COMMONWEALTH OF MASSACHUSETTS
Energy Facilities Siting Board

In the Matter of the Petition of the Massachusetts Municipal Wholesale Electric Company for Approval to Construct a Natural Gas Transmission Pipeline	)	EFSB 97-4

FINAL DECISION

M. Kathryn Sedor
Jolette A. Westbrook
Hearing Officers
June 15, 2001

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
Act	Electric Restructuring Act, Chapter 164 of the Acts of 1997
Altresco Lynn Decision	Altresco Lynn, Inc., 2 DOMSB 1 (1993)
ANP Bellingham Decision	ANP Bellingham Energy Company, 7 DOMSB 39 (1998)
ANP Blackstone Decision	ANP Blackstone Energy Company, 8 DOMSB 1 (1999)
Applicant	Applicant for siting approval
Bay State	Bay State Gas Company
Bay State Contract	Contract for firm transportation between MMWEC and Bay State Gas Company
Berkshire Gas Decision	Berkshire Gas Company, 9 DOMSB 1 (1999)
Btu	British thermal unit
BVW	Bordering vegetated wetlands
c.	Chapter
CELT	Capacity, Energy, Loads, & Transmission (yearly reports provided by NEPOOL)
CMR	Code of Massachusetts Regulations
CO	Carbon monoxide
CO_2	Carbon dioxide
Commonwealth	Commonwealth of Massachusetts
Company	Massachusetts Municipal Wholesale Electric Company
DOMSB	Decisions and Orders of Massachusetts Energy Facilities Siting Board
DOMSC	Decisions and Orders of Massachusetts Energy Facilities Siting Council
Eastern corridor	A route alternative for the proposed project
Eastern Energy Remand	Eastern Energy Corporation (Remand), 1 DOMSB 213 (1993)
EDD(s)	Effective degree day(s)
EIA	Energy Information Administration
Enron Decision	Enron Power Enterprise Corporation, 23 DOMSC 1 (1991)

F	Fahrenheit
FEIR	Final Environmental Impact Report
5.6-mile alternative	Proposed pipeline connecting Stony Brook to the Monson-Palmer line at East Street
G.L.	Massachusetts General Laws
Hampden	Town of Hampden
HRSG(s)	Heat recovery steam generator(s)
Hydro-Québec Contract	Hydro-Québec Phase II Firm Energy Contract
intermediate unit	Stony Brook Intermediate Unit
ISO	Independent System Operator
IT	Interruptible transportation
IT Contract	Contract between MMWEC and Bay State Gas Company for interruptible transportation
lbs/mmBtu	Pounds per million British thermal units
Ludlow	Town of Ludlow
MassPower	264 MW electric generating facility in Springfield**,** Massachusetts
MASSPOWER Decision	MASSPOWER, Inc., 20 DOMSC 301 (1990)
mcf/hr	Thousand cubic feet per hour
MMWEC	Massachusetts Municipal Wholesale Electric Company
MNHESP	Massachusetts Natural Heritage and Endangered Species Program
Monson-Palmer line	Existing gas pipeline extending from Tennessee pipeline at Monson to near the MassPower facility at Indian Orchard
MW	Megawatts
MW-hrs	Megawatt-hours
NAAQS	National ambient air quality standards
NEA Decision	Northeast Energy Associates, 16 DOMSC 335 (1987)
NEPOOL	New England Power Pool
1985 MassElectric Decision	Massachusetts Electric Company, 13 DOMSC 119 (1985)

1989 MassElectric Decision	Massachusetts Electric Company, 18 DOMSC 383 (1989)
1997 BECo Decision	Boston Edison Company, 6 DOMSB 208 (1997)
1998 NEPCo Decision	New England Power Company, 7 DOMSB 333 (1998)
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
Northeast region	New England plus New York state
Northern route	Route for the 5.6-mile alternative along the western/northern corridor
NPDES	National Pollutant Discharge Elimination System
Notice	Company's Notice of Public Hearing and Adjudication
NPV	Net present value
PAC	Pipeline Action Committee
Phase I	First phase of a phased version of the proposed project
Phase II	Second phase of a phased version of the proposed project
Phased project	The proposed project built in two separate phases
PM	Particulates
Preferred corridor	For the proposed project, the Western/Northern Variation
Project Participants	Utilities with power sales agreements for the Stony Brook Intermediate Unit
Proposed project	Proposed pipeline connecting Stony Brook to Tennessee gas pipeline
psig	Pounds per square inch, gauge
RMLD	Reading Municipal Light Department
ROW	Right-of-way
SDEIR	Supplemental Draft Environmental Impact Report
Siting Board	Energy Facilities Siting Board (Massachusetts)
SO_2	Sulfur dioxide
Southern route	Route for the 5.6-mile alternative along the western/eastern corridor
SPCC plan	Spill prevention, containment, and control plan
Stony Brook	Stony Brook Energy Center (Ludlow, Massachusetts)

Tennessee	Tennessee Gas Pipeline Company
3-mile alternative	Proposed pipeline connecting Stony Brook to the Monson-Palmer line at West Street
3-mile alternative 1	Easterly route largely following a WMECO right-of-way
3-mile alternative 2	Westerly route largely following West Street
TMOR	Thirty minute operating reserve
tpy	Tons per year
275 psig line	Existing Bay State pipeline that currently serves Stony Brook
VOC(s)	Volatile organic compound(s)
Western/northern corridor	MMWEC's preferred route alternative for the proposed project
Western/eastern corridor	A route alternative for the proposed project
Wilbraham	Town of Wilbraham
WMECO	Western Massachusetts Electric Company
WMECO Agreement	Letter agreement between MMWEC and WMECO regarding general pipeline alignment and payment for right-of-way use

The Energy Facilities Siting Board ("Siting Board") hereby DENIES the petition of the Massachusetts Municipal Wholesale Electric Company ("MMWEC" or "Company") for approval to construct a natural gas pipeline of approximately 15 miles in length to supply additional natural gas to the Company's existing electric generating facility in Ludlow, Massachusetts. The Siting Board hereby APPROVES the Company's proposed 5.6-mile alternative to the proposed project.

I. INTRODUCTION

A. Summary of the Proposed Project

The Massachusetts Municipal Wholesale Electric Company is a public corporation and a political subdivision of the Commonwealth (Exh. MMWEC-1, at 1). MMWEC was created by the Legislature in 1975 as a non-profit entity to provide Massachusetts cities and towns that operate their own electric systems with the power supply, financial and other services needed to enable them to better serve their customers (id.; Exh. EFSB-3, at 15). Any Massachusetts city or town with a municipal light department may become a member of MMWEC; there are currently 22 MMWEC members (Exh. EFSB-3, at 15; Tr. 8, at 991).

MMWEC stated that it operates the Stony Brook Energy Center ("Stony Brook"), a gas and oil-fired generating plant in Ludlow, Massachusetts, consisting of an intermediate unit and a peaking unit (Exhs. EFSB-3, at 15; MMWEC-JOR/ARM at 7-8). The Stony Brook Intermediate Unit ("intermediate unit") consists of three combustion turbines and three heat recovery steam generators ("HRSGs"), together providing power for an amount of time intermediate between a baseload facility and a peaking unit (Exh. EFSB-4, at 4-1; Tr. 18, at 2856-2858). The intermediate unit is jointly owned by MMWEC and other entities (Exh. MMWEC-JOR/ARM at 8); Massachusetts municipal electric systems are the principal participants ("Project Participants") in the intermediate unit (id. at 8, 9).[1]

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[1] MMWEC is the operator of the intermediate unit in accordance with the provisions of the MMWEC Intermediate Units Agreement for Joint Ownership, Construction and Operation (Exh. HO-G-2). MMWEC has a 90.76% ownership interest in the Stony Brook Intermediate

(continued...)

MMWEC proposes to construct a 14.7-mile long, 16-inch diameter underground pipeline that would run from an interconnection with the existing Tennessee Gas Pipeline Company ("Tennessee") interstate natural gas pipeline in Hampden, Massachusetts, to Stony Brook in Ludlow ("proposed project") (Exh. MMWEC-1, at 3-5). MMWEC stated that the purpose of the proposed project is to enable MMWEC to increase the use of natural gas at the intermediate unit (Exh. EFSB-3, at 1, 18).[2] MMWEC stated that it has no plans for future extension of the proposed pipeline, and that it is not entertaining any proposals to make the Stony Brook site available for additional generation (id. at 21).

MMWEC indicated that the cost of constructing, operating, and maintaining the proposed project would be borne by the Project Participants and Joint Owners, not by MMWEC itself (Exhs. HO-N-18; RMLD-1-72). MMWEC noted that the reduced fuel costs and increased margins earned on the sale of energy would be passed through to the Project Participants in the form of a reduction in purchase power expenses (Exh. RMLD-1-26).[3] MMWEC asserted that construction of the proposed pipeline would lower electricity costs and also would reduce total emissions of carbon dioxide ("CO_2") and criteria pollutants in the northeastern United States (Exh. EFSB-3, at 18, 20; Exh. MMWEC-JJB-

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[1] (...continued)
Unit; of the remaining capacity, 8.80% is owned by the Green Mountain Power Corporation, and 0.44% by the Village of Lyndonville, Vermont (collectively, the "Joint Owners") (id.). Twenty MMWEC members, four non-MMWEC members, and six out-of-state utilities have signed Power Sales Agreements for the output from the intermediate unit (id.). These entities are referred to as Project Participants (id.). The approval process that is required within MMWEC to make major decisions regarding the Stony Brook facility, is an affirmative vote by the MMWEC Board of Directors (Exh. HO-G-4). MMWEC stated that, although it was not contractually required to do so, the MMWEC Board of Directors consulted with Project Participants prior to voting to construct the proposed project (id.).

[2] MMWEC stated that it analyzed the feasibility of converting the Stony Brook peaking unit to dual-fuel capability in August 1997, but concluded that this would not be economic (Exh. RMLD-2-8, Att. 1).

[3] The Project Participants, in turn, may pass the economic benefits, in whole or in part, onto their customers, in the form of lower electric rates (Exh. RMLD-1-26).

S at 3).

MMWEC, in its initial petition, contemplated that the 14.7-mile proposed project would be constructed in a single phase (Exh. MMWEC-1, at 1). However, during the course of the proceeding, MMWEC modified its initial proposal by requesting that the Siting Board approve the separation of the project into two phases ("phased project") (Exh. MMWEC-JOR-S at 1-5). Phase I would be a 20-inch pipeline, approximately 5.4 to 5.6 miles long, entirely within Ludlow, extending from an existing gas pipeline operated by the Bay State Gas Company ("Bay State") and known as the Monson-Palmer line, to Stony Brook (id.). Phase II would be a 16-inch pipeline, approximately 9.1 miles long, extending from the Tennessee pipeline in Hampden, and continuing through Hampden, Wilbraham, and Ludlow to interconnect with the Phase I pipeline in Ludlow (id.). MMWEC explained that the phased project would also include two above-ground facilities, a custody transfer station[4] to be located in Ludlow near the Massachusetts Turnpike, and a metering and pressure regulating station to be located at Stony Brook (Exh. EFSB-3, at 16 to 17).[5]

Significant project alternatives described by MMWEC include an approximately 3-mile long pipeline that would interconnect to Bay State's Monson-Palmer line ("3-mile alternative") and a longer pipeline that would interconnect with the Monson-Palmer line near the point it is crossed by the proposed project ("5.6-mile alternative") (id.). Neither the 3-mile alternative nor the 5.6-mile alternative would interconnect directly to the Tennessee pipeline. The proposed project is shown on

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4 The proposed transfer station would be located within a 25-foot by 36-foot fenced area near the interconnection with the Monson-Palmer line, on East Street in Ludlow (Exhs. MMWEC-JOR-S at 12; EFSB-3, at 16-17).

5 MMWEC has stated that the phased project does not represent a change from the original proposed project (Exh. MMWEC-JOR-S at 4). However, Phase I of the phased project would be constructed of 20-inch diameter pipe, rather than 16-inch pipe as under the original project (Exhs. MMWEC-1, at 4; MMWEC-JOR-S at 4). In addition, the Company stated that the size of the above-ground facilities are dependent on whether only one or both of the phases are built (Exh. EFSB-3, at 16-17). If only Phase I is constructed, both the metering and pressure regulating station and the custody transfer station would be significantly smaller in scale than if both phases were built (id. at 17). Finally, the timing of construction would differ between phased and unphased projects.

Figure 1, at the end of this Decision.

B. Description of Project-Related Contracts

1. Bay State Contract

MMWEC stated that on June 22, 1999, it executed a contract with Bay State ("Bay State Contract") for firm transportation service on the Monson-Palmer line in connection with Phase I of the proposed project (Exh. MMWEC-GEL at 4). The Company explained that under the terms of the Bay State Contract, MMWEC would be responsible for constructing, operating, and maintaining the 20-inch pipeline, for buying its own gas, and for arranging for transportation of that gas to Bay State's gate station on the Tennessee pipeline in Monson (id.). Bay State would be responsible for transporting MMWEC's gas on the Monson/Palmer line from the Monson gate station to the interconnection with MMWEC's Phase I pipeline (id.).

