COMMONWEALTH OF MASSACHUSETTS
Energy Facilities Siting Board

Petition of Southern Energy Kendall, LLC for Approval to Upgrade and Replace Generating Facilities at the Existing Kendall Square Station in Cambridge, Massachusetts	)	EFSB 99-4

FINAL DECISION

Sheila R. McIntyre
Hearing Officer
December 15, 2000

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
AALs	Annual allowable ambient limits
ACCs	Air cooled condensers
ANP Bellingham Decision	ANP Bellingham Energy Company, 7 DOMSB 39 (1998)
ANP Bellingham Compliance Decision	ANP Bellingham Energy Company - Compliance, 9 DOMSB 211 (1999)
ANP Blackstone Decision	ANP Blackstone Energy Company, 8 DOMSB 1 (1999)
AUL	Activity and Use Limitations
BACT	Best available control technology
Board	Energy Facilities Siting Board
Berkshire Power Decision	Berkshire Power Development, Inc., 4 DOMSB 221 (1996)
Brockton Power Decision	Brockton Power LLC, 10 DOMSB 157 (2000)
BTA	Best technology available
Btu/kWh	British thermal units per kilowatt hour
Canal Station site	Southern Energy Canal Units 1 and 2 in Sandwich, Massachusetts
canal walk	Proposed public access path along the Broad Canal
Cancer Incidence Reports	Massachusetts Department of Public Health cancer statistic reports
CELCo	Cambridge Electric Light Company
CELCo/ComGas	Cambridge Electric Light Company and Commonwealth Gas Company collectively
cfs	Cubic feet per second
CHA Report	1999 Public Health Assessment: A Report from the Cambridge Health Alliance
Charles Basin	Charles River from Watertown Dam to the Science Park Dam
CHC	Cambridge Historical Commission
City	Cambridge, Massachusetts as an intervenor
CLEPC	Cambridge Local Emergency Planning Commission
CO	Carbon monoxide
CO_2	Carbon dioxide

Com/Energy	Commonwealth Energy
COM/Gas	Commonwealth Gas Company
Company	Southern Energy Kendall, L.L.C.
COM/Steam	Commonwealth Energy Steam Company
CSO	Combined sewer overflows
CTG	Combustion turbine generator
CRWA	Charles River Watershed Association
dBA	A-weighted decibel
Diffuser	Pipe that diffuses once-through cooling water
Dighton Power Decision	Dighton Power Associates, 5 DOMSB 193 (1997)
DO	Dissolved oxygen
EMF	Electric and magnetic fields
ENF	Environmental Notification Form
EPA	The United States Environmental Protection Agency
EPC	Engineering, procurement, and construction
ERCs	Emission reduction credits
ERP	Emergency Response Plan
F	Fahrenheit
FAA	Federal Aviation Administration
FEIR	Final Environmental Impact Report
fps	Feet per second
GEP	Good Engineering Practice
GIS	Geographic Information Systems
gpd	Gallons per day
HAPs	Hazardous air pollutants
HAPs Study	EPA's 1998 "Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress"
HRSG	Heat recovery steam generator
Hz	Hertz (cycles per second)

IDC Bellingham Decision	IDC Bellingham, LLC, 9 DOMSB 260 (1999)
Kendall Station	The Existing Kendall Square Station
Kendall Station project	The proposal to upgrade Kendall Station
kV	Kilovolt
kV/m	Kilovolts per meter
L_{10}	The sound level that is exceeded 10 percent of a measuring period
L_{90}	The level of noise that is exceeded 90 percent of a measuring period
LAER	Lowest Achievable Emission Rate
Land Boulevard	Edwin Land Boulevard
lbs/MMBtu	Pounds per million British thermal units
L_{dn}	Day-night average sound level with nighttime penalty
L_{eq}	24-hour equivalent noise level
LNAPL	Light non-aqueous phase liquid
LOS	Level of service -- a measure of the efficiency of traffic operations at a given location
LUW	Land under a water body
MassGIS	Massachusetts Geographic Information System
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MDC	Metropolitan District Commission
MDEM	Massachusetts Department of Environmental Management
MDEP	Massachusetts Department of Environmental Protection
mG	Milligauss
$\mu g/m^3$	Micrograms per cubic meter
mgd	Million gallons per day
mg/l	Milligrams per liter
MGP	Manufactured gas plant
mgy	Million gallons per year
MHC	Massachusetts Historical Commission

Millennium Power Decision	U.S. Generating Company, 6 DOMSB 1 (1997)
MIT	Massachusetts Institute of Technology
MMBtu	Million British thermal units
MW	Megawatt
MWRA	Massachusetts Water Resources Authority
NAAQS	National ambient air quality standards
NEA Decision	Northeast Energy Associates, 16 DOMSC 335 (1987)
1985 MECoNEPCo Decision	Massachusetts Electric Company et al., 13 DOMSC 119 (1985)
NML	Noise Monitoring Location
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NRHP	National Register of Historic Places
NSPS	New source performance standards
NSR	New source review
OTC	Once-through cooling
Ozone	Ground level ozone
Peakers	Peaking generators
PL	Property line
PM-2.5	Particulate matter less than 2.5 microns
PM-10	Particulate matter less than 10 microns
PPAs	Power purchase agreements
Ppm	Parts per million
Proposed project	The proposal to upgrade Kendall Station
PSD	Prevention of significant deterioration
PUD	Planned unit development
RAO	Response Action Outcomes

Restructuring Act	M.G.L. c. 164 of the Acts of 1997
ROW	Right-of-way
SCR	Selective Catalytic Reduction System
SE Kendall	Southern Energy Kendall, L.L.C.
7Q10	Seven-day, ten-year low water flow
Sigma	Sigma Consultants, Inc.
SILs	Significant Impact Levels
Silver City Decision	Silver City Energy Limited Partnership, 3 DOMSB 1 (1994)
Sithe Edgar Decision	Sithe Edgar Development LLC, 10 DOMSB 1 (2000)
Sithe Mystic Decision	Sithe Mystic Development LLC, 9 DOMSB 101 (1999)
Sithe West Medway Decision	Sithe West Medway Development LLC, 10 DOMSB 274 (2000)
Siting Board	Energy Facilities Siting Board
SO_2	Sulfur dioxide
Southern Energy	Southern Energy, Inc.
SO_X	Sulfur oxides
SPCC Plan	Spill Prevention, Control and Countermeasure Plan
TDM	Transportation and Demand Management
TDS	Total dissolved solids
TELs	Threshold effects exposure limits
TLV	Threshold Limit Value
tpy	Tons per year
TRC	TRC Environmental Corporation
TSS	Total suspended solids
TURA	Toxic Use Reduction Act
VOCs	Volatile organic compounds
WPA	Wetlands Protection Act

The Energy Facilities Siting Board hereby APPROVES subject to conditions the petition of Southern Energy Kendall, L.L.C. for approval to upgrade generating facilities at the existing Kendall Square Station in Cambridge, Massachusetts. This upgrade will increase the electrical generating capacity at Kendall Square Station from approximately 64 megawatts to approximately 234 megawatts.

I. INTRODUCTION

A. Description of Proposed Project, Site, and Interconnections

Southern Energy Kendall, L.L.C. ("SE Kendall" or "Company")[1] proposes to upgrade Kendall Square Station ("Kendall Station"), an existing cogeneration plant, into a natural gas-fired, combined-cycle, electric generating facility with a total net nominal electric output of 234 megawatts ("MW") in Cambridge, Massachusetts ("proposed project") (Exh. EFSB-G-2-S Bulk Att. at 2-1 to 2-2). The proposed project would integrate a new combined-cycle turbine with a net nominal capacity of 170 MW with existing steam turbines on the site with a net nominal electrical output of 64 MW (id. at 2-1). In December of 1998, Southern Energy purchased the Kendall Station generating assets from Commonwealth Energy ("COM/Energy") under the divestiture of generating assets pursuant to the Massachusetts Restructuring Act of 1997 (Exhs. SEK-1, at 3-4; EFSB-SS-5; G.L. c. 164, §1A).

The proposed project would be located on the 5.8-acre site of Kendall Station in an area of east Cambridge zoned for office and planned unit development (Exh. SEK-1, at 4.2-1 to 4.2-10). The proposed site is bordered to the south by the Broad Canal, an extension of the Charles River; to the east by First Street; to the north by Athenaeum Street and office buildings; and to the west by land currently used as parking lots, where Cambridge Research Park L.L.C. has proposed a ten acre multi-use office, commercial, and residential development (id. at 4.2-10 and 4.2-14, Figure 4.2-5).

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[1] The Southern Company is an international energy company based in Atlanta, Georgia (Exh. EFSB-G-4). Southern Energy, Inc. ("Southern Energy") is a wholly owned subsidiary of the Southern Company; SE Kendall is an indirect wholly owned subsidiary of Southern Energy (id.).

The Company stated that the proposed site contains existing electrical and steam generating equipment and ancillary facilities, including a power block building, administrative offices, a storage shed, a switchyard, two fuel oil tanks, two jet engine peaking generators ("peakers"), cooling water intakes along the Broad Canal, and other minor structures (id. at 2-2). The existing facility produces steam using three main steam boilers (boilers 1, 2 and 3)[2] and two back-up steam package boilers (boilers 4 and 5)[3] (Exhs. EFSB-G-8; EFSB-G-8-S). The steam produced from both the main and package boilers is fed through up to three existing steam turbine generators ("steam turbines")[4] and sent to Commonwealth Energy Steam Company ("COM/Steam") for sale to major customers in the Kendall Station area (Exh. EFSB-G-2-S Bulk Att. at 2-2).[5]

As part of the proposed project, the Company proposed to construct a new building to the west of the existing turbine building that will house a 170 MW GE 7241 FA combustion turbine generator ("CTG"), a heat recovery steam generator ("HRSG"), and a 250-foot exhaust stack (Exh. EFSB-G-2-S Bulk Att. at 2-12 to 2-13, Figure 2-4). The CTG would run primarily on natural gas, with a 30-day back-up supply of 0.05 percent sulfur, distillate oil (id. at 2-13). SE Kendall proposed to use the CTG to generate electricity, and the HRSG to condense the steam

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[2] The Company stated that boiler 1 is rated at 18 MW, boiler 2 at 21 MW, and boiler 3 at 25 MW and that all boilers can run on residual oil or natural gas (Exhs. EFSB-G-8; EFSB-RR-67-S).

[3] The Company noted that boilers 4 and 5 are owned by COM/Steam but operated by SE Kendall under an agreement between SE Kendall and Com/Steam (Exh. EFSB-S-3; Tr. 2, at 242-243).

[4] The three existing steam turbines currently operate at 13.8 kilovolts ("kV") and inject power into the local grid at that level (Tr. 5, at 671-672). In the future, the Company expects to add a new transformer ("future transformer") that would step-up the output from these steam turbines to 115 kV and interconnect them with the same transmission line that would leave the site (id.).

[5] COM/Steam, which is a subsidiary of NSTAR, distributes steam to 17 major customers in the Cambridge and Boston area, including Massachusetts General Hospital, the Museum of Science, Polaroid, and Biogen (Exh. EFSB-G-2-S Bulk Att. at 2-2). SE Kendall proposes to expand steam sales following construction of the proposed project (id. at 2-1 to 2-2; Tr. 8, at 1022).

for use in the steam turbines of the existing plant or for sale to COM/Steam (Exh. EFSB-G-2-S Bulk Att. at 2-1, 2-12 to 2-13, Figure 2-3). Boiler 3 would be used for additional steam capacity during peak steam sale days when the CTG is operating on oil and for back-up in the event that the CTG breaks down or is shut down for maintenance (id. at 2-1; Exh. EFSB-RR-69). Boilers 1 and 2 would serve as additional back-up for steam in the event that either boiler 3 is down or the CTG is down and boiler 3 cannot meet the steam demand (Exhs. EFSB-G-8(c)-S; EFSB-RR-69).

The Company proposes to use the existing once-through-cooling ("OTC") intakes to withdraw cooling water for the proposed project from the Broad Canal. However, the Company proposes to modify the OTC discharge configuration by constructing a new pipe with the capability of diffusing the OTC water out of vents as it discharges into the Charles River ("diffuser") (Exhs. EFSB-G-2-S Bulk Att. at 2-19, Figures 2-3, 2-5; EFSB-G-1-S (Appendix 2)). The Company also proposes to use fin-fan coolers mounted on top of the new building to cool the CTG and the other new equipment (Exh. EFSB-G-2-S Bulk Att. at 2-1; Tr. 8, at 1028). SE Kendall proposes to refurbish the 1.25 million gallon oil tank for storage of the low sulfur oil and reuse buildings on-site for water treatment and other ancillary services (Exhs. EFSB-G-2-S Bulk Att. at Figure 2-4; EFSB-RR-9). Further, the Company proposes to construct a 10,000-gallon ammonia storage tank, a 100,000-gallon demineralized water tank, a switchyard, a substation, and a public access path along the Broad Canal ("canal walk") (Exh. EFSB-G-2-S Bulk Att. at 2-14 to 2-15).

The proposed project would interconnect with the regional transmission system via a new 2.6 mile 115 kV underground transmission line running from Cambridge Electric Light Company's ("CELCo") Putnam Station in Cambridge to Kendall Station (id. at 2-14). The existing natural gas supply to Kendall Station would be upgraded by installing a new high pressure distribution line from Commonwealth Gas Company's ("COM/Gas") existing Third Street gate station and by replacing an existing 14-inch pipeline from the gate station to the connection point with the Algonquin Gas Transmission Company pipeline in Somerville (Exhs. EFSB-G-2-S Bulk Att. at 2-14, Appendix 2; EFSB-G-3).

B. Procedural History

On July 27, 1999, SE Kendall filed with the Energy Facilities Siting Board ("Siting Board") a petition for approval to upgrade the equipment at the existing Kendall Station in Cambridge, Massachusetts. The Siting Board docketed the petition as EFSB 99-4.

On September 23, 1999, the Siting Board conducted a public hearing in Cambridge. In accordance with the direction of the Hearing Officer, the Company provided notice of the public hearing and adjudication.

Timely petitions to intervene were filed by the City of Cambridge ("City"), Joseph J. Avin, Carole K. Bellew, Stephen Bikofsky, Barbara Broussard, Mary Ann Donofrio, Philip Higonnet, Jennie Iantosca, Frances Menezes, Charles C. Poirier, Mary Travers, and Robert Travers; a joint petition to intervene was filed by CELCo and COM/Gas (collectively "CELCo/ComGas"). The Hearing Officer granted the petitions to intervene filed by the City and by CELCo/ComGas (Southern Energy Kendall LLC, EFSB 99-4, Hearing Officer Ruling, October 26, 1999). The Hearing Officer denied the intervention petitions of Mr. Avin, Ms. Bellew, Mr. Bikofsky, Ms. Broussard, Ms. Donofrio, Mr. Higonnet, Ms. Iantosca, Ms. Menezes, Mr. Poirier, Ms. Travers, and Mr. Travers, but permitted these petitioners to participate as a single interested person with a designated spokesperson (id.). The Hearing Officer received timely petitions to participate as interested persons from Sigma Consultants, Inc. ("Sigma") and Massachusetts Institute of Technology ("MIT") (id.). The Hearing Officer granted these petitions (id.).

The Siting Board conducted thirteen days of evidentiary hearings, commencing on February 14, 2000, and ending on May 24, 2000. SE Kendall presented the testimony of the following witnesses: Glenn Harkness, P.E., Senior Vice President of TRC Environmental Corporation ("TRC"), who testified as to site selection, and visual and traffic impacts; Shawn Konary, Environmental Affairs Manager for Southern Energy New England, who testified as to safety, general and solid waste impacts; Laurence Labrie, Senior Air Quality Scientist with TRC, who testified as to safety, general, and air impacts; Gary Ritter, Certified Safety Professional and Certified Industrial Hygienist with TRC, who testified as to safety and general impacts; Charles Cooper, Director of Environmental Permitting and Planning at TRC, who testified as to land use,

health, water, and wetlands impacts; James Barnes, P.E., Senior Engineering Consultant at Acentech Incorporated, who testified as to noise impacts; Peter Valberg, Ph.D., Senior Scientist at Cambridge Environmental, Inc. and Adjunct Associate Professor of Environmental Health at the Harvard School of Public Health, who testified as to electric and magnetic fields ("EMF") and health impacts; Andrew Smyth, Senior Water Resources Specialist at TRC, who testified as to water and wetland impacts; and Norman Cowden, P.E., Project Director for the Kendall Station Project at Southern Energy New England, L.L.C., who testified as to general, site selection, safety, water, EMF, wetland, air and visual impacts.

On June 23, 2000, SE Kendall and the City submitted initial briefs. On July 7, 2000, SE Kendall and the City submitted reply briefs. The record includes 692 exhibits consisting primarily of information request responses and record request responses.

C. Jurisdiction and Scope of Review

As a unit designed to increase existing generating capacity at Kendall Station by 170 MW, from approximately 64 MW to approximately 234 MW, SE Kendall's proposed project falls within the first definition of facility set forth in G.L. c. 164, § 69G, which states, in pertinent part, that a facility is a generating unit defined as:

> any generating unit designed for or capable of operating at a gross capacity of 100 megawatts or more, including associated buildings, ancillary structures, transmission and pipeline interconnections that are not otherwise facilities, and fuel storage facilities.

In accordance with G. L. c. 164, § 69J¼, before approving a petition to construct a generating facility, the Siting Board must determine that the applicant has met five requirements. First, the Siting Board must determine that the applicant's description of the site selection process used is accurate (see Section II., below). Second, the Siting Board must determine that the applicant's description of the proposed generating facility and its environmental impacts are substantially accurate and complete (see Section III., below). Third, the Siting Board must determine that the proposed generating facility will minimize the environmental impacts consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts (see Section III., below). Fourth, the Siting Board must determine

that plans for construction of the proposed generating facility are consistent with current health and environmental protection policies of the Commonwealth and with such energy policies as are adopted by the Commonwealth for the specific purpose of guiding the decisions of the Board (see Section IV., below). Finally, if the expected emissions from the proposed facility do not meet the applicable technology performance standard, the Siting Board must determine, based on a comparison with other fossil fuel generating technologies, that the proposed generating facility on balance contributes to a reliable, low-cost, diverse regional energy supply with minimal environmental impacts.[6]

II. SITE SELECTION

A. Standard of Review

G.L. c. 164, § 69J¼ requires the Siting Board to determine whether an applicant's description of the site selection process used is accurate. An accurate description of an applicant's site selection process shall include a complete description of the environmental, reliability, regulatory, and other considerations that led to the applicant's decision to pursue the project as proposed at the proposed site, as well as a description of other siting and design options that were considered as part of the site selection process.

The Siting Board also is required to determine whether a proposed project provides a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G.L. c. 164, § 69H. To accomplish this, G.L. c. 164, § 69J¼ requires the Siting Board to determine whether "plans for the construction of a proposed project minimize the environmental impacts consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility." G.L. c. 164, § 69J¼. Site selection, together with project design and mitigation, is an integral part of the process of minimizing the environmental impacts of an energy facility. The Siting

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[6] As set forth in Section III.B, below, the Siting Board finds that the expected emissions from the proposed generating facility do not exceed the technology performance standard specified in 980 CMR, § 12.00. Therefore, a generating technology comparison is not required in this case.

Board therefore will review the applicant's site selection process in order to determine whether that process contributes to the minimization of environmental impacts of the proposed project and the costs of mitigating, controlling, and reducing such impacts. In making this determination, the Siting Board also will consider, consistent with its broad mandate under G.L. c. 164, § 69H, the reliability, regulatory, and other non-environmental advantages of the proposed site.

B. Description

SE Kendall is a wholly owned subsidiary of Southern Energy, an international company headquartered in Atlanta, Georgia, whose operations include electric generation and distribution, integrated utility operations, and energy marketing (Exh. EFSB-G-4). In early 1997, Southern Energy decided to pursue a position in the New England generation market in response to the restructuring of the electricity industry in New England (Exhs. EFSB-SS-1; EFSB-2). SE Kendall stated that Southern Energy's goals in New England were to develop a portfolio of existing generation assets and to develop new generating facilities with better efficiency and lower emissions rates than existing regional generating units (Exh. SEK-1, at 3-3).[7]

SE Kendall stated that Southern Energy sought to identify sites in New England which were already committed to power generation and transmission and which offered the potential for further development (id. at 3-2). Southern Energy specifically sought sites where additional generation: (1) would have minimal impact on the environment; (2) would have access to existing water, natural gas, and electric transmission infrastructure; (3) would receive a level of community support; and (4) would be consistent with the policies and objectives of the Restructuring Act (id. at 3-2). The Company asserted that sites already used for electrical generation (i.e., sites considered as brownfield sites) offered advantages from a development perspective (id. at 3-2 to 3-3; Exh. EFSB-SS-2). SE Kendall stated that Southern Energy found

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[7] Southern Energy currently owns generating assets in New York state, including the Bowtie (1215 MW) and Lovett (443 MW) generating stations and two smaller peaking units (Exh. EFSB-SS-2). In addition, Southern Energy began development of a new 525 MW facility on an industrial site in New Hampshire, but subsequently sold the rights to develop and construct the facility (Exh. EFSB-SS-14).

that the Kendall Station measured favorably when considering these factors (Exh. EFSB-SS-2).

Southern Energy successfully bid for the non-nuclear generating assets of COM/Energy, and acquired the assets in December, 1998 (Exh. SEK-1, at 3-4).[8] In addition to Kendall Station, Southern Energy also acquired Canal Units 1 and 2 in Sandwich, Massachusetts ("Canal Station site"), five diesel generating plants located in Martha's Vineyard, and a 1.4325 percent ownership interest in the William F. Wyman Unit 4 located in Maine (id. at 3-4).

SE Kendall stated that Southern Energy evaluated the sites that it purchased from COM/Energy for their potential to be further developed while minimizing environmental impacts including: local and regional land use, water resources, wetlands, air quality, solid waste and hazardous waste, local and regional health impacts, EMF, visual impacts, noise, traffic impacts, and cultural resources (Exhs. EFSB-SS-5; SEK-1, at 3-5). Although Southern Energy did not formally rank or write field observation on the sites it purchased, it visited and evaluated each of the sites on numerous occasions (Exh. EFSB-SS-15). SE Kendall noted that the sites on Martha's Vineyard do not have adequate land and associated infrastructure necessary to develop a large generating facility without significant land-use impacts (Exh. EFSB-SS-5).

SE Kendall indicated that Southern Energy generally requires a 25-acre site consistent with existing land uses and community development objectives for construction of an upgrade or expansion of 500 MW or greater (id.). SE Kendall noted that the only portion of the Kendall Station site available for development is approximately 0.8 acres; consequently, Southern Energy designed a smaller 170 MW combined-cycle facility which incorporated some of the existing equipment on-site (Exh. EFSB-SS-10). SE Kendall asserted that the capacity of the GE 7FA combustion turbine proposed for the upgrade is perfectly matched with the existing steam turbines, while the next smaller available combustion turbine, at 86 MW, would be able to supply only 60 percent of the steam needed for the existing turbines (Exh. EFSB-SS-17). SE Kendall stated that the configuration of the proposed project on the Kendall Station site was constrained by both existing equipment and historical features on the site (Exh. EFSB-SS-12; Tr. 3, at 356-357). In addition, SE Kendall testified that the size and shape of the proposed buildings

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[8] The Company indicated that it has bid for other generating assets in the region but that those bids had not been accepted (Exh. EFSB-SS-2; Tr. 3, at 403).

were determined primarily by the size of the turbines and HRSG units; however, SE Kendall indicated that it reduced its typical design height for the HRSG enclosure to reduce visual impacts (Tr. 3, at 360-361).

SE Kendall argued that, as a brownfield site, the Kendall Station site offers SE Kendall the potential for expanding the existing facilities while minimizing environmental impacts and creating certain environmental improvements (Exh. SEK-1, at 3-5). In particular, SE Kendall asserted that generating capacity at the site could be increased while reducing NO_X and SO_X emissions (Tr. 3, at 365-368). The Company also asserted that the redevelopment project would allow the Company to reduce the current impacts of discharges from Kendall Station on the Charles River and to create an environmental benefit by dissipating the salt wedge in that part of the Charles River (id. at 431-433). In addition, the Company testified that the Kendall Station site could be redeveloped without any increase in impervious surface, and argued that its proposal would actually reduce demand for city water and sewer and stormwater discharges (id. at 388, 392-393).

SE Kendall argued that the higher ambient noise levels associated with the urban location of the proposed project make increases in noise levels less noticeable than at a greenfield site, and that the high buildings surrounding the Kendall Station site would limit the distance at which facility noise could be heard (id. at 369-370, 424). The Company asserted that the visual impacts of the proposed project expansion would be less than those of a facility constructed on a greenfield site because existing and proposed buildings would block views of the facility from most directions, and because the site is already in industrial use (id. at 373-374). SE Kendall testified that the Kendall Station site also has advantages with respect to traffic because of its ready access to public transportation (id. at 376-377). With respect to safety, the Company noted that Kendall Station is located in close proximity to fire stations and hospitals, and argued that Cambridge fire, emergency and health professionals are better trained than their rural counterparts to deal with the type of industrial events (e.g., release of hazardous substances) which could occur at a generating facility (id. at 429-430).

The Company also discussed the advantages and disadvantages of the site with respect to natural gas and electrical interconnections and other infrastructure (Exhs. EFSB-SS-8; EFSB-SS-

9; Tr. 3, at 419-420). The Company stated that, while the electric and natural gas interconnections likely would require Siting Board approval, they would run underground, reducing environmental impacts (Exhs. EFSB-SS-8; EFSB-SS-9; Tr. 3, at 419-420). The Company also noted that because Kendall Station is located close to electrical power demand, there would be no need for upgrades to the regional transmission grid to support the project (Tr. 3, at 416-417, 419-420). The Company noted that it would reuse the existing steam system, water intake and outfall system, and storage tanks (id. at 415).

C. Analysis

The Company has described a development strategy for the Northeast which focuses on the purchase and redevelopment of existing generating assets, and which resulted in the purchase of existing generation assets from Com/Energy. SE Kendall has provided information on the sites Southern Energy has pursued in the Northeast and the assets it bought from Com/Energy. SE Kendall provided information on why Southern Energy chose to develop the Canal Station and Kendall Station sites, as well as how it decided upon site layout, generating capacity, and associated cooling and other technologies for the proposed project. The Siting Board finds that the Company's description of the site selection process used is accurate.

The Company asserted that its proposal minimizes environmental impacts in part through the use of a "brownfield approach" to development. In previous cases, the Siting Board has reviewed the development of new generation on sites currently or previously used for power generation. In these decisions, the Siting Board has noted that the redevelopment and reuse of previously disturbed sites and the use of existing infrastructure can limit many of the environmental impacts that may be associated with industrial development. Additionally, where an industrial character and the presence of industrial support infrastructure are already evident, there often is the potential to develop additional facilities such as a generating plant, consistent with consideration of land use compatibility for such development. The Siting Board encourages such "brownfield" development where appropriate. However, the Siting Board notes that the benefits of such an approach are necessarily site and facility-specific. A review of any such site must take into account the scale, the nature and physical attributes of any existing or recent use

on the site, the existing character of the surrounding area, and the impacts which the specific proposed use would have on the surrounding area. See Sithe Mystic Development, 9 DOMSB 101, at 123 (1999) ("Sithe Mystic Decision"); Sithe Edgar Development, 10 DOMSB 1, at 24 (2000) ("Sithe Edgar Decision"); Sithe West Medway Development, 10 DOMSB 274, at 296 (2000) ("Sithe West Medway Decision").

Here, SE Kendall is proposing the installation of new equipment to be operated integrally with the existing facilities, rather than the development of a separate new generating facility on a brownfield site. Much of the existing equipment and infrastructure – steam turbines, oil tanks, once-through cooling structures -- will be reused in the upgraded facility. The record indicates that the redevelopment of the Kendall Station site could increase generating capacity near the Boston load center while reducing air emissions from the site and improving water quality in the neighboring Charles River. Further, because Kendall Station is located on the Broad Canal, the site has ready access to an adequate supply of water for once-through cooling. In addition, the site has certain advantages directly related to its location in a highly-developed urban area -- the presence of tall structures on and around the site which could block views of the facility from most directions, access to an extensive public transportation network and trained emergency services, and a relatively high level of ambient noise which could, to a certain extent, camouflage facility noise.

However, because the site is located in a dense urban area with constant activity, the noise, visual and safety impacts of the proposed project could affect a significant number of people. The small size of the site and the constraints created by the location of existing equipment may limit the Company's ability to address these issues through site layout. In addition, because ambient noise levels are already high, any increase in noise resulting from the proposed project upgrade is of concern. Finally, although electricity currently is generated at the Kendall Station, the existing natural gas supply and electric transmission infrastructure is not adequate to serve the upgraded facility, and the site is located at a considerable distance from interconnection points. Thus, construction of the proposed project also will require the construction of new natural gas and electric interconnections, each lengthy enough to be the subject of separate Siting Board proceedings. The Siting Board anticipates that these

interconnections will be constructed primarily underground and in city streets, and that future Siting Board proceedings will adjudicate the interconnection routes that could minimize environmental impacts.

The record reflects the advantages and disadvantages of redevelopment at the Kendall Station site. On balance, the advantages contribute to the minimization of environmental impacts and the creation of certain environmental benefits; however, the disadvantages create the potential for environmental impacts which will need to be minimized by the Company through design or mitigation. Accordingly, the Siting Board finds that the Company's site selection process resulted in the selection of a site that contributes to the minimization of environmental impacts and the costs of mitigating, controlling, and reducing such impacts.

III. ENVIRONMENTAL IMPACTS

A. Standard of Review

G.L. c. 164, § 69J¼ requires the Siting Board to determine whether the plans for construction of a proposed generating facility minimize the environmental impacts of the proposed project consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility. In order to make this determination, the Siting Board assesses the impacts of the proposed project in eight areas prescribed by its statute, including air quality, water resources, wetlands, solid waste, visual impacts, noise, local and regional land use, and health, and determines whether the applicant's description of these impacts is accurate and complete. G.L. c. 164, § 69J¼.

The Siting Board also assesses the costs and benefits of options for mitigating, controlling, or reducing these impacts, and determines whether mitigation beyond that proposed by the applicant is required to minimize the environmental impacts of the proposed project consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility. Compliance with other agencies' standards does not establish that a proposed project's environmental impacts have been minimized.

Finally, the Siting Board assesses any tradeoffs that need to be made among conflicting

environmental impacts, particularly where an option for mitigating one type of impact has the effect of increasing another type of impact. An assessment of all impacts of a facility is necessary to determine whether an appropriate balance is achieved both among conflicting environmental concerns and between environmental impacts and cost. A facility proposal which achieves this balance meets the Siting Board's statutory requirement to minimize environmental impacts consistent with minimizing the costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility.

B. Air Quality

This Section describes the proposed project's emissions and impacts, compliance with existing regulations, offset proposals, and mitigation proposed by the Company.

1. Applicable Regulations

The Company indicated that regulations governing air impacts of point sources include National Ambient Air Quality Standards ("NAAQS");[9] New Source Review ("NSR") requirements; Prevention of Significant Deterioration ("PSD"),[10] and New Source Performance Standards ("NSPS") for criteria pollutants; the MDEP Major Comprehensive Plan Approval; MDEP's Air Toxics Policy Operating Permit; and Title IV Acid Rain Sulfur Dioxide Allowances (Exh. EFSB-A-1-S at 3-2 to 3-9).

The Company indicated that, under NAAQS, all geographic areas are classified and designated as attainment, non-attainment or unclassified for the six criteria pollutants: sulfur dioxide ("SO_2"), nitrogen oxides ("NO_X"), carbon monoxide ("CO"), particulate matter ("PM-

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[9] The Company stated that the MDEP enforces the NAAQS as state air quality standards (Exh. EFSB-A-1-S at 3-2).

[10] The Company asserted since it is not changing the existing units in any way -- such as adding new controls, increasing capacity, or making physical alterations – it is not required to assess the net change in emissions of SO_2, PM-10, and CO to determine whether PSD applies to this facility (Tr. 13, at 1887).

10"), ground level ozone, and lead (id. at 3-2 to 3-3).[11] The Company indicated that Massachusetts is classified as "unclassified" or "attainment" for SO_2, NO_2, CO, lead, and PM-10, but is classified as in serious non-attainment for ozone (id. at 3-3). The Company stated that, under the PSD review, the proposed project would be required to incorporate Best Available Control Technologies ("BACT") for SO_2, PM-10, NO_X, CO, and volatile organic compounds ("VOCs") (id. at 6-2).[12]

The Company stated that since Massachusetts is classified as non-attainment for ozone, special rules apply to NO_X and VOCs, which are precursors to ozone (id. at 3-4). The Company indicated that Kendall Station is an existing major source for both NO_X and VOCs and that a net annual emissions increase of greater than 25 tons would trigger non-attainment NSR requirements for these two pollutants (id.). The Company therefore determined that it would confine its annual NO_X and VOCs emissions to an amount equal to or less than past actual emissions plus 25 tons (id.).[13] Consequently, the Company asserted that it would not be subject to the Lowest Achievable Emission Rate ("LAER") and emission offset requirements of NSR (id. at 3-4).

SE Kendall indicated that two different components of the project – the new combustion

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[11] The Company stated that implementation of a new compliance standard for particulates, which would be based on a standard for PM-2.5, as well as a new 8-hour ozone standard, has been delayed (Exh. EFSB-A-1-S at 3-3).

