. Work requiring longer duration than normal construction hours (e.g., deliveries of oversized equipment, pressure-testing, purging, and packing of the pipeline, processes and testing during commissioning of the liquefaction system that cannot be interrupted) is exempted from this condition. Should the Company need to extend construction work beyond the above-noted hours and days, with the exception of emergency circumstances on a given day necessitating extended hours, the Company shall seek written permission from the relevant municipal authority before the commencement of such work, and to provide the Siting Board with a copy of such permission. If the Company and municipal officials are not able to agree on whether such extended construction hours should occur, the Company may request prior authorization from the Siting Board and shall provide the relevant municipal authority with a copy of any such request.

M. The Siting Board directs NEC to prepare a comprehensive vibration mitigation plan in consultation with North American Tool, taking into consideration specific factors related to HDD operations and the timing of construction in the vicinity of North American Tool. NEC shall submit to North American Tool and to the Siting Board at least 60 days prior to the start of construction a comprehensive vibration mitigation

plan that includes provisions for addressing any damage to North American Tool's facility that occurs as a direct result of the pipeline construction. In addition, the Siting Board directs NEC to notify North American Tool both 30 days and five days in advance of construction commencement in the vicinity of North American Tool.

N. The Siting Board directs the Company to include in its final construction contingency plan: (1) the operational measures the Company will put in place to minimize the risk for drilling fluids to inadvertently return to the surface; and (2) the immediate steps the Company would take in responding to the incident and reporting it to appropriate regulatory authorities (e.g., MassDEP, Charlton Conservation Commission). NEC shall submit the HDD construction contingency plan to the Siting Board at least 30 days prior to the start of Project construction.

O. The Siting Board directs the Company to verify and ensure that the Town of Charlton owns sufficient and appropriate fire apparatuses that comply with NFPA 1901 and which are able to traverse the proposed driveways at the Route 169 Site, and to submit this information to the Siting Board prior to starting construction.

P. The Siting Board directs the Company to work collaboratively with the Town of Charlton to conduct a map-based analysis of the Route 169 Site to determine whether the necessary procedures, equipment, and materials (e.g., water and foam) are available such that appropriate firefighting materials can be distributed to all areas of the site.

Q. The Siting Board directs the Company to provide a summary of the results of the three-dimensional vapor dispersion modeling prior to commissioning of the Facility.

R. The Siting Board directs the Company to submit its safety plan to the Siting Board and the Department of Public Utilities Pipeline Safety Division 30 days prior to commencement of Facility operation.

S. The Siting Board directs the Company to provide appropriate emergency personnel from Charlton and its mutual aid partners the opportunity to attend training at a specialized school in Texas for LNG firefighting training (or its equivalent).

T. The Siting Board directs NEC to employ non-PFAS high-expansion foams at the Facility, to the extent such products are commercially available, efficacious, and compliant with the relevant requirements of 310 CMR 112.

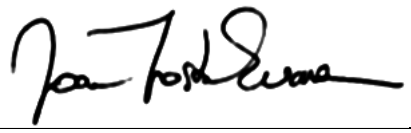
U. The Siting Board directs the Company and its contractors and subcontractors to comply with all applicable federal, state, and local laws, regulations, and ordinances from which the Company has not received an exemption.

V. 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 Decision, noting any outstanding conditions yet to be satisfied and the expected date and status of such resolution.

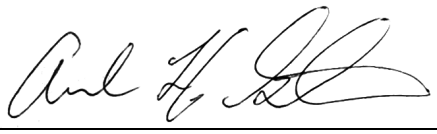
Because issues addressed in this Decision relative to this Facility are subject to change over time, construction of the proposed Project must be commenced within three years of the date of the Decision.

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 the Company, and its successors in interest, to notify the Siting Board of any changes other than minor variations to the Project so that the Siting Board may decide whether to inquire further into a particular issue. The Company 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 herein to the Executive Office of Energy and Environmental Affairs, and the Company shall serve a copy of this Decision on the Town of Charlton Board of Selectmen and Town Administrator. The Company shall certify to the Secretary of the Department within ten business days of issuance that such service has been made.



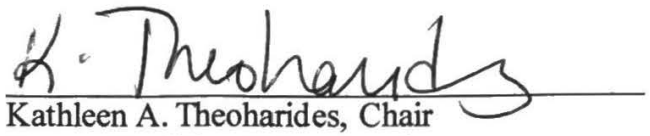
Joan Foster Evans
Presiding Officer



André Gibeau
Presiding Officer

Dated this 22nd day of October 2021

APPROVED by a vote of the Energy Facilities Siting Board at its meeting on October 21, 2021 by the members present and voting. Voting for the Tentative Decision as amended: Kathleen Theoharides, Secretary of the Executive Office of Energy and Environmental Affairs and Siting Board Chair; Matthew H. Nelson, Chair of the Department of Public Utilities; Cecile M. Fraser, Commissioner of the Department of Public Utilities; Patrick C. Woodcock, Commissioner of the Department of Energy Resources; Gary Moran, Deputy Commissioner and designee for the Commissioner of MassDEP; Jonathan Cosco, General Counsel and designee for the Secretary of the Executive Office of Housing and Economic Development; Joseph Bonfiglio, Public Member; and Brian Casey, Public Member.



Kathleen A. Theoharides, Chair
Energy Facilities Siting Board

On this date 22nd day of October 2021

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