The charges for the Bay State transportation service include a fixed demand charge of $70,000 per month and an initial throughput rate of $.03 per million Btu, which escalates at a rate of 3% per year after the first three years (Exh. MMWEC-GEL at 5). The Bay State Contract requires Bay State to deliver gas at a maximum hourly flow rate of 3150 thousand cubic feet per hour ("mcf/hr") at a continuous pressure measured at Stony Brook of 350 pounds per square inch, gauge ("psig"), with two exceptions (id.). First, when Tennessee delivers gas to the Monson gate station at a pressure of less than 510 psig, Bay State's obligations are reduced to 2100 mcf/hr; if the Tennessee delivery pressure is less than 465 psig, the obligation is reduced to 1050 mcf/hr; and if the Tennessee pressure is at less than 425 psig, Bay State has no obligation to deliver any gas (id.). Second, during the period from November 1 through April 30, Bay State may declare up to 45 reduced service days;[6] on such days, Bay State is obligated to deliver only 2100 mcf/hr (id. at 6, 7 and Att. GEL-1, at 5-7). If Bay State fails to provide the level of gas transportation service required under the Bay State Contract, forcing

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[6] Bay State may declare a reduced service day on any day when, no more than 48 hours prior to the start of the day, Weather Services Corporation projects that there will be more than 45 effective degree days ("EDD") level in the greater Springfield, Massachusetts area (Exh. MMWEC-GEL at Att. GEL-1, at 7).

MMWEC to operate the intermediate unit on No. 2 fuel oil, or if Bay State fails to provide the required level of gas transportation service and MMWEC is unable to operate the intermediate unit on oil, Bay State is required to compensate MMWEC for certain incremental costs incurred by MMWEC as provided in the Bay State Contract (id. at 7-8 and Att. GEL-1, at 13-15).[7]

The Bay State Contract commences on the first day of the calendar month following the date on which construction of Phase I is completed and a determination is made by MMWEC that the pipeline is capable of transporting gas (Exh. MMWEC-GEL at 10 and Att.1, at 10). The Company noted that at any time during the pendency of the 20-year Bay State Contract, either MMWEC or Bay State may terminate the Bay State Contract, subject to certain notice requirements and early termination penalties set forth in the Contract (id. Att. 1, at 11).[8] The Company stated that the proposed project would not require any upgrades to the Tennessee mainline (Exh. HO-A-9).

2. WMECO Agreement

MMWEC stated that in August 2000 it executed a legally binding letter agreement with Western Massachusetts Electric Company ("WMECO") that would allow MMWEC to construct, operate and maintain Phase I of the phased project within WMECO's right-of-way ("ROW") and to use WMECO's ROW for Phase II of the phased project ("WMECO Agreement") (Exh. RR-HO-MM-28; Tr. 8, at 993). Specifically, the WMECO Agreement provides that, upon MMWEC and

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[7] If MMWEC must operate the intermediate unit on oil, Bay State would be required to pay MMWEC the difference between the cost of a volume of fuel oil having a Btu content equivalent to the Btu content of the default deficiency gas (the nominated quantity amount less the amount of gas actually delivered) (Exh. MMWEC-GEL at 8-9, and Att. 13). If MMWEC is unable to operate the intermediate unit with oil, Bay State would be required to pay MMWEC an amount for the lost electric production of the intermediate unit, subject to the conditions of the Bay State Contract (Exh. MMWEC-GEL at 9 and Att. GEL-1, at 14-15).

[8] MMWEC may terminate the Bay State Contract upon 36 months prior written notice to Bay State (Exh. MMWEC-GEL, Att. 1, 11). To exercise its right of termination, MMWEC would be required to make an early termination payment to Bay State equal to 50% of the present value of monthly demand charges which would have been payable over the term of the Contract remaining after the effective termination date (id.).

WMECO's final determination of the location of the pipeline for Phase I,[9] WMECO shall grant to MMWEC a permanent easement of 20 feet, more or less, within certain portions of WMECO's ROW (Exh. RR-HO-MM-28). The WMECO Agreement also states that WMECO shall grant MMWEC a temporary easement of sufficient width for construction purposes along certain portions of WMECO's ROW and permanent and temporary easements over lands owned by WMECO which lie outside of the ROW and which have been identified as necessary for the alignment of Phase I of the pipeline (id.). The WMECO Agreement states that, upon approval by the Siting Board of the proposed project or any part thereof, MMWEC shall pay to WMECO $250,000 for consideration of the Agreement (id.). MMWEC further explained that, if Phase II is constructed, the value of the easements, licences or other rights necessary to construct, operate and maintain Phase II within WMECO's ROW would be based on the fair market value of WMECO's ROW at the time Phase II is constructed (id.; Tr. 9, at 1275-1276).

C. Jurisdiction and Scope of Review

The Company filed its petition to construct a natural gas pipeline in accordance with G.L. c. 164, § 69H, which requires the Siting Board to implement the energy policies in its statute to provide a necessary[10] energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost, and pursuant to G.L. c. 164, § 69J, which requires a project applicant to obtain Siting Board approval for the construction of proposed energy facilities before a construction permit

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9 MMWEC stated that the final plan of the alignment for Phase I has not been completed but that in its estimation, MMWEC has reached actual agreement with WMECO for more than 95% of the length of Phase I of the pipeline (Tr. 9, at 1277).

10 The Electric Restructuring Act, Chapter 164 of the Acts of 1997 ("Act") included a number of substantive revisions to the Siting Board's enabling statute, G.L. c. 164 §§ 69G-69Q. One such revision is the amendment of G.L. c. 164, § 69H to replace "necessary" with "reliable." MMWEC filed its petition on November 4, 1997, before the effective date of the Act's revisions to the statute. The Siting Board accordingly reviews the Company's petition under the provisions of the statute that were in effect at the time the petition was filed.

may be issued by another state agency.

As a new pipeline over one mile in length intended for the transmission of natural gas, the Company's proposed project falls within the definition of "facility" set forth in G.L. c. 164, § 69G, which provides that a "facility" includes:

> any new pipeline for the transmission of gas having a normal operating pressure in excess of one hundred pounds per square inch gauge which is greater than one mile in length except restructuring, rebuilding, or relaying of existing transmission lines of the same capacity.

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

D. Procedural History

1. MMWEC's Petition to Construct

MMWEC filed with the Siting Board its original petition to construct the proposed project on November 4, 1997. On December 22, 1997, the Town of Wilbraham ("Wilbraham") filed a motion to dismiss MMWEC's petition, on the ground that MMWEC lacked the statutory authority to construct or own the proposed pipeline. Wilbraham's motion to dismiss was denied.[11]

The Siting Board conducted three public hearings regarding the proposed project. Public hearings were held in Hampden, Massachusetts, on February 4, 1998; in Wilbraham, Massachusetts,

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[11] MMWEC, EFSB 97-4, Hearing Officer Ruling on Motion to Dismiss (March 16, 2000).

on February 9, 1998; and in Ludlow, Massachusetts, on February 10, 1998. The Company's Notice of Public Hearing and Adjudication ("Notice") provided a description of the proposed project along each of the three alternative route corridors identified in the petition.[12]

Seven petitions to intervene and four petitions to participate as an interested person were filed. Petitions to intervene were filed by the Towns of Wilbraham, Ludlow ("Ludlow"), and Hampden ("Hampden"); Reading Municipal Light Department ("RMLD"); WMECO; Pipeline Action Committee ("PAC"); and Bay State. Petitions to participate as an interested person were filed by Anthony M. Molé, the Chicopee River Watershed Council, Stephen J. Rourke, and U.S. Generating Company. In a Procedural Order issued on May 15, 1998, the Hearing Officer granted intervenor status to Wilbraham, Ludlow, Hampden, WMECO, RMLD, and PAC. Bay State was granted status as an interested person with expanded rights. The Hearing Officer granted interested person status to each of the four petitioners seeking that status.

On February 2, 2000, Bay State filed a petition for full intervenor status based on MMWEC's request that the Siting Board consider a phased project involving interconnection with Bay State's Monson-Palmer line (Bay State Petition at 2-3). On March 2, 2000, the Hearing Officer issued a ruling granting Bay State's petition.

In the period between August 9, 2000, and August 18, 2000, the West Boylston Municipal Lighting Plant, Georgetown Municipal Light Department, Middleborough Gas and Electric Light Department and Littleton Electric Light Department each filed a petition to intervene out of time. On September 26, 2000, the Hearing Officer issued a ruling denying the petitions.

On May 24, 2000, Wilbraham filed a motion for partial summary judgment to dismiss that portion of MMWEC's petition which requests approval of Phase II of the proposed project. On July 14, 2000, RMLD filed a motion to dismiss with respect to Phase II of the proposed project. In a Hearing Officer ruling issued on November 10, 2000, both motions were denied.

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[12] The Notice was sent to property owners along the originally proposed 14.7-mile project, which encompassed all property owners along the 5.6-mile project alternative. See Procedural Conference Tr., March 30, 2000, at 12-20. The Notice did not reference the 3-mile alternative.

2. Development of Project Phasing and the 5.6-Mile Alternative

On July 10, 1998, RMLD filed a motion seeking suspension of the proceeding based on its contention that MMWEC was negotiating with Bay State regarding a new project alternative: the transportation of gas to Stony Brook via an approximately 5.6-mile pipeline that would interconnect Stony Brook with Bay State's Monson-Palmer line in Ludlow.[13] In a Procedural Order issued on July 22, 1998, the Hearing Officer denied RMLD's motion to suspend the proceeding, but found it "undisputed" that MMWEC was in negotiations with Bay State regarding a 5.6-mile pipeline, and that "MMWEC has indicated that this . . . pipeline may be the first phase of a two-phased approach to the construction of its proposed project." [14] The Hearing Officer ordered MMWEC to submit, no later than July 31, 1998, additional information regarding the potential phasing of the proposed project. Id. On July 31, 1998, the Company filed the affidavit of Christopher P. Fleming, General Manager of MMWEC, in which Mr. Fleming acknowledged discussions between MMWEC and Bay State regarding the possible construction of a 5.6-mile pipeline between Stony Brook and the Bay State Monson-Palmer line as an alternative to MMWEC's proposed project (Exh. MMWEC-2).

A procedural conference was held on August 31, 1998 and parties were given the opportunity to brief the question of the Siting Board's authority to allow phased construction of the proposed project.[15] At that time, the procedural schedule was suspended pending the submission of briefs.[16] The Hearing Officer subsequently determined that the Siting Board could approve phased construction of the proposed project, and that the Siting Board could approve the 5.6-mile/Phase I alternative.[17] Thereafter, on, January 7, 2000, the procedural schedule was further suspended pending the

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13 MMWEC, EFSB 97-4, Motion of Reading Municipal Light Department for Suspension of the Procedural Schedule (July 10, 1998).

14 MMWEC, EFSB 97-4, Hearing Officer Procedural Order (July 22, 1998).

15 MMWEC, EFSB 97-4, Hearing Officer Memorandum (October 2, 1998).

16 MMWEC, EFSB 97-4,, Procedural Conference Tr., at 60 (August 31, 1998).

17 MMWEC, EFSB 97-4, Hearing Officer Ruling Regarding the Issue of Phased Construction (January 7, 1999).

submission of certain information by MMWEC.[18]

In a filing on February 11, 1999, MMWEC confirmed to the Siting Board that, in addition to the project as originally proposed, the Company was proposing construction of the project in two phases. In addition, MMWEC confirmed that it was proposing the 5.6-mile pipeline as a new project alternative.[19]

On January 20, 2000, MMWEC informed the Siting Board that it had executed a contract with Bay State for firm gas transportation service for Phase I of the phased project (Exhs. MMWEC-JOR-S at 2; MMWEC-GEL at 4). In August 2000, MMWEC informed the Siting Board that it had executed an agreement the WMECO Agreement, which provided the Company with property rights necessary to construct portions of the proposed project in WMECO's ROW (Exh. RR-HO-MM-28, App. 1).

3. Discovery and Witnesses

Discovery by the Siting Board and the parties commenced in July 1998. Siting Board Staff, RMLD, Wilbraham, WMECO, PAC, and MMWEC each issued several rounds of information requests. Discovery concluded in December 2000.

On August 17, 1998, MMWEC submitted to the Siting Board the prefiled direct testimony of eight witnesses: Joseph O. Roy and Alan Menard, MMWEC's Manager of Operating Projects and Engineering Services Manager, respectively; A. Bruce Murray, an independent Consulting Engineer; John J. Boudreau, MMWEC's Senior Project Manager for Strategic Planning; Linda M. Benson, Project Manager at Environmental Science Services, Inc., an environmental and engineering consulting firm; Roger W. Flood, Manager of Pipeline Services for Stone and Webster Engineering Corporation; John K. Downing, Senior Environmental Analyst for the Stone and Webster Environmental Sciences

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18 MMWEC, EFSB 97-4, Hearing Officer Procedural Order (January 7, 1999)

19 MMWEC, EFSB 97-4, Filing of the Massachusetts Municipal Wholesale Electric Company in Response to Hearing Officer Ruling (February 11, 1999).

and Technology Division;[20] and William H. Dunn, Jr., Vice President and Consultant with the management consulting firm of Barker, Dunn and Rossi, Inc.

On January 20, 2000, the Company filed the direct testimony of George E. Leary, MMWEC General Manager, and Laurel J. Carlson, Senior Project Manager at Environmental Science Services, Inc.,[21] as well as the supplemental direct testimony of Joseph O. Roy and the supplemental direct testimony of John J. Boudreau. On October 20, 2000, MMWEC filed the second supplemental direct testimony of John J. Boudreau.