[12] The Company stated that under federal standards the proposed project would be required to meet BACT only for PM-10, CO, and SO_2 (Exh. EFSB-A-1-S at 6-2). However, Massachusetts BACT requirements apply to all new sources emitting more than one ton per year ("tpy") of a pollutant; consequently the new unit is subject to BACT for SO_2, PM-10, NO_X, CO, and VOCs (id.).

[13] The Company stated that the calculation of the net annual emission rate is the difference between past actual emissions and future actual emissions (Exh. EFSB-A-1-S at 5-2). The Company used the average of past annual emissions for the years 1998 and 1999 to calculate allowable emissions for both NO_X and VOCs (id. at 5-1 and Appendix E at Table E-1). The Company stated that the past actual rate for NO_X was 365 tpy; therefore the facility NO_X limit would be 390 tpy (id. at 5-3). The Company stated that the past actual rate for VOCs was 8 tpy; therefore, the facility VOCs limit would be 33 tpy (id. at 5-2).

turbine and the use of the duct burners for supplementary firing of the HRSG, could be subject to NSPS (id. at 3-5 to 3-6). However, the Company indicated that emissions of all regulated pollutants would fall below NSPS threshold levels (id. at 3-5 to 3-6).

SE Kendall noted that the proposed project would be subject to Title IV of the 1990 Clean Air Act -- the Acid Rain Program -- which would require the Company to monitor SO_2 and NO_X emissions, and if necessary, to purchase annual SO_2 allowances (Exhs. EFSB-A-1-S at 3-6). The Company explained that the United States Environmental Protection Agency ("EPA") allocates SO_2 allowances to existing units, which can either use the allowances to cover their emissions or trade them to other facilities (id.). In addition, the proposed project must comport with a NO_X Budget Program, which requires subject facilities to comply with a limit on emissions during the "ozone season" of May 1 through September 30 (id. at 3-7; Exh. EFSB-A-24). The Company stated that MDEP regulates the three Kendall Station main boilers as existing sources under the program and has allocated ozone season NO_X emission allowances equal to 106 tons to Kendall Station (Exhs. EFSB-A-24-S; EFSB-A-33-S; Tr. 9 at 1315). The Company asserted that the relegation of boilers 1, 2, and 3 to back-up status would provide sufficient NO_X allowances for the new power generation equipment to operate at full capacity without the need to purchase additional allowances (Exhs. EFSB-A-24-S; EFSB-A-1-S at 3-7; Tr. 9, at 1315-1320).[14]

The Company stated that MDEP also has an Air Toxics Policy, which establishes Threshold Effects Exposure Limits ("TELs") and annual Average Allowable Limits ("AALs") (Exh. EFSB-A-1-S at 3-8).

The Company stated that its proposed project would meet the technology performance standard for Air Emissions from New Electric Generating Facilities promulgated by the Siting Board in 980 CMR §12.00 (Exh. SEK-1, at 4.5-4). SE Kendall provided documentation indicating that its proposed project would meet the technology performance standard for both

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[14] The Company calculated that the total NO_X emissions to be generated by Kendall Station during the ozone season would be 65.6 tons, of which 48 would be emitted by the new equipment and 17.6 by boiler 3 (Exh. EFSB-A-33-S). The Company based these calculations on boiler 3 operating at a maximum of 3.5 percent of the time during ozone season, since steam demand and outages are at a minimum during ozone season (id.).

criteria pollutants and heavy metals (id.; Exh. EFSB-RR-92).

2. Equipment and Operations

The proposed project would be comprised of a mix of existing and new equipment, including a new combustion turbine and HRSG and three existing boilers which, together with two existing package boilers would be used both to generate electricity and to generate steam for sale to COM/Steam for resale to major customers (Exh. EFSB-A-1-S at 2-1, 2-8).[15] The Company indicated that this mix of equipment could be operated in nine different configurations (Exh. EFSB-RR-69).[16]

SE Kendall stated that it anticipates operating the new CTG at a 90 percent capacity factor, and that it intends to seek a permit allowing it to operate the CTG on No. 2 fuel oil for up to 720 hours annually (Exhs. EFSB-A-1-S at 2-8; EFSB-RR-92; SEK-1, at 4.5-1; Tr. 13 at 1911 and 1942-1943).[17] The Company indicated that it would operate on oil either when the supply of natural gas is disrupted, or when it is more economic to do so (Exhs. EFSB-A-34; RR-CC-9). The Company stated that (1) it expects to use oil for close to the 30 days allowed under its

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[15] The Company stated that the proposed project is designed to accommodate an increase in steam customer load over present levels, and estimated that it could produce up to 720,000 lbs/hr of steam for sale (Tr. 13, at 2005 to 2006). The Company has an obligation to meet its steam sale requirements on an uninterruptible basis (Tr. 8, at 1044; Tr. 13, at 1969).

[16] The following are the possible configurations that can occur through the operation of Kendall Station: (1) the CTG operating on natural gas; (2) the CTG operating on natural gas with power augmentation; (3) the CTG operating on natural gas with steam augmentation; (4) the CTG operating on oil; (5) the CTG operating on oil with boiler 3 on oil; (6) only boiler 3 operating (it would operate 50 percent on natural gas and 50 percent on oil); (7) only boilers 1 and 2 operating (they would operate on natural gas if available, if not available, would use oil); (8) the CTG operating on oil with boilers 1 and 2 operating on oil; and (9) boilers 1, 2 , and 3 operating (boiler 3 would operate 50 percent on natural gas and 50 percent on oil; boilers 1 and 2 would operate on natural gas if available, if not would use oil) (Exh. EFSB-RR-69).

[17] SE Kendall noted that although it is requesting a permit allowing operation on oil for 30 days annually, its fuel procurement specialist recommended that back-up fuel be available for 720 to 1070 hours based on a “maximum” statistical year (Exh. EFSB-A-34).

anticipated permit, and (2) the annual average use of oil over the life of the project would probably be less than 30 days but could not be specifically estimated (Exh. EFSB-A-25; Tr. 9, at 1322). The Company estimated that, of the 30 days of oil use, approximately five days would be due solely to the physical unavailability of natural gas (Exh. CC-RR-9). The Company indicated that, although it did not expect to burn oil frequently during the summer, it would oppose seasonal restrictions on its ability to burn oil, arguing that the number of new natural gas generators proposed for the region makes it conceivable natural gas would be difficult to procure on summer peak days (Exh. EFSB-RR-93; Tr. 13, at 1910-1911).

SE Kendall stated that, under certain conditions, it would operate the CTG with power augmentation (Exh. EFSB-A-1-S at 2-5 and Appendix C). The Company explained that power augmentation minimizes the reduction in power output associated with increases in temperature by firing natural gas into the HRSG to produce additional steam; the steam is injected into the turbine, increasing the air density and thus the power output (Exhs. EFSB-G-8-S; EFSB-A-2-S). The Company noted that power augmentation can only be used when firing natural gas and when the ambient temperature is over 60 degrees Fahrenheit ("F") (Exhs. EFSB-A-2-S; EFSB-A-26). The Company explained that it would limit the use of power augmentation to 1,000 hours per year (Exhs. EFSB-A-2-S; EFSB-A-26). The Company noted that the proposed project's duct burners would be sized to supply steam for power augmentation in the summer and to meet maximum steam sales in the winter using steam augmentation (Exh. NEC-2, at 3). However, the Company noted that peak steam usage only occurs for a few days during the winter; consequently, winter duct firing would be limited (id..; Exh. EFSB-A-1-S at Appendix C, Table C-8).

SE Kendall stated that the new generating equipment would incorporate BACT for CO, PM-10, SO_2, NO_X and VOCs (Exh. EFSB-A-1-S at 6-6 to 6-11). To meet BACT for NO_X, SE Kendall would use Selective Catalytic Reduction ("SCR")[18] together with an efficient natural

[18] The Company explained that SCR is an add-on emissions control technology that uses ammonia to convert nitrous oxides into nitrogen and water (Exh. EFSB-A-1-S at 6-9).

gas-fired combined-cycle turbine (id. at 6-11).[19] The Company asserted that combustion turbines have inherently low VOCs emissions and that uncontrolled VOCs emissions would be minimized through good combustion practices (id.). The Company explained that BACT for VOCs emissions would be achieved through the use of advanced dry low-NO_X turbine combustion and low-NO_X duct burners (id.). The Company also proposed to use an oxidation catalyst to reduce CO emissions, which also would reduce VOCs emissions. The Company stated that it would achieve BACT for SO_2 and PM-10 through the use of natural gas as the primary fuel and very low sulfur oil as the back-up fuel (id. at 6-6 to 6-7).

SE Kendall stated that existing boilers 1, 2, and 3 would be used primarily to meet steam customer demand during planned and unplanned outages of the CTG (Exhs. EFSB-A-4-S; NEC-1-S at 2; EFSB-G-2-S Bulk Att. at 1-8). However, the Company stated that boiler 3 would operate in conjunction with the CTG to meet steam demand at times when the CTG is running on oil (Exhs. EFSB-A-16-S; EFSB-A-4-S). The Company indicated that boilers 1, 2, and 3 have dual-fuel capability; it anticipated that boiler 3 would operate half the time on natural gas and half the time on No. 6 fuel oil, while boilers 1 and 2 would burn oil only if natural gas were unavailable (Exhs. EFSB-G-8-S; EFSB-A-16-S).

SE Kendall indicated that existing package boilers 4 and 5, which can operate only on oil, would serve as back-up to boilers 1, 2 and 3 (Exhs. EFSB-A-4-S; NEC-1-S at 2; EFSB-G-2-S Bulk Att. at 1-8).[20] The Company noted that the two existing jet turbine peaking units, which are not connected to the proposed project, would continue to operate at their current capacity factor of one percent, with operation typically occurring during summer daytime hours (Exhs. EFSB-G-

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[19] The Company stated that the new equipment would meet a NO_X emission limit of 2 parts per million ("ppm") when firing natural gas, which is the lowest guaranteed NO_X emission limit available under SCR (Exh. EFSB-A-1-S at 6-9). The Company included an evaluation of SCONO$_X$ in its BACT analysis, but asserted that SCONO$_X$ is an emerging, unproven technology, that also would result in a NO_X emission limit of 2 ppm (id.). The Company estimated that the levelized cost per ton of NO_X removal using SCONO$_X$ would be eight times that of using SCR, and asserted that the cost of SCONO$_X$ is well above the MDEP's economic threshold per ton (id. at 6-10 to 6-11).

[20] SE Kendall stated package boilers 4 and 5 would operate infrequently since they are the third level of back-up behind the use of boiler 3, and boilers 1 and 2 (Exh. NEC-2, at 4).

8-S; EFSB-A-16-S).

3. Emissions and Impacts

SE Kendall asserted that the proposed project would significantly reduce NO_X and SO_2 emissions from the Kendall Station site, specifically projecting a station-wide decrease in NO_X emissions from 365 tpy to 204 tpy and in SO_2 emissions from 247 tpy to 166 tpy (Exhs. EFSB-G-2-S Bulk Att. at 2-25 and Figure 2-9; EFSB-A-1-S at Figure 2-5). The Company asserted that the air quality impacts of the proposed project would be minimized by the use of efficient combustion technology, the use of advanced pollution control equipment, the use of natural gas as the primary fuel for the new CTG/HRSG system, the use of 0.05 percent low-sulfur oil as the back-up fuel for the new equipment, and the use of 0.3 percent, rather than 0.5 percent, sulfur oil in the existing units (Exhs. EFSB-A-1-S at 2-1, 2-5; EFSB-RR-82). The Company projected that the proposed project would result in increased emissions of other criteria pollutants from the existing Kendall Station, including increases from 25 tpy to 158 tpy of CO; from 43 tpy to 67 tpy of PM-10; and from 8 tpy to 24 tpy of VOCs (See Table 1) (Exhs. EFSB-G-2-S Bulk Att. at Figure 2-9; EFSB-A-1-S at Figure 2-5; EFSB-RR-92).

Table 1
Potential Annual Emissions to Air

Pollutant	Upgrade Project Expected Annual Emissions (tpy) [a]	Past Annual Emissions (tpy) [b,c]
Nitrogen oxides (NO_X)	204	365
Sulfur dioxide (SO_2)	166	247
Particulates (PM-10)	67	43
Carbon monoxide (CO)	158	25
Volatile Organic Compounds (VOCs)	24	8

a. Source: Exhs. EFSB-RR-92; EFSB-A-1-S Figure 2-5
b. Source: Exhs. EFSB-A-1-S Figure 2-5 and Appendix E, Table E-1
c. Average of 1998 and 1999

SE Kendall based its emissions projections on an "expected" operating scenario, which assumed that the new CTG would operate at a 90 percent capacity factor with 720 hours of operation on oil; that boilers 1, 2, and 3 would operate at a combined capacity factor of 10 percent during scheduled and unscheduled outages of the CTG; and that boiler 3 would operate at an 8.2 percent capacity factor in conjunction with the CTG to meet steam demand (Exhs. EFSB-A-1-S at 2-8 to 2-10; EFSB-RR-92; Tr. 13, at 1942-1943).[21] The Company explained that this scenario is an expectation of how the facility would operate in terms of the stated emissions, and that it expects that the emission levels would not be exceeded (Tr. 9, at 1277). The Company asserted that its emissions estimates provide a conservative picture of how much oil would be burned in the existing units; however it acknowledged that when the CTG is not running, there are a number of potential configurations that could occur based on steam demand (Tr. 9, at 1279). SE Kendall indicated that it applied a 10 percent degradation factor in its calculations of facility emissions (Exh. EFSB-A-1-S at 6-5; Tr. 9, at 1288-1289; Tr. 13, at 1894). The Company noted that it always applies a degradation factor to take into account the normal wear and tear of machinery over time, to be conservative and to stay within compliance through the life of its project (Tr. 9, 1289-1292; Tr. 13, at 1894).[22]

The Company indicated that it used the EPA- and MDEP-approved Industrial Source Complex Short-Term ("ISCST3") atmospheric dispersion model to demonstrate compliance with ambient air quality standards (Exh. EFSB-A-1-S at 4-11). The Company asserted that the

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[21] Specifically, the expected case assumes that: (1) the CTG operates on natural gas for 5,240 hours annually; (2) the CTG operates on natural gas with power augmentation for 1,000 hours annually; (3) the CTG operates on natural gas with steam augmentation for 1,800 hours annually; (4) boilers 1 and 2 operate on natural gas for 620 hours annually; (5) boilers 1 and 2 or boilers 4 and 5 operate on oil for 600 hours annually; (6) boiler 3 operates on natural gas for 797 hours annually; (7) boiler 3 or boilers 4 and 5 operate on oil for 797 hours annually; and (8) jets 1 and 2 operate for 88 hours annually (Exh. EFSB-A-1-S at Appendix C, Tables C-7 and C-10).

[22] SE Kendall expressed its belief that applying a degradation factor is commonplace throughout the industry and that other proponents probably have incorporated such a factor but have not detailed its use to the same extent as the Company (Tr. 13, at 1894).

ISCST3 model is preferred by the EPA and other agencies for refined modeling since it can simulate atmospheric dispersion associated with multiple stacks, simple, intermediate and complex terrain, and building wake effects (id.; SEK-1, at 4.5-20). The Company's modeling indicated that emissions from the new CTG, when firing oil, would result in maximum ground level concentrations that exceed EPA Significant Impact Levels ("SILs") for SO_2 for the 3-hour and 24-hour averaging periods and for PM-10 for the 24-hour averaging period, with impacts ranging from 4.4 percent to 7.4 percent of NAAQS (See Table 2; Exhs. EFSB-A-1-S at 4-12 to 4-14; EFSB-RR-92; Tr. 13, at 1899). SE Kendall asserted that the modeled exceedences of SILs are not unusual, and are due to the location of the project in a complex area surrounded by taller structures which would cause building downwash, coupled with a proposed stack height that is lower than the Good Engineering Practice ("GEP") height (Tr. 13, at 1900, 1907).

Table 2
Incremental Impact of Proposed Combustion Turbine

Pollutant	Averaging Period	Modeled Maximum Concentration ($\mu g/m^3$) [a]	Significant Impact Levels ($\mu g/m^3$)	Operating Condition; Dispersion Model
NO_2	Annual	0.68	1	1 month on oil, 11 months on gas, load not specified; ISCST3
SO_2	3-Hour	62.7 / 8.13	25	Oil / Gas; ISCST3
	24-Hour	26.9 / 3.31	5	Oil / Gas; ISCST3
	Annual	0.66	1	1 month on oil, 11 months on gas, load not specified; ISCST3
PM-10	24-Hour	6.6 / 3.6	5	Oil / Gas; ISCST3
	Annual	0.50	1	1 month on oil, 11 months on gas, load not specified; ISCST3
CO	1-Hour	37.8 / 24.8	2000	Oil / Gas; ISCST3
	8-Hour	14.9 / 7.9	500	Oil / Gas; ISCST3

Sources: Exhs. EFSB-A-1-S at 4-11 to 4-14; EFSB-RR-92B Att.

a. Where two values are provided, they are from oil and natural gas firing, respectively.

The Company stated that because modeled emissions from the new CTG exceeded SILs for SO_2 and PM-10, it was required to conduct a combined source impact analysis to demonstrate the proposed project's compliance with NAAQS for these two pollutants (Exh. EFSB-A-1-S at 4-12 to 4-15; Tr. 13, at 1904). The Company modeled the combined impacts of SO_2 emissions from the new CTG and existing Kendall Station sources; its modeling for PM-10 included the new CTG, existing Kendall Station sources and 12 other major sources, including Sithe's Mystic and New Boston Stations, Logan Airport, Braintree Electric and the Trigen facility in Boston (Exhs. EFSB-RR-92 (Att. 92-C); EFSB-A-1-S at Appendix D).[23] These modeled impacts were added to existing ambient air quality data to determine total combined air quality impacts (Exhs. EFSB-RR-92; EFSB-A-29-S). SE Kendall provided combined source impact analyses for two operating configurations: the overall worst-case configuration, in which the new CTG is off-line and the back-up equipment is operating on oil, and a worst-case CTG configuration, which assumes that the new CTG is on-line and operating on oil (Exh. EFSB-RR-92 (Att. 92-C)).[24] The overall worst-case operating configuration resulted in modeled impacts ranging from 87 to 97 percent of NAAQS; the worst-case CTG configuration resulted in modeled impacts that ranged from 73 to 93 percent of NAAQS (See Table 3) (id.).

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[23] SE Kendall asserted that it is not required to incorporate other major sources for the combined impact analysis for SO_2 because the proposed project is expected to result in a net decrease in SO_2 emissions from Kendall Station (Exh. EFSB-A-1-S at 4-12; Tr. 13, at 1921).

[24] The Company explained that twelve different operating scenarios were modeled, which resulted in the highest second high concentration being a scenario where the new unit was not operating (Exh. EFSB-A-1-S at 4-12; Tr. 13, at 1901).

Table 3
Cumulative Impact of Selected Criteria Air Pollutants[a]

Pollutant	Averaging Period	Contribution of Proposed Turbine ($\mu g/m^3$) [b]	Cum. Impact With/Without Proposed Turbine ($\mu g/m^3$) [c]	NAAQS ($\mu g/m^3$)	Percent of Standard, With/Without Proposed Turbine [d,e]	Principal Contributor to Cumulative Impact [f]
SO_2	3-Hour	0.2	945.4 / 1125.3	1300	73 / 87	Other
	24-Hour	14.4	284.4 / 355.4	365	78 / 97	Other
PM-10	24-Hour	0.005	139.9 / 143.3	150	93 / 96	Background

Sources: Exh. EFSB-RR-92C Att; EFSB-A-1-S at 3-3

a. Where the maximum predicted impact was below SILs, cumulative impacts were not analyzed by the Company.
b. Contribution by new combustion turbine to concentration at the point of maximum cumulative concentration.
c.. Where two values are presented, the first is the highest cumulative impact, when the proposed combustion turbine is operating, and the second is the highest cumulative impact of a configuration without operation of the proposed combustion turbine.
d. Where two values are presented, the first is the percentage of NAAQS at the point of maximum cumulative impact, when the proposed combustion turbine is operating and the second is the percentage of NAAQS at the point of maximum cumulative impact of a configuration without operation of the proposed combustion turbine.
e. Percent of standard as calculated by Siting Board staff.
f. Principal contributor to maximum concentration: "Background" is monitored background; "Other" is other major sources including existing Kendall Station sources in the case of PM, but includes only existing Kendall Station sources in the case of SO_2 (Exh. EFSB-RR-92C (Att.)).

SE Kendall indicated that its dispersion models likely would predict progressively lower impacts for progressively higher stacks up to the calculated GEP height of 555 feet; however, the Company noted that a 555-foot stack would be visually intrusive (Exhs. EFSB-A-23; SEK-1, at 2-8). The Company asserted that compared to the existing Kendall Station facilities, the proposed project would result in a negligible or positive effect on air quality, and therefore any additional benefits arising from an increase in stack height above the proposed 250 feet would be insignificant (Exh. EFSB-A-23).

With respect to non-criteria pollutants regulated by the MDEP, the Company proposed an ammonia slip of two ppm (id. at 6-9, 6-11). The Company provided modeling of estimated emissions of toxic chemicals that indicated that the proposed project's emissions would be well

below MDEP's established TELs and AALs (Exh. EFSB-A-28b).

The Company asserted that operation of the proposed project would cause displacement of other more polluting, less efficient generating units and therefore would reduce regional NO_X, SO_2, and CO_2 emissions (Exh. EFSB-A-5). In support, SE Kendall provided an analysis projecting reductions in regional emissions based on the "1996 NEPOOL Marginal Emission Rate Analysis of NO_X, SO_2, and CO_2" (Exh. SEK-1, at 2-24). The Company's analysis indicated that by displacing the generation of an existing average 234 MW NEPOOL facility, operation of the proposed project would reduce New England emissions of NO_X, SO_2 and CO_2 by approximately 2052 tpy, 7846 tpy and 565,758 tpy, respectively (id.).

4. CO_2 Offset Proposal

SE Kendall indicated that the proposed project would emit a maximum of 1,105,460 tpy of CO_2 (Exh. EFSB-RR-82-B-S). The Company stated that, to meet the Siting Board's CO_2 offset requirement, it would select the most cost-effective option from one of three options set forth in the Sithe Mystic Decision (id.). SE Kendall provided a calculation of its offset contribution based on the option of funding CO_2 mitigation through a fee based on the net change in CO_2 emissions from the Kendall Station Project (id.). SE Kendall stated that the past actual annual emission rate -- based on the 1998-1999 average -- was 258,953 tpy, and therefore the net additional annual emission rate would be 846,507 tpy (id.). The Company stated that due to the interest by the local community in open space enhancements, it would consider targeting its CO_2 contribution for suitably planted open space in Cambridge (Exh. SEK-1, at 4.5-34; Tr. 13, at 1926). SE Kendall asserted it would finalize its proposal through the submission of a compliance filing to the Siting Board (Company Initial Brief at 27).

5. Position of the Parties

In its brief, the City expressed strong support for the proposed project based on projected reductions in emissions and displacement benefits associated with the operation of the proposed project on natural gas (City Initial Brief at 23-24). However, the City sought a condition explicitly limiting the use of oil as fuel for the proposed project (id. at 33-34).

In support of its suggested condition, the City noted that the proposed project would result in increased emissions of PM-10, VOCs and CO from the Kendall Station site, and could result in increases, rather than reductions, in facility-wide NO_X and SO_2 emissions (id. at 24). The City noted that while the Company anticipates significant reductions in NO_X and SO_2 emissions, as a matter of permitting strategy it is seeking a cap on NO_X emissions that is 25 tpy higher than existing emissions, and is seeking no cap on SO_2 emissions (id. at 25-27). The City argued that, while the emissions projections which the Company has presented for air permitting are "conservative" in the sense that they likely overstate future emissions, this conservatism may lead to unnecessary regulatory flexibility and overall higher emissions from the proposed project (id. at 28-30).[25]

The City noted that the Company anticipates operating the new CTG for 720 hours of full load operation on oil and that, in addition, it anticipates operating boilers 1, 2, and 3 on oil for a significant number of hours when the new CTG is off-line (id. at 30, 31). Thus, the City argued that the proposed project as a whole is likely to operate on oil for more than 30 days full power equivalent (id. at 31). The City questioned whether this extensive use of oil would actually be necessary, except in circumstances where the CTG is unavailable for an extended period of time and the Company needs to burn oil in the existing units to serve its steam customers (id. at 32). The City acknowledged that SE Kendall needs flexibility to meet its obligations to its steam customers and to respond to possible future disruptions in the natural gas market (id.). However, the City asserted that the Company's air calculations already appear to incorporate ample flexibility, and argued that oil use for the entire plant should be limited to 30 days annually, unless the CTG is unavailable and it is necessary to burn oil to serve uninterruptible steam customers (id.). The City therefore proposed the following conditions:

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[25] The City argued that the Company's air permitting calculations are conservative in that: (1) the air plans application assumes that the existing units operate more frequently than expected; (2) emissions calculations assume that boilers would operate at 100 percent capacity; and (3) emissions calculations incorporate a 10 percent degradation factor to account for a deterioration in equipment operation over time (City Initial Brief at 28-30).

> To minimize emissions of pollutants to the air, the Company shall make a compliance filing demonstrating its final operating restrictions designed to reduce air pollution. The Siting Board will expeditiously issue a compliance decision affirming this decision if the Company commits to limit its use of oil to no more than the sum of: (a) 30 days full power annual equivalent for the CTG, plus (b) during CTG outages: (i) non-summer use consistent with the operation of existing equipment shown in Ex. EFSB-RR-69, plus (ii) summer time oil use associated only with physical unavailability of natural gas and meeting non-interruptible steam and electric demand. If the Company's plan involves additional use of oil, the Siting Board will determine, based on the compliance filing, whether additional discovery and hearings are necessary. If additional proceedings are needed, they will be an extension of this case. Therefore, the parties to this case would be parties to any additional proceedings and the issues in any such additional proceedings would be limited to the issues raised by the changes to the Company's proposal.
>
> To minimize sulphur emissions, the Company shall implement its proposal to use 0.05 % (or less) percent sulfur distillate oil as backup fuel for the Combustion Turbine Generator and 0.3% sulphur (or less) No. 6 fuel oil where burning oil is allowed for the existing boilers (City Initial Brief at 33-34).

In response to the City's proposed conditions, SE Kendall noted that, even using the conservative emissions levels in its Air Plan Application, estimated emissions of NO_X, SO_2, PM-10, and VOCs from the existing units would be significantly below average emissions levels for 1998 and 1999 (Company Reply Brief at 5). The Company therefore asserted that there is no basis for limiting oil use at Kendall Station, except for the 30-day limit on the use of oil in the new CTG/HRSG system (id. at 6).

With respect to CO_2 mitigation, the City requested that the Company's CO_2 offset contributions by directed toward projects related to the City's Climate Protection Action Plan, and its ClimateWise Project (City Initial Brief at 35).[26] Specifically, the City proposed the following condition:

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[26] The City indicated that the Climate Protection Action Plan is being prepared as part of Cambridge's participation in the "Cities for Climate Protection" campaign, a project of the International Council for Local Environmental Initiatives, and that the ClimateWise project, which seeks to help local businesses and institution reduce their greenhouse gas emissions, is funded by a grant from EPA (City Initial Brief at 35).

To minimize CO_2 emissions, the Siting Board requires the Company to provide CO_2 offsets through a total contribution of $269,650 to be paid in five annual installments, annually in advance, covering the first five years of facility operation into a fund for climate protection projects to be administered by the City of Cambridge. Alternatively, the Company may pay its contribution in one lump sum, with a present value equal to $203,300 within 45 days of the issuance of this Decision (id. at 35, 36).

6. Analysis

The record shows that the proposed project would consist of a highly efficient combustion turbine primarily fueled with natural gas, but permitted to use 0.05 percent distillate fuel oil as a back-up fuel for up to 720 hours per year.[27] The record also indicates that the project would include an HRSG with duct firing, incorporating advanced pollution control equipment. The record shows that the proposed project would achieve BACT for NO_X, VOCs, PM-10, SO_2, and CO.[28] The Company also has shown that its proposed facility would not emit toxics or other non–criteria pollutants at levels that exceed state or federal standards. The Company provided

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[27] The record also indicates that the Company intends to use oil with a 0.3 percent sulfur content in the existing boilers, rather than the 0.5 percent sulfur oil that is currently used. The Siting Board notes that the air analyses relied upon in this decision assume the use of 0.05 percent sulfur oil in the CTG and 0.3 percent sulfur oil in the existing boilers. Consequently, a decision to routinely use oil with a sulfur content other than that set forth in this decision, either in the CTG or the existing boilers, would require written notification to the Siting Board so that the Siting Board could determine whether to inquire further into the air impacts of the proposed project.

[28] With regard to the use of SCR or a zero ammonia technology to achieve BACT, the Siting Board is of the opinion that, due to its primacy of jurisdiction and to its greater expertise in emissions control technologies, MDEP is the agency best suited to determine whether and when to introduce new emissions control technologies into the Commonwealth. See IDC Bellingham LLC, 9 DOMSB 225, at 270 (1999). As a result, the Siting Board will not require use of such technology (id.). The Siting Board also notes that MDEP in a recent natural gas facility permit effectively has allowed the use of SCR rather than a zero ammonia technology at this time, with a review of the cost-effectiveness of retrofitting a zero ammonia technology to be conducted within five years. ANP Bellingham Compliance Decision, 9 DOMSB 211, at 221 (1999). The Siting Board therefore concludes that by incorporating the control technology that MDEP determines to be LAER for NO_X, the Company will have minimized its NO_X emissions and ammonia slip consistent with minimizing the cost of mitigating and controlling such technologies.

information regarding total facility emissions which demonstrates that the proposed project would meet technology performance standards for both criteria and non-criteria pollutants. Consequently, the Siting Board finds that no alternative technologies assessment is required for the proposed project.

SE Kendall has used MDEP-approved air modeling techniques to model, for certain pollutants, both the air quality impacts of the proposed project and the cumulative air quality impacts of the proposed project and other existing sources of emissions. The record indicates that the proposed project should benefit regional air quality through net decreases in emissions of NO_X and SO_2 from Kendall Station and through the potential displacement of older generating facilities in the New England region. Station-wide emissions of other criteria pollutants, including PM-10, CO, and VOCs, would increase.[29]

SE Kendall proposes to seek a permit to fuel the new CTG with oil for up to 30 days annually. The Company has indicated that it would use oil both during periods of natural gas curtailment and for economic reasons, and that it anticipates using oil for most of the permitted 30 days in a typical year. The Company also has the ability to operate its existing boilers on oil, and has stated that it anticipates: (1) operating boiler 3 on oil at times when the CTG is operating on oil and demand for steam cannot be met by the CTG alone; (2) operating boiler 3 on either natural gas or oil when the CTG is off-line; and (3) operating boilers 1 and 2 on oil only when natural gas is unavailable. The Siting Board notes that Kendall Station is a must run producer of steam, and that the Company is responsible to serve its steam customers before electricity production.

The record indicates that, under a reasonably conservative operating scenario, station-wide emissions of NO_X and SO_2 would be reduced significantly – from 365 tpy to 204 tpy for NO_X, and from 247 tpy to 166 tpy for SO_2 – while additional generating capacity would be created within the currently constrained Boston load center. However, SE Kendall has not

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[29] The modeling indicates that concentrations of pollutants from the proposed project with the new CTG when firing oil would be above SILs for SO_2 for the 3-hour and 24-hour averaging periods and for PM-10 for the 24-hour averaging period.

proposed to guarantee these reductions through a regulatory mechanism such as an enforceable emissions cap for Kendall Station. Instead, it seeks to retain operational flexibility, particularly for its existing units, in order to serve its steam customers and to respond to fluctuations in the prices of natural gas and oil. Thus, the possibility exists that the projected NO_X and SO_2 benefits could be significantly less than projected, and that emissions of PM-10, CO, and VOCs could be significantly higher than projected, if the new CTG operates at less than the projected 90 percent capacity factor and the existing equipment operates frequently on oil to meet the needs of Kendall Station's steam customers. Further, because of the many possible operating configurations that could be used to generate some combination of electricity and steam, it is difficult to establish a single reasonable worst-case estimate of overall emissions.

The City has proposed to address these uncertainties by restricting the use of oil in both the new and existing equipment to levels consistent with representations made in this proceeding, and by restricting the use of oil during the ozone season to those occasions when it is required to meet the needs of uninterruptible steam customers because natural gas is physically unavailable. The City acknowledges that the Company needs flexibility to meet the needs of its steam customers and to respond to disruptions in the natural gas market, but argues that the conservative emissions projections presented in this proceeding incorporate substantial flexibility.