On June 9, 2000, PAC filed the direct testimony of Jean Porwoll, M.D., Monson Conservation Commissioner and a member of PAC, and Alan J. Fritts, Engineer and Management Consultant, also a member of PAC. On September 11, 2000, PAC filed the supplemental and revised prefiled testimony of Alan J. Fritts.

On June 9, 2000, Wilbraham filed the direct testimony of Paul L. Chernick, Utility Consultant and President of Resource Insight, Inc. WMECO filed the direct testimony of Michael T. Smith, Director of Energy Delivery for WMECO.[22]

On June 19, 2000, RMLD filed the direct testimony of Susan F. Tierney, Ph.D., Senior Vice President at Lexicon, Inc., and Mayhew Seavey, Jr., Principal of Power Line Models, Inc. On September 19, 2000, RMLD filed the supplemental direct testimony of Susan F. Tierney and Mayhew Seavey, Jr.

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20 Stone and Webster is the primary environmental and engineering consultant for MMWEC's proposed project.

21 On July 10, 2000, MMWEC requested the substitution of Laurel Carlson for Linda Benson. MMWEC's request was granted. Thus, Linda Benson did not appear at hearings but her direct prefiled testimony was adopted, with minor modifications, by Laurel Carlson, who did appear and testify at hearings (Exh. MMWEC-LJC at 5).

22 On August 10, 2000, WMECO moved to withdraw the prefiled testimony of Michael Smith. The motion was denied. MMWEC, EFSB 97-4, Hearing Officer Ruling on WMECO Notice of Withdrawal (September 7, 2000).

4. Hearing and Post-Hearing

Adjudicatory hearings commenced on July 17, 2000, and closed on November 21, 2000. In addition to testimony from witnesses who submitted prefiled direct testimony, MMWEC also offered the testimony of Michael DiMauro, Environmental Engineer for MMWEC, who testified as to air impacts. Bay State presented the testimony of Paul LaShoto, Director of Engineering Construction for Bay State; Francis Chico DaFonte, Director of Gas Control and Gas Supply for Bay State; and Joseph Ferro, Director of Revenue Development for Bay State, each of whom testified as to need issues.

On December 11, 2000, the final exhibit list was issued. The record includes over 2100 exhibits consisting primarily of information request responses and record request responses. On December 15, 2000, MMWEC, Wilbraham, Bay State, and RMLD each filed an Initial Brief. On December 19, 2000, PAC filed an Initial Brief. On January 8, 2001, MMWEC, Bay State, PAC and RMLD each filed a Reply Brief.

II. ANALYSIS OF THE PROPOSED PROJECT

A. Need

1. Standard of Review

In accordance with G.L. c. 164, § 69J, the Siting Board is charged with the responsibility for implementing the energy policies in its statute to provide a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. In carrying out its statutory mandates with respect to the construction of energy facilities such as MMWEC's proposed natural gas pipeline, the Siting Board first evaluates whether there is a need for additional energy resources[23] to meet reliability, economic efficiency, or environmental objectives. The Siting Board must find that additional energy resources are needed as a prerequisite to approving a proposed energy facility. Berkshire Gas Company, 9 DOMSB 1, 12 (1999) ("Berkshire Gas Decision"); New England

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[23] In this Decision, the term "additional energy resources" is used generically to encompass both supply and capacity additions including, but not limited to, new or expanded gas pipelines, new or expanded gas storage facilities, new gas supply or transportation contracts, and savings associated with conservation and load management.

Power Company, 7 DOMSB 333, 344 (1998) ("1998 NEPCO Decision"); Massachusetts Electric Company, 18 DOMSC 383, 393 (1989) ("MassElectric Decision").

2. Description of the Existing System

Stony Brook is located in Ludlow, east of the Westover Air Reserve Base (Exh. EFSB-3, at Fig. 1). The Stony Brook facility is comprised of two units located on one site: an intermediate unit which can operate on either natural gas or No. 2 fuel oil, and a peaking unit which operates only on No. 2 fuel oil (id. at 15; Exh. MMWEC-JOR/ARM at 7-8). The two units have a total generating capacity of 522 megawatts ("MW") (Exhs. MMWEC-JOR/ARM at 7-8; EFSB-3, at 15; Tr. 7, at 786). The intermediate unit, which began operating in 1981,[24] consists of three identically rated dual-fuel combined cycle combustion turbines, each with a HRSG, with a total capacity of 352 MW (Exhs. MMWEC-JOR/ARM at 8; MMWEC-ABM at 4; Tr. 7, at 786). MMWEC stated that it is in the process of upgrading the intermediate unit's three turbines; it expects to realize a 3 to 5% increase in net output following these upgrades (Tr. 9, at 1358).

MMWEC provided information on the annual hours of operation of the intermediate unit in recent years, including the time operated on gas and on oil (see Tables 1A-1C). MMWEC indicated that it ran all three of the intermediate unit turbines on gas simultaneously for 74 days in 1997, 115 days in 1998, 128 days in 1999 and 64 days between January through July of 2000 (Exh. RR-TW-MM-2). MMWEC noted that turbine 1B has been converted to use a dry-low nitrogen oxide ("NO_X") control system, and that the Company therefore tends to use turbine 1B more frequently during the ozone season so that it does not exceed the intermediate unit's NO_X cap (Exh. HO-N-64; Tr. 7, at 792).

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[24] The intermediate unit began as an oil-only unit; the three turbines were converted to dual-fuel capability in 1982 and 1986 (Exh. HO-G-5).

TABLE 1A
ANNUAL HOURS OF OPERATION FOR THE INTERMEDIATE UNIT

	Turbine 1A	Turbine 1B	Turbine 1C
1996	1387	1948	1201
1997	2667	3641	2227
1998	3026	3784	2715
1999	2872	3186	2400

TABLE 1B
INTERMEDIATE UNIT HOURS OF OPERATION ON GAS

	Turbine 1A	Turbine 1B	Turbine 1C
1996 [a]	955	1490	706
1997 [a]	2164	3420	1627
1998 [a]	2162	3574	1839
1999 [b]	2145	2983	1416

TABLE 1C
INTERMEDIATE UNIT HOURS OF OPERATION ON OIL

	Turbine 1A	Turbine 1B	Turbine 1C
1996	432	458	495
1997	503	221	600
1998	864	210	876
1999 [b]	727	202	984

Sources: Exhs. HO-N-52; RR-HO-MM-30

a. Calculated by subtraction of hours on oil from total hours of operation (from Tables 1C, 1A).

b. Calculated from total hours of operation and percentage of operating time on gas (Exh. HO-N-52 Att. 1).

MMWEC presently has the ability to supply the three turbines with oil 365 days per year (Tr. 7, at 797; Tr. 9, at 1217; Company Initial Brief at 30). The Company indicated that the Stony Brook intermediate unit is able to operate throughout its design capabilities while burning on oil under all

operating conditions (Exh. TW-132).

MMWEC explained that the intermediate unit currently receives gas through a 12-inch, 275 psig distribution line ("275 psig line") owned and operated by Bay State (Exh. MMWEC-ABM at 4).[25] The 275 psig line is approximately 19 miles long and begins at the East Longmeadow gate station where it connects to the Tennessee pipeline (id.).[26] The series of mains that comprise the 275 psig line were installed from 1963 through 1972 (Exh. PAC-A-9 (November 3, 1984 letter)). MMWEC initially stated that the maximum capacity of this line under steady state conditions is approximately 1800 to 1900 mcf/hr, an amount sufficient to fuel approximately 1.8 to 1.9 of the three intermediate unit turbines (Exhs. MMWEC-JOR/ARM at 18; EFSB-3, at 30, 31). However, the Company later asserted that it currently receives a maximum of 1700 mcf/hr on the 275 psig line (Exhs. MMWEC-JJB-S-2, at 6; Tr. 8, 1073).

MMWEC receives its gas from Bay State as an interruptible transportation ("IT") customer (Exh. MMWEC-JOR/ARM at 17; Tr. 15, at 2272). MMWEC has been an IT customer since 1981, and is the sole interruptible customer served off of the 275 psig line (Exhs. MMWEC-ABM-5, at 18; HO-BSG-4; RR-PAC-BSG-3).[27] Bay State indicated that it is currently unable to provide MMWEC with firm 365-day service off the 275 psig line at the minimum pressure that MMWEC states is necessary to operate one turbine throughout the winter season (Exh. HO-BSG-4). Specifically, Bay State asserted that it cannot supply MMWEC with service off the 275 psig line on days colder than a

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25 MMWEC receives gas from the 275 psig line at a pressure of approximately 110 psig and uses its compressors to increase the pressure to the level required to fire the intermediate units (Exhs. EFSB-3, at 31; MMWEC-JOR/ARM at 21; Tr. 8, at 1071).

26 MMWEC indicated that Bay State operates a liquified natural gas ("LNG") plant in Ludlow, approximately 12 miles from the gate station, where the gas flowing to Stony Brook passes through the LNG plant yard (Exh. MMWEC-ABM-5). Bay State reported that the only time that liquification of natural gas would occur is in the non-heating months, and that the most recent time period in which it liquified natural gas at the Ludlow facility was June through August of 1996 (Exh. HO-BSG-3).

27 The current IT agreement has been in place since July 1, 1997 and it continues on an annual basis unless terminated by either party providing ninety-days written notice (Exh. HO-BSG-6).

40 EDD, which typically occurs from December 1 through March 15, due to the demand of Bay State's existing firm customers (Exhs. HO-BSG-8; RR-PAC-BSG-6).[28]

MMWEC stated that, to allow the intermediate units to operate properly, gas pressure should be controlled at 310 psig in the gas supply header immediately upstream of the gas turbines (Exh. RMLD-2-41). The Company explained that there is a 25 psig pressure drop between the existing gas compressor house and the pressure control point, and a 25 psig pressure drop across the regulating control valve (Exh. HO-N-4). MMWEC noted that a pressure drop is based on physical piping conditions such as length, internal diameter, valves, fittings, and flow path changes (id.). The Stony Brook system currently has three gas compressors, two of which operate at any one time (Exhs. HO-A-11; MMWEC-JOR/ARM at 21). MMWEC reported that outage time due to compressor problems was limited to a total of 39 minutes in the five-year period of 1991 to 1996 (Exhs. MMWEC-JOR/ARM at 21; EFSB-3, at 34).

The Monson-Palmer line, which is the proposed supply for Phase I, is an 18.7 mile 16-inch distribution lateral owned by Bay State, with a maximum operating pressure of 500 psig, which runs from the Tennessee gate station in Monson to the 264 MW MassPower generating facility ("MassPower") in Springfield (Exhs. EFSB-3, at 32; MMWEC-JOR/ARM at 22). The Company stated that the Monson-Palmer line presently supplies MassPower with 2250 mcf/hr of gas and that 400 mcf/hr is dedicated to the local distribution system in the towns of Monson and Palmer, of which up to 250 mcf is currently taken (Exhs. HO-A-8; RR-PAC-BSG-7; Tr. 9, at 1329-1333).

3. Economic Need

a. Basis for Economic Need

MMWEC asserted that the proposed project would provide a necessary energy supply in that it would provide economic efficiency benefits for Stony Brook, the Commonwealth, and the New

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[28] Bay State noted that it expects that its annual firm growth will lower the level of degree days at which interruptions must occur (Tr. 21, at 3205-3207).

England region (Company Reply Brief at 24).[29] Specifically, MMWEC argued that construction of the proposed project would result in significant savings for the Project Participants and the Joint Owners of the intermediate unit over a wide range of reasonable assumptions (Exhs. MMWEC-JJB at 6; MMWEC-JJB-S at 3; MMWEC-JJB-S-2, at 9; Company Reply Brief at 24).

MMWEC and RMLD each performed extensive modeling of the economic benefits of the proposed project under a variety of economic scenarios. MMWEC's modeling is described in Section II.A.3.b, below. RMLD's modeling is described in Section II.A.3.c, below. The parties' positions with respect to specific modeling assumptions are discussed in Section II.A.3.d, below.

b. MMWEC's Modeling

MMWEC asserted that the net economic benefit of the proposed project should be defined as the increase in the energy value[30] of Stony Brook resulting from the construction of a new pipeline, less the cost of constructing, owning and operating the new pipeline (Exh. MMWEC-JJB at 8). The Company stated that it calculated the economic benefits of the proposed project by modeling the increase in the energy value of the Stony Brook intermediate unit resulting from the construction of the proposed pipeline (id.).

The Company developed costs for the proposed project based on estimates prepared by Stone and Webster (Exh. HO-N-53; Tr. 23, at 3474). The capital cost estimates included direct construction costs, legal costs, MMWEC costs, and other costs, as well as an allowance for escalation, interest during construction, and credit for the sale of compressors (Exhs. HO-N-53, Att. 2; MMWEC-JJB at 36). The direct construction costs consisted of costs for land, pipeline materials,

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29 The Company also asserted that its economic analyses demonstrate that construction of the proposed project would increase competition in the electric energy market in New England by creating downward pressure on electric energy prices in the region (Exhs. MMWEC-JJB at 6; MMWEC-JJB-S at 3).