The Siting Board agrees with the City regarding the need to strictly limit oil firing during the ozone season, when regional emissions of NO_X and VOCs result in the highest concentrations of ozone. The record indicates that both new and old equipment would emit substantially higher levels of these ozone precursors when operating on oil than when operating on natural gas. The record also indicates that, while Massachusetts meets federal air quality standards for all other criteria pollutants, it is classified as in serious non-attainment for ozone. It is therefore particularly important to minimize the proposed project's emissions of ozone precursors during the ozone season. The Siting Board notes that such limitations would be consistent with restrictions on oil firing at other recently approved facilities, which have agreed to refrain from the use of oil during the ozone season either entirely, or except in the case of a natural gas supply emergency. Brockton Power, LLC, 10 DOMSB 157, at 192 (2000) ("Brockton Power

Decision"); Sithe Edgar Decision, 10 DOMSB at 39. Therefore, the Siting Board directs the Company to limit oil firing for the new equipment and boilers 1, 2, and 3 to the months outside of the ozone season of May 1 through September 30, except in the case of a natural gas supply interruption beyond the Company's control, and to seek an air quality plan approval from the MDEP incorporating this condition. The Company shall provide the Siting Board with a copy of its pre-construction air quality plan approval prior to the commencement of construction.

The Siting Board also agrees with the City that, given the regulatory framework anticipated by the Company, the proposed project's emissions of criteria pollutants could theoretically be higher than currently projected. However, given the conservative nature of the assumptions underlying the Company's emissions projections, it is unlikely that emissions would be substantially higher than projected for any sustained period of time. The City's proposal for limiting the use of oil at Kendall Station is complex, and would be best analyzed in the context of the Company's MDEP air plan review. Based on this record, the Siting Board cannot conclude that this or a similar condition would minimize environmental impacts consistent with minimizing the cost of mitigation, control and reduction of impacts, or that it would not have unanticipated consequences on the reliability or cost of electricity in the Boston load center. Further, the Company has agreed to fire the new CTG with oil for no more than 30 days each year, and the Siting Board already has placed limits on the use of oil during the five months that make up the ozone season. Consequently, the Siting Board will not place further limitations on the use of oil as a condition of this approval.[30]

SE Kendall has proposed a single 250-foot stack in order to minimize the visual impacts of the proposed project. Although the Company did not conduct modeling analyses to determine the extent to which moderate increases in stack height would reduce air quality impacts, it seems clear that the significantly sub-GEP stack height contributes to SO_2 and PM-10 impacts in excess of SILs. The Siting Board acknowledges that locating a stack with a height approaching GEP in

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[30] The Siting Board notes that, upon further analysis of the Company's Air Plan Proposal, MDEP may set further limits on emissions from Kendall Station, potentially including an enforceable cap on NO_X and SO_2 emissions below current levels. Nothing in this decision is intended to preclude such action by MDEP.

the Kendall Square area would be unacceptable. The Siting Board also notes that there are likely to be overall air quality benefits associated with the displacement of the existing boilers with the CTG and HRSG, even given the substantially sub-GEP stack height. In Section III.F., below, the Siting Board reviews the visual impacts of the proposed project and concludes that, although the proposed stack is taller than the existing stacks, the overall visual impacts of the proposed project would be minimized. Consequently, the Siting Board finds that the proposed 250-foot stack height, in conjunction with limiting oil firing for the new equipment and boilers 1, 2, and 3 to the months outside of the ozone season, except in the case of a natural gas supply interruption beyond the Company's control, would minimize air quality impacts consistent with the minimization of the visual impacts of the proposed project.

The Siting Board has set forth a general approach to the mitigation of CO_2 emissions that requires generating facility applicants to make a monetary contribution, based on offsetting one percent of annual facility CO_2 emissions at $1.50 per ton,[31] to cost-effective CO_2 offset programs selected in consultation with the Siting Board staff. Nickel Hill Energy, EFSB 99-3, at 42-43; Brockton Power Decision, 10 DOMSB at 192-193; Dighton Power Associates, 5 DOMSB at 239-240 (1997) ("Dighton Power Decision"). The Siting Board also recently has approved a non-monetary approach to CO_2 mitigation based on the shutdown or curtailment of an existing source of CO_2 emissions. Sithe Edgar Decision, 10 DOMSB at 136-140; Sithe Mystic Decision, 9 DOMSB at 136-140.

In the Sithe Mystic Decision, the Siting Board accepted for the first time a non-monetary CO_2 mitigation program based on voluntary curtailment of operations at an existing source, subject to conditions precluding collateral use of the curtailed operations for offsetting other pollutant emissions. Sithe Mystic Decision, 9 DOMSB at 136-140. In that decision, the Siting

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[31] The Siting Board notes that, in future reviews, evidence may be developed that supports use of a different assumed cost of providing CO_2 offsets, or use of a range of monetary values, or a greater or sole use of a non-monetary basis, in determining the appropriate level of CO_2 mitigation. Future applicants are put on notice that the Siting Board may seek to develop evidence relating to the appropriateness of the review standards set forth in Dighton Power Decision, 5 DOMSB 193 (1997), or other reviews, and that the Siting Board may adjust its existing monetary standard to account for inflation or other similar changes based on the passage of time.

Board also outlined two alternative approaches: (1) Sithe could make the standard monetary contribution, based on offsetting one percent of CO_2 emissions from its proposed facility at $1.50 per ton; or (2) Sithe could base its monetary contribution on the net increase in CO_2 emissions at the Mystic Station site, provided that it did not use CO_2 reductions from its existing units as offsets for CO_2 emission from any other source. Id. at 140.

SE Kendall proposes to meet the Siting Board's CO_2 offset requirement by selecting the most-cost effective option of the three set forth in the Sithe Mystic Decision. The Company has estimated that the net increase in CO_2 emissions from the Kendall Station Project would be 846,507 tpy. The Company therefore concludes that providing CO_2 mitigation based on an offset level of 8465 tpy, representing 1 percent of the added emissions from the proposed facility, would be consistent with Siting Board precedent regarding CO_2 mitigation.

The Siting Board finds that SE Kendall's suggested approach of providing offsets for 1 percent of the net increase in CO_2 emissions from Kendall Station, currently estimated at 8465 tpy, properly complies with Siting Board requirements for CO_2 mitigation, provided that SE Kendall establishes that it would make no additional use of the CO_2 emissions reductions to provide offsets for CO_2 emissions from other sources. Alternatively, SE Kendall may elect to provide offsets for 1 percent of the maximum CO_2 emissions from the proposed project.

Alternatively, consistent with the CO_2 mitigation approach accepted in the Sithe Mystic Decision, the Company may use any reductions in overall CO_2 emissions from existing equipment at Kendall Station to offset 1 percent of the proposed project's maximum CO_2 emissions. Use of offsets from the existing equipment at Kendall Station would be subject to the condition that SE Kendall establish that: (1) the existing equipment would be subject to enforceable operating limits, with supporting verification mechanisms, to ensure that projected reductions in CO_2 emissions are realized; and (2) it will make no collateral use of the modified operations of existing equipment on which the CO_2 offsets for the proposed project are based, in order to provide emissions offsets relating to other pollutants and/or other sources.

The City has requested that any required emissions offset contribution be targeted to programs specific to Cambridge. However, this request is premature given the Siting Board's general approach to CO_2 mitigation, set forth above, which requires applicants to select CO_2

mitigation programs outside of the adjudicatory process in consultation with Siting Board staff. This consultation generally takes place at a time close to commencement of commercial operation, in order to allow consideration of a broad range of cost-effective CO_2 mitigation options, including options that might not be available at the time of the underlying proceeding. The Company has committed to further consider CO_2 mitigation options with the City. If the Company proposes to support Cambridge-based programs as part of a monetary CO_2 mitigation approach, the Siting Board staff will evaluate the proposal as it would any other CO_2 mitigation proposal. Specifically, the Siting Board staff evaluates a CO_2 mitigation program based on its ability to provide proven, incremental offsets, its cost-effectiveness, its ability to provide ancillary environmental or economic benefits that flow to the community or region, and other similar criteria.[32]

Accordingly, consistent with its rulings in recent cases, the Siting Board directs the Company either to: (1) make a monetary contribution to a cost-effective program or programs to be selected upon consultation with the staff of the Siting Board, based on the maximum CO_2 emissions from the operation over 20 years of the proposed project; or (2) make a monetary contribution based on the maximum net increase in CO_2 emissions from Kendall Station over 20 years, if it can establish that it will make no additional use of the CO_2 emissions reductions from existing equipment to provide offsets for CO_2 emissions from other sources; or (3) provide offsets for 1 percent of the proposed project's maximum CO_2 emissions based on voluntary curtailment of operations of existing equipment at Kendall Station, or of equipment at another existing source, subject to conditions, as described above, that the curtailment of operations be based on enforceable and verifiable limits and that there be no collateral use of the curtailment of operations to provide emissions offsets relating to other pollutants and/or sources. If the Company elects to pursue monetary CO_2 offsets, the Siting Board directs the Company to

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[32] We note that the selection by applicants of a CO_2 mitigation program or programs in consultation with the staff of the Siting Board -- a conditional requirement in recent generating facility reviews consistent with the CO_2 mitigation standard set forth in the Dighton Power Decision -- must include consideration of the relative cost-effectiveness of various reasonably available programs. Dighton Power Decision, 5 DOMSB at 239-240. See, e.g., ANP Blackstone Energy Company, 8 DOMSB at 127-128 (1999).

provide CO_2 offsets through a total contribution of $352,142 (or $269,650, if based on the maximum net increase in CO_2 emissions from Kendall Station), to be paid in five annual installments during the first five years of facility operation.[33, 34]

Accordingly, the Siting Board finds that, with the implementation of the above conditions concerning use of oil for back-up and CO_2, the air quality impacts of the proposed project would be minimized.

C. Water Resources

In this Section, the Siting Board addresses the water-related impacts of the proposed project, including: (1) the water supply requirements of the facility and related impacts on affected water supply systems and on other water resources; and (2) the water-related discharges from the facility, including heated effluent and wastewater.

1. Description

The Company stated that the existing facility uses water withdrawn from the Broad Canal for OTC of the steam turbines, and uses water obtained from the City of Cambridge for process and sanitary purposes, and for production of steam for distribution to steam customers (Exhs. EFSB-G-2-S Bulk Att. at 3-15, 3-21; EFSB-RR-70-C). The Company stated that after use at the facility, the OTC water is discharged to the Charles River via an outfall pipe in the riverbank

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[33] The contribution is based on offsetting 1 percent of facility CO_2 emissions over 20 years, at $1.50 per ton. The 20-year amount is first distributed as a series of payments to be made over the first five years of project operation, then adjusted to include an annual cost increase of 3 percent. See IDC Bellingham LLC, 9 DOMSB at 273; Sithe Mystic Decision, 9 DOMSB at 140; U.S. Generating Company, 6 DOMSB 1, at 128-129 (1997) ("Millennium Power Decision").

[34] If the Company chooses, the CO_2 offset requirement also would be satisfied by a single first-year contribution based on the net present value of the five annual payments totaling $352,142, (or $269,650 if based on the maximum net increase in CO_2 emissions), discounted at 10 percent per year. See IDC Bellingham LLC, 9 DOMSB at 273; Sithe Mystic Decision, 9 DOMSB at 140; Millennium Power Decision, 6 DOMSB at 128-129. The single up-front payment of $$286,626, (or $219,484 if based on the maximum net increase in CO_2 emissions) would be due by the end of the first year of operation.

retaining wall, and process wastewater is discharged to a Massachusetts Water Resources Authority ("MWRA") sewer (Exh. EFSB-G-2-S Bulk Att. at 3-15 to 3-17, 3-21).

The Company stated that the proposed project would continue to use river water for OTC; in addition, process water would be diverted from the OTC flow once it has gone through the condensers (id. at 3-21; 3-67 to 3-71).[35] SE Kendall stated that OTC water, wastewater generated from the water treatment process ("water treatment reject"), and boiler blowdown all would be discharged to the Charles River via a new diffuser system (id. at 3-72). The proposed project would rely on city water only for sanitary water requirements and as an emergency back-up source for process water; sanitary wastewater and other process wastewater would be discharged to the MWRA sewer system (id. at 3-67 to 3-72).

SE Kendall estimated that its current process water requirements average 188,640 gallons per day ("gpd"); of this, 151,200 gpd is used for steam distribution and the remaining 37,440 gpd is used for sanitary, boiler makeup, and equipment wash down uses (id. at 3-66 to 3-67; Exh. EFSB-RR-70-C-S2; Tr. 12, at 1744-1745). The Company estimated that the process water requirements for the proposed project would average of 632,160 gpd,[36] including an annual average 87,120 gpd for HRSG/boiler make-up and other process water needs,[37] and additional

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[35] The Company considered obtaining process water for the proposed project from Cambridge, but determined that doing so would increase process water requirements from 632,160 gpd to 724,320 gpd due to the need to demineralize the city water (Exhs. EFSB-G-2-S Bulk Att. at 3-67; EFSB-WU-1). The Company also noted that the use of city water for process requirements would increase the project's production of demineralized wastewater and its use of water treatment chemicals (Exh. EFSB-WU-2).

[36] The Company estimated this based upon the following hours of operation per year as described in Section III.A: 4,414 hours CTG with natural gas firing, 950 hours of natural gas-fired CTG with power augmentation, 1,800 hours of natural gas-fired CTG with steam augmentation, 220 hours of CTG burning oil, 500 hours of oil-fired CTG with boiler, 3,569 hours of natural gas-fired boiler 3, and 307 hours of natural gas-fired boilers 1, 2, and 3 (Exhs. EFSB-RR-70-C-S2 (Att.); EFSB-G-2-S Bulk Att. at Table 3-17). The Company noted that this operating scenario is different from the worst-case scenario used to model air quality impacts (Exh. EFSB-RR-70-C; Tr. 11, at 1605-1607).

[37] The Company stated that the proposed project would use 55,872 gpd of process water when firing the CTG with natural gas, 197,136 gpd when firing the CTG with oil, and

(continued...)

water for steam distribution (id. at 3-21, 3-67, Table 3-17; Exh. EFSB-RR-70-C-S2).

The Company stated that the existing facility discharges an average of 43,488 gpd of wastewater including stormwater to the MWRA sewer system and added that the proposed project would generate an average of approximately 49,824 gpd of wastewater (Exhs. EFSB-G-2-S Bulk Att. at 3-21, 3-75; EFSB-RR-70-C-S2 (Att. 3)). SE Kendall indicated that, with the diversion and treatment of river water to meet process requirements at the proposed project, an additional 361,440 gpd of water treatment reject would be combined with the OTC return flow and discharged to the Charles River (Exh. EFSB-G-2-S Bulk Att. at 3-21).[38]

The Company indicated that it evaluated alternatives to OTC, including the use of wet cooling towers, helper towers, and air-cooled condensers, but concluded that these alternatives would require more land than was available at the proposed site, would be more costly, and would have greater noise, visual, and land use impacts than OTC (id. at 4-28-4-41; Exh. EFSB-G-2-S Bulk Att. at 4-28, Figures 4-2, 4-3, 4-4).

2. Impacts on Municipal Water Supply and Sewage Systems

The Company stated that Kendall Station's use of city water would decrease from an annual average of 188,640 gpd to 5,040 gpd under the proposed project (Exhs. EFSB-G-2-S Bulk Att. at 3-21, Table 3-17; EFSB-RR-70-C-S2). The Company stated that although it does not foresee the need for an emergency back-up supply of water, in the event of an emergency it would obtain process water from Cambridge (Exh. EFSB-G-2-S Bulk Att. at 3-67).[39]

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[37] (...continued)
223,776 gpd when using power augmentation (Exhs. EFSB-G-2-S Bulk Att. at Table 3-17; EFSB-RR-70-C-S2).

[38] SE Kendall noted that a portion of the process wastewater generated by the proposed project, specifically 20,160 gpd of boiler blowdown wastewater, also would be combined and mixed with the OTC return flow (Exhs. EFSB-G-2-S Bulk Att. at 3-21; EFSB-RR-70-C-S2 (Att. 3)).

[39] The Company at various times estimated its maximum emergency back-up water requirement at levels between 188,640 gpd and 518,400 gpd (Exhs. EFSB-G-2-S Bulk Att. at 3-67; EFSB-RR-96-C).

The Company stated that Cambridge obtains its water supply from system reservoirs at upstream locations in the Charles River watershed, and noted that Cambridge is permitted to withdraw 16 mgd and currently uses 15 mgd (id. at 3-66; Exh. EFSB-WU-13). The Company stated that its proposed use of river water for process purposes would reduce the demand on Cambridge's water supply; further, because process water would be withdrawn at Kendall Station, downstream of Cambridge's reservoirs, upstream flow reductions during low-flow periods would be reduced (Exhs. EFSB-WU-2; EFSB-G-2-S Bulk Att. at 3-71).[40] The Company indicated that the City of Cambridge, the CRWA, and regulatory agencies generally approve of the use of river water as opposed to city water for process water needs (Exh. EFSB-G-2-S2-A (Att.); EFSB-G-1-S (Att. b)).

With respect to wastewater, the Company stated that the existing facility discharges an average of approximately 38,304 gpd of wastewater into the MWRA's combined stormwater and sanitary sewer system (Exhs. EFSB-G-2-S Bulk Att. at 3-21; EFSB-RR-70-C-S2 (Att. 3)). SE Kendall explained that while the proposed project would significantly increase the amount of wastewater generated, both water treatment reject and boiler blowdown would be discharged to the river rather than to the MWRA (id.). Thus, wastewater discharges to the MWRA would decrease by 13,824 gpd (id.). The Company noted that the MWRA's combined sewers currently experience frequent periods of excess flow with discharges of untreated wastewater via combined sewer overflow ("CSO") outfalls, thus increases in discharges to the MWRA might increase CSO discharges (Exhs. EFSB-WU-4; EFSB-WU-7).

3. Impacts on the Charles River

SE Kendall stated that the character of the Charles River near its mouth in the vicinity of Kendall Station has been affected by urbanization in Boston and Cambridge and by the Science Park Dam located just downstream of the Kendall Station (Exhs. EFSB-G-2-S Bulk Att. at 3-5 to

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[40] The Company noted that the streams that feed the Cambridge water supply have seven-day, ten-year low water flows ("7Q10s") of between 0.19 and 10.2 cubic feet per second ("cfs"), while the 7Q10 of the Charles River near Kendall Station is estimated at 22 cfs (Exh. EFSB-G-2-S Bulk Att. at 3-6, 3-66 to 3-67).

3-6; EFSB-WG-1 (Att.)). The Company stated that the Metropolitan District Commission ("MDC") regulates the dam to keep the Charles River at 108 feet above sea level at all times, creating a nine-mile stretch of river from the Watertown Dam to the Science Park Dam ("Charles Basin") that functions in some ways as a lake (Exhs. EFSB-WG-2 (Att. A); EFSB-G-2-S Bulk Att. at 3-6; Tr. 11, at 1528-1529). The Company stated that the Charles Basin is classified by the MDEP as a Class B CSO[41] river, but noted that these standards are currently not met (Exhs. EFSB-WQ-4; EFSB-WQ-5; EFSB-WQ-5-S; EFSB-WG-1 (Att.) at 8, 85-86).

The Company noted low dissolved oxygen ("DO") levels in the lower portion of the Charles Basin resulting from the stratification of water behind the dam (Exhs. EFSB-WQ-20 (Att. at 4); EFSB-G-2-S Bulk Att. at 3-6, 3-7 and 3-10). The Company explained that salt water, which is denser and colder than the freshwater in the Charles River, intrudes through locks and leaks in the dam, creating a migrating salt water wedge along the bottom of a portion of the Charles River up to the Longfellow Bridge ("lower Charles Basin") (Exh. EFSB-G-2-S Bulk Att. at 3-10, 3-12 to 3-13). The Company explained that the salt water wedge exacerbates the thermal stratification and prevents the mixing of higher DO surface water with the bottom waters (id. at 3-12 to 3-13). The salt water wedge has resulted in DO levels in the bottom zone of the river of less than 5 milligrams per liter ("mg/l"), which is the Class B water quality standard, and in fact, the Company submitted figures documenting DO levels at 0 mg/l ("anoxia") (id. at 3-12, Figures 3-25, 3-29; Exh. EFSB-G-2-S2 (Att. B) at 10). The Company indicated that the low DO levels make the lower Charles Basin unsuitable habitat for benthic, or river bottom dwelling, species, and reported that the lower Charles Basin behind the dam has only four benthic organisms per four square feet, as compared to 81 in the Charles River near the Watertown Dam and 335 in the Connecticut River (Exhs. EFSB-WQ-10; EFSB-G-2-S Bulk Att. at 3-7). The Company indicated that a variety of agencies and organizations have raised concerns about anoxia in the lower Charles Basin and that these groups have identified that problem as a priority in basin plans developed under the Massachusetts Executive Office of Environmental Affairs ("EOEA") (Exhs.

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[41] SE Kendall explained that a Class B CSO river should meet water quality standards that support primary and secondary contact recreational uses, with an exception made to allow CSO discharges (Exh. EFSB-WG-1 (Att.), at 87; EFSB-WQ-6).

EFSB-WQ-3: EFSB-G-1-S; EFSB-G-2-S (Att. A); EFSB-WG-2 (Att. A)).

SE Kendall stated that it currently withdraws water for OTC from the Broad Canal and discharges it into the Charles River just downstream of Kendall Station (Exh. EFSB-G-2-S (Att.) at 3-15 to 3-16*).* The Company's discharges are governed by a National Pollution Discharge Elimination System ("NPDES") permit from EPA, which allows it to discharge a monthly average of 70 mgd and a daily maximum of 80 mgd, with a maximum rise in temperature of 20 degrees F over the temperature of the intake water (id. at 3-23; Exhs. EFSB-WQ-1 (Att.); EFSB-G-2-S Bulk Att. at 3-23). However, the Company stated that its actual water use is much lower than its permit limitations, estimating that it currently uses an average 47.5 mgd and a maximum of 66.8 mgd (Exhs. EFSB-WU-9; EFSB-RR-72; EFSB-RR-70-C-S).[42] The Company also noted that while the NPDES permit allows for the transfer of heat load to the cooling water of up to an average of 486.5 million British thermal units ("MMBtu") per hour or a maximum of 556 MMBtu/hr, the project's actual average heat load transfer is 217 MMBtu/hr and its average daily maximum heat load transfer is 250 MMBtu/hr (Exh. CC-2 (Figure 1); Tr. 10, at 1455-1457, 1497-1498).

SE Kendall has proposed to change its NPDES permit slightly to allow a maximum average use of 70 mgd on an annual basis, rather than a monthly basis, while maintaining the maximum daily use of 80 mgd and the maximum temperature change of 20 degrees F over the intake temperature (Exhs. EFSB-G-2-S Bulk Att. at 3-23; EFSB-WQ-9-S).[43] SE Kendall stated that this change would allow it to increase its average discharge to the river, and projected that its maximum monthly average discharge would be approximately 77 mgd when the proposed

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[42] The Company estimated the maximum based upon the past ten years of operation, excluding 1999, during which the plant was running at higher capacity (Tr. 8, at 1160-1161).

[43] In its original petition, the Company had proposed to use a maximum of 86.4 mgd on a daily and an annual average basis (a heat load of 600 MMBtu/hr), but as a result of comments on the DEIR, the Company reduced its need to those currently proposed through the use of a fin-fan cooler mounted on the roof to cool the new CTG and through refinements to the heat and material balances (Exhs. CC-2, at 2*;* EFSB-G-2-S Bulk Att. at 1-8 to 1-9; EFSB-WQ-9-S).

project is in operation (Exh. EFSB-G-2-S Bulk Att. at 3-22 to 3-23; Tr. 8, at 1158-1159). SE Kendall noted that its withdrawals, discharges and heat load would vary based on operational factors including the extent of steam augmentation, the type of fuel used, and the amount of steam sent to customers (Exh. EFSB-RR-70-C-S2; Tr. 8, at 1168-1169). The Company indicated that it also intends to discharge water treatment reject and boiler blowdown to the Charles River (Exh. EFSB-G-2-S Bulk Att. at 3-72).

SE Kendall described the impacts of its water withdrawals and discharges on water levels in the Charles River, on water quality, and on fisheries. With respect to water levels, the Company indicated that withdrawals for the proposed project would represent up to 72 percent of the average summer flow of the Charles River at Waltham, and nearly five and a half times the 7Q10 of 22 cfs at Kendall Station (id. at 3-67; Exh. EFSB-RR-70-C-S2). However, the Company asserted that since the MDC regulates the Science Park Dam to maintain the river at 108 feet above sea level at all times, this large withdrawal in comparison to river flow would not have an impact on water levels (Exh. EFSB-G-2-S Bulk Att. at 3-67; Tr. 11, at 1526-1532). SE Kendall indicated that Kendall Station does not currently use river water for any consumptive purpose, i.e., all water withdrawn from the river is discharged back to the river (Exhs. EFSB-G-2-S Bulk Att. at 3-67; EFSB-RR-70-C-S2). However, the proposed project would consume on average 0.98 cfs of river water, or on average 0.6 percent of the average summer flow and 4.5 percent of 7Q10 flow at Kendall Station (id.; EFSB-RR-70-C-S1).[44]

The Company asserted that the inclusion of boiler blowdown and water treatment reject in its discharges to the Charles River would not have a significant impact on water quality (Exh. EFSB-G-2-S Bulk Att. at 3-72-3-75). The Company noted that the boiler blowdown is very similar in composition to the river water (id. at 3-72). The Company stated that water treatment reject would have high concentrations of total suspended solids ("TSS"), total dissolved solids ("TDS"), and de minimis levels of other pollutants; however, it argued that because the water

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[44] The Company indicated that the proposed project would consume the most water during power augmentation and oil-fired operations, estimating that consumptive use would be 1.19 cfs or 5.4 percent of 7Q10 flow during power augmentation and 1.15 to 1.16 cfs or 5.2 percent of 7Q10 flow during oil-fired operations (Exhs. EFSB-G-2-S Bulk Att. at 3-67; EFSB-RR-70-C-S2).

treatment reject would make up only 0.5 percent of the discharge volume, concentrations of TSS and TDS in the discharge water would increase by only 1 percent (id. at 3-72; Exh. EFSB-WQ-14). The Company stated that wastewater discharges to the river would be regulated under its NPDES permit, as well as by the MWRA, the Army Corps of Engineers and MDEP, and added that discharges to the MWRA must meet certain pollutant standards set by MWRA and EPA (Exh. EFSB-G-2-S Bulk Att. at 3-4 to 3-5).

SE Kendall modeled the impact of the proposed project on the temperature of the Charles River under a variety of river flow and seasonal conditions, and used a number of different assumptions regarding the allocation of discharges between the existing surface pipe and the proposed deep diffuser (id. at 3-6; Exh. EFSB-RR-84). The Company asserted that its model incorporated conservative assumptions regarding facility operations, oxygen demand levels, and the duration of the modeled 7Q10 or extreme low flow rate (Exhs. EFSB-G-2-S Bulk Att. at 3-48; AS-2, at 3).[45] The Company submitted graphical representations of the change in temperature from the intake temperature under these different scenarios, including surface, transverse, and longitudinal simulations of the change in temperature and final temperature (Exh. EFSB-RR-86 (Att.)). SE Kendall stated that the model results show that average temperature changes and resulting final temperatures would be within normal variation for this type of ecosystem (Exh. EFSB-G-2-S Bulk Att. at 3-42 to 3-45). Table 4 below summarizes the results of some of the model runs.

The Company also conducted a model run for 7Q10 flow with the current facility running at average discharge and heat load (Exh. EFSB-RR-87). The graphical representations

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[45] SE Kendall also used existing input data from 1998 and 1999 to model temperature and DO changes and compared those with actual water temperature readings ("calibration models"). The Company stated that these calibrations show that on average modeled temperature changes were 2.52 times higher than actual temperature changes (Exh. EFSB-G-2-S Bulk Att. at 3-33). The Company also stated that its DO model generally predicted higher values for DO than the actual data, but that the modeled and actual values were close (id. at 3-33). SE Kendall submitted comments from agencies that indicate their concern with the accuracy of the models and the projection that temperature impacts would exceed the 5 degree F water quality standard under some scenarios (Exh. EFSB-G-2-S2-A (Att.); EFSB-G-1-S).

of this model run indicate that current facility operation results in modeled average temperature rises of approximately between 1 to 3 degrees F, with a small area around the surface discharge having an 8 degree F temperature rise (id.).

Table 4
Effects of the Proposed Project's OTC Discharge
on Water Temperature and DO in the Charles River

Flow/Month Scenario	Average Surface Temp-erature Increase (degrees F)	Maximum Surface Temp-erature Increase (degrees F)	Average Bottom Temp-erature Increase (degrees F)	Maximum Bottom Temp-erature Increase (degrees F)	Average Bottom DO (mg/l)
Average Flow May	3.5	7.6	2.5	3.6	7.3
Average Flow September	5.1	9.2	3.7	5.1	6.2
Extreme Low Flow March/April	6.0	10.1	5.0	6.3	9.0
Extreme Low Flow June	5.9	10.0	4.6	6.0	6.3
7Q10	6.0	10.1	6.5	6.0	6.1

Sources: Exhs. EFSB-G-2-S Bulk Att. at Table 3-13; EFSB-RR-86 (Att.); EFSB-RR-89 (Att.)

SE Kendall asserted that the anticipated temperature changes associated with operation of the proposed project would be within the tolerance ranges of fish species and would have no ecological impact (Exh. EFSB-G-2-S Bulk Att. at 3-60 to 3-61; Tr. 12, at 1794). In support, the Company provided information on the optimal, avoidance and lethal water temperatures of different fish species that are found in the Charles River and compared it to the maximum temperature that would be present over 90 percent of the model area (Exh. EFSB-G-2-S Bulk Att. at Table 3-16). The Company submitted a letter from the Massachusetts Division of Fisheries and Wildlife stating that likely average temperature impacts outside the 5 degree F mixing zone appear to be within likely normal temperature ranges for inland fish and that the increase in DO would more than offset any intake or temperature impacts (Exh.

EFSB-RR-97-S).[46]

SE Kendall also evaluated the impacts of the proposed project on Charles River basin fisheries resulting from impingement and entrainment losses at the OTC intake (Exh. EFSB-G-2-S Bulk Att. at 3-53 to 3-59). The Company indicated that the existing facility withdraws water from the Broad Canal through screened intakes at a rate of between 0.6 and 1.1 feet per second ("fps"), and does not employ a fish return system (id. at 4-7; Exh. EFSB-WF-6). The Company conducted studies of current impingement and entrainment rates beginning in the spring of 1999; it reported that 304 fish were impinged during a 162-day period, consisting primarily of river herring, white perch, and sunfish (Exh. EFSB-G-2-S Bulk Att. at 3-51 to 3-52, Table 3-15). The Company noted that most fish were impinged during the anadromous fish runs in the spring (id. at 3-51 to 3-52, Table 3-15). The Company estimated current entrainment losses based on icthyoplankton studies (id. at 3-52). The Company concluded that total impingement and adult equivalent[47] entrainment losses represent less than 1 percent of the fish's population for all species of fish except white perch (Exh. EFSB-G-2-S Bulk Att. at 3-54, Table 3-15).

In order to mitigate impingement and entrainment impacts associated with increased water withdrawals for the proposed project, SE Kendall proposed to deploy a barrier net around the water intakes; it anticipated that the barrier net would effectively reduce the velocity of the intake water to less than 0.05 fps (Exh. EFSB-WF-6-S).[48] The Company indicated that the barrier net would be deployed during certain times of the year when the data shows that most of the impingement and entrainment occurs, namely late April through early July (Exh. EFSB-G-2-

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46 The Company indicated that not all fish temperature tolerances have been established (Exh. EFSB-G-2-S Bulk Att. at Table 3-16; Tr. 12, at 1810-1811).

47 The Company explained that it estimated the impact of the intake on eggs and larvae, but since a vast number of fish eggs and larvae do not make it to adulthood, the Company translated egg and larval losses into adult equivalents (Exh. EFSB-G-2-S Bulk Att. Appendix 3.6; Tr. 12, at 1760).

48 The Company evaluated other options for reducing fish impacts, including a Gunderboom system, traveling screens with fish returns, and fine-mesh screens, and concluded the barrier net would be the most effective and least costly option (Exhs. EFSB-WF-7-S; EFSB-G-2-S Bulk Att. at 4-52 to 4-61). SE Kendall also stated that EPA would require the Best Technology Available ("BTA") for fish return systems and barriers (id.).

S Bulk Att. at 3-54). The Company asserted that the barrier net would virtually eliminate impingement and significantly reduce entrainment losses (id.; Exh. EFSB-WF-11-S). The Company estimated that, at 50 percent effectiveness, the barrier net would reduce impingement and entrainment losses to less than current levels; at 25 percent effectiveness, losses would be greater than at present, but impacts for all species except white perch would be less than 1 percent of the total population (Exh. EFSB-G-2-S Bulk Att. Table 3-15). The Company stated that it tested the barrier net in late spring of 2000 and noted that federal and state agencies had raised concerns about SE Kendall's estimates of fish losses until results of the barrier net tests were available (id. at 3-12, Appendix 3.6; Exh. EFSB-G-2-S2 (Att. B)).

As further mitigation for the proposed project's impacts on fisheries, the Company has proposed to extend one of its discharge pipes down to the bottom and middle of the Charles Basin (approximately 600 feet) and diffuse the discharge through ports located near the end of the pipe (Exh. EFSB-G-2-S Bulk Att. at 3-17 to 3-20).[49] The Company asserted that the diffuser pipe would increase DO levels[50] in the lower basin because the warmer effluent would rise to the surface, breaking the stratification layer and creating convection that circulates higher surface water into the depths (id. at 3-43).[51] The Company modeled projected DO levels in the Charles Basin with the diffuser in place; Table 4 above shows the average predicted DO level for a variety of model runs. The Company estimated that the oxygenation of the benthic environment resulting from the use of the diffuser would result in a 10 percent increase in the population of resident species, since the lower Charles Basin represented about 10 percent of the habitat of the

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[49] SE Kendall stated that it chose the discharge design and location with the maximum benefit and the minimum cost and that the diffuser would cost approximately $2 million (Exhs. EFSB-WQ-24; EFSB-WQ-18).

[50] SE Kendall testified that the temperature increases resulting from the proposed discharge would decrease DO levels, but that this would be insignificant compared to the proposed diffuser's projected increase (Tr. 10, at 1422, 1425-1426).

[51] The Company reported that the MDC temporarily employed aerators in the lower Charles River that increased DO and decreased biological oxygen demand, phosphorus and ammonia, and that other electrical generating facilities have successfully employed deep diffusers to dissipate thermal discharges (Exhs. EFSB-G-2-S Bulk Att. at 3-12; EFSB-WQ-20 (Att.); EFSB-WQ-25).

lower Charles River (Tr. 12, at 1832-1824).

Overall, SE Kendall asserted that the diffuser would increase DO levels in the lower Charles Basin, with a consequent extension of fish habitat that would more than offset the proposed project's entrainment and impingement impacts (Exh. EFSB-G-2-S Bulk Att. at 3-50). Based on its impingement and entrainment studies, the Company projected that the proposed project would have the greatest negative impacts on river herring and white perch, and that those same species, as well as northern pike and channel catfish, would benefit most from the improved bottom conditions (Exh. EFSB-WF-11-S). The Company submitted comments from agencies and other organizations indicating a serious concern about the population data used and the overall impact on fisheries, and recommending further study, but supporting the use of the barrier net and the deep diffuser to offset impacts (Exhs. EFSB-G-2-S2-A (Att.); EFSB-G-1-S (Att. b)). The Company also asserted that the proposed project would decrease levels of ammonia and hydrogen sulfides (products made during anaerobic breakdown), decrease phosphorus levels, improve clarity, reduce algae blooms, and decrease levels of more mobile heavy metals (Exh. EFSB-G-2-S Bulk Att. at 3-11, 3-17, 3-49 to 3-50; Tr. 11, at 1825). Consequently, the Company argued that there would be a net increase in fish populations as a result of the proposed project (Exh. EFSB-G-2-S Bulk Att. at 3-50, 3-60, Table 3-16).

4. Positions of the Parties

In its briefs, the City addressed a number of water-related issues, including the likely impacts of the Company's proposed increased use of once-through cooling water, uncertainties with regard to the Company's thermal modeling and fisheries analyses, uncertainties regarding the operation and benefits of the proposed barrier nets and diffuser, and the Company's plans to rely on city water for process uses in an emergency (City Initial Brief at 2-21; City Reply Brief at 2-3). Overall, the City agreed with the Company that the proposed changes to the discharge structure should improve water quality in the Charles River by breaking up the existing salt wedge, and that the barrier net should reduce the entrainment of larvae and impingement of fish (City Initial Brief at 2-3). However, the City sought certain conditions to ensure the minimization of the proposed project's impacts on the Charles River and on Cambridge's water

supply (id. at 18-22; City Reply Brief at 3).

First, the City requested that the Siting Board specifically condition its approval of the proposed facility on the construction of the deep diffuser, arguing that without the fisheries benefits provided by the diffuser technology, it would be impossible to conclude that impacts on the Charles River would be minimized (City Initial Brief at 18). The City therefore proposed the following condition:

> In order to minimize water and fisheries, the Siting Board directs the Company to make a compliance filing with the Siting Board regarding the Company's final design, construction and operational protocols of the facility's cooling water system discharge. The Siting Board will expeditiously issue a compliance decision affirming this decision if the Company builds a discharge 600 to 800 feet into the Charles River, with diffuser ports a minimum depth of 25 feet, substantially at the location shown on Figures 3-47 and 3-48 of the FEIR, designed to improve the water quality and aquatic habitat of the Charles River. The construction must include a diffuser designed to mix and re-oxygenate this portion of the Charles River Lower Basin. The Project must also include a bypass option that would terminate discharge of cooling water through the deep diffuser, temporarily or permanently, in the event that the discharge produces net adverse impacts to the River and its environment. If the Company's choice of cooling water system discharge changes, the Siting Board will determine, based on the compliance filing, whether additional discovery and hearings are necessary. If additional proceedings are needed, they will be an extension of this case. Therefore, the parties to this case would be parties to any additional proceedings and the issues in any such additional proceedings would be limited to the issues raised by the changes to the Company's proposal (id. at 18-19).

Second, the City argued that, because the Company's modeling of thermal impacts, its fisheries analysis, and its net testing all are subject to a certain degree of uncertainty, the Company should be required to monitor the impacts of the proposed project on water temperature, dissolved oxygen content, fish spawning patterns, and entrainment and impingement (id. at 19). The City therefore proposed the following condition:

> In order to minimize impacts upon fisheries, the Company shall make a compliance filing with the Siting Board, regarding the Company's choice of fisheries monitoring, including in-stream biological monitoring, to ensure that the increased intake of River water and increased discharge of cooling water are not having a net adverse impact upon the environment of the Charles River. The Company's compliance filing shall include a plan

> to adjust its operations to avoid such impacts (including but not limited to adjustments in the location of the discharge, the amount of water taken in, and other measures) and to implement that plan in the event that monitoring demonstrates that such adverse impacts are occurring (id. at 20).

Third, the City argued that because the proposed barrier net was still in the testing stage at the time briefs were filed, the Company should be under an obligation to revisit the issue of the net unless it is installed as currently proposed (id.). The City therefore proposed the following condition:

> In order to minimize impacts on fisheries, the Company shall make a compliance filing with the Siting Board regarding the Company's choice of, and timing of use of barrier net and other facilities designed to minimize entrainment and impingement of fish, larvae and eggs by the plant's intake of water. The Siting Board will expeditiously issue a compliance decision affirming this decision if (a) the Company justifies not installing a Gunderboom, with reduced intrusion into the Broad Canal and (b) there has been no change in the Company's decision to construct and use a fine-mesh exclusion barrier with a low approach velocity, on the order of 0.043 ft/s or less, spanning at least 250 feet in length and 15 feet in depth, constructed of 30 % monofilament geotextile fabric with openings sized at 1/32 inch. If the Company's choice of barrier net changes, the Siting Board will determine, based on the compliance filing, whether additional discovery and hearings are necessary. If additional proceedings are needed, they will be an extension of this case. Therefore, the parties to this case would be parties to any additional proceedings and the issues in any such additional proceedings would be limited to the issues raised by the changes to the Company's proposal (id. at 21).

In response to these three proposed conditions, the Company contended that matters relating to the design of the intake and discharge will be addressed appropriately and effectively during the NPDES permitting process, which can be expected "to address the location and placement of discharge structures, intake mitigation measures, construction and operation protocols, monitoring requirements and any and all other issues relating to water and habitat" (Company Reply Brief at 1). The Company asserted that EPA, through the NPDES process, would ultimately determine project design, and urged the Siting Board to approve the proposed project subject to approval by appropriate state and federal agencies and the submission of a compliance filing which addresses the design, construction, operation and other requirements imposed by those permits (id. at 2).

The City also raised concerns regarding the Company's plans for the emergency use of city water for process purposes (City Initial Brief at 16-18; City Reply Brief at 2-3). The City noted that current demand for city water is close to the limits on its withdrawals from reservoirs, and that further water demands might require investment in new water sources or infrastructure improvements (City Initial Brief at 16). The City expressed particular concern regarding the Company's varying record estimates of the amount of water it might need in an emergency, and the lack of clarity as to whether a permit from the City would be required for such use (id.). In addition, the City expressed concern that a prolonged use of emergency water could interfere with the optimal functioning of Cambridge's water supply system (City Reply Brief at 3). The City therefore proposed the following condition:

> The Company shall make a compliance filing with the Siting Board with copies to the City of Cambridge regarding its plan for the emergency use of City of Cambridge water. The Siting Board will expeditiously issue a compliance decision affirming this decision if the Company commits to limit its emergency use of City water to its current average daily use (200,000 gallons per day), for no more than 30 days unless extended by the City Water Department for good cause. If the Company's plan involves additional use of City water, the Siting Board will determine, based on the compliance filing, whether additional discovery and hearings are necessary. If additional proceedings are needed, they will be an extension of this case. Therefore, the parties to this case would be parties to any additional proceedings and the issues in any such additional proceedings and the issues in any such additional proceedings would be limited to the issues raised by the changes to the Company's proposal (id. at 3).

Concerning the emergency supply of water, the Company proposed to limit its emergency use of water to the greater of (a) its current average daily use (250,000 gpd), or (b) the minimum amount necessary to serve its non-interruptible steam customers, not to exceed 518,000 gpd (Company Reply Brief at 7).

Finally, the City requested that the Siting Board impose a condition similar to those imposed in the ANP Blackstone Energy Company, 8 DOMSB 1 (1999) ("ANP Blackstone Decision"), and ANP Bellingham Energy Company, 7 DOMSB 39 (1998) ("ANP Bellingham Decision"), directing the Company to cooperate with the Charles River Watershed Association and local officials (City Initial Brief at 21-22). Specifically, the City requested the following

condition:

> In order to minimize impacts to water resources, the Siting Board directs the Company to work with the Charles River Watershed Association ("CRWA") and the City of Cambridge to ensure periodic coordination of program activities and to share periodic reports with City of Cambridge officials, the CRWA, and the Siting Board (id. at 22).

5. Analysis

SE Kendall has proposed an upgrade to its existing facilities at Kendall Station, which produce both electricity for sale into the regional energy market, and steam for sale to major customers through Com/Steam. The proposed project, like the existing facilities, would be cooled by water withdrawn from the Broad Canal and returned to the Charles River. Thus, the proposed project would require water for three primary purposes: for electric production, for steam production, and for once-though cooling. The record demonstrates that, although the Company analyzed cooling technologies other than once-though cooling, none of these alternate technologies would be feasible given the size constraints of the Kendall Station site. The Company intends to withdraw most of its process water from the Broad Canal, and to discharge most of its wastewater to the Charles River in combination with its OTC discharge. However, it would still rely on city water for sanitary uses and for process water in emergencies, and would continue some discharges to the MWRA sewer system. Consequently, in order to determine whether the water impacts of the proposed project would be minimized, the Siting Board considers below the proposed project's impacts on municipal water and sewer systems, and on water quality, water flow, and fisheries in the Charles River.

The record indicates that proposed project would increase water use at Kendall Station for electric and steam production from the current average of 188,640 gpd to an average of approximately 632,160 gpd. An average of approximately 87,120 gpd would be used for HRSG/boiler make-up and other process water needs; process water requirements would range from approximately 55,872 gpd during baseload operations, up to 197,126 gpd when the CTG operates on oil and 223,776 gpd during power augmentation. The per MW process water requirements for the proposed facility would be 372 gpd. Although this represents a significant

reduction from the current 957 gpd per MW requirement for the existing facility, it is considerably higher than the per MW water use of recently approved generating facilities.[52]

The record indicates that the Company has taken steps to reduce the proposed project's water use. In particular, the Company's proposal to obtain process water from the Charles River, rather than from municipal water supplies, has the effect of reducing overall process water demand from 724,320 gpd to 632,160 gpd. Further, because the process water would be taken from the OTC flow after it has been used for cooling, the magnitude of process water use would not affect the magnitude of withdrawals from the Broad Canal. The use of OTC water for process purposes also would reduce Kendall Station's use of city water from the current average of 188,640 gpd to 5,040 gpd. The Company analyzed the alternative of obtaining its process water from municipal supplies rather than the river; however, because the overall demand for city water of 15 mgd is close to Cambridge's permitted amount of 16 mgd and the capacity of city water lines to supply water to Kendall Station is unclear, the record suggests that Cambridge might not be able to supply process water for the proposed project without either expanding its permitted water supply or investing in new infrastructure. Finally, given that Cambridge's water sources include upstream reservoirs, reduced use of city water for Kendall Station could result in higher flows upstream in the Charles River and thereby provide water resource benefits in Cambridge and other areas.

The Company has stated that, in event of an emergency, it may seek to use city water for process water and steam production; the Company's estimate of its emergency water use needs has ranged from 188,640 gpd to 518,000 gpd at various points in the proceeding. The City supports the proposed use of city water as a back-up supply, but has expressed concern about its ability to provide water at the higher levels proposed by the Company, or over an extended

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[52] The comparable usage rates for recently reviewed facilities include: 169 gpd per MW for the 775 MW Sithe Edgar project (with back-up oil); 87 gpd per MW for the 1550 MW Sithe Mystic project; 272 gpd per MW for the 580 MW ANP Blackstone project; 256 gpd per MW for the 580 MW ANP Bellingham project; and 613 gpd per MW for the 170 MW Dighton Power project. Sithe Edgar Decision, 10 DOMSB at 55; Sithe Mystic Decision, 9 DOMSB at 145; ANP Blackstone Decision, 8 DOMSB 1, at 146; ANP Bellingham Decision, 7 DOMSB 39, at 170; Dighton Power Decision, 5 DOMSB at 240.

period of time. Consequently, the City has requested a condition setting limits on the Company's use of city water in emergencies without prior approval. Given the limitations on Cambridge's water supply and water distribution infrastructure, it is necessary to resolve the conditions under which city water would be used for process water in order to ensure that the impacts of the proposed project on the city water supply are minimized. The Siting Board notes, however, that issues regarding the precise terms and conditions for the use of city water as a back-up supply are matters that should properly be resolved through negotiations between the City and the Company. Consequently, the Siting Board directs the Company to negotiate a mutually acceptable emergency water use agreement with the City and to provide a copy to the Siting Board prior to the commencement of commercial operation. With the implementation of this condition, the Siting Board concludes that the proposed project's impacts on municipal water supplies would be minimized.

The record indicates that the proposed project would significantly increase wastewater flows from Kendall Station. However, most of the proposed project's wastewater would be water treatment reject and boiler blowdown, which would be discharged to the Charles River with the OTC water, resulting in a net reduction of 13,824 gpd in wastewater discharges to the MWRA sewer system. The record indicates that the boiler blowdown would be similar in chemical composition to river water, while the water treatment reject would be high in TSS and TDS, but would constitute less than one percent of the total discharge volumes. These discharges would be regulated by several agencies including EPA, MDEP, MWRA, and the Cambridge Conservation Commission. The record also indicates that the MWRA sewer system periodically overflows via CSOs in the Kendall Station area; the reduction in discharges to the MWRA sewer system therefore may result in water quality benefits by reducing the frequency and amounts of CSO discharges into the Charles River. Accordingly, the Siting Board finds that the wastewater impacts of the proposed project on both the MWRA system and the Charles River would be minimized.

SE Kendall proposes to withdraw water for OTC and for process uses from the Broad Canal and to return the OTC water, together with most of the proposed project's process wastewater, to the Charles River. While the record suggests that these withdrawals and

discharges would require only minor changes to the Company's NPDES permit, the water volumes withdrawn and discharged would increase by nearly one half, from an existing average of 47.5 mgd to a projected annual average of 70 mgd. These changes in volume may have impacts on flow levels, water temperature, DO levels, and fisheries in the Charles River.

With respect to flow levels, the record shows that the proposed project typically would not withdraw or consume a significant percentage of the flow of the Charles River. However, during periods of low flow, the proposed project's withdrawals would exceed river flow[53] and include consumptive losses that are a significant percentage of river flow, 4.5 percent of 7Q10 flow on average and as much as 5.2 to 5.4 percent of 7Q10 flow with use of power augmentation or oil firing. Although the MDC would operate the Science Park Dam to maintain a constant water level in the Charles Basin, the relatively high consumptive water use resulting from oil firing and other operations, if occurring during low-flow conditions, could lead to decreases in river flow rates past the project's intake/discharge point and downstream of the Science Park Dam. In Section III.B, above, the Siting Board directed the Company to limit its use of oil during the ozone season, which is also a period when low flows might be expected. The Siting Board notes that this condition should reduce the amounts of potential downstream flow reduction associated with operation of the proposed project during low flow conditions.

The record indicates that the proposed project's withdrawals and discharges would result in the entrainment and impingement of fish larvae and fish, and would alter water temperature and dissolved oxygen levels in the Charles Basin. Each of the impacts could ultimately affect fish populations in the Charles River. The Company has recently begun monitoring the impingement rates at the existing facility and has conducted icthyoplankton studies to estimate entrainment impacts. The Company used data from these studies to estimate the additional impingement and entrainment losses that could result from the proposed project's increased water withdrawal. The Company has proposed to use a barrier net, subject to regulatory

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[53] The record shows that the Charles River functions in some ways as a lake in the project area, and thus to the extent that project withdrawals could theoretically exceed river flow, the same water would pass through the OTC equipment several times. The Company's thermal models address this possibility.

approval, to reduce impingement and entrainment losses. The record shows that at 50 percent effectiveness, the barrier net would reduce impacts to below current levels; at 25 percent effectiveness, the proposed project's impacts would be higher than current impacts, but would still represent the loss of less than 1 percent of the population for all but one species of fish.

SE Kendall modeled projected water temperature changes in the vicinity of the proposed discharges under a number of conditions. The Company's model predicts that the proposed project would raise the average temperature of water in the study area between the Longfellow Bridge and the Museum of Science by 2.5 to 6.5 degrees F, with a maximum temperature increase of 10.1 degrees F in extreme low flow conditions.[54] A comparison of modeled and actual water temperature increases resulting from the operation of the existing facility suggests that these values likely are high, and that actual temperature increases may be only half those modeled. The record indicates that the modeled temperature changes are generally within known normal ranges for freshwater species of fish, and may be within the temperature ranges of anadromous fish; however, optimum and lethal temperatures have not been established for all species at all life stages.

As mitigation for potential entrainment, impingement, and thermal impacts on fish populations, the Company has proposed to direct a portion of its discharge to the bottom of the Charles River through a newly constructed deep diffuser. The diffuser is intended to re-oxygenate the lower Charles Basin by causing stratified layers of water to mix. The record demonstrates that a salt water wedge in the lower Charles Basin has caused severe anoxia problems, which in turn have caused an extremely poor benthic community and the production of toxic hydrogen sulfide. Without a healthy benthic community, the lower Charles Basin cannot support significant bottom fisheries or effectively process accumulated sediments. The record demonstrates that the diffuser is likely to provide some increase in DO, with modeled levels increasing significantly. This increase in DO should reduce hydrogen sulfide levels, decrease algae blooms, increase the breakdown of organic pollutants, and stabilize metals, as evidenced by past attempts by MDC and modeling by the Company. In addition, the Company estimates that

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[54] Discharges from the existing facility under 7Q10 conditions would raise water temperature in the study area by an average of 1 to 3 degrees F.

the reoxygenation would increase fish habitat in the Charles River by approximately 10 percent, and consequently projects a 10 percent increase in fish populations. The Siting Board notes that fish populations are dependent on factors other than availability of habitat, and that populations are therefore unlikely to increase in exact proportion with the extension of habitat. However, the creation of significant new habitat through the re-oxygenation of the lower Charles Basin is an important benefit which has the potential to offset potential entrainment, impingement, and thermal impacts on fish populations. The Siting Board notes that, while numerous agencies and the City have expressed concern about the potential impacts of the proposed withdrawals and discharges on fish populations, overall they support the construction of the deep diffuser, and feel it has significant potential to improve water quality and habitat in the lower Charles Basin.

In summary, the proposed project's increased water withdrawals from the Broad Canal may result in increased impingement and entrainment of fish larvae and fish; however, these increases should be partially or completely offset by the Company's proposed installation of a barrier net at the intake structures. Similarly, the proposed project's increased discharges to the Charles River may result in an increase in thermal impacts on fish populations; however, these impacts should be partially or completely offset by the Company's proposed construction of the deep diffuser. Thus, the proposed project could have a net overall positive impact on water resources. The Siting Board concludes that, if the barrier net and deep diffuser are installed and operate substantially as anticipated, the impacts of the proposed project's increased water withdrawals and discharges would be minimized.

The Siting Board notes that it is important to ensure that the proposed project's overall impacts on water resources, including the benefits of the diffuser and barrier net, are close to those presented here, because the minimization of impacts is dependent on these benefits. Because the design of the Company's discharge, including the diffuser, is not yet complete, and because the actual effectiveness of both the diffuser and the barrier net are still unknown, the City has proposed three conditions addressing the Company's proposed mitigation. Two of the conditions would require pre-construction compliance filings to allow the Siting Board to review the design of the barrier net and discharges once designs are complete and have been approved by other agencies. The Siting Board recognizes that the exact design, installation and operation of

the intake/discharge system is subject to approval by other agencies, including EPA, MDEP, the Massachusetts Department of Fisheries and Wildlife and the Cambridge Conservation Commission, and thus is subject to change. We agree with the Company that these agencies have both the authority and the expertise to deal with detailed design and engineering issues. Consequently, the Siting Board will not require a compliance filing to review detailed design issues. However, the Siting Board notes that its approval is contingent upon the installation of the deep diffuser and barrier net substantially as proposed in this proceeding. If there are substantial changes in the final design of the proposed project's intake or discharge, and in particular to the deep diffuser or barrier net, the Company must notify the Siting Board so that it can determine whether to inquire further into the changes.

The City's third proposed condition would require the Company to conduct monitoring to ensure that the proposed project's increased withdrawals and discharges do not have a net adverse impact on the Charles River. The Siting Board agrees that SE Kendall should monitor the effects of its intake/discharge system on water quality and fisheries, particularly since the benefits of the proposed barrier net and diffuser, although potentially significant, have not been tested. The Siting Board anticipates that such monitoring will take place primarily under the auspices of EPA, as a condition of the Company's revised NPDES permit. The Siting Board directs the Company, in consultation with MDEP and EPA, to develop and implement a plan to monitor the impacts and the beneficial effects of the proposed intake/discharge system, including temperature impacts, fishery impacts as indicated by changes in impingement and entrainment rates, DO changes and other parameters the Company considers important, for a minimum of two years following the commencement of commercial operation. The Company shall provide the Siting Board with a copy of its monitoring plan prior to commencement of commercial operation. Within three years of the commencement of commercial operation, the Company shall provide the Siting Board with an analysis of the results to date of its monitoring of temperature impacts, fishery impacts and DO changes, with supporting data. If the Siting Board determines based on the Company's analysis that the temperature or fishery impacts are significantly greater than approved by the Siting Board, or that, overall, the DO benefits of the intake/discharge system are not being realized, then the Siting Board may require operating changes or additional mitigation

that contributes to the minimization of water resources impacts, consistent with the cost of mitigating, controlling and reducing such impacts.

Accordingly, the Siting Board finds that, with the conditions set forth above regarding an emergency water supply agreement and monitoring of the impacts and benefits of the proposed intake/discharge system, the water resource impacts of the proposed project would be minimized.

D. Wetlands

This Section describes the wetland impacts of the proposed project and its interconnections and the mitigation proposed by the Company.

1. Description

SE Kendall stated that Kendall Station is located on a highly developed and disturbed site bounded to the south by the Broad Canal; the Charles River is located approximately 200 feet east of the site. The Company delineated wetlands on and adjacent to the proposed site, as defined by the Massachusetts Wetlands Protection Act ("WPA")[55] (Exh. SEK-1, at 4.7-1 to 4.7-2, 4.7-10). Specifically, the Company identified an area of bank and land under a waterbody ("LUW") associated with the Broad Canal on the southern portion of the site and a 100-foot buffer zone extending northward from the bank (id., at 4.7-2, 4.7-12, Figure 4.7-1). The Company stated that the site is not located in a flood zone, and that current facility staff are unaware of any past flooding from sewers, storm drains, or the river (Exhs. EFSB-WW-5; SEK-1, at 4.7-10 to 4.7-11; EFSB-RR-60; Tr. 7, at 925). The Company also identified areas of bank, LUW, buffer zone, and land located within the 25-foot riverfront zone associated with the Charles River, where the cooling water discharge pipe for the proposed project would be located (Exh. SEK-1, at 4.7-2, 4.7-12).

SE Kendall indicated that the proposed generating facility would not affect any wetland resource area or buffer zone; however, the removal of existing structures and construction of a switchyard and substation control building would permanently alter 12,740 square feet of

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[5] Reference to the WPA includes any amendments to the act, including the Rivers Protection Act.

wetland buffer zone, while utility lines would be installed within a 21,000 square-foot area of buffer zone, creating some temporary impacts (Exhs. SEK-1, at 4.7-2; EFSB-WW-1). The Company stated that it could not move the electrical facilities out of the buffer zone because of site constraints and traffic circulation requirements (Tr. 7, at 880-881). The Company indicated that it currently stores water treatment chemicals and fuel oil in the buffer zone and in the future would use mineral oil for the switchyard, to be located in the buffer zone (Exh. EFSB-RR-57; Tr. 7, at 877-878). The Company testified that it would have three hazardous waste containment areas on-site -- one near the northern oil tank for unloading, one around the chemical storage area to the north of the existing turbine building, and one to the southwest of the southern oil tank; however site plans do not show the containment area near the southern oil tank (Exhs. EFSB-G-2-S Bulk Att. at Figure 2-4; Tr. 7, at 929-932, 953).

The Company estimated that the proposed pedestrian canal walk along the Broad Canal would occupy 4530 square feet of buffer zone, and that construction of the canal walk would temporarily affect 94 linear feet of bank along the Broad Canal, consisting of a granite wall in poor condition (Exhs. EFSB-WW-2; EFSB-WW-12). The Company indicated that it would restore the wall to the extent practical, and that the bank's ability to provide storm protection, flood control or wildlife habitat therefore would be unaffected (Exhs. EFSB-WW-2; EFSB-WW-12). In addition, the Company stated that a portion of the canal walk may be constructed on piles in the Broad Canal and such piles would permanently alter approximately 6250 square feet of the LUW (Exhs. EFSB-RR-59; EFSB-G-2-S Bulk Att. at 1-9, 4-52). The Company indicated that it is consulting with the Cambridge Conservation Commission concerning the best means to reduce the impact of the canal walk on the bank and other wetland resources (Tr. 7, at 887-892).

SE Kendall described the wetlands impacts of two possible designs for the cooling water outfall pipe and diffuser, which would extend approximately 640 feet into the middle of the Charles River (Exh. EFSB-RR-58). Under the Company's preferred design, the new discharge pipe would connect with one of the two existing discharge pipes as it exits an existing wall along the bank of the Charles River, then enter the river beneath the surface and slope toward the bottom of the river (id.; Tr. 7, at 893-895). SE Kendall estimated that this design would result in

up to 7700 square feet of temporary disturbance and 5300 square feet of permanent disturbance[56] to LUW in the Charles River (Exh. EFSB-RR-58).[57] In an alternative design, the diffuser pipe would connect with the existing discharge pipes prior to their point of entry into the Charles River, then enter the river beneath the surface and slope toward the bottom of the river (Exhs. EFSB-WW-3; EFSB-G-1-S at 2-19 to 2-20, Appendix 2; Tr. 7, at 893-895). The Company estimated that this design would result in up to 12,800 square feet of temporary disturbance and 8,800 square feet of permanent disturbance to LUW (Exhs. EFSB-WW-3; EFSB-RR-58; Tr. 7, at 900). In addition, this alternative would require the dismantling and reconstruction of a portion of the granite wall containing the existing outfall pipes, resulting in the temporary disturbance of approximately 30 linear feet of bank (the wall) (Exh. EFSB-WW-2).

The Company asserted that the dredging required to construct the discharge pipe would be regulated by the Cambridge Conservation Commission through an Order of Conditions, by the Army Corps of Engineers under Section 10 and 404 permits, and by MDEP under a Section 401 permit (Exh. SEK-1, at 8-1 to 8-7). The Company stated that it would reuse the dredged sediment to bury the pipe and confine the area of increased turbidity through silt screens and staged dredging sections (Exhs. EFSB-RR-58; EFSB-G-2-S Figure 3-48).

SE Kendall stated that the proposed project would not significantly benefit or adversely affect the wildlife associated with wetlands on the proposed site, because these wetlands are highly disturbed and support only urban species (Exh. EFSB-WW-16).[58] The Company noted that the Charles River itself provides significant wildlife habitat, which would be improved by the proposed project's discharge, which is expected to reduce anoxic conditions in the deep portions of the lower Charles River (Exhs. EFSB-G-1-S at 8-17; EFSB-WW-4). In addition, the

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[56] The Company estimated permanent impacts based upon the area of LUW where the pipe would not be fully buried under the bottom of the Charles River (Exh. EFSB-RR-58).

[57] SE Kendall also testified that a small area around the actual discharge would be permanently affected because the discharge area would be cleared of softer and finer sediments (Tr. 7, at 905).

[58] The Massachusetts Natural Heritage and Endangered Species Program office indicated that it is not aware of any rare plants or animals or exemplary natural communities that would be adversely affected by the proposed project (Exh. SEK-1, Appendix 4.7).

Company asserted that the proposed discharge would create open water habitat on the Charles River in the winter (Exhs. EFSB-G-1-S at 8-17; EFSB-WW-4). SE Kendall argued that construction of the discharge pipe would not affect the river's carrying capacity or negatively impact fisheries or wildlife, since the discharge pipe would be located in an area that, due to anoxia and contamination, does not support extensive benthic species (Exh. EFSB-WG-2 (Att. A); Tr. 7, at 907-909).

SE Kendall noted that the proposed site is almost entirely impervious, and indicated that construction of the proposed project would create no new impervious surface (Exhs. EFSB-WW-6; EFSB-WW-15 (Att.)). The Company stated that it would upgrade the stormwater management system on the proposed site, which currently discharges a significant portion of rooftop and surface drainage into combined sewers operated by the MWRA (Exhs. EFSB-WW-7; EFSB-G-2-S Bulk Att. at 3-75 to 3-77). The Company proposed to reroute all stormwater away from the combined sewers to stormwater discharge outfalls along the Broad Canal (Exh. EFSB-G-2-S Bulk Att. at 3-75 to 3-77; Tr. 7, at 927). The stormwater would pass through deep sump catch basins and would be treated to remove approximately 80 percent of total suspended solids (Exhs. EFSB-G-2-S Bulk Att. at 3-75 to 3-77; EFSB-RR-64). The Company stated that the proposed project would meet applicable GEP stormwater guidelines (Exhs. SEK-1, Appendix 4.7). The Company also indicated that it would update its existing Stormwater Pollution Prevention Plan under its NPDES permit, and would provide the City of Cambridge with an opportunity to comment on the revised plan (Exhs. EFSB-RR-19; EFSB-RR-62).

The Company stated that it would need to employ temporary erosion control measures during the initial construction period, as the existing stormwater management system would be demolished during construction of the foundations of the proposed project (Exh. EFSB-WW-10; Tr. 7, at 938-939, 943-944). The Company stated that, during construction, it would maintain silt fences around the catch basins and the Broad Canal, handle chemicals in accordance with state and federal regulations, and place oil booms at drainage outfalls during appropriate times of construction (Exhs. EFSB-WW-10; EFSB-WW-15; EFSB-RR-19; Tr. 7, at 941-945). SE Kendall also indicated that it would need to file with the EPA for a General Permit for

Construction to support the construction phase of redevelopment (Exh. EFSB-RR-62).[59]

2. Positions of Parties

The City expressed concerns about the impact of the canal walk, construction of the outfall pipe, storage of chemicals in the buffer zone, repair of the canal wall, and the proper stormwater standards to apply under the WPA, but stated that these issues could be addressed through local permits (City Initial Brief at 22-23).

3. Analysis

The record shows that construction of the proposed project would result in the permanent alteration of: (1) 17,270 square feet of on-site wetlands buffer zone, and (2) up to 8,800 square feet of LUW in the Charles River. In addition, construction of the proposed project would result in temporary impacts to: (1) a 21,000 square-foot area of on-site buffer zone, in which utilities would be installed; (2) up to 12,800 square feet of LUW in the Charles River and up to 6250 square feet of LUW in the Broad Canal; and (3) up to 124 linear feet of bank, consisting of two stone walls along the Broad Canal and the Charles River. The precise routes of the electric and natural gas interconnections for the proposed project have yet to be determined; however, the record indicates that they would be placed along roadways and would not directly affect wetlands.[60]

While the square footage of anticipated wetlands disturbance associated with the proposed project is not insignificant, the record indicates that the affected on-site wetland and wetland buffer areas are already in a disturbed and impervious state. No new impervious surface would be created as a result of the construction of the proposed project, and stormwater

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[59] The Company noted that possible routes for the transmission line could extend to riverfront area and the 100-foot buffer zone under the WPA, along the Broad Canal and the Charles River (Exh. EFSB-G-7-S4).

[60] The Siting Board will review the wetland impacts, if any, of the project interconnects in Commonwealth Gas Company, EFSB 00-2, and Cambridge Electric Light Company, EFSB 00-3.

discharges would be significantly improved by separating stormwater from combined sewers and installing stormwater pollution removal systems. Further, the record indicates that recreational access to the wetland buffer area would be improved by the construction of the pedestrian canal walk, and that, as further discussed in the water section at III.C, above, wetland habitats of the Charles River could be improved as a result of the proposed project's discharge.

The record indicates that the Company currently is working with the Cambridge Conservation Commission and other regulatory authorities to evaluate design options that would reduce the wetlands impacts of the proposed cooling water discharge and pedestrian canal walk. Plans for both the discharge and the canal walk require further review from other regulatory agencies to determine both the effectiveness of the different design options and their impacts on fishery, historical, and recreational resources. The Siting Board concludes that the adoption of the discharge and canal walk designs agreed upon by the Company and affected federal, state and local regulatory authorities would minimize the wetlands impacts associated with these elements of the proposed project.