30 MMWEC defined the energy value of Stony Brook as the competitive market value of the energy produced, less the short-run marginal cost of operating the unit (Exh. MMWEC-JJB at 8).

pipeline installation, major facilities, permitting, engineering procurement, and contingency (Exh. HO-N-37). MMWEC provided capital cost estimates of $28.458 million for the proposed project and $17.269 million for Phase I, assuming an on-line date of January 2002 (Exh. HO-N-53, Att. 2). The Company noted that the cost figures for the proposed project assume the 14.7-mile line is constructed as a single line, rather than in phases (Tr. 10, at 1399; Tr. 13, at 1927).

To analyze economic benefits, the Company stated that it used a deterministic model developed by Edward Bodmer of the Energy Exchange of Chicago to simulate the bid-based dispatch of the New England Power Pool ("NEPOOL") system (Exhs. MMWEC-JJB-15; HO-N-70-R; Tr. 23, at 3422). MMWEC stated that the model is based on a chronological hourly evaluation of the demand for and supply of electricity (Exh. MMWEC-JJB at 16). Key demand and supply assumptions used by the dispatch model included: (1) the projected load and load shape for the NEPOOL region; (2) the existing generation capacity available to the NEPOOL region, including imports from neighboring regions; (3) new capacity additions for the region and the operating characteristics of such additions; and (4) the heat rates and projected fuel and variable operation and maintenance expenses of existing thermal units (Exh. MMWEC-JJB at 18).

Key modeling assumptions related to the Stony Brook intermediate unit included: (1) the limitations on Bay State's ability to deliver gas to Stony Brook via the existing 275 psig line and via the proposed pipeline; (2) the price of natural gas and distillate fuel oil delivered to Stony Brook; and (3) Stony Brook's heat rate, including any effects resulting from increased firing on natural gas and changes in the existing gas supply system (id. at 18-19). Throughout its modeling, the Company assumed that natural gas would not be available to Stony Brook during the months of December and January (Exhs. HO-A-46; MMWEC-JJB-S at 9; HO-N-46). MMWEC asserted that this assumption is conservative, since the Company recently has been able to purchase gas in those two months; consequently, the Company argued that its modeling likely understates the economic value of the proposed project (Exhs. HO-N-46; PAC-00N-21; Tr. 8, at 996-997).

MMWEC provided two primary economic analyses based on demand and supply projections taken from NEPOOL's 2000 Capacity, Energy, Loads & Transmission ("CELT") Report (Exhs. HO-

N-53; HO-N-53R; MMWEC-JJB; MMWEC-JJB-S; MMWEC-JJB-S-2).[31] MMWEC's initial analysis ("Low Generation/HQ Firm case") assumed: (1) peak energy demand as forecasted in the 2000 CELT Report reference case; (2) existing generation resources as reflected in the 2000 CELT Report; (3) the addition of approximately 6250 MW of new generation by the year 2003; (4) dispatch of Hydro-Québec under a must-take contract[32] that is dispatched before the Stony Brook intermediate unit on gas, resulting in the importation of 9 terawatt-hours of energy annually; (5) fossil fuel costs based on projections in the Energy Information Administration's ("EIA") Annual Energy Outlook 2000;[33] and (6) a commercial operation date of January 2002 for the proposed project (Exhs. HO-N-53-R; MMWEC-JJB-S-2, at 11; Tr. 23, at 3376). Generic future capacity additions were assumed to be 80% gas-fired combined cycle units and 20% simple cycle combustion units (Exh. MMWEC-JJB at 22). MMWEC's modeling showed that, under these assumptions, the net present value ("NPV") savings of the proposed project to the Project Participants and Joint Owners in the intermediate unit for the 2002 to 2021 period would be approximately $20.8 million, while the NPV savings of Phase I would be $22.5 million (Exh. HO-N-53-R Att. 1).

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31 MMWEC earlier provided analyses based on the 1996 and 1998 CELT Reports (Exhs. MMWEC-JJB-S-2, at 3; HO-N-9; HO-N-37).

32 The Hydro-Québec Phase II Firm Energy Contract ("Hydro-Québec Contract"), which expires in 2001, provides for Hydro-Québec to supply energy to a group of utilities known as the New England Utilities, most but not all of which are NEPOOL members (Exh. MMWEC-JJB-S-2, at 7; Tr. 24, at 3497-3498). MMWEC explained that the present contract is a firm energy contract where Hydro-Québec agreed to provide 7 terawatt-hours of energy per year, with an extension provision which resulted in a 9 terawatt-hour delivery rate the last year (Tr. 24, at 3498). MMWEC noted that extension Hydro-Québec of the Hydro-Québec Contract is not reflected in the 2000 CELT Report (Exh. PAC-00N-58).

33 MMWEC explained that, for both cases, it calculated the starting gas prices for the existing units in the dispatch analysis by reviewing spot gas price purchases for 1997 as the base year, when they were available, and then applied the escalation rates reflected in the EIA forecast (Tr. 23, at 3358). Specifically, for all fuels, the Company stated that the start prices for identified units were based on what was actually paid and reported to the EIA, and for units where the prices could not be identified, the cost was based on the Brayton 4 unit in Somerset (id. at 3362).

MMWEC's other primary analysis, its preferred analysis ("High Generation/HQ Dispatch case"), relied on the same forecasts of peak energy demand and fuel prices, and the same assessment of existing generation. It differed from the Low Generation/HQ Firm case in the following respects: (1) it assumed the addition of 10,071 MW, rather than 6250 MW, of new generation by the year 2003;[34] (2) it modeled Hydro-Québec as dispatched on a bid basis at approximately $28 per MW-hr, after Stony Brook on gas, resulting in the importation of an average of 3.2 terawatt-hours of energy annually;[35] and (3) it reduced the assumed current deliverability of gas to Stony Brook on the 275 psig line from the equivalent of 1.9 turbines to 1.7 turbines (Exhs. N-53-R; MMWEC-JJB-S-2, at 6). MMWEC's modeling showed that, for this case, the NPV savings of the proposed project to the Project Participants and Joint Owners for the 2002 to 2021 period would be approximately $16.5 million, and the NPV savings of Phase I would be approximately $18.4 million (Exh. MMWEC-JJB-S-2, at 9 and Att. JJB-4-S(2)).

At RMLD's request, MMWEC also modeled a variation on the High Generation/HQ Dispatch case which assumed that the dispatch of Hydro-Québec would remain unchanged ("High

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34 Unit additions consisted of generating units not listed as available in the 2000 CELT Report, but beleived to be either "In Commercial Operation" or "Under Construction"(Exh. MMWEC-JJB-S-2 Att. JJB-1-S(2)). Units in the first category consisted of (based on winter capacity): (1) Duke Bridgeport - 520 MW; (2) Andoscroggin - 109.2 MW; (3) EMI Dighton - 181.81 MW; (4) Maine Independence - 490 MW; (5) Berkshire Power - 264.7 MW; (6) Tiverton - 285.8 MW. Units in the second category included: (1) Millennium - 400 MW; (2) Rumford Power - 257.2 MW; (3) Bucksport Power - 174 MW; (4) ANP Blackstone - 580 MW; (5) Devon (Milford) - 580 MW; (6) Westbrook Power - 520 MW; (7) Lake Road - 810 MW; (8) ANP Bellingham - 580 MW; (9) Mystic - 1550 MW; (10) Edgar - 775 MW; (11) AES Londonderry - 742 MW; (12) Con Ed Newington - 525 MW; (13) Wallingford - 250 MW; and (14) generic contingent resource - 477 MW (id.).

35 MMWEC's witness, Mr. Boudreau, argued that the modeled reduction in energy imports from Hydro-Québec comports with Hydro-Québec's intentions to reduce its exports to the United States by two-thirds, based in part on the growing load in Quebec (Exh. PAC-00N-59, Att. 3; Tr. 23, at 3367, 3379; Tr. 24 at 3506). MMWEC also argued that future imports from Hydro-Québec would decline as a result of the excess capacity resulting from an assumed addition of approximately 10,000 MW of new generating capacity in the region (Exh. MMWEC-JJB-S-2, at 7).

Generation/HQ Firm Case"). In this case, the NPV savings of the proposed project to the Project Participants and Joint Owners for the 2002 to 2021 period would be approximately negative $1.6 million, and the NPV savings of Phase I would be approximately $1.2 million (Exh. RMLD-7-14-A; Tr. 23, at 3373).

Finally, MMWEC provided a sensitivity analysis based on the High Generation/HQ Dispatch Case which assumed that additional combined cycle capacity with a winter rating of 1000 MW would be added on July 1, 2004, and that a further 1000 MW of combined cycle capacity would be added on January 1, 2005 ("+ 2000 MW Case") (Exh. MMWEC-JJB-S-2, at 11). MMWEC's modeling showed that, in this case, the NPV savings of the proposed project to the Project Participants and Joint Owners for the 2002 to 2021 period would be approximately $2.5 million, and the NPV savings of Phase I would be $5.1 million (id., at 9 and Att. JJB-4-S(2)).

TABLE 2
CASE SPECIFIC NPV OF THE SAVINGS (in millions $)

CASES	14.7-Mile	PHASE I
CELT 2000 (High Generation/HQ Dispatch Case)	$16.481	$18.419
CELT 2000 (Low Generation/HQ Firm Case)	$20.797	$22.532
CELT 2000 (High Generation/HQ Firm)	($1.6)	$1.2
CELT 2000 (High Generation/HQ Dispatch Case + 2000 MW)	$2.512	$5.123

Sources: Exhs. HO-N-53R; MMWEC-JJB-S-2; HO-A-47-S(2); HO-N-73; HO-N-73R; RMLD-7-14-A.

MMWEC ran 20 additional cases testing the sensitivity of its High Generation/HQ Dispatch case and Low Generation/HQ Firm case to assumptions regarding reserve levels, fuel prices, load forecasts, gas availability, and similar issues (Exh. MMWEC-JJB-S-2, at 11-14).[36] The modeled NPV

[36] In addition to the High Generation/HQ Dispatch Case and the +2000 MW case discussed (continued...)

savings of the proposed project ranged from negative $17.2 million to positive $27.04 million under the various scenarios; the modeled NPV savings of Phase I of the proposed project ranged from negative $13.67 million to positive $28.58 million (Exh. MMWEC-JJB-S-2, Att. JJB-4-S(2)). The only sensitivity case to yield a negative NPV savings was the low load case; the highest modeled NPV savings resulted from the low reserve case (Exh. MMWEC-JJB-S-2, Att. JJB-4-S(2). MMWEC also modeled the termination by MMWEC of the Bay State Contract at the end of the 60th month of

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[36] (...continued)
above, the Company analyzed the following sensitivity cases: (1) low reserves - assumes installed reserve levels fall to 6% by the year 2017; (2) high reserves - assumes new capacity is built to maintain a reserve level of 20%; (3) high gas prices - assumes gas prices are 10% higher than the reference case for all NEPOOL units; (4) low gas prices - assumes gas prices are 10% lower than the reference case for all NEPOOL units; (5) high supply - gas is assumed to be available to the Stony Brook units during the months of December and January; (6) high load - uses high case load forecast from the 2000 CELT Report; (7) low load - uses low case load forecast from the 2000 CELT Report; (8) high oil and gas prices - the price of gas is assumed to be 46% higher, the price of No. 2 oil is assumed to be 42% higher, and the price of No. 6 oil is assumed to be 34% higher than under the reference case, based on the increase in the cost of fuel from the 1996 to 2000 EIA; (9) increased exports - assumes the sale of 500 MW of firm capacity at 100% load factor for the period January 1, 2002 to December 31, 2010; (10) base unit retirements - coal plants totaling approximately 529 MW are retired; (11) reduced IT supply - assumes that by January 1, 2005, the ability of Bay State Gas to deliver gas over 275 psig line will restrict Stony Brook to one turbine for the months of April through October with no gas for the remaining months; and (12) new combined cycle delay - assumes generation additions categorized as "under construction" are delayed by one year (Exh. MMWEC-JJB-S-2 at 11-14).

MMWEC ran the following eight sensitivity analyses for the Low Generation/HQ Firm case: (1) + 4000 - assumes 4000 MW of new combined-cycle capacity to come on-line in 1000 MW increments in January 2002, 2003, 2004 and 2005; (2) + 2000 - assumes 2000 MW of new combined-cycle capacity come on-line in 1000 MW increments in January 2002 and 2003; (3) low reserves - assumes reserve levels fall to 6%; (4) high gas prices - assumes gas prices are 10% higher than the reference case for all NEPOOL units; (5) low gas prices - assumes gas prices are 10% lower than the reference case for all NEPOOL units; (6) high supply - assumes gas is available for the months of December and January to fire two units under Phase I and the 3-mile alternative, and to fire all three units for the proposed project; (7) high load - uses the high case load forecast from the 2000 CELT Report; and (8) low load - uses the low case load forecast from the 2000 CELT Report (Exh. HO-N-53-R).

operation, resulting in an early termination payment of approximately $3.19 million to Bay State (Exhs. HO-N-57; PAC-00N-15). The Company's modeling indicated that these additional costs would reduce the NPV savings of the proposed project by approximately $6 million (Exhs. HO-N-53; HO-N-53R; HO-N-73; HO-N-73R).

c. RMLD's Modeling

RMLD stated that it used PROSYM, a competitive market simulation model developed by Henwood Energy Services, Inc., to project the operation of and market revenues from Stony Brook (Exh. RMLD-MDS at 6). RMLD asserted that the PROSYM model is well suited to this analysis because: (1) it performs a chronological simulation of the operation of the power system; (2) it uses a Monte Carlo simulation to model random forced outages of generators; and (3) it simulates a market where generators are dispatched based on the prices they bid rather than on the cost of generation (id. at 8). Witnesses for RMLD and MMWEC both acknowledged that MMWEC's deterministic model and RMLD's probabilistic model generally yield similar results, given similar assumptions (Tr. 22, at 3281-3282; Tr. 23, at 3422).