Overall, the record demonstrates that the Company would take all measures to reduce the wetland impacts associated with the construction and operation of the proposed project, and that the proposed impacts are necessitated by the location of electrical facilities, the proposed use of OTC, the development of the canal walk as a public access requirement of Chapter 91 regulations, and the constraints of the site. The record also shows that, as part of the development of the proposed project, the Company will improve both stormwater treatment at the site and wetland habitats in the Charles River. Accordingly, the Siting Board finds that the wetland impacts of the proposed project would be minimized.

E. Solid and Hazardous Waste

This Section describes the solid and hazardous waste impacts of the proposed project, the mitigation proposed by the Company, and the costs and benefits of any additional mitigation options.

1. Description

SE Kendall stated that Kendall Station currently generates approximately 1,200 to 1,500 pounds per week of solid waste, consisting primarily of office and plant worker trash, which is transported off-site weekly to an energy waste facility (Exhs. SEK-1, at 4.12-4; EFSB-SW-11). The Company added that the existing facility produces approximately four cubic yards of bottom ash every two years; this bottom ash is recycled or land-filled off-site (Exh. SEK-1, at 4.12-4; Tr. 3, at 328). SE Kendall indicated that the operation of the proposed project would not result in a marked increase in the production of office and plant solid waste, and that the production of bottom ash is expected to decrease, as the new equipment will burn natural gas or No. 2 fuel oil rather than No. 6 fuel oil (Exhs. SEK-1, at 4.12-4; EFSB-SW-1). The Company stated that it was evaluating the option of increasing the size of its solid waste container to reduce the number of trash pick-ups (Exh. EFSB-RR-23).

The Company noted that its parent company, Southern Energy, is an EPA WasteWi$e partner, with programs in place to recycle coal ash, prevent pollution, recycle office waste, and purchase recycled materials (Exh. EFSB-SW-8).[61] The Company stated that, while there is no recycling program for general waste currently in place at the Kendall Station, it is committed to conducting a solid waste audit and developing an integrated solid waste management program for the station prior to the start-up of the proposed project (Exh. EFSB-SW-2; Tr. 3, at 335-336). The Company stated that it would implement recycling and waste reduction strategies used at other Southern Energy facilities at the proposed project as appropriate, and would continue existing waste reduction and recycling efforts, including the recycling of bottles, collection of scrap metal, and reuse of cleaning rags (Exhs. EFSB-SW-8; EFSB-SW-13; Tr. 3, at 348-350). The Company stated that it would comply with Cambridge's solid waste regulations for commercial facilities, which require the completion of a recycling plan, and would incorporate the policies of the City of Cambridge's Division of Recycling into its solid waste audit (Exhs. EFSB-SW-10; EFSB-RR-23; EFSB-RR-24). The Company indicated that the recycling plan,

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[61] WasteWi$e is a voluntary EPA-sponsored program aimed at reducing municipal solid waste by working with partners to set recycling goals and report on waste reduction strategies (Exhs. EFSB-SW-7 (Att.) at i; EFSB-RR-27).

which it expected to submit to the City in mid-2000, would later be updated to cover the upgraded facility (Exh. EFSB-RR-26).

The Company testified that Cambridge has reached a 31 percent rate of recycling (Exh. EFSB-RR-26). According to the Massachusetts Solid Waster Master Plan 1997 Update, Massachusetts has set a state-wide goal of 46 percent for recycling of municipal solid waste (consisting of residential and commercial waste); further, the average rate of recycling of non-municipal solid waste (consisting primarily of construction and demolition debris) was 68 percent in 1996 (Exhs. EFSB-SW-14 (Att.) at 1-2, 3-3; EFSB-RR-26). The Company stated that it is committed to achieving Cambridge's recycling goals for commercial facilities and that it would work to achieve or exceed the current overall recycling rate for Cambridge (Exh. EFSB-RR-26).

The Company estimated that construction of the proposed project would generate solid waste including: 4500 cubic yards of soil and concrete, 14 tons of wood and steel, and 7,000 linear feet of wire and cable (Exh. EFSB-SW-5). The Company stated that it would work to reduce and recycle construction waste, specifically metal and paper scrap, during the construction of the proposed project (id.).

The Company indicated that Kendall Station currently is a Small Quantity Generator of federally-regulated hazardous wastes, including sodium hydroxide and sulfuric acid, and a Large Quantity Generator of state-regulated hazardous wastes, including oily debris, used oil and contaminated soil (Exh. SEK-1, at 4.12-3 and 4.12-4; Tr. 3, at 329-330). The Company indicated that the operation and maintenance of the proposed project would slightly increase the amount of hazardous waste produced at Kendall Station, but would not affect the frequency of offsite hazardous waste disposal (Exh. SEK-1, at 4.12-3, 4.12-6). Specifically, the Company noted that the treatment system for make-up water from the Charles River would produce 200 to 400 pounds per week of sediment which might be classified as hazardous, depending on the presence of contaminants such as lead (id. at 4.12-6). The Company also indicated that the proposed project would produce 2,600 gallons of wash water (water used to clear the interior of the combustion turbine) once per month during natural gas firing and once per week during oil firing (id. at 4.12-7 to 4.12-8). The wash water would be collected in a storage tank within the building

and transported off-site by a licenced vendor for treatment (id.).

2. Analysis

The record demonstrates that the operation of the proposed project would have minimal impact on the production of solid waste at Kendall Station. While the volume of plant and office waste would increase slightly from current levels, this increase would be offset by the likely reduction in the production of bottom ash. In addition, the proposed project would result in a slight increase in the quantity of hazardous waste produced at Kendall Station.

The record indicates that SE Kendall's parent company has worked with EPA to reduce waste at other facilities. Here, the Company has committed to submitting plans for recycling in compliance with the City's regulations and to conducting an audit of its existing and proposed facilities to determine how further recycling or waste reduction could be attained.

SE Kendall has indicated that it would attempt to meet or exceed Cambridge's 31 percent average rate of recycling, and would work to reduce construction and demolition debris during construction. The Siting Board encourages SE Kendall to work with the City to develop a program with the goal of attaining a recycling rate for operational wastes, including bottom ash, of 46 percent, the target recycling rate for municipal solid waste set forth in the Massachusetts Solid Waste Master Plan, and to work with its contractor to attain the maximum feasible recycling of construction and demolition debris. The Siting Board notes that SE Kendall intends to submit an updated recycling plan for the upgraded facility to the City. The Siting Board directs the Company, prior to the commencement of operation, to file a copy of the updated recycling plan with the Siting Board, and to report on its recycling rate for construction and demolition debris and its anticipated recycling rate for operational wastes.

The Siting Board finds that, with the implementation of the above condition, the solid waste impacts of the proposed project would be minimized.

F. Visual Impacts

This Section describes the visual impacts of the proposed project and the proposed mitigation.

1. Description

The Company stated that the Kendall Station Project was designed to allow the new structure to appear as a logical extension of existing buildings and to blend into its urban setting (Exh. SEK-1, at 4.9-1). The existing Kendall Station consists of a power block building, administrative offices, a storage shed, field switchyard, fuel oil storage tanks, a guard shack, open parking areas and other minor structures, with building heights ranging from 18 feet to 105 feet, and three 175-foot stacks (Exh. EFSB-G-1-S at 4-6). The new HRSG building would be 85 feet by 225 feet, with a maximum height of 100 feet; the building height would step down as it extends away from the existing power block building, with one 250-foot stack (id.; Exh. SEK-1, at 4.9-1). The Company explained that the proposed HRSG building would be located approximately in the center of the site; it would be aligned with the largest portions of the existing power plant and placed as far away as possible from the Broad Canal side of the site (Exh. EFSB-G-1-S at 1-13; Tr. 1, at 14). The Company asserted that this orientation would create a logical extension of the existing building mass, thereby lessening visual impacts by blending the new building into the existing facility layout (Exh. EFSB-G-1-S at 1-14). The Company explained that the design of the new building and stack would include horizontal and vertical elements similar to elements present in the existing facility, consisting of windows and fenestration (id. at 1-15; Exh. SEK-1, at 4.9-5). SE Kendall stated that the color of the proposed building would blend with the existing plant to reinforce the connection between the existing and new structures (id. at 4.9-5).

The Company asserted that the design of the new building would be consistent with the historic industrial character of the Charles River frontage and the Broad Canal (Exh. SEK-1, at 4-34). SE Kendall stated that Cambridge has expressed a preference for preserving the visual and historical value of the existing building (Exh. EFSB-V-8). The Company noted that the Cambridge Historical Commission ("CHC") would comment on the design of the proposed new building as well as improvements to be made to the existing building, and any canal-side buildings, to enhance the canal walk (Exh. EFSB-L-19).

The Company submitted an evaluation of the potential visual impacts of the proposed project (Exhs. SEK-1, at 4.9-6 to 4.9-15; EFSB-G-1-S at 4-34 to 4-53). The Company selected

eight visual receptor points and the Siting Board requested an additional two viewsheds (Exhs. SEK-1, at 4.9-6; EFSB-V-12; EFSB-V-13). For each viewpoint, the Company presented both a photograph of existing views looking toward the Kendall Station site, and the same photograph with a superimposed computer-generated rendering of the proposed facilities (Exh. SEK-1, at Figures 4.9-5 to 4.9-12).

The Company stated that the existing residences closest to the proposed project are condominiums located off of Edwin Land Boulevard ("Land Boulevard") to the north of the site (Tr. 1, at 28, 45). Based on its viewshed analysis, the Company stated that the view of the new HRSG building from the condominiums would be blocked by the Riverview Office complex, but that the stack would be visible (id. at 28-29). SE Kendall stated that the proposed project and its stack would not be visible from the established East Cambridge neighborhood located to the north of the site (Exh. EFSB-V-12). The Company stated that existing office buildings located on Broadway, and the Riverview Office complex on Athenaeum Street, which abut the proposed project to the south and north, would continue to have direct views of the Kendall Station equipment (Exh. EFSB-V-3). Further, the Company stated that with the exception of the new stack, the proposed project would not be visible from First Street or Land Boulevard; consequently, views of older significant buildings along First Street would be unchanged (Exhs. EFSB-RR-19; EFSB-L-14).

The Company noted that a mixed-use development known as the Cambridge Research Park[62] has been proposed for the 10-acre parcel immediately adjacent to the west of Kendall Station, and that when completed, its residences would be the closest residential use to the proposed project (Exh. EFSB-L-21; Tr. 1, at 28, 45). SE Kendall asserted that the proposed

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[62] When completed, the Cambridge Research Park development will consist of 726,000 square feet of life sciences research and office space; 125,000 square feet of retail space; a 400-room hotel; approximately 150 units of housing (with the potential for an additional 100 units of housing); and approximately 95,000 square feet of open space which would include a recreational plaza and a skating rink located between Athenaeum Street and Linsky Way (Exh. EFSB-L-21 (Att.)). The landscaping plan for the development shows vegetation bordering the areas designated for residential development (id.). The Cambridge Research Park would consist of buildings ranging in height from 20 feet to 230 feet (Exh. EFSB-L-3 (Att.)).

project would not cast shadows onto the proposed Cambridge Research Park or associated open space (Exh. EFSB-L-3). The Company also asserted that, when constructed, the Cambridge Research Park would alter or eliminate views of the proposed project from areas to the west and northwest of Kendall Station (Exh. EFSB-V-2).

The Company explained that due to the size constraints of the site, its visual mitigation plans focus on building treatment and architectural details, color and landscaping, including the development of a public canal walk located adjacent to the Broad Canal along the south side of the project site (Exhs. EFSB-V-7; EFSB-V-15; Tr. 1, at 16).[63] The canal walk would be an eight-foot path along the canal's edge with an adjacent four to five-foot landscaped buffer zone and screen fence on the building side of the canal walk, and would include features such as guardrails, light posts and light fixtures, and seating (Exh. EFSB-G-1-S at 4-56 and Figure 2-7). The Company provided plans that detailed the landscaping of the buffer zone along the fence line and the canal walk, with trees to be planted at an initial height of between 12 to 18 feet (id.; Tr. 1, at 16). The Company noted that the only existing on-site trees are located along the front entrance of the power-block building extending along the existing canal walk area to the southeast of the building, and that this vegetation would either remain or be improved as part of the design of the canal walk (Tr. 1, at 19, 53). SE Kendall indicated that in accordance with the preferences of the City and the MDC, the canal walk would be designed so that it could be incorporated into an overall public access plan for the area (Exh. EFSB-G-1-S at 1-14).[64]

The Company indicated that the landscape plans it has submitted to the City do not include plantings within the site boundary beyond those proposed for the canal walk, but that it is reviewing its landscaping plans for the northern property line where Second Street and Athenaeum Street intersect in the vicinity of the site entrance, in light of the City zoning

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63 The MDEP Waterways Program -- Chapter 91 -- requires that SE Kendall provide public access to the Broad Canal because the project will be constructed on filled tidelands (Exh. EFSB-G-1-S at 4-1).

64 A Charles River Basin Master Plan has been developed by the MDC (Exh. EFSB-L-14).

requirements (Exh. EFSB-V-15; Tr. 1, at 39).[65] The Company indicated that it does not plan on-site landscaping along its western boundary; however, SE Kendall stated that it would continue to work with the developers of the Cambridge Research Park to design mutually acceptable plantings or screening along the property line with Cambridge Research Park (Exhs. EFSB-V-15; EFSB-RR-4; Tr. 1, at 50-51). SE Kendall explained that the Cambridge Research Park site has a larger area available for landscaping than the proposed site in the vicinity of this site boundary (Tr. 1, at 39).

The Company suggested that the fenestration on the HRSG building may be backlit so that the "shadowbox type" windows would provide some illumination to the facade of the building (Exh. EFSB-V-1; Tr. 1, at 22). SE Kendall stated that the proposed on-site lighting would be subdued and that the canal walk would use the historic period lighting currently in place on the adjacent MDC property (Tr. 1, at 22). With respect to the new stack and navigational lighting, the Company provided a determination by the Federal Aviation Administration ("FAA") requiring obstruction lighting consisting of red flashing beacons equally spaced around the stack within 20 feet of the top of the stack (Exh. EFSB-RR-1-S). The Company asserted that, with the exception of adhering to the FAA requirements, the final lighting design for the proposed project would be determined through an open interactive process with the City (Tr. 1, at 68).

The Company analyzed the meteorological and operating conditions under which visible exhaust plumes likely would emanate from the new stack based on a model developed by TRC (Exh. EFSB-V-9 (Att.)). The Company stated that the model indicated that a plume might be visible up to 10 percent of the time when a plume could actually exist, which would be during daylight and fair weather, with normal operation using natural gas (id.). SE Kendall noted that any such visible plume would be less than 200 meters long 99 percent of the time, and would be "light and wispy" (id.).

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[65] The Cambridge zoning by-law requires screening from abutting streets and lots for outdoor parking facilities with five or more parking spaces (Exh. EFSB-V-15). The Company stated that if the City requires screening at Athenaeum Street, it would provide a five-foot wide strip densely planted with shrubs or trees (id.).

2. Analysis

The proposed project would be located at a site -- Kendall Station -- that is presently used for electric and steam generation. The record demonstrates that land uses in the area around the proposed project site consist primarily of commercial uses, recreational uses associated with the Charles River and the Broad Canal, and to a lesser extent, multi-family residential uses. The Kendall Station site is the last remaining industrial use in the area, and is visually distinct from its neighboring uses. However, the City has encouraged SE Kendall to maintain the integrity of the existing buildings as much as possible, thereby retaining the current industrial viewshed associated with this site. While the proposed stack would be taller than the existing stacks, the record shows that building heights would not increase and that the new building, through architectural enhancements and placement, would blend with the existing structure.

The record demonstrates that the Company analyzed the potential visual impacts of the proposed project at ten receptor locations in the surrounding area. For each receptor, the Company submitted a viewshed showing the current view from that location, and a second viewshed showing future views with the proposed project.

The record indicates that the views from existing residential areas are limited to views of the stack from the condominiums located to the north of the facility. The record further indicates that the existing residential areas from which the stack could be visible are urban in nature, generally consisting of multi-story dwellings without ground level open space or private yards, and that off-site vegetative screening therefore would not be an effective means of reducing visual impacts. In addition, residential development is planned for the Cambridge Research Park development project; however, the project is in the early stages of development, and additional on-site landscaping could be included into the landscape plan for that development.

The Company plans a landscaped canal walk located along the south of the site. The Company has been working with the City and the MDC to design the canal walk, which could incorporate a recreational path for walking and biking, extensive landscaping, lighting, and seating. The landscaping for the canal walk would extend to the area that fronts on Land Boulevard. The record shows that the Company is committed to working collaboratively with the City and the MDC on the canal walk project.

SE Kendall also has indicated that, if required by the City under its zoning by-law relating to landscaping of parking areas -- which prescribes a five-foot wide landscaped buffer -- it would landscape the area along its northern border which fronts on Athenaeum Street. The Siting Board notes that the Riverfront Offices directly abut the facility to the north, with the attendant pedestrian traffic traveling along Athenaeum Street. In addition, the area surrounding the site is undergoing redevelopment, and there will be an emphasis on pedestrian walkways and recreational activities in the area along Athenaeum Street. Without landscaping in the vicinity of the Kendall Station entranceway which fronts Athenaeum Street, components of the proposed project would be in full view of pedestrians, especially those with destinations in the surrounding mixed-use area. Further, although the Company has proposed building treatments and architectural details that would serve to minimize the visual impacts, the project would result in an already constrained site being more intensively developed. Therefore, to minimize visual impacts of the proposed project from the north of the site, the Siting Board directs the Company to provide a five-foot wide on-site buffer strip densely planted with shrubs or trees along Athenaeum Street.

Accordingly, the Siting Board finds that with the implementation of the above condition, the visual impacts of the proposed project would be minimized.

G. Noise

This Section describes the proposed project's noise impacts and mitigation proposed by the Company.

1. Description

The Company asserted that it had conducted an accurate and reliable analysis of noise impacts, consistent with Siting Board precedent, and that the proposed facility would meet regulatory noise guidelines (Company Initial Brief at 106). The Company stated that increases in off-site noises caused by operation of the proposed facility would be well below MDEP's limit of 10 decibels ("dBA") at the nearest residences, and at or below MDEP's 10 dBA limit at the project property lines (Exhs. EFSB-G-2-S Bulk Att. at 6-9; EFSB-RR-41-A-C2).

The Cambridge Noise Control Ordinance limits both overall A-weighted and octave band noise levels to 50 dBA at nighttime for residential areas, and to 65 dBA for commercial areas and 70 dBA for industrial areas at all times (Exhs. EFSB-A-1-S at 6-2; EFSB-N-21 at (8.16) 5); SEK-1, at 4.6-2). The Company asserted that Cambridge officials recommend that a facility's noise contribution be designed to be less than or equal to the late night ambient levels when the existing ambient levels approach or exceed the city standards (Exh. EFSB-N-8). The Company asserted that it would comply with the ordinance based on the A-weighted indicators at all noise measurement locations ("NML"), and would comply with the octave band restrictions at office and residential locations; however, the Company's witness noted that the project "may or may not" comply for each individual octave band at all property line locations (Exh. EFSB-N-8; Company Initial Brief at 94; Tr. 9, at 1241).

To determine the noise impacts of the proposed facility, the Company analyzed existing noise levels in the vicinity of the proposed site and the expected changes in noise levels resulting from construction and operation of the proposed facility (Exhs. EFSB-RR-41-A-C2; EFSB-A-1-S at 7-9, 7-10; SEK-1, at 4.6-9). The Company measured background noise levels at 13 NMLs, including seven NMLs selected to represent the nearest residential and commercial sites in various directions from Kendall Station, and six NMLs selected to represent property line ("PL") locations (Exh. SEK-1, at 4.6-4).[66] The Company stated that it selected the noise monitoring locations by first identifying nearby noise sensitive areas, then choosing locations at the nearest bordering commercial areas (Exh. EFSB-N-4).

The Company's measurements indicated that existing L_{90}[67] levels in the vicinity of the

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[66] The Company initially provided a set of noise measurements based on two methods of noise monitoring -- three hour monitoring (continuous monitoring) at four off-site locations and 10-minute (short-term) monitoring at three off-site locations and the six PL locations (Exh. SEK-1, at 4.6-4). For each NML, the measurements were taken once in order to represent a nighttime weekday period (Exh. SEK-1, at Table 4.6-2). At the request of the Siting Board, the Company conducted additional monitoring to take into account weekend nighttime measurements and daytime measurements for all PLs and the four off-site locations (Exh. EFSB-N-23-S).

[67] The Company indicated that L_{90} noise is the sound level that is exceeded 90 percent of the (continued...)

proposed facility ranged from 48 dBA to 56 dBA[68] during the day and from 47 to 56 dBA at night (Exh. EFSB-N-25-S).[69] At the closest existing residence, the Esplanade Condominiums, located 880 feet to the north of the site, the quietest L_{90} noise level was 51 dBA during the day and 53 dBA at night (id.; Exh. EFSB-N-10-C). At the Cambridge Research Park, where residential development has been proposed, located 650 feet to the west of the site, the quietest L_{90} noise level was 49 dBA at night and 50 dBA during the day (Exhs. EFSB-N-10-C; EFSB-N-25-S). The Company indicated that the principal sources of noise that control the L_{90} are distant traffic, and mechanical equipment and ventilation systems from buildings other than the existing Kendall Station (Tr. 9, at 1188).

The Company next used NOISECALC, a model developed by the New York State Department of Public Service specifically for the purpose of calculating noise levels from electric generating facilities, to estimate daytime and nighttime facility noise and combined background and facility noise for three operating scenarios: (1) the Base Case, which assumes operation of the CTG with increased duct firing, steam turbines 1, 2, and 3, a fin-fan cooler with reduced low-noise fan with barrier, and the future transformer; (2) Case 2, which assumes operation of the CTG on oil, steam turbines 1, 2 and 3, boiler 3, a fin-fan cooler with reduced low-noise fan with barrier, and the future transformer; and (3) Case 3, which assumes operation of boilers 1, 2, and 3, steam turbines 1, 2, and 3 and the future transformers (Exhs. EFSB-RR-41-A; EFSB-RR-41-

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67 (...continued)
time during the measurement period (Exh. SEK-1, at 4.6-1).

68 One NML located across the Charles River on Beacon Hill was measured at 59 dBA during the day and 47 dBA at night; this NML was not included in the range noted above (Exh. EFSB-N-25-S).

69 SE Kendall also calculated a "greenfields" ambient noise level of 52 dBA for all receptors by averaging the L_{90} sound level over the whole test period and over all locations (Exhs. SEK-1, at 4.6-7; EFSB-N-24). The Company asserted that this is a fair and conservative method for identifying a greenfields ambient when the background sound sources are typically distant sources, such as traffic and building heating, ventilation and air conditioning systems, rather than local sources (Exh. EFSB-N-24). For the purposes of analyzing the noise impacts associated with the proposed project, the Siting Board relies on the actual measured ambients at each NML.

A-C2; EFSB-N-2; EFSB-A-1-S at 7-6; Tr. 9, at 1177-1181, 1191-1192).

Based on its noise impact analysis, the Company indicated that under the Base Case:[70] (1) L_{90} noise increases at all residential NMLs would range from 0 to 2 dBA for both the day and night; and (2) L_{90} noise increases at commercial NMLs would range from 1 to 5 dBA for both the day and night[71] (Exh. EFSB-RR-41-A-C2). The Company further indicated that under the Base Case: (1) L_{90} noise on the northern site boundary, which directly abuts the Riverview Office building, would increase by 5 dBA for both day and night to a level of 60 dBA during the day and 61 dBA at night; (2) L_{90} noise on the southern site boundary, which directly abuts the Canal Walk, would increase by 7 dBA to a level of 59 dBA during the day and by 8 dBA to a level of 59 dBA at night; (3) L_{90} noise on the western site boundary, which directly abuts the proposed Cambridge Research Park, and is represented by a southwest and a northwest NML, would increase by a maximum of 6 dBA for both day and night to a level of 54 dBA; and (4) L_{90} noise on the eastern site boundary, which fronts on Land Boulevard and is represented by a southeast and a northeast NML, would increase by 1 dBA to a maximum level of 60 dBA during the day, and would increase by 5 dBA to a maximum level of 52 dBA at night (Exh. EFSB-RR-41-A-C2).[72] The Company indicated that its noise impact analysis predicted attenuation of facility noise with distance from the source, due to hemispherical spreading and atmospheric absorption (Exhs. EFSB-N-2; EFSB-A-1-S at 7-7). The Company added that its analysis did not reflect other factors that may be present and serve to attenuate noise impacts at receptor locations, such as shielding by on-site or local buildings and wind effects, and therefore argued that the noise

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70 The Company asserted that the Base Case would be representative of the noise impacts that would occur 90 percent of the time, and reflects the worst-case scenario (Tr. 9, at 1178-1179).

71 The commercial NMLs include the office building south of the Broad Canal and the area along Linsky Way, between Second and Third Street (Exhs. SEK-1, at 4.6-3; EFSB-RR-41-A-C2). As described above, some property line locations also represent commercial locations.

72 The Siting Board notes that the Company's use of 52 dBA to represent all the NMLs based on its calculation of an existing greenfields background yields increases ranging from 0 to 8 dBA (Exhs. EFSB-A-1-S at 7-10; EFSB-RR-41-A-C2).

analysis results are conservative (id.; Tr. 5, at 606).

The Company also provided estimated day-night sound levels ("L_{dn}"),[73] with and without the proposed facility, for each NML (Exh. EFSB-N-11-S). The Company indicated that the existing L_{dn} levels at all NMLs exceed the EPA guideline of 55 dBA, since noise levels at the closest residence and at two PLs measure 71 dBA and noise levels at the remaining NMLs are all 65 dBA (id.; Exh. EFSB-N-15). The Company indicated that with operation of the proposed facility, L_{dn} noise at all but one of the residential and commercial NMLs would remain unchanged; at that location, L_{dn} noise would increase from 65 dBA to 66 dBA (Exh. EFSB-N-11-S). At two of the PL locations, those directly to the north and the south of the new building, the L_{dn} noise would increase from 65 dBA to 68 dBA (id.). The Company noted that the 55 dBA figure set out in the levels document was intended to be used as a guideline, not as a regulation, and that the existing L_{dn} of 65 dBA found in the Kendall Station area is consistent with measurements for urban areas (Tr. 9, at 1209, 1217).

To achieve its noise control targets, SE Kendall indicated that it would implement a combination of the following noise mitigation measures: (1) enclosure of the combustion turbines and HRSGs; (2) enclosure of the gas metering station; (3) enclosure of the boiler feed pumps, air compressors, and other ancillary equipment; (4) an HRSG stack silencer; (5) high-efficiency, low-noise transformers with barrier walls; and (6) reduced-speed low-noise fan and a barrier system for the fin-fan cooler (Exhs. EFSB-N-2-S; EFSB-N-30-S; EFSB-A-1-S at 7-14; EFSB-RR-75-S2; EFSB-RR-94-S). The Company also stated that it would install mufflers on the project's non-emergency steam vents (Exh. EFSB-RR-77).[74] The Company

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[73] L_{dn} is defined as the day-night average sound level -- a 24-hour equivalent sound level, with a 10 dBA penalty added to sounds occurring between the hours of 10:00 p.m. and 7:00 a.m. (Exh. EFSB-N-15 at 13). EPA has identified an outdoor L_{dn} of less than or equal to 55 dBA in community areas as the noise level requisite to protect public health and welfare (id. at 3; Tr. 9, at 1208).

[74] The Company explained that at the existing facility, normal steam venting occurs in the mid-afternoon and late nighttime periods for about 15 to 20 minutes every 12 hours (Exh. EFSB-RR-77). The Company stated that noise from its existing venting can reach 61 dBA at the Esplanade Condominiums, which is similar to the noise from local traffic

(continued...)

asserted that noise from the existing equipment would not significantly contribute to the overall noise levels of Kendall Station with the new equipment at receptor locations as long as the existing building is well maintained (Exhs. EFSB-N-30; EFSB-N-13-S). The Company stated that it would keep the windows and doors closed, provide mufflers for vent openings, and maintain or improve glazing on the east wall windows near the boiler feed pump area (Exhs. EFSB-N-2S; EFSB-N-13-S; EFSB-N-30-S).[75]

SE Kendall estimated construction noise impacts at both the existing and future nearest residences for different construction activity stages, including: (1) 24-hour equivalent sound ("L_{eq}") levels from 59 dBA to 63 dBA during the site clearing, foundation and excavation stages; (2) an L_{eq} level of 66 dBA associated with the use of trucks on-site; and (3) a peak sound level of 85 dBA during pile driving (Exh. EFSB-N-17; Tr. 5, at 648). The Company indicated that, with the exception of pile driving, which is explicitly exempted under the Cambridge Noise Control Ordinance, the project would comply with the provisions of the Cambridge Noise Control Ordinance applicable to construction noise (Exhs. EFSB-N-1; EFSB-N-21 at (8.16) 6; Tr. 5, at 648).[76] The Company stated that steam blows would occur during the final stages of construction for a period of approximately one to two weeks (Exh. EFSB-N-18). SE Kendall stated that it would employ a high performance muffler to reduce the noise from steam blows by 40 to 50 dBA, to approximately 80 to 100 dBA (id.; Tr. 5, at 650). The Company indicated that it expects the noise from the steam blows to exceed limits in the Cambridge Noise Control Ordinance but that a variance could be granted for this situation (Tr. 5, at 650).

The Company argued that, given the urban nature of the area and elevated ambient sound

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74 (...continued)
(id.).

75 The Company indicated that the estimated reduction in future noise due to maintaining or improving the glazing for the east wall windows near the boiler feed pump area would be up to 3 dBA at PL 1 (southeast corner) (Exh. EFSB-RR-44).

76 The Cambridge Noise Control Ordinance places the following limits on construction noise: an L_{10} of 75 dBA for residential abutters, an L_{10} of 80 dBA for business/office abutters, and an L_{10} of 85 dBA for industrial abutters; and a maximum sound level of 86 dBA for residential abutters (Exhs. EFSB-N-1; EFSB-N-21 at (8.16) 6).

levels, the expected construction noise would not be as intrusive as it would be in a rural area (Exh. EFSB-A-1-S at 7-13). To mitigate construction noise impacts, the Company stated that to the extent possible, noise intensive construction activities would be limited to the hours of 7:00 a.m. to 6:00 p.m. Monday through Friday,[77] with pile driving limited without exception to 8:00 a.m. to 5:00 p.m., Monday through Friday (Exhs. EFSB-N-1; EFSB-N-17). In addition, the Company stated that it would maintain functional mufflers on construction equipment (Exh. EFSB-A-1-S at 7-13). Finally, the Company stated that it would notify community groups, the Cambridge Police and Fire departments, and the Cambridge Noise Office of impending steam blows (Tr. 5, at 650).

2. Position of the Parties

The City acknowledged that the noise impact analysis conducted by the Company demonstrates compliance with the MDEP requirements and the Cambridge Noise Control Ordinance on an A-weighted basis, contingent on the sound control scenario proposed by the Company (City Initial Brief at 36). However, the City noted that compliance with the Cambridge Noise Control Ordinance with regard to octave band levels at the property lines is not certain (id. at 36-37). In addition, the City noted that ambient noise levels at the Cambridge Research Park and the Esplanade Condominiums already equal or exceed levels permitted in the ordinance, and that at these locations nighttime levels would increase by 2 dBA and 1 dBA, respectively (id. at 37). The City stated that SE Kendall should pay particular attention to noise reduction at these locations, and that further design work and analyses may be needed (id.). The City noted that further refinement in the design of the proposed project may be necessary for it to fully comply with the Cambridge Noise Control Ordinance (id. at 38). However, the City indicated that as long as the design of the plant, on its face, minimizes excess noise, and the Company maintains the commitment and the ability to remedy any noise violations, the Cambridge Noise Control

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[77] The Siting Board notes that the Cambridge Noise Control Ordinance prohibits construction during the hours of 6:00 p.m. to 7:00 a.m. when the following day is a weekday and during the hours of 6:00 p.m. to 9:00 a.m. when the following day is a Saturday, Sunday or a holiday (Exh. EFSB-21 (Att.) at (8.16) 7).

Ordinance provides adequate assurance that the proposed project's noise would be adequately minimized. The City therefore did not request a condition addressing this issue (id.). The City did express concern about the level of noise associated with non-emergency steam venting and therefore requested that the Siting Board impose the following condition relating to noise: "In order to minimize the noise impacts from steam venting at the plant, the Company shall install mufflers on the non-emergency steam vents (id. at 38-39)."

3. Analysis

In prior decisions, the Siting Board has reviewed the noise impacts of proposed generating facilities for general consistency with applicable governmental regulations, including the MDEP's 10 dBA standard. Sithe West Medway Decision, 10 DOMSB 1, at 322; Brockton Power Decision, 10 DOMSB at 217; Altresco Pittsfield, Inc., 17 DOMSC 351, at 401 (1988). In addition, the Siting Board has considered the significance of expected noise increases which, although lower than 10 dBA, may adversely affect existing residences or other sensitive receptors. IDC Bellingham LLC, 9 DOMSB at 311 (1999) ("IDC Bellingham Decision"); Sithe Mystic Decision, 9 DOMSB at 164; Northeast Energy Associates, 16 DOMSC 335, at 402-403 (1987).