RMLD stated that its analysis of the proposed project, like MMWEC's, is based on modeling the net benefits to Stony Brook of adding a pipeline, and that many of its economic assumptions are identical to those used by MMWEC in its modeling (Exhs. RMLD-SFT at 28, 29; RMLD-MDS at 5). However, RMLD modeled different assumptions regarding: (1) the amount of new generating capacity being added to the New England market; and (2) the costs that MMWEC would incur in acquiring the ROW for the pipeline (Exhs. RMLD-SFT at 30; RMLD-MDS at 6).

RMLD developed two forecasts of capacity additions, which it termed the Low and Intermediate Capacity cases (Exhs. RMLD-SFT at 30-3; RMLD-MDS-S at Att. MDS-2-R; MM-RMLD-2-2(b)). The Low Capacity case assumed that all new generation that was either currently operational or under construction at the time RMLD conducted its analysis would come into

commercial operation, resulting in the addition of 9340 MW of new generation by the end of 2002.[37] The Intermediate Capacity case assumed that, in addition to the units identified in the Low Capacity case, three additional units deemed to be close to construction also would come into commercial operation, resulting in the addition of 11,115 MW of new generation (Exh. RMLD-MDS-S at Att. MDS-2-R).[38]

RMLD also developed two estimates of ROW acquisition costs (Exh. RMLD-SFT at 35, and Att. SFT-3R). The first estimate, which RMLD labeled "optimistic," was identical to the cost assumptions used by MMWEC in its modeling (Exh. RMLD-SFT at 35). The second estimate, which RMLD labeled "less optimistic," incorporated a higher estimate of the amount of ROW needed for the pipeline, based on a 40-foot width rather than a 20-foot width, and a higher land valuation, with the result that assumed ROW acquisition costs increased from $0.6 million to $1.5 million for Phase I, and from $2.0 million to $4.6 million for the proposed project (Exh. RMLD-SFT at 36-37). Table 3, below, sets forth the NPV savings of the proposed project for the four cases modeled by RMLD.

TABLE 3
RMLD CASES - NPV OF THE SAVINGS (in millions $)

CASES	**14.7-Mile**	**5.6-Mile**

[37] These units included: (1) Bridgeport Harbor (Duke) - 543.7 MW; (2) Andoscroggin - 109 MW; (3) EMI Dighton - 170 MW; (4) Maine Independence - 520 MW; (5) Berkshire Power -300 MW; (6); Millennium - 360 MW; and (7) Bucksport Energy - 175 MW, all currently operational; and (8) Tiverton - 284.4 MW (9) Rumford Power - 265 MW; (10) ANP Blackstone - 580 MW; (11) Devon (Milford) - 544 MW; (12) Westbrook Power - 528 MW; (13) Lake Road -792 MW; (14) ANP Bellingham - 580 MW; (15) Mystic - 1550 MW; (16) Edgar - 775 MW; (17) AES Londonderry - 720 MW; and (18) PDC Meriden - 544 MW, all under construction (Exh. RMLD-MDS-S at Att. MDS-2-R).

[38] The three additional units included: (1) Con Ed Newington - 525 MW; (2) ANP Gorham - 900 MW; and (3) Cabot Power - 350 MW (Exh. RMLD-MDS-S at Att. MDS-2-R).

1) Low Capacity/Optimistic ROW	$3.937	$6.673
2) Low Capacity/Less Optimistic ROW	$1.390	$5.861
3) Intermediate Capacity/Optimistic ROW	($5.284)	($2.062)
4) Intermediate Capacity/Less Optimistic ROW	($7.821)	($2.857)

Source: Exh. RR-MM-RMLD-2-2(b)

d. Positions of the Parties Regarding Modeling Assumptions

RMLD asserted that the assumptions underlying MMWEC's modeling are not reliable and that MMWEC's analyses therefore are flawed (RMLD Initial Brief at 32). RMLD focused its arguments on assumptions relating to six issues: (1) capacity additions; (2) fuel price forecasts; (3) the on-line date for the proposed project; (4) the current availability of natural gas over the 275 psig line; (5) capacity available from Hydro-Québec; and (6) reserve margins (id. at 33-60).

RMLD noted that the assumption that has the greatest impact on the NPV savings of the proposed project is the amount of new combined cycle capacity added to the existing generation mix in New England (Exh. MMWEC-JJB-S at 12-13; RMLD Initial Brief at 33). RMLD asserted that the most appropriate capacity scenario presented in this proceeding is its own Intermediate Capacity case, since this case is midway between MMWEC's base case and + 2000 MW case (RMLD Initial Brief at 36). In response, MMWEC argued that RMLD's estimates of new combined cycle capacity in New England have been neither consistent nor correct, and asserted that there is no credible record evidence that the Meriden, Cabot, and ANP Gorham plants are either under construction or close to construction (id. at 30-33). PAC noted that the economic value of MMWEC's project is very sensitive to the assumed amount of new combined cycle capacity additions, and argued that MMWEC has not included the full amount of new capacity additions forecasted in the 2000 CELT Report (Tr. 24, at 3496; PAC Initial Brief at 7). PAC calculated that 3646 MW of new capacity additions[39] that have received Siting Board or equivalent approvals were not included in MMWEC's analyses, and noted that MMWEC's own figures show that for every 1000 MW of new capacity that is assumed to

[39] PAC listed the following projects: ANP Gorham, Meriden, Cabot, Reliant Hope, Sithe West Medway, Towantic, and Brockton as approved new capacity additions (PAC Initial Petition at 7, citing Exh. RMLD 4-8, Att. 1).

be added, the modeled NPV savings of the proposed project is reduced by approximately $6.7 million (Exh. MMWEC-JJB-S-2; PAC Initial Brief at 7). PAC therefore asserted that approved capacity additions could wipe out the entire NPV savings of the proposed project (PAC Initial Brief at 7).

RMLD stated that the set of assumptions with the second largest impact on NPV savings are fuel price forecasts and the price differential between distillate oil, residual fuel oil and natural gas (Exh. MMWEC-JJB-S-2; Tr. 10, at 1428; RMLD Initial Brief at 40). RMLD argued that, in order for MMWEC's proposed facility to produce significant revenue increases, average fuel oil prices must be greater than natural gas prices (Tr. 22, at 3303; RMLD Initial Brief at 40). RMLD stated that the 1999 EIA Annual Energy Outlook fuel price forecast showed a smaller differential between oil and gas prices than the 1997 EIA forecast, and argued that current trends in oil and gas prices more closely resemble those in the 1999 EIA than those in the 2000 EIA forecast (Exh. MMWEC-JJB-S at 8-9; RMLD Initial Brief at 40-42). RMLD asserted that the NPV savings of the project would be further degraded should the spread between oil and natural gas prices decrease (RMLD Initial Brief at 40-42). In response, MMWEC noted that RMLD questioned the validity of MMWEC's fuel price assumptions for the first time in its brief, and argued that its fuel price forecasts were adopted by RMLD's own witnesses, and that the record does not support RMLD's fuel price arguments (Company Reply Brief at 51).

RMLD and PAC asserted that MMWEC's assumed project on-line date of January 1, 2002 is unattainable given the tasks that remain to be completed (RMLD Initial Brief at 43; PAC Initial Brief at 11).[40] RMLD noted that MMWEC's analyses indicate that a one-year delay in the Phase I on-line date would decrease the NPV savings of Phase I by $1.618 million (Exh. RMLD-7-14; RMLD Initial Brief at 45). In response, MMWEC argued that assertions that the Company cannot meet its on-line date of January 1, 2002 are not supported by record evidence (Company Reply Brief at 52).

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[40] RMLD listed the following tasks: complete the Final Environmental Impact Report ("FEIR"); obtain property rights for the non-WMECO portions of the ROW; obtain all necessary construction permits; carry out the necessary engineering analyses; obtain approval of the MMWEC Board of Directors; purchase the pipe, and construct the pipeline (RMLD Initial Brief at 43).

RMLD noted that MMWEC's High Generation/HQ Dispatch case assumes that the 275 psig line can provide sufficient gas to power only 1.7 of Stony Brook's three units, while earlier analyses assumed that the line could power 1.9 units (RMLD Initial Brief at 51). RMLD and PAC asserted that this change in assumptions, which increases the NPV savings of Phase I by $2.444 million, is unsupported by the record (id. at 54; PAC Initial Brief at 9-10). RMLD noted that while MMWEC assumes a gas requirement of 1050 mcf/hr as the full load operation of all three units, this volume of gas is based on a temperature of 13 degrees Fahrenheit ("F"), and would not be representative of the period of May through October for which the maximum delivery capability of the 275 psig line – whether 1.7 or 1.9 turbines – is assumed (RMLD Initial Brief at 54). In response, MMWEC noted that it consistently testified that the Company currently receives gas sufficient to power about 1.7 turbines over the existing 275 psig line (Company Reply Brief at 43-44). MMWEC further noted that, even if the figure of 1.9 turbines were used, the NPV savings of Phase I would be approximately $15.97 million under the High Generation/HQ Dispatch case (Exh. RMLD-7-14, Att. 2; Company Reply Brief at 46-47).

RMLD also challenged MMWEC's assumption, in the High Generation/HQ Dispatch Case, that the amount of energy exported by Hydro-Québec into New England would decline once the Hydro-Québec Contract expires in 2001 (RMLD Initial Brief at 46-47). RMLD also argued that the High Generation/HQ Dispatch case is flawed because MMWEC used a year 2000 starting fuel price for Hydro-Québec, while continuing to use a 1999 starting fuel price for all other units (Exh. JJB-S-2, Att. 4-S(2); RMLD Initial Brief at 46-47). RMLD asserted that when the starting fuel price for Hydro-Québec is adjusted to be the same as for Stony Brook and the other fossil fuel units, the NPV savings of the 5.6-mile pipeline falls from $18.419 million to $1.174 million (RMLD Initial Brief at 48). RMLD also asserted that MMWEC's assumption that Hydro-Québec will sell 70% less energy to New England for each of the next 20 years is speculative and inconsistent with the evidence in this proceeding (Exh. RMLD-7-5; RMLD Initial Brief at 48). PAC argued that the premise of including a 15% NEPOOL reserve capacity requirement needs to be changed if Hydro-Québec is not considered a must-take contract (PAC Initial Brief at 8).

In response, MMWEC noted that neither RMLD nor PAC disputes that the Hydro-Québec

Contract will expire in 2001 (Company Reply Brief at 38). MMWEC noted that when it ran its model using bid prices requested by RMLD, the results showed that Hydro-Québec exported significantly more energy to the United States than indicated in its strategic plan (id. at 39-40). MMWEC asserted that its modeling of imports from Hydro-Québec is consistent with the evidence on the record, including in particular the expiration of the Hydro-Québec Contract in 2002 and Hydro-Québec's stated intent to reduce exports by two-thirds in order to serve a growing load in the province of Quebec (id. at 42).

RMLD and PAC both argued that MMWEC's modeling understated the amount of new combined cycle capacity likely to be added within New England over time, since it allocates only 80% of new capacity to combined cycle units and allocates 20% to single-cycle combustion turbines (RMLD Initial Brief at 58; PAC Initial Brief at 9). RMLD argued that the 80/20 split is not justified in light of Mr. Seavey's Supplemental Testimony, which indicates that well over 90% of currently projected capacity additions are combined cycle units (id. at 59-60). RMLD asserted that assuming a higher percentage of combined cycle units would lower the modeled NPV savings for the project (id. at 60). In response, MMWEC asserted that the only evidence in this case addressing the likely mix of future capacity additions is MMWEC's economic analysis showing that an 80/20 split would result in an economic balance between future combined cycle units and peaking units (Company Reply Brief at 35). MMWEC argued that the current high penetration rate of new combined cycle units has saturated this sector of the market, and that peaking units will be needed to restore an optimum balance; therefore, MMWEC concluded that its projected 80/20 split for new generation may be conservative (Company Reply Brief at 37).

MMWEC argued that RMLD's less optimistic ROW cost estimates were developed before MMWEC reached an agreement with WMECO concerning the use of WMECO's ROW (Company Reply Brief at 47). MMWEC asserted that the assumptions that underlie the less optimistic ROW costs are now moot, given the agreement (id. at 48). MMWEC also argued that, even if RMLD's less optimistic ROW costs were used, the economics of the project would not change significantly (Company Reply Brief at 50).