The record demonstrates that the existing nighttime L_{90} noise levels at the residential NMLs in the vicinity of the proposed facility range from to 49 dBA to 53 dBA[78] and that existing L_{dn} levels in this area are well above the 55 dBA guideline identified by EPA as the level requisite to protect public health and welfare with an adequate margin of safety. Thus, there is a compelling reason for the Company to use all cost-effective noise mitigation to limit noise increases at residential receptors closest to the Kendall Station site. Here, SE Kendall voluntarily has committed to installing noise mitigation that would limit the noise impacts of the proposed facility to no more than 2 dBA at residential NMLs in the vicinity of the proposed facility. This commitment represents a level of noise mitigation that is more stringent than required by the Siting Board in most cases, but is consistent with noise levels accepted in recent

[78] The levels at the Beacon Hill NML are not included in this range.

Siting Board reviews of facilities proposed for urban locations with high ambient levels. Sithe Mystic Decision, 9 DOMSB at 161-162 (nighttime L_{90} ranges from 47 to 55 dBA, highest impact at a residential receptor is 2 dBA); Cabot Power Corporation, 7 DOMSB 233, at 301 (1998) (highest residential nighttime L_{90} was 50 dBA, with a 4 dBA increase).

The Siting Board notes that the proposed facility as designed may not satisfy the requirements of the Cambridge Noise Control Ordinance, with respect to the octave band limits at the property lines. The Siting Board notes that the calculated property line noise impacts in this case are significant due to the close proximity of abutting uses and pedestrian access activities at property line locations. SE Kendall has asserted that the noise impacts of the proposed facility will meet regulatory guidelines, and that its facility design properly addresses the intent of the Cambridge Noise Control Ordinance. The record shows that the Cambridge Noise Control Ordinance comprehensively addresses many facets of noise impacts, including both operational and construction noise. The City has indicated its intention to work with SE Kendall to ensure that the proposed project will meet the noise ordinance limits as determined by the City, and to diligently monitor compliance with these limits. The Siting Board anticipates that compliance with the noise ordinance limits would not increase the modeled A-weighted decibel levels.

With respect to construction noise impacts, the Siting Board agrees that adherence to the construction site practices proposed by the Company, and the comprehensive requirements set forth in the Cambridge Noise Control Ordinance, would help minimize construction-related noise impacts. In addition, the Siting Board notes that such practices are consistent with approaches to construction noise mitigation reviewed in recent generating facility cases.

The City has requested a condition requiring mufflers on non-emergency steam vents. The record shows that the Company has incorporated such mufflers into its noise mitigation plans; consequently the condition is not necessary.[79]

Accordingly, the Siting Board finds that, with the implementation of the Company's proposed level of mitigation, the noise impacts of the proposed facility would be minimized.

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[79] The Siting Board notes that the proponent has an obligation to construct and operate its facility in conformance with all aspects of the proposal as presented to the Siting Board.

H. Safety

This Section describes the safety impacts of the proposed project with regard to overall safety, materials handling and storage, fogging and icing, emergency response, and existing hazardous conditions.

SE Kendall stated that it would design and operate the proposed project in accordance with all applicable health and safety regulations and engineering standards, and would review the current facility for potential upgrades of existing safety features (Exh. SEK-1, at 4.13-1). The Company stated that, at a minimum, the proposed project design would include the following safety features: (1) equipment and building layouts that incorporate provisions for safe access to and egress from the facility, as well as adequate access for firefighting and other emergency vehicles; (2) automatic shutdown systems with back-up power supply for turbines and fuel supply systems; (3) emergency lighting with back-up power supply; and (4) automatic fire protection systems, and, where appropriate, the use of fire retardant building material (id.).

SE Kendall stated that it would continue its existing site security program, which monitors and controls entry to the site through the use of a gatehouse and cameras (Exh. EFSB-S-16; Tr. 2, at 172-173).

1. Materials Handling and Storage

The Company indicated that it would store oil for the proposed project in two existing above-ground storage tanks located on the western portion of the site (Exh. SEK-1, at 2-2). The Company stated that No. 2 distillate oil would be stored in a 1.25 million gallon tank and that No. 6 oil would be stored in a one million gallon tank (Exhs. SEK-1, at 2-2; EFSB-S-3; Tr. 2, at 155-156). SE Kendall explained that the larger tank, which currently holds No. 6 oil, would be opened, cleaned, inspected, and repaired if necessary; the smaller tank underwent such procedures three years ago when it was converted to store No. 6 oil (Exhs. EFSB-S-3; EFSB-RR-9).

SE Kendall indicated that the unloading area for the 1.25 million gallon tank would need to be relocated and reconstructed due to the layout of the new HRSG building (Exhs. SEK-1, at 4.12-6; EFSB-S-3). The Company indicated that the existing truck delivery area is equipped

with a containment area to control spills, and stated that oil delivery trucks would follow the established truck route from Land Boulevard (See Traffic Section III.I, below) (Exh. EFSB-RR-14; Tr. 1, at 82).

SE Kendall stated that 19.5 percent aqueous ammonia would be stored in a 10,000 gallon single-walled steel tank located north of the turbine building (Exhs. SEK-1, at 2-9 and Figure 2-4; EFSB-RR-15). The Company stated that the tank would be located on a skid surrounded by a bermed secondary containment structure sized to hold 110 percent of tank volume (Exhs. EFSB-S-10; EFSB-RR-15; CC-RR-6). The Company stated that the tank would be equipped with spill prevention valves, level gauges, an alarm system, tank labels and with baffles that reduce the exposed liquid surface area (Exhs. SEK-1, at 4.5-35 and 4.12-8; CC-RR-6). SE Kendall asserted that its proposed secondary containment system would adequately control spills, and that a double-walled or enclosed tank would not increase the degree of protection to the community (Exh. EFSB-S-22; Tr. 2, at 165-167).[80] The Company estimated the cost of a double-walled tank with containment at approximately $221,715, as opposed to $117,750 for the proposed single-walled tank with containment (Exh. EFSB-RR-15).[81] SE Kendall noted that the final design plans for the tank would be subject to approval by the Cambridge Local Emergency Planning Commission, the Cambridge Fire Department, the Cambridge Department of Public Health, and the Cambridge Licensing Commission (Exhs. EFSB-RR-19; CC-RR-6).

SE Kendall stated that 19.5 percent aqueous ammonia would be delivered to the site in 5,500 to 6,700 gallon tanker trucks, at an average of one truckload per week (Exh. EFSB-S-12;

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[80] The Company stated that while double-walled tanks are very commonly used for certain types of petroleum products, they are not necessary for storing aqueous ammonia (Tr. 2, at 165). SE Kendall explained that a double-walled tank would need additional monitoring in the event of leakage between the two walls (Tr. 13, at 1981). Further, the Company asserted that enclosing aqueous ammonia tanks is not a typical practice for electric generating facilities (Exh. EFSB-S-22; Tr. 2, at 163).

[81] The Company stated that it was unable to obtain a price quote for a double-walled tank (Exh. EFSB-RR-15). Consequently, it assumed that the cost of a double-walled tank would be 2.5 times that of a single-walled tank, while the cost of the containment structure would remain the same (id.). The Company estimated that the cost of placing a single-walled tank in an enclosed structure would be $579,310 (id.).

Tr. 2, at 227). The Company noted that the delivery and unloading procedure would be performed jointly by the plant equipment operator and the delivery truck driver, and stated that it would prepare an aqueous ammonia operations management method to address the delivery and unloading of aqueous ammonia (Exh. EFSB-S-20-R).[82] The Company indicated that the unloading/delivery area would be bermed and paved (Exh. EFSB-RR-19).

SE Kendall modeled a worst-case release of ammonia from the storage tank using EPA guidance techniques (Exhs. EFSB-S-8; EFSB-RR-13; Tr. 2, at 159).[83] The Company explained that since a release would occur at ground level, maximum concentrations would occur at the surface and would decrease with height and distance downwind as the plumes disperse (Exh. EFSB-RR-13). Consequently, the Company modeled ammonia concentrations at four heights – zero, two, five and ten meters above ground level (id.).[84] The Company's modeling indicated that at ground level, the maximum impact would drop below 200 ppm, a level known as the "toxic endpoint",[85] at a distance of 60 feet from the ammonia tank (Exh. EFSB-S-8(S)). The Company provided a project plan that graphically depicts the distance from the ammonia storage tank to the closest property line, located approximable 30 feet north (Exh. EFSB-G-2-S at Figure

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[82] The operations method would address the following: preparing the receiving system for delivery; preparing the aqueous ammonia unloading area for delivery; inspecting the delivery truck; setting up the delivery truck; unloading aqueous ammonia for the delivery truck; completing the delivery and truck exit; and the posting of delivery inspection and delivery documentation (Exh. EFSB-S-20-R).

[83] The Company stated that a worst-case release is an instantaneous release of all of the aqueous ammonia into the dike area surrounding the tank, at which point the ammonia would then evaporate from the surface. The release rate would be a function of the exposed surface area of the liquid, weather conditions, and the temperature of the liquid (Exh. EFSB-S-8(S)).

[84] The Company stated that it used the USAF Toxic Chemical Dispersion Model to predict maximum concentrations downwind of the release (Exh. EFSB-S-8(S)).

[85] The toxic endpoint value, as established by the American Industrial Hygiene Association based on EPA's Emergency Response Planning Guidance 2, is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without sustaining serious or irreversible health effects that could impair the individual's ability to take protective action (Exhs. EFSB-S-18; EFSB-S-21).

2-4). The Company's model predicted worst-case ground level ammonia concentrations of 100 ppm at the Riverview Office Building, located 88 feet from the ammonia tank, and 26 ppm at the canal walk, located 200 feet from the ammonia tank (Exh. EFSB- S-8(S)). The Company stated that at distances above ground level, the impacts at the Riverview Office Building would be less than the most stringent short-term health based standard of 25 ppm (Exh. EFSB-RR-13).[86] The Company asserted that concentrations modeled at heights of two meters should be used to assess impacts, as that is considered to be breathing height (Tr. 13, at 1948). The Company acknowledged, however, that the EPA standards were based on the maximum concentrations at a given distance, without regard to height (id.).[87]

The Company stated that in addition to fuel oil and aqueous ammonia, Kendall Station also currently uses and stores lubricating oils, turbine oil, sodium hydroxide, sulfuric acid, sodium hypochlorite, sodium sulfite, di-sodium phosphate, morpholine, kerosene, and recovered virgin oils (Exh. SEK-1, Table 4.12-1). SE Kendall noted that the use and storage of these chemicals are governed by numerous federal, state, and local laws (Exh. SEK-1, at 4.12-1). The Company noted that it has worked with the state's Toxic Use Reduction Act ("TURA") program

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[86] The Company reported that according to the American Industrial Hygiene Emergency Response Planning Guide ("Response Planning Guide"), nearly all individuals could be exposed to ammonia concentrations of 25 ppm for up to one hour without experiencing adverse health effects or an objectionable odor (Exh. EFSB-S-21). However, the Company's witness, Dr. Valberg, also noted that the threshold for odor detection is 5 ppm and that ammonia concentrations in the range of 20 to50 ppm can be disagreeable and irritating (Exh. EFSB-RR-99). The Company explained that mild short-term effects could occur at 25 ppm, which is the first level that would be considered an emergency condition under the Response Planning Guide (Tr. 2, at 162, 168-169).

[87] The Company asserted that the use of urea pellets instead of aqueous ammonia to address traffic and safety issues would not be warranted, since the delivery of aqueous ammonia to the proposed facility would require only one truck per week (Exh. EFSB-S-12). In addition, the Company stated that a urea pellet system would not improve the operation of the SCR system, would be more costly, and would be difficult to locate on the constrained Kendall Station site (Exhs. EFSB-S-12; EFSB-RR-20: Tr. 9, at 1329). The Company noted that there are currently other users of ammonia in the Kendall Square area, and that Cambridge safety personnel therefore are familiar with ammonia use and transport (Exh. EFSB-S-12; Tr. 9 at 1324, 1328).

to reduce the use of sulfuric acid and sodium hydroxide at the existing facility and stated that it would work with TURA in the future to use those chemicals more efficiently (Exh. EFSB-SW-4; Tr. 3, at 337-340). The Company indicated that, after construction of the proposed project, all chemicals which are not currently stored within a building or within secondary containment would be stored within a building, and that certain outdoor chemical storage facilities, including the aqueous ammonia delivery area and the No. 6 fuel oil tank, would be upgraded as part of the proposed project (Exh. SEK-1, at 4.12-5 to 4.12-6, Table 4.12-1).

2. Fogging and Icing

The Company testified that the proposed project is designed to use once through cooling, rather than cooling towers (Exh. EFSB-S-13). Therefore, the Company asserted that fogging or icing problems would not result from the operation of the proposed project (id.).

3. Emergency Response

SE Kendall stated that the existing Emergency Response Plan (“ERP”) and Spill Prevention, Control and Countermeasure Plan ("SPCC Plan") for Kendall Station would be revised six months before the testing of the proposed project (Exh. EFSB-S-6). The Company stated that revisions would address such issues as: facility information; hazard evaluation; the fire protection system; spill scenarios; exit routes; the stormwater management system; and site plans (Exh. EFSB-S-20-R). SE Kendall indicated that although aqueous ammonia is not regulated under the ERP or SPCC Plan, the Company would prepare a site specific operations method to address the delivery, unloading and storage of aqueous ammonia (id.).

SE Kendall stated that plant staff would receive training for chemical hazards, and that a spill response team would be trained for hazardous material spills (Exh. EFSB-S-10). The Company indicated that, in the unlikely event of an ammonia tank release or spill, the Cambridge Fire Department, Regional HAZ MAT personnel, and the management of the Riverview Office Building would be notified (Exh. CC-RR-6). In addition, the Company indicated that it would provide the City Fire and Police Departments with on-site tours and training, and all plans and appropriate safety manuals to familiarize them with the layout of the site and location of

hazardous materials (Exh. EFSB-RR-19).

4. Existing Hazardous Conditions

SE Kendall indicated that accidental releases of petroleum liquids have occurred in the past at Kendall Station, and that historic uses of the site and nearby areas have resulted in releases of hazardous materials (Exh. SEK-1, at 4.3-6). The Company identified two contaminated areas on the Kendall Station property which have been remediated under the Massachusetts Contingency Plan ("MCP"),[88] and a third contaminated area which is still undergoing remediation (id. at 4-3.6). The two remediated sites are now subject to Activity and Use Limitations ("AUL"), which are designed to restrict soil exposure (id. at 4-3.1; Exh. EFSB-S-17 (Att.)).

SE Kendall provided a history of the contamination and cleanup of the two remediated sites (Exh. SEK-1, at 4-3.9). The Company explained that one of the two sites had been used for ancillary components of a former manufactured natural gas plant ("MGP") and tar processing plant which were once located west of Kendall Station (id.). Studies conducted in 1997 and 1998 identified oil, hazardous materials and low levels of MGP-related residual contaminants in the soil and groundwater at this site ("MGP site"); however no offsite migration of these contaminates was identified (id.). The MGP site was remediated in part through the implementation of an AUL, which requires that a Soil Management plan and a Health and Safety plan be developed and implemented prior to any long-term subsurface work within the AUL area, and that pavement or a crushed stone covering be maintained within the area (id.; Tr. 2, at 179).

The second remediated site was contaminated by a June, 1997 release of No. 6 fuel oil within the secondary containment area of an oil tank (Exh. SEK-1, at 4.3-11; Tr. 2, at 177). Affected soil was excavated and the site was placed under the AUL discussed above for the MGP site (Exh. SEK-1, at 4.3-11). The Company explained that all construction that would take place

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[88] Reportable concentrations of oil and hazardous materials are regulated under the MCP, which establishes a standard for determining when response actions are complete in terms of the risks remaining at the site (Exh. SEK-1, at 4-3.1). A condition of No Significant Risk must exist or be achieved through the documentation of a Response Action Outcome ("RAO") (id.).

in the AUL area, which covers approximately half of Kendall Station, would have to take place in accordance with approved Soil Management and Health and Safety plans to address fugitive emissions (Exh. SEK-1, at 4.3-11; Tr. 2, at 179-180). The Company stated that it anticipates that the Soil Management and Health and Safety plans would be prepared approximately six months prior to the start of construction (Exh. EFSB-S-17).

The Company indicated that the site still undergoing remediation, known as the jet fuel release area, was contaminated by the accidental release of jet fuel from underground storage tanks (Exh. SEK-1, at 4.3-11). The Company asserted that the substance associated with the release, termed light non-aqueous phase liquid ("LNAPL"), is localized and is not migrating off-site (id.). The Company explained that the cleanup is being completed with a multi-phase extraction system; results of the cleanup are reported to MDEP every six months (id. at 4.3-11 to 4.3-12). SE Kendall anticipates that the remediation for the jet fuel release area would be completed under a Class A RAO, which would indicate that the site has been cleaned up and does not pose a risk (id. at 12). The Company stated that both the jet fuel storage tanks and the No. 6 fuel oil storage tanks have been upgraded with spill and overflow protection devices to prevent future releases (Exh. EFSB-S-19).

5. Analysis

SE Kendall has demonstrated that it would properly store and handle oil and other non-fuel chemicals in accordance with applicable public safety standards and that it would have in place secondary or tertiary systems to contain chemical spills. The record also demonstrates that SE Kendall has arranged for the proper storage, use, and secondary containment of hazardous materials associated with the construction and operation of the proposed project and that emergency supplies and training in the safe handling of those chemicals would be provided. The record demonstrates that the Company would take steps to ensure the safe transport and delivery of oil. The Company intends to take measures to prevent spills and accidents, or in the event of a spill or accident, to respond and remediate quickly.

SE Kendall has proposed to store aqueous ammonia in a single walled storage tank, arguing that this arrangement adequately protects neighboring properties and that enclosing the

tank or using double-walled construction is not a typical practice within the generating industry. However, it appears from the record that in the event of a worst-case ammonia release, ammonia concentrations above the 200 ppm "toxic endpoint" could extend as much as 30 feet onto the Riverview Office property. Further, the Kendall Station site is located in a dense mixed-use area, and the nearest off-site use -- the Riverview Office Building -- is located only 88 feet from the ammonia tank. The record shows that in the event of a catastrophic failure of the ammonia tank, the ammonia concentrations at the office building would be 100 ppm. While this level is below the 200 ppm "toxic endpoint," the record shows that at concentrations of between 20 and 50 ppm, the general population could experience disagreeable and irritating effects. While the Siting Board recognizes that the possibility of a catastrophic spill is remote, it is nonetheless desirable to protect the general public from this level of impact.

The Company has argued that the use of a double-walled or enclosed ammonia storage tank is not an industry standard. However, in a number of recent cases, developers have proposed aqueous ammonia tanks that were either double-walled or enclosed. Brockton Power Decision, 10 DOMSB at 226; Sithe Edgar Decision, 10 DOMSB at 97; IDC Bellingham Decision, 9 DOMSB at 317-318; Sithe Mystic Decision, 9 DOMSB at 166-167; ANP Blackstone Decision, 8 DOMSB 1, at 179; ANP Bellingham Decision, 7 DOMSB at 203.[89] Given the project's urban mixed-use surroundings, there is significant potential for large numbers of office-

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[89] Four of the applicants provided modeled maximum off-site ammonia concentrations from a worst-case spill, that with the proposed mitigation for their projects, ranged from less than 0.5 ppm to 29.5 ppm. Brockton Power Decision, 10 DOMSB at 226-227; Sithe Edgar Decision, 10 DOMSB at 98; IDC Bellingham Decision, 9 DOMSB at 317-318; Sithe Mystic Decision, 9 DOMSB at 167. In three of these previous cases, applicants proposing use of containment structures for ammonia storage tanks provided estimates of worst-case ammonia concentrations indicating that, even without containment structures, property line concentrations would have been well under 200 ppm. IDC Bellingham Decision, 9 DOMSB at 318; ANP Blackstone Decision, 8 DOMSB at 179; ANP Bellingham Decision, 7 DOMSB at 203. The maximum modeled concentrations without use of containment structures would have been 200 ppm at a distance of 317 feet from the IDC Bellingham facility's ammonia storage tank, well short of the nearest facility property line located at a distance of 1500 feet from the storage tank, and would have been 79 ppm and 42 ppm at the property lines of the ANP Blackstone and ANP Bellingham facilities, respectively. Id.

workers and pedestrians to be in the vicinity of the northern site boundary (See Traffic Section III.I, below). Further, recreational use of the canal walk will take place directly abutting the proposed project. The Siting Board notes that the cost of the two alternatives, a double-walled tank and an enclosed tank, are not prohibitive in comparison to the total cost of the project and appear to be justified in order to provide an additional level of safety in a dense urban area.

Therefore, to provide an additional level of safety in the event of a spill from the ammonia storage tank, the Siting Board directs SE Kendall to enclose the ammonia storage tank or incorporate an alternative design such as a double-walled tank to mitigate the impacts of any potential ammonia spill, and to file with the Siting Board prior to commencement of construction of the ammonia system, an analysis of the cost and relative safety advantages of the design options considered for ammonia storage.

The Company has indicated that it intends to develop emergency procedures and response plans similar to those found acceptable in previous Siting Board decisions; however, the Company has not yet developed such plans. Consequently, the Siting Board directs the Company to (1) consult with the appropriate Cambridge officials in the revision of its SPCC Plan and the Emergency Response Plan; and (2) update the construction section of its Emergency Response Plan, in consultation with appropriate Cambridge officials, and file it with Cambridge before facility construction begins in order to cover possible emergencies related to construction accidents.

The record indicates that the proposed project is subject to several federal, state, and local regulations concerning the use, storage, and disposal of hazardous chemicals and waste. The record indicates that the Company is working with the state's TURA program to reduce the use of certain chemicals and that the Company would work with the TURA program in the future. In addition, the record indicates that construction of the proposed project would result in an improvement in the storage of chemicals, as, at the proposed project, all chemicals would be stored inside or with secondary containment. Finally, the record indicates that several outdoor chemical storage facilities would be upgraded as a result of the proposed project.

With respect to fogging and icing, there is no record evidence that ground level fogging or icing would result from the operation of the proposed project.

With respect to the presence of contamination at the Kendall Station site, the record shows that the existing site has been thoroughly assessed for the presence of hazardous materials and that three areas of contamination have been identified. The Company also has demonstrated that in the view of the MDEP permanent solutions for two of the three sites have been achieved. The Company further expects that a permanent solution for the remaining site would be achieved in the near future. The record shows that, due to the location of the AUL's placed on approximately half of the Kendall Station site, SE Kendall must prepare Soil Management and Health and Safety plans, pursuant to the MCP, prior to beginning any significant construction work. Based on a review of the evidence presented, and assuming (1) the mitigation of any remaining oil and hazardous waste releases at the proposed site as required under the MCP, including a permanent solution for the jet fuel release area; and (2) the implementation of MDEP approved Soil and Management and Health and Safety plans to meet the risk-based standard established by MCP regulations, the Siting Board finds that the safety risks associated with existing hazardous conditions on the site would be minimized.

Accordingly, the Siting Board finds that with the implementation of the above conditions requiring a double-walled or enclosed ammonia storage tank and emergency response plans, the safety impacts of the proposed project would be minimized.

I. Traffic

This Section describes the impact of the construction and operation of the proposed project on local traffic conditions and outlines proposed mitigation of traffic impacts.

1. Description

The Company asserted that the proposed project would be sited, designed and mitigated so that traffic impacts would be minimized (Company Initial Brief at 127). In support of its assertion, the Company provided traffic volume data for existing traffic conditions, and modeled future traffic conditions, with and without the proposed project (Exh. EFSB-T-1).

The Company indicated that the existing peak commuter traffic periods in the vicinity of Kendall Station are from 8:00 a.m. to 9:00 a.m. and 5:00 p.m. to 6:00 p.m. (Exh. SEK-1, at 4.4-

4). The Company stated that construction workers would work a 12-hour shift, from 6:00 a.m. to 6:00 p.m. (Tr. 1, at 88). The Company indicated that the majority of the construction work would occur during this daytime shift, although a minimal number of workers would work in the evening to set up material for the next workday (Exh. SEK-1, at 4.4-10; Tr. 1, at 88). The Company stated that construction of the proposed project would take approximately 22 months, with a maximum of 130 workers expected during the peak construction period, which would occur midway through the schedule and last for four to six months (Exh. SEK-1, at 4.4-10; Tr. 1, at 86).

The Company stated that it would not provide on-site parking for construction workers, and that instead construction workers would commute to the site via public transit or be bused in from a satellite parking area (Exhs. SEK-1, at 4.4-10; EFSB-T-1; EFSB-T-3; Tr. 1, at 89).[90] Therefore, the Company explained that the traffic analyses of impacts associated with the proposed Kendall Station Project would reflect the same traffic volumes for both the no-build and build scenarios (Exh. EFSB-T-1).

The Company indicated that its engineering, procurement and construction ("EPC") contractor would work with Cambridge to develop a Transportation and Demand Management ('TDM") Plan, which would incorporate TDM techniques to encourage construction workers to use public transportation and would reduce single-occupancy vehicle trips (Exhs. SEK-1, at 4.4-10; EFSB-G-2-S Bulk Att. at 8-109). The TDM Plan would be incorporated into a final construction management plan (Exh. EFSB-G-2-S Bulk Att. at 8-109).[91]

The Kendall Station site is in close proximity to two Massachusetts Bay Transportation

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[90] SE Kendall noted that five to ten parking spaces would be available on-site to be used by supervisors and for deliveries (Tr. 1, at 89).

[91] SE Kendall listed the following nine TDM techniques that could be incorporated into the construction management plan: (1) encouragement of employees to use public transportation; (2) encouragement of car pooling; (3) use of shuttle buses from off-site parking; (4) scheduling construction worker arrivals and departures for off-peak hours; (5) use of an off-site construction staging area; (6) provision of a secure bicycle area; (7) sale of transit passes on-site; (8) provision of lockers, showers and/or changing rooms; and (9) discussions with the Charles River Transportation Management Association (Exhs. EFSB-G-2-S Bulk Att. at 8-110; EFSB-T-3; EFSB-T-4).

Authority ("MBTA") subway stops: the Kendall Square stop, which is located a few blocks from the site, and the Lechmere stop, which is located within a ten minute walk of Kendall Station (Exhs. SEK-1, at Figure 4.4-1; EFSB-G-2-S Bulk Att. at 8-109). The Company stated that it expects as many as 50 percent of the construction workers to eventually use public transportation, depending on the location of their homes (Tr. 1, at 94). SE Kendall noted that it is the responsibility of the EPC contractor to determine the plans for construction parking and whether to offer incentives for public transit use, such as subsidized passes (id. at 96).

The Company indicated that construction of the proposed project would overlap with the ongoing development of the Cambridge Research Park on abutting property between Kendall Station and Third Street (id. at 82-83). Construction of the Cambridge Research Park was scheduled to begin in late 1999 and continue to June of 2003 (Exhs. EFSB-T-1; EFSB-T-6). SE Kendall stated that it would work with Cambridge and with the developer of the Cambridge Research Park to explore possible opportunities to further minimize construction worker traffic to and from the Kendall Station and Cambridge Research Park sites without adversely affecting the Kendall Station Project (Exh. EFSB-RR-11). The Company noted that the developers of the Cambridge Research Park intend to optimize signal phasing at nearby intersections that are served by traffic signal controls, including the Land Boulevard and Binney Street intersection (Tr. 1, at 105).[92]

The Company stated that during the four to six month peak construction period, it expected 25 truck trips a day, over the 10-hour period from 7:00 a.m. to 5:00 p.m. (id. at 84 and 86). The Company indicated that it would attempt to have the truck traffic arrive and depart outside of the peak traffic hours (id. at 86). SE Kendall stated that trucks would follow Land Boulevard to either Binney Street or Rogers Street and then travel south on Second Street to the entrance to the site; SE Kendall added that Cambridge prefers to keep traffic concentrated along

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[92] Land Boulevard runs in a northeasterly direction from the vicinity of the intersection of First Street and Athenaeum Street to McGrath Highway and access to Route 93; Binney Street runs in a east-west direction from Land Boulevard, two streets north of Athenaeum Street.

that route to avoid residential areas (Exhs. SEK-1, at Figure 4.4-5; EFSB-T-7; Tr. 1, at 114).[93]

Based on its traffic analysis, the Company indicated that the Land and Binney Street intersection currently operates at an overall Level of Service ("LOS") F for the a.m. peak and LOS C for the p.m. peak (Exh. EFSB-T-1, Tables T-1-A and T-1-B).[94] The traffic analyses for the year 2003, with both the Kendall Station and Cambridge Research Park projects complete, indicate that the Land and Binney Street intersection would continue to operate at the current overall levels of LOS F for the a.m. peak and LOS C for the p.m. peak, even with the signal improvements proposed by Cambridge Research Park (id.; Tr. 1, at 105-106).

The Company indicated that, although there is essentially no pedestrian or vehicle access to Kendall Station for casual use, it would install appropriate barricades and fencing on-site to ensure safe pedestrian travel (Exh. EFSB-T-5). The Company noted that most of the pedestrians walking immediately adjacent to the site are employees traveling to and from the Riverview Office complex at approximately 8:00 to 9:00 a.m. and 4:30 to 6:00 p.m (Tr. 1, at 109). However, SE Kendall noted that when the Cambridge Research Park is complete, the area would experience an increase in pedestrian traffic (id. at 38). The Company stated that, if necessary, it would provide flagmen at areas where pedestrian traffic may conflict with delivery and/or shuttle bus traffic (Exh. EFSB-T-11; Tr. 1, at 110).

The Company maintained that the access to the site, which is a driveway at the end of Second Street and Athenaeum Street, would remain the same after the facility upgrade (Exh. SEK-1, at 4.4-3). The Company stated that once the proposed project is operational, employment at the Kendall Station site would return to current staffing levels of approximately 50 employees

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93 In the event that the primary truck route becomes temporarily unavailable, the Company has developed an alternate truck route that would have the trucks arriving into Kendall Square via the Longfellow Bridge, turning right from Broadway onto Third Street, then right onto Binney Street, and then right onto Second Street into the Kendall Station site (Exh. EFSB-RR-14).

94 Traffic conditions on a roadway and at intersections are represented by the letters A to F on the LOS scale, ranging from LOS A, which represents operations with a very low delay to LOS F, where demand exceeds capacity and is unacceptable to most drivers (Exh. EFSB-RR-8).

on three shifts (Exh. SEK-1, at 4.4-1; Tr. 1, at 97).[95] The Company stated that the shift changes are scheduled to avoid the a.m. and p.m. peak traffic periods (Exh. SEK-1, at 4.4-6).

The Company stated that oil would be delivered at a rate of approximately 1.4 trucks per hour when the CTG is operating on oil, or approximately 17 trucks per 12 hour delivery period (Exhs. EFSB-G-1-S at Appendix 5, Table 2; EFSB-RR-7; Tr. 1, at 102). When both boiler 3 and the CTG are running on oil, there would be an extra three oil truck deliveries over a 12-hour period (Exh. EFSB-RR-7S). The Company also stated that ammonia would be delivered at the rate of one truck per week (Tr. 1, at 111). The Company noted that oil and ammonia delivery trucks would use the same truck route as the construction truck traffic (id. at 103). SE Kendall asserted that use of the preferred route would be included as a contractual obligation with suppliers, and that suppliers of such materials would then be required to follow the preferred route (Tr. 1, at 126).

2. Position of the Parties

The City of Cambridge stated that it anticipated continued coordination with the Company to develop the TDM Plan, finalize primary and back-up transit routes, and ensure that traffic impacts in the area are mitigated (City Initial Brief at 40). The City proposed the following condition to address the construction and operation of the proposed facility in a constrained urban environment:

> "In order to minimize traffic impacts during peak hours, the Company shall (1) use satellite parking and schedule the construction work shift to avoid adverse traffic impacts during the peak commuting hours of 7:15 A.M. to 8:45 A.M. and 5:00 P.M. to 6:00 P.M. (2) schedule deliveries to be spread over the construction work shift, with deliveries of very large equipment and, to the fullest extent possible, deliveries of oil, aqueous ammonia and other materials and substances, scheduled during off-peak times in cooperation with City of Cambridge officials, (3) in consultation with the City of Cambridge, implement measures that would encourage the use of public transportation and alternative routes to the site by

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[95] Of the 50 current employees, 30 work the main shift, which is from 6:30 a.m. to 2:30 p.m., and the remaining employees work the evening and night shift (Exh. SEK-1, at 4.4-4).

construction workers, and (4) in consultation with the City, develop and implement a traffic mitigation plan" (City Reply Brief at 4).

3. Analysis

The impacts of construction traffic at or near a proposed facility site typically have two components: the impact of construction worker traffic, and the impact of materials and equipment delivery. Here, the construction worker impact is strictly limited; due to the small size of the Kendall Station site and its location in a densely developed area, there will not be on-site or local parking for construction workers. Workers are anticipated to arrive at the site either by shuttle from a satellite parking location, or by public transportation. Therefore, the only construction worker traffic associated with the proposed facility would be generated by the shuttle bus trips. The Company anticipates a maximum of 130 construction workers on the site at any one time during the four to six month peak construction period; the Siting Board notes that even assuming that all workers drive to the satellite parking location, the transportation of this number of workers could be accomplished by the use of no more than 12 shuttle trips to the site, which would not significantly affect peak commuter traffic in the Kendall Station area. In addition, the EPC contractor, in conjunction with Cambridge, would implement the TDM techniques itemized above into a final construction management plan. In order to minimize off-site parking and shuttle service, one of the goals of applying the TDM techniques is to attain 50 percent public transit use by the workers.

The Siting Board notes that the Kendall Station site is in close proximity to public transportation, thereby increasing the likelihood that a significant percentage of the construction workforce would commute to the site by public transportation thus reducing the number of shuttle bus trips needed to bring workers to the site. For the most part, the TDM techniques proposed by the Company incorporate measures that serve to promote public transit use. The Siting Board therefore concludes that impacts of construction worker traffic at the Kendall Station area would be minimized.

The Siting Board notes, however, that the use of satellite parking does not eliminate construction worker traffic impacts; it merely displaces them to another location. The Company has indicated that the responsibility for identifying and securing an off-site parking area rests

with the EPC contractor; however, ultimately it is SE Kendall which must ensure that traffic impacts are minimized. The Siting Board notes that until the EPC contractor determines the location and size of the satellite parking area, the Siting Board does not have a sufficient record to determine whether traffic impacts near the satellite parking area would be minimized. The Siting Board notes that the off-site parking area could be located either in Cambridge or a surrounding community. Consequently, the traffic impacts from the workers arriving and departing the off-site parking areas may fall in another community. In addition, since the number of parking spots to be available at the off-site lot cannot be determined, the impacts to surrounding roadways and intersections are undocumented.

Therefore, the Siting Board directs the Company, prior to commencement of construction, to file with the Siting Board a traffic analysis and mitigation plan that identifies the location of the off-site parking area and provides information on the schedule and volume of project-related traffic at affected intersections along the likely routes of arrival and departure and sets forth plans for any necessary mitigation. The analysis should include a LOS analysis with back-up data, and all assumptions should be clearly stated. The plan should specifically address: (1) the costs and benefits of subsidizing the MBTA fares of the Company's workers in order to decrease traffic impacts at the satellite site; and (2) comments from Cambridge, and if applicable, the community in which the satellite parking would be located. The Siting Board will expeditiously review the Company's filing to determine whether traffic impacts at the satellite parking site would be minimized.

With respect to equipment deliveries, the Company plans to schedule deliveries for off-peak hours, and to require that trucking companies adhere to a specific route approved by Cambridge in order to avoid residential areas. The Company's traffic analyses show that the intersection of Land Boulevard and Binney Street, which lies along the approved delivery route, currently operates at LOS F during the a.m. peak and would continue to operate as such even with traffic improvements proposed by the developers of the Cambridge Research Park. There is the potential for the traffic to deteriorate even further in this area of poor traffic flow if significant delivery traffic arrives or departs Kendall Station during the peak traffic periods. Consequently, the Siting Board directs the Company to schedule deliveries to be spread over the

construction work shift, with deliveries of very large equipment and, to the fullest extent possible, post-construction deliveries of oil, aqueous ammonia and other materials and substances, scheduled during off-peak times in cooperation with Cambridge officials. In the unlikely event that deliveries can only be scheduled near or during the a.m. peak, the Company should work in conjunction with Cambridge to provide traffic control officers at the intersection of Land Boulevard and Binney Street.

With respect to workforce traffic impacts during facility operation, the Company has demonstrated that no adverse traffic conditions would result from operation of the proposed project at the proposed site.

Finally, because of the number and complexity of traffic issues associated with the proposed project, the City has requested that information regarding traffic impacts and mitigation be detailed in one document. Therefore, in order to allow the interrelated traffic issues to be comprehensively addressed by all affected communities, the Siting Board directs the Company, in consultation with the City and any other affected municipalities, to develop and implement an overall traffic mitigation plan.

Accordingly, the Siting Board finds that with the (1) development of a satellite-parking traffic analysis and mitigation plan, and acceptance of such plan by the Siting Board, (2) the development and implementation of an overall traffic mitigation plan, and (3) the condition relating to deliveries during off-peak hours, the Company will have established that the traffic impacts of the proposed project would be minimized.

J. Electric and Magnetic Fields[96]

This Section describes the electric and magnetic field impacts of the proposed project, the mitigation proposed by the Company, and the costs and benefits of any additional mitigation options.

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[96] Electric fields produced by the presence of voltage, and magnetic fields produced by the flow of electric current, are collectively known as electromagnetic fields ("EMF").

1. Description

The Company indicated that operation of the proposed project would: (1) produce magnetic fields associated with the new 115 kV line to be constructed by CELCo to interconnect the Kendall Station with existing transmission lines owned by CELCo and other utilities; and (2) produce magnetic fields associated with increased power flows at the Kendall Station switchyard and other existing transmission lines (Exhs. SEK-1, at 2-8, 4.11-14; EFSB-G-7-S3). The Company stated that the proposed new 115 kV transmission line would extend approximately 2.6 miles via an underground route from the switchyard at Kendall Station to CELCo's existing Putnam Station (Exh. EFSB-G-7-S4).

The Company explained that the Kendall Station switchyard currently serves as both a generation and a distribution substation; its load can vary from 180 MW to 300 MW, with the electric power generated at Kendall Station being only a fraction of this throughput (Exh. SEK-1, at 4.11-14). Currently there are a number of 13.8 kV underground lines that connect Kendall Station to nearby substations (Exh. SEK-1, at 4.11-14). The Company indicated that, once the proposed project is completed, the output of Kendall Station would be transmitted on the new underground 115 kV circuit to Putnam Station (Exh. SEK-1, at 4.11-14).

To assess EMF impacts, the Company first measured levels of existing electric and magnetic field strength for four locations chosen to represent the area traversed by possible transmission line routes (Exhs. SEK-1, at 4.11-18; EFSB-G-7-S3).[97] The Company indicated that its magnetic field measurements, taken at 3⅓ feet above street level, ranged from a peak strength of 6.5 milligauss ("mG") to a low of 0.1 mG (Exh. SEK-1, at 4.11-8 and 4.11-9). The Company indicated that although it also measured electric fields in the area, underground lines produce no street level electric field strength because underground placement of conductors completely shields such fields (Exh. SEK-1, at 4.11-18).

The Company stated that, to model the maximum possible magnetic field with the new

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[97] EMF levels were measured on Second Street near the corner of Second and Athenaeum Streets; on Main Street between 101 and 139 Main Street; on Broadway near the intersection of Broadway and Ames Street; and around a typical residential block with overhead distribution lines about one-half mile from Kendall Station (Exh. SEK-1, at 4.11-4 to 5).

line, the maximum magnetic field that could be produced by the new line is added to the maximum present day magnetic field values at the baseline locations (Exh. EFSB-E-6). The Company explained that, when two sources of magnetic fields are present simultaneously, the possible result can range from a maximum that is the sum of the new and old lines to a minimum that is the difference between the two lines (Exh. EFSB-E-6). The Company asserted that the magnetic field levels projected for the project would be below: (1) any level of concern identified by scientific review groups; (2) precautionary levels suggested by occupational, state, federal, world health, or professional organization summary documents; and (3) existing fields found near home appliances (Exh. SEK-1, at 4.11-19). The Company therefore argued that no EMF mitigation measures would be needed (Exh. SEK-1, at 4.11-19).

In its EMF analysis, the Company projected that if the new line were placed underground in a steel pipe, the combined magnetic field strength from the new line and existing sources at the locations that were monitored for present day fields could range from 0.7 mG to 11.3 mG (Exh. EFSB-E-6).[98] The Company explained that the estimated magnetic field levels in its analysis were low as a result of a number of factors it had assumed about the design of the line, including that: (1) the line would be underground; (2) the phase conductors would be in close proximity in an underground pipe, which helps to minimize magnetic field strength; and (3) the conductors would be in a steel pipe which attenuates the magnetic field (Exh. SEK-1, 4.11-18).

The Company indicated that all modifications to connect the new transmission line at the Putnam Station would be located within the existing building (Exh. EFSB-G-7-S3). The Company presented measured and modeled magnetic field levels near Putnam Station; the highest measured level was 40 mG, found above an underground transmission line running beneath Putnam Street (Exh. EFSB-E-4). With the addition of the new 115 kV line, the Company modeled the maximum potential magnetic field level near Putnam Station to be in a range of 35 to 45 mG (Exh. EFSB-E-7-C).

After the close of hearings, the Company cited updated design information developed by CELCo, and indicated that CELCo currently expects that street level magnetic field strength

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[98] The range at Second Street would be 0.7 to 10.3 mG; at Main Street 2.0 to 7.6 mG; at Broadway 2.3 to 7.3 mG, and at the residential block 1.7 to 11.3 mG (Exh. EFSB-E-6).

directly above the new line would be 124 mG, a level substantially greater than that estimated in the Company's EMF analysis (Exh. EFSB-G-7-S4). The Company provided no information concerning design or siting factors which account for the differences between the magnetic field levels in its analysis and the level currently estimated by CELCo. The Company noted that CELCo is developing its estimates of EMF levels, based on its current routing plans and preliminary engineering design for the new transmission cable, for inclusion in CELCo's Siting Board filing for the new transmission line (Exh. EFSB-E-7-C; EFSB–G-12).

The Company stated that the Kendall Station switchyard, which is located close to the proposed canal walk, also is a possible source of electric and magnetic fields (Exh. SEK-1, at 4.11-4). The Company estimated that the EMF levels in the canal walk with a 115 kV switchyard on the site would be 0.3 kilovolts per meter ("kV/m") for the electric field and 62 mG for the magnetic field (Exh. SEK-1, at 4.11-14). The Company indicated that, with installation of chain link fencing as part of the proposed screen fence to separate the site from the canal walk, electric field strength along the canal walk would be further attenuated (Exh. SEK-1, at 4.11-17). The Company also explained that the magnetic field levels would drop to 4 mG on the other side of the Broad Canal from the site (Exh. SEK-1, at 4.11-19; Figure 4.11-6).

The Company indicated that CELCo is also conducting a system impact study which will determine the impact of the proposed project on the local transmission system and the New England Bulk Power system (Exh. EFSB-G-12).

2. Analysis

The record shows that a new transmission line is required to interconnect the proposed project, and that based on current plans CELCo would install a 2.6-mile 115 kV line along an underground route predominantly within public ways in Cambridge.

In a previous review of proposed transmission line facilities, the Siting Board accepted edge-of-ROW levels for a 345 kV line of 1.8 kV for the electric field and 85mG for the magnetic field. Massachusetts Electric Company et al., 13 DOMSC 119, at 228-242 (1985) ("1985 MECo/NEPCo Decision"). Here, the Company provided EMF analyses indicating that EMF impacts from the transmission line would be minimized and well below levels previously

accepted by the Siting Board, based on the Company's assumptions related to the planned underground siting of the line. The transmission line would produce no additional electric fields and would produce magnetic fields which, when combined with existing magnetic field levels, would result in maximum potential magnetic field levels of 45 mG adjacent to Putnam Station and 11.3 mG along the route of the new line. The Company's analysis also indicated that, with operation of the proposed project, the Kendall Station switchyard would produce EMF along the proposed canal walk, including a maximum electric field of 0.3 kV/m and a maximum magnetic field of 62 mG.

With respect to the new transmission line, the record shows that the Company's estimates of magnetic field impacts reflect design assumptions that served to minimize such impacts, including use of a steel pipe conduit with close spacing of conductors. The record also shows that updated design information has been developed by CELCo which indicates that CELCo currently expects that magnetic field strength directly above the new line would be 124 mG. The Siting Board notes that the magnetic field levels estimated by CELCo are substantially greater than those estimated in the Company's EMF analysis, and would be among the highest levels ever reviewed by the Siting Board. In addition, the estimated magnetic field directly over the proposed line, while predominantly within public ways, would represent a substantial increase above existing levels and also be significantly higher than the edge-of-ROW levels previously accepted by the Siting Board.

The Siting Board notes that, in past transmission line reviews, applicants have recognized that some members of the public are concerned about magnetic fields and for that reason, the applicants have incorporated design features into proposed transmission lines that would reduce magnetic fields at a low additional cost or no additional cost. See e.g., NEPCo Uxbridge Decision, 4 DOMSB 109, at 148 (1995). The Siting Board has held that, as part of pursuing interconnection plans that require upgrades to the regional transmission system, generating facility applicants also should work with transmission providers to seek inclusion of practical and cost-effective transmission designs to minimize magnetic field levels along affected ROWs. Sithe Mystic Decision, 9 DOMSB at 181; ANP Blackstone Decision, 8 DOMSB at 188; Silver City Decision, 3 DOMSB at 353-354 (1994).

As has been the case in a number of previous reviews of proposed generating facilities, the project interconnection study has not been completed as of the close of the record, and therefore the extent and final design of required transmission upgrades is subject to change. In addition, the EMF impacts will be addressed as part of the required review by the Siting Board of CELCo's proposal to construct a new 115 kV transmission line to allow interconnection of the proposed project. In that review, it is possible that siting, design or mitigation options will be identified to reduce EMF impacts below the level estimated by CELCo, and that based on its review of such options the Siting Board may determine that a different magnetic field level than estimated by CELCo is required to allow a finding that the EMF impacts of the new transmission line would be minimized, consistent with minimizing cost.

Here, the Siting Board notes that its review of the EMF impacts of the transmission line is supported primarily by the EMF analysis developed by SE Kendall. If the expected EMF impacts of the proposed project change, based on the final design of the transmission line reflecting regulatory and other applicable approvals, SE Kendall must inform the Siting Board of such change in order that the Siting Board may determine whether to inquire further into the matter.

Accordingly, the Siting Board finds that, based on the record in this proceeding, the EMF impacts of the proposed project would be minimized, consistent with minimizing the cost of mitigating, controlling or reducing such impacts.

K. Land Use

This Section describes the land use impacts of the proposed project, including the impacts to wildlife species and habitats, and significant cultural resources.

1. Description

The Company asserted that the proposed project would benefit local land use (Exh. SEK-1, at 4.2-1). The existing station is an older (1947-50) steam and electric generating facility located on a 5.8 acre site at 265 First Street in East Cambridge (id. at 4.2-2). The Company stated that the proposed site contains a power block building with three stacks, administrative

office space, a storage shed, field switchyard, two oil storage tanks, two jet engine peaking generators, and other minor structures (id. at 2-2, Figure 2-2). The Company indicated that the proposed site is nearly completely developed, with a small landscaped area located where the project fronts on First Street (id. at 4.2-10). The proposed new equipment would be contained primarily in an open, paved portion of the site (id. at 4.2-10, Figure 4.2-3). The new equipment would consist of a new building housing the CTG and HRSG, storage tanks for demineralized water and ammonia, an electrical switchyard, and other supporting facilities including a substation control building, gas metering station, and guard house (id. at 2-10 to 2-11).

The Company stated that the existing site is located in an Office 3A District as defined by the City of Cambridge Zoning Ordinance and is also located in a planned unit development ("PUD") overlay district (id. at 4.2-1, Figure 4.2-1). The Company stated that an Office 3A District allows business and professional offices and multi-family dwellings and also allows limited other uses classified as utility under a special permit from the Cambridge Zoning Board of Appeals (id. at 4.2-1). The Company explained that the PUD district allows for larger scale mixed development projects that encourage linkage between developments in East Cambridge and Kendall Square. It stated that although office uses are preferred, all uses allowed in the underlying zoning district are allowed in a PUD district under a special permit from the planning board (id. at 4.2-3; Appendix 4-2). According to the Company, this preference for office use reflects a fundamental shift for this area, which was historically an industrial area (id.). The Company stated that it must also apply to the Cambridge City Council for a "planning overlay special permit" before receiving a building permit (Exh. EFSB-RR-41). This permit application must include a site plan, traffic study, and a certification that all other special permits and variances have been granted (id.). The project also may require a variance in order to modify the cooling discharge system, an existing nonconforming structure (Exh. SEK-1, at 4.2-3; Appendix 4-2). The Company asserted that the project is explicitly exempt from a moratorium on development in East Cambridge (Exh. EFSB-RR-35; Tr. 4, at 557-558).

The Company stated that the land use contiguous to the project is mixed and typical of the existing development in the surrounding area (Exh. SEK-1, at 4.2-10). According to the Company: (1) the Riverview Office Building abuts the site to the north; (2) First Street abuts the

eastern edge of the site, with the Charles River Reservation Bike Path running parallel to it along the Charles River; (3) the Broad Canal runs along the southern site boundary; (4) parking lots that are the future site of the proposed Cambridge Research Park abut the site to the west; and (5) office buildings, a hotel, parking lots, MIT dormitories, and a child care center lie to the southwest of the site (id. at 4.2-10 to 4.2-14). The closest existing residential use is the Esplanade Condominiums, located approximately 450 feet from the site's northeast property line and approximately 880 feet from the proposed new stack (id. at 4.2-14; Exh. EFSB-N-10-C). The proposed residential units would be about 650 feet west of the stack (Exh. EFSB-N-10-C). The MIT dormitories are about 800 to 1,000 feet from the site (Tr. 4, at 562).

The Company submitted land use maps of the area surrounding the site, and based upon those maps calculated that the land uses within one-half mile of the proposed site are 35 percent water, 35 percent commercial, 11 percent open space and recreational uses, 9 percent transportation, 9 percent multi-family residential, and 1 percent industrial (Exhs. EFSB-L-1 (Att.); EFSB-L-2).[99] The Company calculated that land uses within one mile of the proposed site are 25 percent commercial, 20 percent multi-family residential, 18 percent water, 17 percent open space and recreational uses, 15 percent transportation, and 5 percent industrial (Exhs. EFSB-L-1 (Att.); EFSB-L-2). The Company testified that these values are based upon Massachusetts Geographic Information Systems ("GIS") data, and do not fully reflect the extent of mixed use in the area, in which commercial use is predominant with a mix of residential, industrial, and institutional uses (Tr. 4, at 522-528). The Company asserted that 6 sensitive receptors, including playgrounds, schools, hospitals, and parks, are located within approximately one-half mile of the proposed site (Exh. EFSB-L-6; Tr. 4, at 527).

The Company stated the project site is located entirely within filled tidelands, subject to MDEP Chapter 91 review (Exh. SEK-1, at 4.2-3, 4.2-5). According to the Company, the project would comply with all Chapter 91 requirements, including preserving public access rights by providing public access to the Broad Canal (id. at 4.2-5). Specifically, the Company would build

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[99] Open space and recreational uses include: forest, spectator recreation, participation recreation, water-based recreation, marinas, open land, wetlands, and urban open/public spaces (Exh. EFSB-L-2).

a public canal walk along the canal's north wall, with improvements such as period lighting and interpretive elements along the canal walk which discuss the history and use of the site (id. at 4.10-11). The Company stated that the canal walk would require approval from the MDC under G.L. c. 92, §74, which grants the MDC authority to license structures and recreational facilities that encroach on or over the embankment of the Charles River Basin (id. at 4.2-6). The Company stated that the canal walk plan is consistent with the Draft Charles River Basin Master Plan, prepared under MDC guidance, and that plans for the canal walk would be reviewed by the MDC, the Massachusetts Historic Commission ("MHC"), and the CHC prior to implementation (id. at 4.10-11). The Company stated that the site is not located in an area covered by a municipal harbor plan (id. at 4-2.5).

With regard to the potential impacts of the proposed project on historic resources, the Company consulted with the MHC and the CHC, as well as the MDC, which has jurisdiction over the Charles River Historic District (id. at 4.10-2).[100] The Company stated that there are 57 structures, parks, and historic districts within a 1.5 mile radius of the project that are on or eligible for listing on the National Register of Historic Places ("NRHP") (Exh. EFSB-L-13). The most predominant historic resources in the area are the Athenaenum Press Building adjacent to the site and the Charles River Basin Historic District (id.). The Company stated that the Broad Canal is part of the Charles River Historic District and that the existing Kendall Station building may be eligible for listing on the NRHP, because of its intact state, architecture, and association with industry and the development of Cambridge (Exh. SEK-1, at 4.10-2 and 4.10-10). The Company stated that the new building's design will be consistent with the existing plant's appearance (id. at 4.10-10). The Company submitted a determination from the MHC that the proposed project would have no adverse effect on the Charles River Basin Historic District, provided that the MHC and CHC have the opportunity to review and comment on more detailed drawings of the facility once they are available (Exh. EFSB-G-2-S Bulk Att. at 8.7.1). According to the Company, the canal walk would enhance the existing site conditions, reinforce the

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[100] SE Kendall noted that, although the CHC has no formal jurisdiction over the project, the Company is consulting with the CHC as well as the MHC on historical matters (Company Initial Brief at 121, 122).

historical character of the MDC's river plan, and preserve the historic seawalls along the canal (Exh. SEK-1, at 4.2-7).

The Company stated that very little natural vegetation or wildlife is present on the site and cited correspondence with the Massachusetts Natural Heritage and Endangered Species Program indicating that no state or federal listed rare plants or animals have been found on the site or within the vicinity (id. at 4.2-10, Appendix 4.2).

The Company stated that CELCo would construct an approximately 2.6 mile 115 kV underground transmission line from Kendall Station to its Putnam Station in Cambridge in order to interconnect the proposed project (Exh. EFSB-G-7-S4). In addition, COM/Gas would construct a new high pressure distribution line from Kendall Station to its existing Third Street gate station, and replace the existing 14-inch pipeline from the gate station to the connection point with the Algonquin Gas Transmission pipeline in Somerville, in order to upgrade the natural gas supply at Kendall Station (Exhs. EFSB-G-2-S; SEK-1, at 2-14, Appendix 2; EFSB-G-3). The Company anticipated that the new and upgraded electric transmission and natural gas pipeline facilities would follow existing streets and would not cause any long-term land use impact (Exh. SEK-1, at 4.2-18). Both the electric transmission and natural gas pipeline facilities and their specific routes are subject to Siting Board approval under separate filings, which will include consideration of the land use impacts of these lines.

2. Analysis

As part of its review of land use impacts, the Siting Board considers the extent to which a proposed project would be consistent with existing land uses, state and local requirements, and policies or plans relating to land use. The Siting Board also considers the potential impacts of the project on terrestrial resources including vegetative cover and habitat.

The record shows that the construction of the proposed project is consistent with the present use of the Kendall Station and that operation of the proposed project would not result in an additional incursion of industrial use beyond the existing Kendall Station boundary. The record shows that the land use in the vicinity of the proposed project is changing from industrial to large scale mixed development. The closest residential property is a condominium complex

450 feet from the Kendall Station property line.

Based on the record in this case, the proposed project is an allowed use under the Cambridge zoning ordinances. The record demonstrates that the facility is located in an Office 3A District that allows utility use under a special permit from the Zoning Board of Appeal. However, the project may require a variance to modify the existing cooling discharge system, an existing nonconforming structure. The record shows the Company must also obtain a planning overlay special permit from the Cambridge City Council. The Company has stated that it intends to apply for the cooling discharge variance, if needed, for the new facility and the planning overlay special permit.

The record shows that the proposed electric transmission and natural gas pipeline facilities will follow along roadways and that their specific routes and land use impacts are subject to Siting Board approval under separate filings.

The record also demonstrates that SE Kendall proposes to provide public access to the Broad Canal through creation of a public canal walk consistent with the goals of the Company's MDEP Chapter 91 permit and the MDC's Charles River Basin Master Plan. The Company has provided information concerning impacts to historic and cultural resources and will continue to consult with the MDC, MHC and CHC throughout the project's development.

The record demonstrates that the Company has adequately considered the impacts of the proposed project with respect to wildlife species and habitats and archeological resources. Based on its review of the information submitted by the Company, and on the separate review that will occur for the proposed electric transmission and natural gas pipelines, the Siting Board concludes that no such resource impacts are likely to occur as a result of the construction or operation of the proposed project.

Accordingly, the Siting Board finds that the land use impacts of the proposed project would be minimized.

L. Cumulative Health Impacts

This section describes the cumulative health impacts of the proposed project. The Siting Board considers the term "cumulative health" to encompass the range of effects that a proposed

project could have on human health through emission of pollutants over various pathways, as well as possible effects on human health unrelated to emissions of pollutants (e.g., EMF or noise effects). The Siting Board considers these effects in the context of existing background conditions, existing baseline health conditions, and, when appropriate, likely changes in the contributions of other major emissions sources.

The analysis of the health impacts of a proposed generating facility is necessarily closely related to the analysis, in sections above, of specific environmental impacts which could have an effect on human health and any necessary mitigation measures. This Section sets forth information on the human health effects that may be associated with air emissions, including criteria pollutants and air toxics, emissions to ground and surface waters, the handling and disposal of hazardous wastes, EMF and noise; describes any existing health-based regulatory programs governing these impacts; and considers the impacts of the proposed project in light of such programs.

1. Baseline Health Conditions

The Company provided summaries of four reports produced within the last ten years documenting health conditions in the Cambridge/Boston/Somerville area (Exhs. SEK-1, at 4.14-1 to 4.14-4; EFSB-H-1; EFSB-H-1-S). Two related reports, published by the Massachusetts Department of Public Health, examine cancer incidence statistics for Massachusetts for the years 1987-1994 ("First Cancer Incidence Report") and for the years 1990-1995 ("Second Cancer Incidence Report") (Exhs. SEK-1, at 4.14-1 to 4.14-3; EFSB-H-1). The Cancer Incidence Reports compare the incidence rate of 22 types of cancer for each of the 351 Massachusetts cities and towns with the state-wide average for males, females, and the total population, and notes statistically significant deviations (Exh. SEK-1, at 4.14-1). The Company noted that the authors of the First Cancer Incidence Report cautioned that statistical significance does not necessarily imply biological or public health significance (id. at 4.14-3).

In Cambridge, the First Cancer Incidence Report finds statistically elevated levels of oral

cancer (significant at p <= 0.01) and prostate cancer (significant at p <= 0.05),[101] and statistically reduced rates of lung cancer, melanoma, cervical cancer, bladder cancer, leukemia, "all other" and total cancer (Exh. SEK-1, at 4.14-2). The Second Cancer Incidence Report found significantly elevated levels of prostate cancer, and significantly reduced levels of uterine, kidney, melanoma, non-Hodgkin's lymphoma, lung, thyroid, and total cancers (Exh. EFSB-H-1).

In the neighboring city of Somerville, the First Cancer Incidence Report found statistically elevated levels of stomach, liver and larynx cancers (all significant at p <= 0.05), and statistically reduced levels of melanoma, breast cancer and leukemia (Exh. SEK-1, at 4.14-2). The Second Cancer Incidence Report found statistically elevated levels of larynx cancer, and statistically reduced rates of melanoma, breast cancer, and prostate cancer (Exh. EFSB-H-1).

Finally, for the City of Boston, the First Cancer Incidence Report found statistically elevated levels of esophagus, larynx, liver, lung, non-Hodgkin's lymphoma, oral, and stomach cancers (all significant at p <= 0.001) and of prostate cancer (p <= 0.01) and cervical cancer, "all other", and total cancers (p <= 0.05) (Exh. SEK-1, at 4.14-2). The First Cancer Incidence Report also found statistically reduced levels of brain, breast, Hodgkin's, kidney, leukemia, melanoma, testis, thyroid and uterine cancers (id.). The Second Cancer Incidence Report found statistically elevated levels of cervical, esophagus, larynx, liver, lung, multiple myeloma, non-Hodgkin's lymphoma, oral, prostate, stomach, thyroid, and total cancers, and statistically reduced rates of bladder, brain, breast, Hodgkin's, leukemia, melanoma, ovary, testis and uterine cancers (Exh. EFSB-H-1). The Company attributed the large number of statistically significant deviations from state averages to Boston's very large population base (Exh. SEK-1, at 4.14-2).

A third report, entitled 1999 Public Health Assessment: A Report from the Cambridge Health Alliance, ("CHA Report") provided an extensive analysis of public health in Cambridge (Exh. EFSB-H-1-S). According to the Company, the CHA Report indicates that mortality rates and causes of death in Cambridge are generally comparable to those of the state as a whole,

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[101] The term statistically significant at $p \leq 0.01$ means that there is at most one chance in 100 that the excess of observed cancer cases is due to chance alone (Exh. EFSB-H-2, at 5). Similarly, the term statistically significant at $p \leq 0.05$ means that there is at most one chance in 20 that the excess of observed cancer cases is due to chance alone (id.).

although the annual death rate from HIV/AIDS is significantly higher in Cambridge than in the rest of the state (id.). With respect to air quality, the CHA Report noted that days with unhealthful air quality in the Boston area have dropped from 15 in 1988 to one or none each year since 1993, and that the Boston area has met EPA ozone standards each year since 1992 (id.). With respect to water quality, the CHA Report indicated that Cambridge tap water has met EPA water quality standards since August 1994 (id.). The Company concluded that the CHA Report did not identify significant differences in health status between Cambridge and the state as a whole (id.).

Finally, the Company provided the abstract and certain data from a study entitled Poverty, Race, and Medication Use are Correlates of Asthma Hosptalization Rates, which was published in July 1995 (Exh. SEK-1, at 4.14-3). The focus of the report is on characteristics of Boston neighborhoods with high hospitalization rates (id.). According to the Company, the report found the city-wide hospitalization rate for asthma to be 4.2 per 1000, while hospitalization rates in the "Downtown" and "Back Bay" areas, which are most directly downwind of the proposed project, were less than 2.5 per 1000 (id.). The Company also indicated that asthma hospitalization rates in Cambridge are below the statewide average (Tr. 6, at 807).

2. Criteria Pollutants

As discussed in Section III.B.1, above, the MDEP regulates the emissions of six criteria pollutants under NAAQS: SO_2, PM-10, NO_2, CO, ozone, and lead.[102] The Company's witness, Dr. Valberg, stated that NO_2, SO_2, and ozone are respiratory irritants which, if inhaled at high levels, could cause coughing, narrowing of airways in the lungs, and lung tissue damage (Tr. 6, at 775-776, 778). Dr. Valberg indicated that CO disrupts the ability of the blood to carry oxygen,

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[102] The Company indicated that EPA has promulgated regulations that also would set standards for emissions of PM-2.5 and that would revise the current standard for emissions of PM-10; however, these regulations are not currently in effect (Tr. 6, at 772-774). The Company also indicated that EPA has promulgated a revised ozone standard based on eight-hour, rather than one-hour, concentrations; this standard also is not currently in effect (Tr. 6, at 766, 769-770). The Company indicated that the proposed project would comply with the new ozone standard (Tr. 6, at 769).

with results ranging from a headache to death, and that lead is a neurotoxin that could impair the functioning of the nervous system (Tr. 6, at 777-778). Dr. Valberg indicated that particulate matter generally is a respiratory irritant, which could stimulate coughing and, at very high levels, could accumulate in the lungs (Tr. 6, at 777-778). He noted that asthmatics are particularly sensitive to particulates (for example, ragweed or pollen) which have immune effects (id. at 777).

SE Kendall indicated that EPA has developed NAAQS for six criteria pollutants based on a review of current medical, scientific and public health literature (Tr. 6, at 762-764). The Company stated that primary NAAQS standards are designed to protect human health, including the health of sensitive subgroups, with a margin for safety, while secondary standards are designed to avoid damage to property or vegetation (Exh. EFSB-A-1-S at 3-3; Tr. 6, at 764). The Company indicated that SILs, which represent a small fraction of NAAQS, also have been established for each criteria pollutant; new sources with emissions above SILs are required to conduct interactive source modeling of their emissions to demonstrate compliance with NAAQS (Exh. EFSB-A-1-S at 4-4). The Company provided data on background air quality from MDEP monitoring stations in Boston, Chelsea, Charlestown, and Brookline indicating that background concentrations of SO_2, NO_2, CO, and PM-10 ranged from 20 percent to approximately 61 percent of NAAQS over all measuring periods (Exhs. EFSB-A-1-S at 4-7 to 4-9; EFSB-RR-92-B).

As discussed in Section III.B, above, the Company estimated that the proposed project would reduce Kendall Station NO_X emissions from 365 tpy to 204 tpy, and SO_2 emissions from 247 tpy to 166 tpy, although it does not intend to seek permit restrictions limiting its emissions to these levels (id. at Figure 2-5). The Company estimated that CO emissions would increase from 25 tpy to 158 tpy, PM-10 emissions from 43 tpy to 67 tpy, and VOCs emissions from 8 tpy to 24 tpy (id.).

The Company determined that concentrations of NO_X and CO resulting from the new combustion turbine on oil would be well below SILs; however, concentrations of SO_2 and PM-10 would exceed SILs if the turbine were operating on oil (id. at 4-12 to 4-14). The Company therefore calculated cumulative impacts for these two pollutants under two worst-case operating configurations: the overall worst-case configuration, which occurs when the new combustion turbine is off-line, and a configuration where the new combustion turbine is on-line but operating

on oil (id. at 4-12 to 4-15; Exh. EFSB-RR-92C). The results show that, without the combustion turbine in operation, the maximum cumulative concentrations of SO_2 would be between 86 and 97 percent of the NAAQS, with Kendall Station's emissions making up 50 to 64 percent of the cumulative pollutant concentrations (Exh. EFSB-RR-92C). With the CTG in operation, maximum cumulative concentrations of SO_2 would be between 73 and 78 percent of the NAAQS, with Kendall Station's emissions making up 41 to 50 percent of the concentrations; emissions from the CTG would contribute less than 4 percent to the total (id.). Maximum cumulative concentrations of PM-10 would be 93 percent of NAAQS with the CTG in operation, and 96 percent without the CTG; approximately 44 percent of the concentrations represent the emissions of Kendall Station and 12 other major sources of PM-10, including Sithe's Mystic and New Boston Stations, Logan Airport, Braintree Electric and the Trigen facility in Boston (id.; Exhs. EFSB-RR-92 (Att. 92-C); EFSB-A-1-S at Appendix D).