MMWEC noted that its estimates of project costs included $5.775 million of project development costs spent between February 1996 and March 31, 2000 (Exh. MMWEC-JJB-S-2, at

8). MMWEC subsequently argued that these are sunk costs with respect to the Company, that they accordingly should be excluded from project costs for purposes of the economic analysis of the proposed project, and that only the project's going forward costs should be considered by the Siting Board (Exh. MMWEC-JJB-S-2, at 8; Tr. 23, at 3476). MMWEC asserted that the NPV savings of the proposed project would be $5.775 million higher if sunk costs were excluded from the economic analysis (Exh. MMWEC-JJB-S-2, at 8; Tr. 24, at 3646, 3652-3653). In response, RMLD's witness Ms. Tierney asserted that sunk costs must be included in calculating a project's economics, for both economic and public policy reasons (Tr. 20, at 3060). Ms. Tierney asserted that while costs may be sunk from an applicant's perspective, they still should be included when determining whether a particular project has economic benefits for the Commonwealth (id. at 3061). Ms. Tierney noted that the exclusion of sunk costs from the Siting Board's economic analysis of a project would not reflect the project's true cost, and could encourage applicants in future cases to shift the timing of project expenditures in an effort to improve the appearance of project economics (id. at 3059-3061). RMLD concluded that the Siting Board should consider the full costs and benefits of a proposed project (id. at 3061).

e. Analysis

In order to meet its statutory mandate, the Siting Board first evaluates whether there is a need for additional energy resources to meet reliability, economic efficiency or environmental objectives. The Siting Board must find that additional energy resources are needed as a prerequisite to approving a proposed energy facility. Berkshire Gas Decision, 9 DOMSB 1, 12.

MMWEC has asserted that the proposed project would provide both economic efficiency and environmental benefits by increasing the natural gas supply to Stony Brook. In the past, the Siting Board has determined that, in some instances, utilities need to add energy resources primarily for economic efficiency purposes. Specifically, in Massachusetts Electric Company, 13 DOMSC 119, 178-179, 183, 187, 246-247 (1985), and in Boston Gas Company, 11 DOMSC 159, 166-168 (1985), the Siting Board recognized the benefit of adding economic supplies to a specific utility system. The Siting Board also noted in Eastern Energy Corporation (Remand), 1 DOMSB 213 (1993)

("Eastern Energy Remand"), that because G.L. c. 164 requires a necessary energy supply to be provided with a minimum impact on the environment at the lowest possible cost, it is reasonable to conclude that a proposed facility may be necessary even if there is no additional need for supply capacity or transmission reasons. We stated that, in such a case, an applicant would have to establish a record that supported a finding by the Siting Board that the Commonwealth's energy supply would have lower costs and/or reduced environmental impacts with the addition of the proposed facility than it would have without the addition of the proposed facility. Eastern Energy Remand, 1 DOMSB 213, 411-412.

Here, the Company has provided a 20-year analysis of the economic efficiency benefits associated with the proposed project, together with a detailed description of its methods and assumptions. MMWEC first determined the increase in Stony Brook's energy value resulting from the construction of the new pipeline. MMWEC then calculated the costs of constructing, owning, and operating the proposed pipeline, and finally determined the NPV savings of the proposed project by subtracting this cost from the increased energy value. The intervenors have not questioned MMWEC's basic methods, and in fact have used the same basic methods in their own economic analyses. The Siting Board notes that MMWEC's deterministic model and RMLD's probabilistic model appear to provide similar economic results given similar assumptions. The Siting Board therefore finds that MMWEC's deterministic model and RMLD's probabilistic model both are acceptable as a basis for determining the economic benefits provided by the proposed project.

While the intervenors have not challenged MMWEC's methods, they have challenged a number of the assumptions that MMWEC made in conducting its economic modeling. The Siting Board notes that, while it is important to understand the effect that each assumption has on the analyses, in this case the significant fluctuations in NPV savings are associated almost entirely with the assumed changes in available capacity, including both in-region supply and power imports from Hydro-Québec. Assumptions as to the number of turbines used for the status quo case, the on-line date, reserve levels, and ROW costs, while having an effect on the NPV savings, are not significant factors in determining

the economic efficiency of the proposed project.[41] The Siting Board therefore focuses its analysis on these capacity-related issues.

The record shows that MMWEC and RMLD together have put forth a set of economic analyses encompassing a range of capacity assumptions. The varying levels of new generation assumed in different model runs during the proceeding has largely reflected differing assumptions as to the number of generating units coming on-line in the immediate planning horizon of 2002. MMWEC has put forth the High Generation/HQ Dispatch case, submitted close to the end of the proceeding, as its preferred case. The High Generation/HQ Dispatch case captures a 10,071 MW increase in generation by 2002 (based on units known to be operational or under construction) and the expiration of the Hydro-Québec Contract, with an attendant reduction in exports to the United States. MMWEC's Low Generation/HQ Firm case assumes approximately 4000 less MW of new generation than MMWEC's preferred case, and the continuation of the Hydro-Québec Contract, with an attendant continuation of current levels of exports to the United States.

RMLD also developed a supply case based on the addition of generating units known to be operational or under construction; this case, which RMLD calls its Low Capacity case, assumes the addition of 9340 MW of new capacity by 2002. RMLD also provided, as its preferred case, an Intermediate Capacity case, which in addition to the new capacity in its Low capacity case, assumes the addition by 2002 of units believed to be close to construction, for a total of 11,115 MW of new capacity by 2002. Finally, MMWEC provided a sensitivity analysis of its High Generation/HQ Dispatch case which assumes the further addition of 2000 MW in 2003 and 2004.

The Siting Board first addresses the issue of new generation and the timing for such generation coming on-line. Based on the evidence provided by MMWEC and RMLD, it is clear that MMWEC's Low Generation case, including 6250 MW of new capacity, significantly underestimates the amount of new generation known to be operating or under construction in New England. Further, based on the record evidence regarding the number of new units in operation and under construction, the Siting

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41 With regard to fuel prices, MMWEC conducted sensitivity analyses under a range of fuel price assumptions. The record shows that the modeled NPV savings remained positive under the varying fuel price inputs.

Board concludes that RMLD's Low Capacity case at 9340 MW, and MMWEC's High Generation case at 10,071 MW, represent reasonable estimates of known capacity additions. The Siting Board notes, however, that permitting on many additional generating projects was in progress at the close of the record, and that while these projects may not all be built, there is a significant probability of further capacity additions in 2003 and 2004. The Siting Board accepts RMLD's Intermediate Case and MMWEC's +2000 MW case as reasonable approximations of the possible impact of further capacity additions.

The Siting Board next turns to the issue of future imports from Hydro-Québec. The record indicates that the Hydro-Québec Contract is due to expire in 2001, and that a successor contract has not been negotiated. Because significant changes have taken place in the electric industry since the Hydro-Québec Contract was negotiated, including changes in the role played by the signatory electric utilities, the Siting Board concludes that the continuation of the Hydro-Québec Contract in its current form is unlikely. The Siting Board recognizes that Hydro-Québec may seek either to retain some larger portion of its production within Canada, or to export to other regions of the United States. However, the assumption that Hydro-Québec would be dispatched at the $28 bid price, resulting in an approximately 65% decrease in sales to New England, is speculative. The Siting Board concludes that the level of future exports to New England is likely to fall somewhere between those projected by MMWEC and RMLD.

The Siting Board next assesses the various supply scenarios presented by MMWEC and RMLD in light of these conclusions. As can be seen in Tables 2 and 3, above, RMLD and MMWEC have presented four capacity cases[42] reflecting the assumption that the Hydro-Québec contract would continue in its current form. These four cases reflect generating capacity increases of between 6250 MW and 11,115 MW. The expected NPV savings of the proposed project is positive for cases showing capacity increases of up to 9340 MW, while the expected NPV savings of Phase I of the

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[42] Because MMWEC has reached an agreement with WMECO regarding the use of WMECO's ROW, and because that agreement calls for the use of a 20-foot ROW (as assumed in RMLD's optimistic ROW case), rather than a 40-foot ROW (as assumed in RMLD's less optimistic ROW case), the Siting Board here relies on RMLD's optimistic ROW cases.

proposed project is positive for cases showing capacity increases of up to 10,071 MW, including both MMWEC's High Generation case and RMLD's Low Capacity case.

MMWEC also has presented two capacity cases that assume a significant reduction in imports from Hydro-Québec. One of these cases assumes capacity additions of 10,071 MW by 2002; the other assumes capacity additions of 12,071 MW by 2004. The NPV savings of both the proposed project and Phase I remain positive for both cases. A comparison of two cases that are identical except for assumptions regarding Hydro-Québec imports – MMWEC's High Generation/HQ Dispatch case and its High Generation/HQ Firm case – shows a difference in NPV savings of approximately $18.1 million for the proposed project and approximately $17.2 million for Phase I. Thus, projections of economic benefits are highly sensitive to assumptions about future levels of imports from Hydro-Québec.

Overall, the record indicates that the addition of natural gas capacity at Stony Brook is likely to provide economic benefits either if capacity additions remain at current levels, or if additional capacity is added in 2003 and 2004, but Hydro-Québec imports decrease. Economic losses ranging from $1.6 to $5.284 million are projected only if further capacity additions are combined with current levels of imports from Hydro-Québec. The Siting Board has concluded, above, that the continuation of the Hydro-Québec Contract in its current form is unlikely. We note that the losses projected for the cases involving high levels of new capacity and current levels of imports from Hydro-Québec are relatively small; thus, even minor reductions in the current level of imports likely would result in economic benefits. Consequently, the Siting Board concludes that the addition of natural gas capacity at Stony Brook is likely to result in economic benefits under most reasonable capacity scenarios.[43]

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[43] MMWEC and RMLD differ as to whether an estimated $5.775 million in already incurred project expenses should be included in the economic analysis of the proposed project, or treated as sunk costs. The Siting Board notes, as a matter of policy, that an analysis of the economic need for a project should be prepared prior to making a significant investment in that project, and therefore should include all costs associated with the project, including project development, design, and permitting costs. Expenditures made prior to project approval typically are made at the petitioner's risk. Our analysis of need therefore includes the $5.775 million in the total cost of the proposed project. The Siting Board recognizes, however, that in

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The Siting Board concludes that, under most reasonable scenarios, construction of an additional source of natural gas such as the proposed project would provide economic benefits for the Project Participants and Joint Owners, although the level of such benefits is uncertain. Consequently, the Siting Board finds that MMWEC has demonstrated that there is a need for additional energy resources serving Stony Brook for economic efficiency purposes.

4. Environmental Need

a. MMWEC's Modeling

MMWEC asserted that the proposed project would enable MMWEC to increase the use of natural gas at Stony Brook, and that this would lead to a reduction in regional emissions of criteria pollutants and CO_2, as well as to reductions in the emissions of certain pollutants within Massachusetts (Exh. EFSB-3, at 10). Using results of the dispatch model described in Section II.A.3, above, MMWEC estimated changes in air emissions from Stony Brook, from Massachusetts, and from New England plus New York ("northeast region") (Exh. HO-N-63). MMWEC presented modeling showing increases in overall facility operations and increases in facility air emissions, both reflecting increased gas-fired operation (Exhs. MMWEC-LMB at 8; MMWEC-JJB-S-2; HO-N-75-S-2; RR-HO-MM-31-S-2; Tr. 2, at 223-224). MMWEC's modeling showed that the project would result in decreases in regional air emissions, as described below.

MMWEC modeled the dispatch of the Stony Brook facility and other generation facilities in New England for the period 2002 to 2021, with and without the project, under a variety of economic

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43 (...continued)
this instance both the costs and the economic benefits of the proposed project reside with the Project Participants and Joint Owners. Incurred project costs already have been assumed by the Project Participants and Joint Owners; they cannot be disallowed through a future rate case, as in a typical utility proceeding. Therefore, as a practical matter, the actual economic benefits to the Project Participants and Joint Owners of going forward with one or both phases of the proposed project likely would be higher than indicated in Tables 2 and 3, above.

conditions, as described in Section II.A.3, above.[44] The dispatch model indicated that greater use of Stony Brook, utilizing gas, would lessen the use of other facilities, some of which are fueled with oil (Exhs. HO-N-75-S-2; RR-HO-MM-31-S-2). To estimate changes in air emissions, MMWEC modeled facility, Massachusetts, and regional emissions of CO_2 and five criteria pollutants, for each of three years – 2002, 2005, and 2010 – based on its dispatch model.[45] MMWEC variously used existing facility permit limits, state or federal regulatory limits, and default emission rate factors compiled by the U.S. Environmental Protection Agency to estimate emission rate factors for each plant that could be displaced by increased operation of the intermediate unit (Exh. MMWEC-LMB at 5; Tr. 1, at 62).[46] MMWEC characterized these various rate factors as being very close to the actual emissions of displaced generating facilities (Tr. 1, at 62). MMWEC calculated the change in air emissions for each facility by multiplying the change in the facility's dispatch by its emission rate factor (Exh. MMWEC-LMB at 5).

MMWEC's analysis showed that construction of the proposed project would result in increases in Stony Brook emissions and decreases in emissions at specific generating facilities in New

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44 The dispatch model is based on a set of assumptions about hourly power supply bids that would be placed with the New England Independent System Operator ("ISO"). MMWEC suggested that it would be economically rational for firms to place bids at the level of their short-run marginal costs (Tr. 12, at 1702-1704).