The record indicates that the EPA has set in place ambient air quality standards, called NAAQS, for six criteria pollutants – SO_2, PM-10, NO_2, CO, ozone, and lead. These standards are set based on an extensive review of the medical literature regarding the health effects of each pollutant, and are designed to be protective of human health, including the health of sensitive subgroups such as the elderly, children, and asthmatics, with an adequate margin for safety. The Siting Board gives great weight to these standards as indicators of whether incremental emissions of criteria pollutants would have a discernable impact on public health.

The record also shows that MDEP has set in place standards for reviewing the compliance of proposed new sources of criteria pollutants, such as the proposed project, with NAAQS. Specifically, new sources may not cause or contribute significantly to a violation of NAAQS. In addition, as discussed in Section III. B, above, MDEP requires major new sources to meet BACT (when the area is in attainment or is unclassifiable for a particular pollutant) or LAER (when the area is in non-compliance for a particular pollutant), and to obtain offsets greater than 100 percent of emissions when the area is in non-compliance for a particular pollutant. The Siting Board notes that MDEP's new source program balances environmental impacts and costs when an area is in compliance with NAAQS, but requires stronger measures, including emissions offsets, when an area is in non-attainment. The Siting Board finds that this

approach is consistent with its own mandate to minimize both the environmental impacts and costs of proposed generating facilities. The Siting Board therefore gives great weight to compliance with MDEP air quality programs as an indicator of whether the Company has minimized the health impacts of a proposed project.

In this case, the record shows that Massachusetts is unclassified or in attainment for SO_2, PM-10, NO_2, CO, and lead, but is treated as non-attainment for ozone. In addition, the record indicates that Cambridge-area background levels of SO_2, PM-10, NO_2, and CO are well below ambient standards for criteria pollutants. Thus, with the possible exception of ozone, Cambridge area levels of criteria pollutants are generally within standards set for purposes of protecting public health. The record also shows that concentrations of NO_X and CO resulting from the new combustion turbine alone would be well below SILs. However, maximum cumulative concentrations of SO_2 with the Kendall Station in operation are up to 97 percent of NAAQS, and maximum cumulative concentrations of PM-10 with Kendall Station and 12 other major sources in operation are up to 96 percent of NAAQS. Thus, the information in the record indicates that operation of the Kendall Station in a worst-case configuration would not cause health-based air quality standards to be violated, although air quality impacts would closely approach those standards.

Because the Company did not provide the air quality modeling for the existing Kendall Station, the Siting Board cannot assess precisely the air quality and related health impacts of the proposed project. However, the following conclusions can be drawn from the record. First, the worst-case impacts of the proposed project likely are very similar to the worst-case impacts of the existing Kendall Station, since the worst-case scenario for the proposed project does not involve the operation of the new CTG. Thus, the maximum cumulative concentrations which closely approach NAAQS are attributable not to the proposed changes at Kendall Station, but to the continued operation of existing equipment.

Second, the air quality impacts of operating the new equipment are significantly less than the impacts of operating the old equipment – in some cases, by an order of magnitude or more. For example, in the worst-case with-CTG scenario, emissions from the new combustion turbine contributed less than 0.01 percent of the total combined impact for 3-hour SO_2, and

approximately 5 percent of the total combined impact for 24-hour SO_2, while operation of existing equipment contributed 41 percent and 50 percent, respectively. Similarly, emissions from the new CTG contribute less than 0.001 percent of the total combined impact for 24-hour PM-10 in the worst-case with-CTG scenario. Some of this significant differential may be attributable to the lower stack height of the existing equipment, as well as to the higher sulfur levels of oil burned in the existing equipment. Thus, any displacement of the existing equipment by the new equipment likely results in a significant improvement in air quality.

Third, the new equipment is expected to displace the existing equipment entirely for at least 80 percent of the year, and in part for approximately 90 percent of the year. In addition, operation of the proposed project is expected to result in significant reductions in annual NO_X and SO_2 emissions from the Kendall Station, although total annual emissions of CO, PM-10, and VOCs are expected to increase. Overall, the record suggests that the proposed project would result in significant air quality improvements for at least some pollutants for the majority of the year, and would not result in increased worst-case pollutant concentrations.

The Siting Board notes that while the proposed project is anticipated to result in lower overall emissions of the ozone precursor NO_X, it is also expected to result in increased emissions of VOCs, another ozone precursor. In Section III.B, above, the Siting Board directed the Company to limit oil firing for both the new and existing equipment to the months outside of the summer ozone season, except when natural gas is unavailable. The Siting Board concludes that, with this condition, the health impacts of the proposed project related to the emission of ozone precursors would be minimized.

Overall, the record indicates that, with the possible exception of ozone, Cambridge area levels of criteria pollutants are generally within standards set for purposes of protecting public health. Further, the record shows that operation of the Kendall Station in a worst-case configuration would not cause health-based air quality standards to be violated, although air quality impacts would closely approach those standards. Moreover, the record suggests that the proposed project would result in significant air quality improvements for at least some pollutants for the majority of the year, and would not result in increased worst-case pollutant concentrations. Finally, the Siting Board has imposed a condition that minimizes potential health

impacts related to the emissions of ozone precursors. Consequently, the Siting Board finds that the cumulative health impacts of criteria pollutant emissions from the proposed project would be minimized.

3. Air Toxics

Air toxics, or hazardous air pollutants, are pollutants known or suspected to cause cancer or other serious health effects such as birth defects or reproductive effects. Toxics include chemicals such as arsenic, benzene, chlorine, beryllium, lead, mercury, nickel, and formaldehyde (Exhs. EFSB-H-3(Att.); EFSB-H-8).

SE Kendall provided a MDEP memorandum setting forth 24-hour average TELs and annual average AALs for air toxics (Exh. EFSB-H-3(Att.)). The memorandum indicates that the TELs and AALs were established in 1995 following a review of the scientific literature and toxicity data, and reflected peer review (id.). The Company indicated that TELs and AALs are permitting tools developed to ensure that toxics emissions from a single source would have an insignificant impact on public health (Exh. EFSB-H-3; Tr. 6 at 790-791).

SE Kendall provided an abstract of a 1998 study by the EPA entitled "Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress" ("HAPs Study") (Exh. SEK-1, at 4.14-4 to 4.14-5). The HAPs Study assessed the hazards and risks due to inhalation exposure to 67 hazardous air pollutants ("HAPs") from 684 fossil fuel plants nation-wide (id.). The HAPs Study also included multipathway assessments for the four highest-priority HAPs – arsenic, mercury, dioxins, and radio nuclides (id.). The HAPs Study eliminated natural gas-fired power plants from its analysis at the screening stage, noting that "[t]he cancer risks for all gas-fired plants were well below one chance in one million ... and no noncancer hazards were identified" (id.). Based on the EPA's findings, the Siting Board concludes that, in the absence of project-specific evidence to the contrary, the air toxics emissions from a natural gas-fired generating facility should be considered to have no discernable public health impacts.

Although SE Kendall proposes to use natural gas as the primary fuel for its proposed project, it does intend to seek permits to use oil as a back-up fuel for its new equipment for up to

720 hours per year, and to continue to use oil in its existing boilers 1, 2 and 3. However, as noted in Section III.B, above, even with the assumption that the facility operates for 720 hours with oil burning, the proposed project's emissions of all regulated air toxics would be below TELs and AALs, which are designed to be protective of public health. In addition, there is no evidence in the record suggesting that the proposed project would emit any specific air toxic at levels which would affect public health. Consequently, the Siting Board finds that the health impacts, if any, of the air toxics emissions from the proposed project would be minimized.

4. Discharges to Ground and Surface Waters

The Company identified two water-linked pathways by which substances hazardous to human health could theoretically reach the local population: through stormwater discharges, and through discharges of project cooling water or other wastewater (Exh. EFSB-H-3). The Company stated that the proposed project would be in compliance with Massachusetts Stormwater Management Standards, which are designed to protect public health and welfare (id.). In addition, as discussed in Section III.D, above, the Company intends to improve on-site stormwater treatment and eliminate site contributions to combined sewer overflows as part of the proposed project.

As discussed in Section III.C, above, cooling water from the proposed project would be discharged to the Charles River pursuant to an existing NPDES permit for the Kendall Station site. In addition, minor discharges would be made to the Cambridge municipal sewer system, which in turn discharges to the MWRA wastewater treatment plant and thence to Massachusetts Bay, pursuant to MWRA's NPDES permit (id.). The Company stated that the NPDES permit discharge limits are set to ensure that discharges will not adversely affect water quality (id.). Further, based on the experience of MDC, which installed an aerator in a similar part of the Charles River in 1978, the Company also anticipated that the startup of the proposed diffuser likely would release substances including hydrogen sulfide from sediments on the bottom of the Charles River (id.). The Company noted that hydrogen sulfide emissions from the start-up of the MDC aerator dropped below detection levels one day after start-up (id.).

In Section III.D, above, the Siting Board reviewed the Company's planned changes to

stormwater systems at Kendall Station, and concluded that handling of stormwater would be significantly improved as a result of the separation of stormwater from combined sewers and the installation of stormwater pollution removal systems. Further, in Section III.C, above, the Siting Board found that the wastewater impacts of the project on both the MWRA sewer system and the Charles River would be minimized. Consequently, the Siting Board finds that the project, as proposed, poses no health risks related to the disposal of cooling water and other wastewater, and that construction of the proposed project would reduce current health risks associated with the flow of stormwater into combined sewers.

5. Handling and Disposal of Hazardous Materials

As discussed in Section III.H, above, the proposed project would use 19.5 percent aqueous ammonia for NO_X control, and limited amounts of certain industrial chemicals for project operation (Exh. SEK-1, at 4.12-5). In addition, the Company would store fuel oil in two on-site oil storage tanks (id. at 2-2).

In Section III.H, above, the Siting Board reviewed the Company's plans for storage and handling of hazardous materials, including aqueous ammonia, and its plans for minimizing and responding to accidental releases of oil or other hazardous materials. The Siting Board determined that oil and other non-fuel chemicals would be properly handled and stored, that emergency supplies and training would be provided concerning the safe handling of hazardous chemicals, and that the Company would be prepared to respond effectively to an accidental release of hazardous materials. The Siting Board also determined that the Company would employ appropriate measures to ensure the safe transport and delivery of oil, to prevent oil spills and accidents, and to respond quickly and effectively to any spills that occur.

With respect to ammonia, the Siting Board has determined that, given the Company's proposed storage design, ammonia concentrations above the toxic endpoint could extend beyond the Kendall Station property boundaries in the event of an ammonia tank failure. Consequently, the Siting Board has directed the Company to enclose the ammonia storage tank or incorporate an alternative design such as a double-walled tank to mitigate the impacts of any potential ammonia spill in order to minimize the risk to public health posed by on-site ammonia storage.

The Company has demonstrated that it has in place procedures for the proper handling, storage, and disposal of hazardous materials during construction and operation of the proposed project. The Company must prepare Soil Management and Health and Safety plans prior to beginning any significant construction work on site. In addition, the Siting Board has required the Company either to enclose its ammonia tank, or to use a double-walled tank, in order to minimize the risk to public health posed by on-site ammonia storage. Consequently, the Siting Board finds that the health risks of the proposed project related to the handling and disposal of hazardous materials would be minimized.

6. EMF

As discussed in Section III. J, above, interconnection of the proposed project would require the construction of a new underground transmission line from Kendall Station to CELCo's Putnam Station in Cambridge. The Company initially estimated worst-case magnetic field strength along the new transmission line at 11.3 mG, but later indicated that CELCo expects that street-level magnetic field strength directly above the new line would be 124 mG.[103] In addition, members of the public using the proposed canal walk near the switchyard could be exposed to magnetic field levels of up to 62 mG while on the canal walk.

The possible health effects of exposure to EMF have been a subject of considerable debate. In a 1985 case involving the construction of the 345 kV overhead HydroQuebec line, the Siting Board heard expert testimony, reviewed the existing literature, and concluded that there was no affirmative evidence that the proposed facilities, which had edge-of-ROW levels of 85 mG, would produce harmful health effects. 1985 MECo/NEPCo Decision, 13 DOMSC 119, at 240. In this case, the Company has provided a summary of existing state and non-regulatory guidance regarding exposure to EMF (Exh. SEK-1, at 4.11-2 to 4.11-3). The Company indicated that eight states have adopted EMF guidelines which are generally based on levels in existing transmission corridors; the maximum permissible levels for magnetic fields under those

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[103] The EMF impacts of the transmission interconnect also will be addressed as part of the Siting Board's review of CELCo's proposal to construct a new 115 kV transmission line. The transmission line filing has been docketed as EFSB 00-03.

guidelines range from 150 mG (for a 230 kV line in Florida) to 250 mG (for a 500 kV, double circuit line in Florida) (id. at 4.11-3). The Company stated that the International Radiation Protection Association recommends that occupational exposure to 60-Hertz ("Hz") magnetic fields be limited to 4167 mG; that routine exposure for the general public be limited to 833 mG; and that general public exposure to fields between 1000 and 10,000 mG be limited to a few hours per day (id. at 4.11-2). The Company also stated that the American Conference of Governmental Industrial Hygienists had established a Threshold Limit Value ("TLV") level of 10,000 mG, to which nearly all workers may be exposed repeatedly without adverse health effects (id. at 4.11-3).

The Company provided a 1997 report by the National Research Council ("NRC"), which provides a comprehensive review of research up to that date on the biologic effects of exposure to power-frequency electric and magnetic fields, including cellular and molecular studies, animal studies, and epidemiological studies (Exh. EFSB-RR-51). The report concludes that the current body of evidence does not show that exposure to such fields presents a human health hazard. (id. at 2). With respect to epidemiological studies, the report indicates that the aggregate evidence does not support an association between magnetic field exposure and adult cancer, pregnancy outcome, neurobehavioral disorders, or childhood cancers other than leukemia (id. at 3). With respect to in vitro studies, the report finds that exposure to 50-60 Hz fields induces changes in cultured cells only at field strengths 1000 to 100,000 times the levels typically found in residences (id. at 6). With respect to animal studies, the study finds no convincing evidence that exposure to power-frequency fields causes cancer or has any adverse effects on reproduction or development in animals (id. at 7). The report finds evidence of behavioral response to fields "considerably larger than those encountered in a residential environment"; however, there was no demonstration of adverse neurobehavioral impacts (id.). The Company provided a summary of a follow-up NRC report,[104] dated June 1999, which concluded that "... it now appears even less likely that [EMF] in the normal domestic or occupational environment produce[s] important

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[104] Research on Power-Frequency Fields Completed Under the Energy Policy Act of 1992. Final Report. National Academy of Sciences Evaluation of the EMF RAPID Program, National Research Council, National Academy Press.

health effects, including cancer" (Exh. EFSB-RR-52, at 2-3). The Company also summarized recent research surveys sponsored by the World Health Organization[105] and the National Institute of Environmental Health Sciences[106] (id.). The Company cited findings from the World Health Organization Report that, while health hazards exist from exposures at high levels (above 50,000 mG), the literature does not establish health hazards associated with lower-level fields (id. at 2). The National Institute of Environmental Health Sciences Report concluded that there is "weak" scientific evidence suggesting that exposure to power line EMF may pose a leukemia hazard, but that there is not sufficient evidence of a risk of other cancer or non-cancer health outcomes to warrant concern (id. at 3).

With respect to recent individual studies, the Company noted that a large number of laboratory studies have been published which found no promoting effect of power-line EMF exposure on tumor development in animals (id. at 4). The Company also provided summaries of six recently-published (1999 or 2000) studies of the association between EMF exposure and leukemia or other childhood cancers (id. at 4-8). While some studies found no correlation between magnetic field exposure and cancer risk, others found a relationship between leukemia risk and modeled residential EMF levels, or measured residential EMF levels for children diagnosed at a young age (id.). Maternal occupational exposure to EMF during pregnancy was not found to be a risk factor for childhood cancers (id. at 7). Finally, the Company summarized recent epidemiological studies finding no correlation between residential or occupational exposure to EMF and breast cancer in adult women, and a non-significant correlation between spot measurements of EMF above 3 mG and brain tumors in adults (id. at 8).

Overall, although there are some epidemiological studies which suggest a correlation between exposure to magnetic fields and childhood leukemia, and some evidence of biological response to exposure to magnetic fields in animal studies, there is no evidence of a cause-and-

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[105] Repacholi, Michael H. and Ben Greenbaum, "Interaction of Static and Extremely Low Frequency Electric and Magnetic Fields with Living Systems: Health Effects and Research Needs (World Health Organization)". Bioelectromagnetics 20:133-160, 1999.

[106] "Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields", NIH Publication No. 99-4493, June 1999.

effect association between magnetic field exposure and human health. Thus, the record in this case does not support a conclusion that the EMF levels anticipated as a result of the proposed project would pose a public health concern. Accordingly, the Siting Board finds that the health effects, if any, of magnetic fields associated with the proposed project would be minimized.

7. Noise

As discussed in Section III. G, above, the proposed project would produce noise that would be noticeable in some surrounding community areas, both during the facility construction period and during operation of the facility. The Company has assessed the noise impacts of the proposed project in relation to applicable federal and local criteria for acceptable ambient noise, as well as the MDEP standard which limits allowable noise increases from new sources.

With respect to health effects of noise, the Company asserted that the only direct physiological effect of excessive noise is damage to hearing; however, it noted that exposure to unpleasant or unusual noise could increase stress levels, resulting in increased heart rates or blood pressure (Tr. 6, at 848, 854). The Company stated that Occupational Safety and Health Agency guidelines require the use of protective devices to prevent hearing loss at prolonged exposure levels of 85 dBA or higher (Exh. EFSB-H-3). The Company provided an EPA document[107] which recommends that noise exposure not exceed an average of 75 dBA over 8 hours, or 70 dBA over 24 hours in order to prevent hearing loss, and which suggests that an outdoor L_{dn} of 55 dBA likely would result in indoor nighttime noise levels of approximately 32 dBA, which should, in most cases, protect against sleep interference (Exh. EFSB-N-15 at 3, 4, D-34). Dr. Valberg asserted that studies of the impact of noise on the ability to sleep or to concentrate suggest that the effect depends to a great extent on the content of the noise -- for example, steady noise was found to be more tolerable than infrequent staccato noise (Tr. 6, at 847).

The record shows that, with the proposed project in operation, L_{dn} noise levels at two

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[107] "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin for Safety", EPA Publication 550/9-74-004, March 1974.

commercial locations (the Riverfront Office Park (NML A) and the property line adjacent to the Riverview Office Building) (PL-5) would increase from 65 dBA to 66 dBA, and from 65 dBA to 68 dBA, respectively, with L_{dn} noise at all other residential and commercial receptors remaining unchanged. The resulting noise levels are below thresholds where hearing loss from long-term noise exposure could occur, although both existing and anticipated noise levels may be high enough to interfere with sleep. Because of the existing high levels of noise in the vicinity of the proposed project, the Company has agreed to limit L_{90} noise increases at residential receptors to no more than 2 dBA. The Siting Board has found that this level of mitigation would minimize the noise impacts of the proposed project. Consequently, the Siting Board finds that the health effects, if any, of noise from the proposed project would be minimized.

8. Conclusions

In the sections above, the Siting Board has reviewed the proposed project's potential for effects on human health resulting from emissions of criteria pollutants, emissions of air toxics, emissions to ground and surface waters, handling and disposal of hazardous materials, electric and magnetic frequencies, and noise. The Siting Board has found that: (1) the cumulative health impacts of criteria pollutant emissions from the proposed project would be minimized; (2) the health impacts, if any, of the air toxics emissions from the proposed project would be minimized; (3) the project, as proposed, poses no health risks related to the disposal of cooling water and other wastewater, and that construction of the proposed project would reduce current health risks associated with the flow of stormwater into combined sewers; (4) the health risks of the proposed project related to the handling and disposal of hazardous materials would be minimized; (5) the health effects, if any, of magnetic fields associated with the proposed project would be minimized; and (6) the health effects, if any, of noise from the proposed project would be minimized.

The Siting Board notes that the only indication of potential pre-existing public health problems in the communities surrounding the proposed project is the existence of statistically elevated levels of a variety of cancers. However, there is no evidence in the record suggesting that the pollutants which the proposed project would emit are in any way linked to the these types

of cancer. Moreover, the record shows that the proposed project emits air toxics, including carcinogens, at levels below TELs and AALs, and that, where adequate information is available, AALs for carcinogens are set to correspond to an incremental lifetime risk of developing cancer of one in one million. Consequently, the Siting Board finds that there is no evidence that the proposed project would exacerbate existing public health problems in the communities surrounding the proposed project.

Accordingly, based on its review of the record, the Siting Board finds that the cumulative health impacts of the proposed project would be minimized.

M. Conclusions

Based on the information in Sections II through III, above, the Siting Board finds that the Company's description of the proposed project and its environmental impacts is substantially accurate and complete.

In Section III.B, the Siting Board has found that, with limitations on oil firing and the implementation of CO_2 mitigation, the air quality impacts of the proposed facility would be minimized.

In Section III.C, the Siting Board has found that with the conditions relating to the development and implementation of a plan for monitoring and with the impacts and benefits of the proposed intake/discharge system; and with the condition requiring an emergency water use agreement, the water resource impacts of the proposed project would be minimized.

In Section III.D, the Siting Board has found that the wetlands impacts of the proposed project would be minimized.

In Section III.E, the Siting Board has found that, with the implementation of the condition directing SE Kendall to file a copy of its updated recycling plan and report on its recycling rate, the solid waste impacts of the proposed project would be minimized.

In Section III.F, the Siting Board has found that, with the implementation of the condition directing the Company to provide a five-foot wide on-site buffer strip along Athenaeum Street to the north of the site, the visual impacts of the proposed project would be minimized.

In Section III.G, the Siting Board has found that with implementation of the Company's

proposed mitigation, the noise impacts of the proposed project would be minimized.

In Section III.H, the Siting Board has found that, with the implementation of the conditions directing SE Kendall to enclose the ammonia storage tank or incorporate an alternative design, and to revise and update its Emergency Response Plan and Spill Prevention, Control, Countermeasure Plan, the safety impacts of the proposed project would be minimized.

In Section III.I, the Siting Board has found that with the (1) development of a satellite-parking traffic analysis and mitigation plan, and acceptance of such plan by the Siting Board, (2) the development and implementation of an overall traffic mitigation plan, and (3) the condition relating to deliveries during off-peak hours, the Company will have established that the traffic impacts of the proposed project would be minimized.

In Section III.J, the Siting Board has found that the EMF impacts of the proposed project would be minimized.

In Section III.K, the Siting Board has found that the land use impacts of the proposed project would be minimized.

In Section III.L, the Siting Board has found that the cumulative health impacts of the proposed project would be minimized.

Accordingly, the Siting Board finds that, with the implementation of the above-listed conditions, SE Kendall's plans for the construction of the proposed generating project would minimize the environmental impacts of the proposed project consistent with the minimization of costs associated with the mitigation, control and reduction of the environmental impacts of the proposed generating facility.

IV. CONSISTENCY WITH THE POLICIES OF THE COMMONWEALTH

A. Standard of Review

G.L. c. 164, § 69J¼ requires the Siting Board to determine whether the plans for construction of a proposed generating facility are consistent with current health and environmental protection policies of the Commonwealth and with such energy policies of the Commonwealth as are adopted by the Commonwealth for the specific purpose of guiding the decisions of the Siting Board. The health and environmental protection policies applicable to the

review of a generating facility vary considerably depending on the unique features of the site and technology proposed; however, they may include existing regulatory programs of the Commonwealth relating to issues such as air quality, water-related discharges, noise, water supply, wetlands or riverfront protection, rare and endangered species, and historical or agricultural land preservation. Therefore, in this section, the Siting Board summarizes the health and environmental protection policies of the Commonwealth that are applicable to the proposed project and discusses the extent to which the proposed project complies with these policies.[108]

B. Analysis

In Sections II and III, above, the Siting Board has reviewed the process by which SE Kendall sited and designed the proposed project, and the environmental and health impacts of the proposed project as sited and designed. As part of this review, the Siting Board has identified a number of Commonwealth policies applicable to the design, construction, and operation of the proposed project. These are briefly summarized below.

As discussed in Section III.B, above, the MDEP extensively regulates emissions of criteria and non-criteria pollutants from new sources such as the proposed project. SE Kendall has demonstrated that it expects to comply with all applicable MDEP standards.

As discussed in Section III.C, above, MDEP, EPA, MWRA and the Army Corps of Engineers regulate various wastewater discharges. SE Kendall has demonstrated that it expects to comply with all applicable MDEP, EPA, MWRA and Army Corps of Engineers standards.

As discussed in Section III.D, above, SE Kendall has demonstrated that it is working with affected federal, state and local regulatory authorities to evaluate design options that would reduce the wetlands impacts of the proposed water intake/discharge and pedestrian canal walk.

As discussed in Section III.G, above, SE Kendall has demonstrated that it will limit

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[108] The Siting Board notes that its Technology Performance Standard at 980 CMR, § 12.00 could be construed as an energy policy of the Commonwealth adopted for the purpose of guiding the decisions of the Siting Board. The proposed project's compliance with 980 CMR, § 12.00 is discussed in Sections I.C and III.B, above. The Commonwealth has not adopted any other energy policies pertaining to the Siting Board's review of generating facilities since G.L. c. 164, § 69J¼ was enacted.

increases in off-site noises caused by operation of the proposed facility to 2 dBA at the nearest residences, and to no more than 8 dBA at the project property lines, consistent with MDEP policy 90-001, which limits such increases to 10 dBA.

As discussed in Section III.K, above, SE Kendall has demonstrated that it has complied with state programs protecting historical and archeological resource areas and rare or endangered species.

Consequently, based on its review above, the Siting Board finds that plans for construction of the proposed project are consistent with current health and environmental protection policies of the Commonwealth and with such energy policies of the Commonwealth as have been adopted by the Commonwealth for the specific purpose of guiding the decisions of the Siting Board.

V. DECISION

The Siting Board's enabling statute directs the Siting Board to implement the energy policies contained in G.L. c. 164, §§ 69H-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. Section 69J¼ requires that, in its consideration of a proposed generating facility, the Siting Board review inter alia the site selection process, the environmental impacts of the proposed project, and the consistency of the plans for construction and operation of the proposed project with the environmental policies of the Commonwealth.

In Section II, above, the Siting Board has found that the Company's description of the site selection process it used is accurate, and that the site selection process resulted in the selection of site that contributes to the minimization of the environmental impacts of the proposed project and the costs of mitigating, controlling, and reducing such impacts.

In Section III, above, the Siting Board has found that with the implementation of listed conditions relative to air quality, water resources, solid and hazardous waste, visual, safety and traffic impacts, the Company's plans for the construction of the proposed generating facility would minimize the environmental impacts of the proposed project consistent with the minimization of costs associated with the mitigation, control and reduction of the environmental

impacts of the proposed project.

In Section IV, above, the Siting Board has found that the plans for the construction of the proposed project are consistent with current health and environmental protection policies of the Commonwealth and with such energy policies of the Commonwealth as have been adopted by the Commonwealth for the specific purpose of guiding the decisions of the Siting Board.

Accordingly, the Siting Board finds that, upon compliance with the conditions set forth in Sections III.B, III.C, III.E, III.F, III.H, and III.I, above, and listed below, the construction and operation of the proposed project will provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Accordingly, the Siting Board APPROVES the petition of Southern Energy Kendall, L.L.C. to upgrade the generating facilities from its existing generating capacity of approximately 64 MW to approximately 234 MW in Cambridge, Massachusetts, subject to the following conditions:

Prior to the commencement of construction:

A. In order to minimize traffic related impacts, the Siting Board directs the Company to file with the Siting Board a traffic analysis and mitigation plan that identifies the location of the off-site parking area and provides information on the schedule and volume of project-related traffic at affected intersections along the likely routes of arrival and departure and sets forth plans for any necessary mitigation. The analysis should include a LOS analysis with back-up data, and all assumptions should be clearly stated. The plan should specifically address: (1) the costs and benefits of subsidizing the MBTA fares of the Company's workers in order to decrease traffic impacts at the satellite site; and (2) comments from Cambridge, and if applicable, the community in which the satellite parking would be located. The Siting Board will expeditiously review the Company's filing to determine whether traffic impacts at the satellite parking site would be minimized.

B. In order to minimize safety impacts the Siting Board directs the Company (1) to

enclose the ammonia storage tank or incorporate an alternative design such as a double-walled tank to mitigate the impacts of any potential ammonia spill, and (2) to file with the Siting Board prior to commencement of construction of the ammonia system, an analysis of the cost and relative safety advantages of the design options considered for ammonia storage.

C. In order to minimize safety impacts, the Siting Board directs the Company to (1) consult with the appropriate Cambridge officials in the revision of its SPCC Plan and the Emergency Response Plan; and (2) update the construction section of its Emergency Response Plan, in consultation with appropriate Cambridge officials, and file it with Cambridge before project construction begins in order to cover possible emergencies related to construction accidents.

Prior to commencement of operation:

D. In order to minimize solid and hazardous waste impacts, the Siting Board directs the Company to file a copy of the updated recycling plan with the Siting Board, and to report on its recycling rate for construction and demolition debris and its anticipated recycling rate for operational wastes.

E. In order to minimize water impacts, the Siting Board directs the Company to negotiate a mutually acceptable emergency water use agreement with Cambridge and to provide a copy to the Siting Board prior to the commencement of operation.

F. In order to minimize water impacts, the Siting Board directs the Company, in consultation with MDEP and EPA, to develop and implement a plan to monitor the impacts and the beneficial effects of the proposed intake/discharge system, including temperature impacts, fishery impacts as indicated by changes in

impingement and entrainment rates, DO changes and other parameters the Company considers important, for a minimum of two years following the commencement of commercial operation. The Company shall provide the Siting Board with a copy of its monitoring plan prior to commencement of commercial operation.

During construction and operation of the proposed project:

G. In order to minimize air impacts, the Siting Board directs the Company to limit oil firing for the new equipment and boilers 1, 2, and 3 to the months outside the ozone season of May 1 through September 30, except in the case of a natural gas supply interruption beyond the Company's control, and to seek an air quality plan approval from MDEP incorporating this condition. The Company shall provide the Siting Board with a copy of its pre-construction air quality plan approval prior to the commencement of construction.

H. In order to minimize CO_2 emissions, the Siting Board requires the Company either to: (1) make a monetary contribution to a cost-effective program or programs to be selected upon consultation with the staff of the Siting Board, based on the maximum CO_2 emissions from the operation over 20 years of the proposed project; or (2) make a monetary contribution based on the maximum net increase in CO_2 emissions from Kendall Station over 20 years, if it can establish that it will make no additional use of the CO_2 emissions reductions from existing equipment to provide offsets for CO_2 emissions from other sources; or (3) provide offsets for 1 percent of the proposed project's maximum CO_2 emissions based on voluntary curtailment of operations of existing equipment at Kendall Station, or of equipment at another existing source, subject to conditions, as described above, that the curtailment of operations be based on enforceable and verifiable limits and that there be no collateral use of the curtailment of operations to provide

emissions offsets relating to other pollutants and/or sources. If the Company elects to pursue monetary CO_2 offsets, the Siting Board directs the Company to provide CO_2 offsets through a total contribution of $352,142 (or $269,650, if based on the maximum net increase in CO_2 emissions from Kendall Station), to be paid in five annual installments during the first five years of facility operation.

I. In order to minimize water resource impacts, the Siting Board directs the Company to within three years of the commencement of commercial operation, provide the Siting Board with an analysis of the results to date of its monitoring of temperature impacts, fishery impacts and DO changes with supporting data. If the Siting Board determines based on the Company's analysis that the temperature or fishery impacts are significantly greater than approved by the Siting Board, or that, overall, the DO benefits of the intake/discharge system are not being realized, then the Siting Board may require operating changes or additional mitigation that contributes to the minimization of water resources impacts, consistent with the cost of mitigating, controlling and reducing such impacts.

J. In order to minimize visual impacts, the Siting Board directs the Company to provide a five-foot wide on-site buffer strip densely planted with shrubs or trees along Athenaeum Street.

K. In order to minimize traffic impacts, the Siting Board directs the Company to schedule deliveries to be spread over the construction work shift, with deliveries of very large equipment and, to the fullest extent possible, post-construction deliveries of oil, aqueous ammonia and other materials and substances, scheduled during off-peak times in cooperation with Cambridge officials. In the unlikely event that deliveries can only be scheduled near or during the a.m. peak, the Company should work in conjunction with Cambridge to provide traffic control officers at the intersection of Land Boulevard and Binney Street.

L. In order to minimize traffic impacts, the Siting Board directs the Company to consult with the City and any other affected municipalities to develop and implement an overall traffic mitigation plan.

Because issues addressed in this Decision relative to this facility are subject to change over time, construction of the proposed generating facility 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 to notify the Siting Board of any changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. The Company is obligated to provide the Siting Board with sufficient information on changes to the proposed project to enable the Siting Board to make these determinations.

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Sheila Renner McIntyre
Hearing Officer

Dated this 15th day of December, 2000