45 MMWEC modeled projected differences in Massachusetts and northeast region annual total emissions in each of three years (2002, 2005, 2010) under: (1) a reference economic case based on the High Generation/HQ Dispatch case; and (2) an economic scenario which assumes construction of an additional 2000 MW of combined cycle generation compared to the reference case (Exhs. MMWEC-LMB at 8; MMWEC-JJB-S-2; HO-N-75-S-2; RR-HO-MM-31-S-2). Multiple iterations of air emissions analyses were provided (Exhs. EFSB-3, at 93-99; HO-N-76; HO-N-76-S; HO-76-S-2; HO-N-76-R; RR-HO-MM-31-S-2). Earlier emissions analyses were provided for a wider range of economic scenarios, including high and low gas prices (Exh. HO-N-76-R-3). Differences in ozone season emissions were also modeled (id.; Exhs. HO-N-75-S-2; RR-HO-MM-31-S-2).

46 MMWEC stated that, because the New York facilities that would be displaced were not specifically identified, this procedure could not be followed for New York reductions, and NEPOOL marginal emission rates were used in their stead (Exh. MMWEC-LMB at 13).

England (id., at 4). Changes in Massachusetts and regional emissions that would result from the project in 2002 are shown in Table 4, below.

TABLE 4
PROJECTED NET CHANGE IN STATE AND REGIONAL EMISSIONS, YEAR 2002 [a]

Pollutant	Change in Massachusetts Emissions, tons per year	Change in Northeast Region Emissions, tons per year
Nitrogen oxides (NO_X)	33 to 43	-173 to -157
Sulfur dioxide (SO_2)	-348 to -307	-872 to -768
Particulates (PM)	-13 to -12	-74 to -67
Carbon monoxide (CO)	-17 to -15	-57 to -51
Carbon dioxide (CO_2)	–[b]	-23,789 to -19,528
Volatile organics (VOC)	4 to 5	-9

Sources: Exhs. HO-N-75-S-2; RR-HO-MM-31-S-2.
a. Ranges shown include emissions changes that would result from the proposed project, if built in its entirety, and emissions changes that would result from construction of Phase I of the project.
b. Carbon dioxide is considered only as a global pollutant, so change in state emissions is not calculated here.

Based on the modeled changes in emissions due to displaced generation, MMWEC claimed that the proposed project would result in a net decrease in emissions of CO_2 and five criteria pollutants in the northeast region, and also would result in a net decrease in emissions of SO_2, particulates, and CO within Massachusetts (Exhs. EFSB-3, at 10, 28; HO-N-75-S-2; HO-N-76-S; RR-HO-MM-31-S-2) (See also Section II.B.5.c, below).

MMWEC's modeling predicted very low oil usage by the intermediate unit under baseline conditions and consequently did not predict that use of No. 2 fuel oil as fuel for Stony Brook would decrease in any significant way as a result of the project (See Section II.B.5, below).[47] MMWEC indicated that the way its dispatch model incorporated the possibility of unexpected outages at other

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47 MMWEC stated that the Stony Brook intermediate unit would continue to burn oil when the gas supply is interrupted for pipeline maintenance, when transportation service is reduced in accordance with the Bay State Contract, and when fuel oil is less expensive than gas (Exhs. HO-N-20-R; HO-N-20-S).

facilities is a factor leading to its prediction of low rates of oil burning at Stony Brook (Tr. 10, at 1471). MMWEC explained that its deterministic model multiplies long-term average outage rates for other facilities by the facilities' power outputs to calculate an average expected power output for each competing facility, rather than the more random and abrupt occurrence of outages as they would actually occur; as a result, the deterministic model tends to underestimate oil-fired generation at the Stony Brook facility (Tr. 11, at 1564-1571; Tr. 23, at 3422-3423). Consequently, MMWEC's deterministic model predicts very low dispatch rates in the winter, when reserve levels are typically high, and therefore very low oil usage by the intermediate unit under baseline conditions (Tr. 10, at 1470-1471). MMWEC indicated that in actuality there would continue to be a reasonable likelihood that multiple facilities would have outages in the winter months and that Stony Brook would end up being called on to run on oil (id., at 1471).

MMWEC provided emissions projections for a variety of scenarios including, as part of its final corrected projections, scenarios assuming higher regional electric generation capacities (Exh. HO-N-75-S-2). Scenarios of higher regional generation capacities resulted in reduced dispatch of Stony Brook. For example, a scenario of an additional 2000 MW regional capacity would reduce the projected year 2005 increase in Stony Brook generation, with the proposed project, from 426,600 MW-hrs to 214,100 MW-hrs (Exh. HO-N-75-S-2). MMWEC agreed that with more new power plants coming on line, the proposed project would have progressively less impact in reducing emissions of criteria pollutants (Tr. 2, at 167-168).

b. Positions of the Parties

PAC contended that Stony Brook is located in "what is already one of the poorest air quality areas in Massachusetts"[48] and that emissions from Stony Brook move to very densely populated areas

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[48] In response to a request from PAC to describe air quality in the Springfield area, MMWEC provided excerpts from the U.S. Environmental Protection Agency's 1996 Annual Report on Air Quality in New England (Exh. PAC-PH-7). The Massachusetts summary from that document indicates that CO was monitored only at Boston, Worcester, Springfield, and Lowell in 1996; that lead monitoring has been discontinued; that nitrogen dioxide ("NO_2")

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no matter which way the wind blows (PAC Initial Brief at 31). PAC contended that, in contrast, the facilities expected to be displaced by increased generation at Stony Brook are largely out-of-state and almost wholly along the coast line, where, it says, emissions are carried out to sea (id.).[49] Finally, regarding the projected increase in Massachusetts NO_X and VOC[50] emissions, PAC questions whether a project that would result in such increases would be allowable under law (id.).

c. Analysis

The Siting Board has held that in determining environmental need, a project proponent must provide full documentation of its assumptions pertaining to environmental benefits associated with the dispatch of generation capacity. ANP Blackstone Energy Company, 8 DOMSB 1, 59 (1999) ("ANP Blackstone Decision"); ANP Bellingham Energy Company, 7 DOMSB 39, 93 (1998) (ANP Bellingham Decision); Altresco Lynn Inc., 2 DOMSB 1, 98 (1993) (Altresco Lynn Decision); see also,

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48 (...continued)
concentrations were highest at monitoring stations located in Worcester, Springfield, and metropolitan Boston and lowest at Quabbin and Newbury; that ozone concentrations were highest in Fairhaven and Truro; that concentrations of particulates were highest at Boston and Springfield and lowest at Quabbin; and that SO_2 concentrations were highest at Chelsea and Swansea and lowest at Quabbin (id.). The document also indicates that biogenic volatile compounds such as isoprene have relatively high concentrations at inland sites including Quabbin (id.).

49 In response to a PAC request, MMWEC provided a map showing that generating facilities that were modeled as having the greatest displacement of generation (in one selected year, 2002) are located along the coast from Bridgeport, Connecticut, to Salem, Massachusetts (Exh. RR-PAC-MM-1).

50 PAC's brief refers to MMWEC's air emissions designation "VOC" as "carcinogens" (PAC Initial Brief at 31). The Siting Board understands the Company's use of the term "VOC" to conform to widespread usage of the term in the context of ozone formation, where "VOC" refers to a total amount of volatile organic material, thought to act in bulk as a precursor to the formation of ground-level ozone. The Siting Board recognizes that there are specific carcinogenic chemicals that are also volatile and so can be described as being among the set of VOCs. However, the record does not indicate that power plants, when fueled by natural gas, have any significant emission of volatile carcinogenic compounds, and the term "VOC" does not itself indicate carcinogenicity, as implied by the intervenor comment.

Enron Power Enterprise Corporation, 23 DOMSC 1, 71 (1991) ("Enron Decision"); MASSPOWER Inc., 20 DOMSC 301, 388 (1990) ("MASSPOWER Decision").

In the Enron Decision, the Siting Board found for the first time that a proposed generating project would provide Massachusetts with environmental benefits related to net changes in air emissions from existing and future generating facilities in Massachusetts. Enron Decision, 23 DOMSC 1, 69-73. In later decisions, the Siting Board found that applicants' projects likely would provide short-term air quality benefits for Massachusetts and/or the region based on the displacement of existing generation and associated emissions. ANP Blackstone Decision, 8 DOMSB 1, 48; Cabot Power Corporation, 2 DOMSB 241, 324, 329 (1994); Eastern Energy Remand, 1 DOMSB 213, 325-335.

Here, the record shows that MMWEC modeled the dispatch of the Stony Brook facility and other generating facilities in New England for the period 2002 to 2021, with and without the proposed project, under a variety of economic conditions. MMWEC's analysis (described in Section II.A.3, above) implicitly assumed that the proposed project would not affect the total amount of electricity consumed in the region, so each additional one megawatt generated at Stony Brook is offset by the displacement of one megawatt generated by a competing facility.[51] The record shows that MMWEC then modeled facility, statewide, and regional emissions of CO_2 and five criteria pollutants, for the years 2002, 2005, and 2010, based on the dispatch model.

The record sets forth the methods MMWEC used to derive emissions changes from modeled displacement of generation in Massachusetts and the northeast region. Although the analysis addresses the addition of a new fuel supply rather than the addition of new generation capability, MMWEC's analytical methods are generally similar to those used in past Siting Board reviews of generating facilities, and raise issues identified in earlier cases. First, the time frame of MMWEC's air pollution displacement analysis is nine years. Despite concerns set forth in past Siting Board reviews of proposed generation facilities, MMWEC did not specifically focus its air pollution displacement analysis on the near future. Second, in addressing the viability over time of aging generators, MMWEC simply

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[51] The Siting Board has reviewed this type of analysis in past cases. See, e.g., ANP Blackstone Decision, 8 DOMSB 1, 55-56, 61-62; ANP Bellingham Decision, 7 DOMSB 39, 84-87, 94-96; MASSPOWER Decision, 20 DOMSC 301, 387-388.

assumed that the dispatch of such generators would be best predicted by their short-term operating costs, rather than assuming that some aging plants would be retired or modified.[52] To its credit, MMWEC did assume that future generic combined cycle unit additions would have better fuel efficiencies than Stony Brook.

The record reflects one specific weakness of MMWEC's reliance on a deterministic dispatch model, which incorporates plant outage levels into long-term average generation capacities. As noted by MMWEC, its deterministic modeling likely resulted in the underestimation of oil-fired generation at the Stony Brook facility, as modeled both with and without the proposed project.

Generally, MMWEC's dispatch model supports the expectation that the project would cause wholesale market prices of electricity to decrease marginally in New England. The Siting Board notes that a marginal decrease in prices could marginally postpone the construction of future generating facilities. MMWEC's model does not address this possible economic feed-back mechanism and therefore may overestimate air emissions benefits over the long term.

The Siting Board notes, however, that these are relatively minor methodological issues and that dynamic modeling of the electric industry could introduce additional inaccuracies due to the difficulty of determining the likely market response to lower prices. Consequently, the Siting Board finds that MMWEC's model provides a reliable basis for predicting emissions impacts.

MMWEC's modeling indicates that, in the short run, greater use of Stony Brook on gas would lessen use of other regional generating facilities, some of which are fueled with oil. The model predicts that the proposed project would result in a net decrease in emissions of CO_2 and five criteria pollutants when the entire northeast region is considered, and a net decrease in emissions of SO_2, particulates, and CO within Massachusetts. Modeled in-state and regional decreases in emissions of criteria pollutants are on the order of hundreds of tons per year, and the modeled decreases in regional CO_2 emissions are approximately 20,000 tons per year. These predicted changes are significantly smaller

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[52] In previous cases involving addition of electrical generating capacity, the Siting Board identified concerns with respect to (1) assumed redispatch of displaced generation over time with continued load growth and (2) failure to address the potential for significant amounts of retirement of existing generating units. See, e.g., ANP Blackstone Decision, 8 DOMSB 1, 47.

than projected changes resulting from recently approved generating facilities such as the Nickel Hill project, for which the applicant projected regional net reductions of 8000 tons of NO_X per year, 30,000 tons of SO_2 per year, and 2,510,000 tons of CO_2 per year (Nickel Hill Energy, LLC, 11 DOMSB 83, 136 (2000)); ANP Blackstone, for which the applicant projected regional net reductions averaging 4092 tons of NO_X per year, 15,354 tons of SO_2 per year, and 1,400,000 tons of CO_2 per year over five years (ANP Blackstone Decision, 8 DOMSB 1, 58-59); and Millennium, for which the applicant projected regional net reductions averaging 601 tons of NO_X per year, 1366 tons of SO_2 per year, and 550,000 tons of CO_2 per year over six years (U.S. Generating Company, 6 DOMSB 1, 56 (1997)). Thus, the Siting Board concludes that the regional emissions reductions associated with the proposed project, although clear, are on a relatively modest scale. Moreover, while the dispatch model shows that displacement of existing facilities would tend to lessen total regional pollutant emissions, any tendency of the project to delay construction of newer facilities likely would have a countervailing effect. As noted above, MMWEC's model does not account for possible economic feed-back mechanisms. Therefore, the potential countervailing effect of delaying other generators is not reflected in MMWEC's model results.

MMWEC presented changes in both Massachusetts and regional emissions, without reference to the spacial distribution of those emissions. The Siting Board notes that this approach is most suitable for evaluation of emissions of regional and global concern, including emissions of NO_X and VOC, which are precursors to ozone; emissions of SO_2, a contributor to haze and acid rain; and emissions of CO_2, which is considered a factor in climate change. As a result, the Siting Board considers the net impact of the project in reducing regional emissions of SO_2, NO_X, VOC, and CO_2 to be particularly significant. MMWEC's analysis shows benefits on a regional level for each of these pollutants. The Siting Board notes that ground-level concentrations of CO and particulates are not directly related to total statewide or regional emissions. Thus, for other pollutants which may be of local concern, comparison of modeled regional or statewide emissions gives only a rough indication of overall impacts or benefits.

MMWEC's modeling, on its face, predicts increases in Stony Brook emissions of all criteria pollutants as a result of the proposed project. However, as discussed above, MMWEC's use of a

deterministic model likely understated the continuing amount of oil-fired generation at Stony Brook; consequently, the projected absence of any improvement in facility emissions is not wholly credible. Displacement of oil burning at Stony Brook by gas burning at Stony Brook is probably underestimated by the model. A model that projected more baseline use of oil would presumably predict that an enhanced gas supply would lead to a larger reduction in Stony Brook operations on oil, and thereby predict a reduction in local emissions of pollutants, such as SO_2, that have dramatically lower emissions from gas compared to emissions from oil. Therefore, MMWEC's prediction of adverse changes in local emissions of all criteria pollutants could be conservative; i.e. local air emissions would likely increase less than predicted by MMWEC and SO_2 emissions may actually decrease**.**

PAC has argued in essence that projected increases in local emissions at Stony Brook should be given greater weight than projected emissions reductions at other locations because air quality near Stony Brook is unusually poor and because emissions at other locations might typically drift out to sea. However, the record evidence does not suggest that any one area of the Commonwealth has markedly worse air quality than any other area. Rather, the record suggests that, throughout the state, criteria pollutants tend to have higher concentrations in urban areas than in rural areas. Also, the record does not demonstrate that a given emission of an air pollutant would have a greater adverse impact if released near Ludlow rather than at a point near the ocean, and it does not demonstrate that pollutants emitted along the coast have no local or regional impacts. Therefore, the Siting Board will not give greater weight to Stony Brook emissions than to similar emissions at another location. Notwithstanding modeled increases in Massachusetts NO_X and VOC emissions, the Siting Board notes that emissions of these ozone precursors at Stony Brook will continue to be subject to regulation by the Massachusetts Department of Environmental Protection.

Overall, the Siting Board notes that MMWEC was able to demonstrate, through its displacement analysis, modest net reductions in northeast regional NO_X, SO_2, particulates, CO, and CO_2 emissions in the years 2002 through 2010 if the proposed project is constructed.[53] Thus, the

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[53] The record contains little if any information about any additional environmental benefits that might accrue in the future from enhancing gas transportation capacity in the area surrounding

(continued...)

Siting Board finds that the proposed project is needed to provide regional air quality benefits.

The Siting Board recognizes the complexity involved in estimating pollutant emissions for Massachusetts due to the transportation of pollutants across state lines and the uncertainty regarding the location of generating facilities to be developed in the future. The Company's approach for estimating Massachusetts emissions benefits by including all generating units physically located in Massachusetts is reasonable. The Company's analysis projects modest net emissions reductions in Massachusetts for SO_2, particulates, and CO over the analysis period. The Siting Board notes that Massachusetts also benefits from reductions in regional emissions of certain criteria pollutants such as NO_X, SO_2, and VOC. Consequently, the Siting Board finds that there is a need in Massachusetts for additional energy resources serving Stony Brook for environmental purposes.

5. Conclusions on Need

The Siting Board has found that there is a need for additional energy resources serving Stony Brook for economic efficiency purposes. Further, based on anticipated improvements in regional air quality and anticipated reductions in the emissions of some air pollutants in Massachusetts, the Siting Board has found that there is a need in Massachusetts for additional energy resources serving Stony Brook for environmental purposes. Consequently, the Siting Board finds that there is a need for additional energy resources serving Stony Brook to provide for a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

The Siting Board notes that MMWEC has not, in this proceeding, argued that the proposed project is needed to ensure the reliability of either the New England or the Massachusetts energy supply. Thus, our finding of a need for additional energy resources is based on economic benefits which would accrue to Project Participants under most reasonable capacity scenarios, and on the clear

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53 (...continued)
Stony Brook, beyond displacement effects from enhanced use of the existing intermediate unit at Stony Brook. Nevertheless, depending on its sizing and design, additional pipeline capacity has the potential to support additional use of natural gas at new or modified facilities at Stony Brook or surrounding areas, potentially leading to further regional environmental benefits.

but relatively modest state and regional environmental benefits that would result from the increasing operation of the Stony Brook facility on natural gas. Since the finding of need for the proposed project is based solely on economic and environmental benefits, and since the identified benefits may be modest, the Siting Board notes that the benefits of the proposed project could be outweighed by its other environmental impacts. These impacts are considered in Section III.C, below.

B. Comparison of the Proposed Project and Alternatives

1. Standard of Review

G.L. c. 164, § 69H requires the Siting Board to evaluate a proposed project in terms of its consistency with providing a necessary energy supply to the Commonwealth with a minimum impact on the environment at the lowest possible cost. In addition, G.L. c. 164, § 69J requires a petitioner to present "alternatives to planned action" which may include: (1) other methods of generating, manufacturing or storing electric power or gas; (2) other sources of electrical power or natural gas; and (3) no additional electric power or gas.[54]

In implementing its statutory mandate, the Siting Board requires a petitioner to show that, on balance, its proposed project is superior to alternative approaches in terms of cost, environmental impact, and ability to meet the identified need. Berkshire Gas Decision, 9 DOMSB 1, 24; 1998 NEPCo Decision, 7 DOMSB 333, 358; MassElectric Decision, 18 DOMSC 383, 404-405. In addition, the Siting Board requires a petitioner to consider reliability of supply as part of its showing that the proposed project is superior to alternative approaches. Berkshire Gas Decision, 9 DOMSB 1, 24; Commonwealth Electric Company, 5 DOMSB 273, 299-300 (1997); MassElectric Decision, 18 DOMSC 383, 404-405.

2. Identification of Project Approaches

The Company presented three approaches for meeting the identified need: (1) the proposed

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[54] G.L. c. 164, § 69J also requires a petitioner to provide a description of "other site locations." The Siting Board reviews MMWEC's preferred and alternative pipeline routes, as well as other potential pipeline routes, in Section III.B., below.

project; (2) a 5.4-mile pipeline, located entirely in Ludlow, that interconnects with the Monson-Palmer line, ("5.6-mile alternative");[55] and (3) an approximately 3.0-mile pipeline that interconnects with the Monson-Palmer line closer to Stony Brook, also located entirely in Ludlow ("3-mile alternative"). During the proceeding, variations to two of these alternatives were identified: the construction of the proposed project in two phases, and the use of the 3-mile alternative combination with the existing 275 psig Bay State line that currently serves Stony Brook.[56]

a. Proposed Project

The Company described the proposed project as a 14.7-mile pipeline originating at the Stony Brook facility and terminating at an interconnection point with the Tennessee interstate pipeline in Hampden (Exh. EFSB-3, at 2). The pipeline would be designed for a maximum allowable operating pressure of 1000 psig, and would be operated to provide a minimum delivery pressure of 360 psig at Stony Brook (id. at 16; Exh. MMWEC-JOR/ARM at 14; Tr. 8, at 1098). The proposed project also would include two above-ground facilities: a custody transfer station, and a meter station located at Stony Brook (Exh. EFSB-3, at 16-17).

MMWEC currently proposes to construct the proposed project in two phases. Phase I would be an approximately 5.4-mile, 20-inch pipeline which would begin at Stony Brook and would terminate at an interconnection point with the Monson-Palmer line close to the Massachusetts Turnpike in Ludlow (Exh. MMWEC-JOR-S at 1, 2, 4). Phase II would be an approximately 9.1-mile, 16-inch pipeline, which would continue along the proposed route from the Monson-Palmer interconnection point to a final interconnection point with Tennessee in Hampden (id. at 1- 2; Exh. EFSB-3, at 32).

MMWEC proposes to construct Phase I first, and to construct Phase II only if the operation of

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55 MMWEC noted that the actual length of the 5.6-mile alternative is approximately 5.4 miles (Exh. EFSB-3, at 39). However, it has generally been identified in the record using the name "5.6-mile alternative."

56 MMWEC stated that it also considered a no-build alternative, i.e., the continued use of the 275 psig line in its present configuration (Exh. EFSB-3, at 30). The Company stated that this approach, because it would not increase the volume of gas available to Stony Brook, would not produce the environmental and economic benefits the Company asserts will result with increased use of gas (id. at 30 to 31).

Phase I proves to be unsatisfactory from either an engineering or economic standpoint (Exh. MMWEC-JOR-S at 2). The Company stated that the Phase I custody transfer station would be located near the Massachusetts Turnpike; if Phase II is constructed, the custody transfer station would be relocated adjacent to the Tennessee ROW in Hampden (Exh. EFSB-3, at 16-17). MMWEC noted that the Phase I custody transfer station and meter station both would be significantly smaller in scale than their Phase II counterparts (id. at 17).

b. 5.6-Mile Alternative

The Company stated that the 5.6-mile alternative would consist of an approximately 5.4-mile, 20-inch pipeline running from Stony Brook to an interconnection point with the Monson-Palmer line at a point in Ludlow near the Massachusetts Turnpike (Exhs. EFSB-3, at 39; MMWEC-JOR-S at 5). MMWEC noted that the location and physical configuration of the 5.6-mile alternative are the same as those of Phase I of the proposed project (Exhs. EFSB-3, at 39; PAC-00N-20). In addition, MMWEC noted that, assuming the same inlet conditions, the capacity of the 5.6-mile alternative is the same as that of Phase I of the proposed project (Exh. PAC-00N-20). MMWEC stated that the primary difference between the 5.6-mile alternative and Phase I of the proposed project is that Phase I is intended as an intermediate step towards construction of the proposed project in its entirety, whereas the 5.6-mile alternative ends at the Ludlow interconnection point (Exh. MMWEC-JOR-S at 6-7).

MMWEC stated that the 5.6-mile alternative would provide natural gas at a delivery pressure of 350 psig at Stony Brook, and therefore would require modifications at the Stony Brook facility (Exhs. MMWEC-GEL at 5- 6; HO-N-4-S). MMWEC calculated that the capacity of the 5.6-mile alternative would be 2730 mcf/hr, at a pipeline roughness of 1800 micro inches (Exh. HO-RR-MM-25).[57] The Company noted that the use of the 275 psig line in conjunction with the 5.6-mile alternative could enable the system to be operated to provide a delivery pressure of 360 psig (Tr. 8, at 1067).

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[57] Bay State calculates a significantly higher flow rate (see Section II.B.3.c, below).

c. 3-Mile Alternative

MMWEC described the 3-mile alternative as an approximately 3-mile, 16-inch pipeline which would extend south from Stony Brook to interconnect with the Monson-Palmer line at a point near West Street and West Road in Ludlow (Exh. EFSB-3, at 8, 9, 32). The Company presented two potential routes for this alternative. The first route ("3-mile alternative 1"), would travel for 2155 feet in West Street, 8100 feet in a WMECO ROW, and 5000 feet in an oil ROW and on MMWEC property, for a total length of 2.89 miles (Exhs. HO-A-6; EFSB-3, at 32; HO-A-47-S; RR-PAC-MM-5). The second route ("3-mile alternative 2"), would run for approximately 2.83 miles, predominantly within the West Street ROW (Exhs. HO-B-A-6; EFSB-3, at 32; HO-A-47-S; RR-PAC-MM-5). The endpoint of the 3-mile alternative lies between Cady's Corner in Ludlow and Indian Orchard in Springfield; there is extensive urbanized land between this point and the Tennessee pipeline, limiting the future potential for expansion of the 3-mile line (Exh. EFSB-3, at Figures 2, 3).

MMWEC calculated that the capacity of the 3-mile line, standing alone, would be 2187 mcf/hr at a delivery pressure of 360 psig, and 2318 mcf/hr at a delivery pressure of 350 psig at a pipeline roughness of 1800 micro inches (Exh. RR-HO-MM-25). However, the Company noted that the use of the existing 275 psig line in conjunction with the 3-mile line could enable the system to operate with a flow rate of between 4000 to 4300 mcf/hr (id.; Exh. EFSB-3, at 30). This calculation assumed that the 3-mile line would provide between 2187 to 2318 mcf/hr under steady state flow conditions, and that the 275 psig line could provide 1800 to 1900 mcf/hr (Exhs. RR-HO-MM-25; EFSB-3, at 30).[58]

MMWEC indicated that the 275 psig line is available to it only on a interruptible basis, as Bay State may use the capacity on the line for other purposes (Exh. MMWEC-JOR/ARM at 17) (See Section II.B.3, below). Bay State indicated that MMWEC is presently the only interruptible customer served off the 275 psig line (Exh. RR-PAC-BSG-3). MMWEC noted that, although the low pressure line has a maximum design pressure of 275 psig, it normally can sustain only 95-120 psig pressure at Stony Brook during operation, and therefore under this alternative continued use of gas compression

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[58] Bay State indicated that when MMWEC is drawing 1000 mcf/hr from the 275 psig line, Bay State can get an additional 1610 mcf/hr through the line without having to run its LNG system (Exh. RR-PAC-BSG-5).

would be required (Exhs. HO-A-27; HO-A-19).

PAC supported a variation of the 3-mile alternative in which two of the three intermediate unit turbines would be supplied by the new 16-inch line and one turbine would be supplied by the existing 275 psig line, with no interconnection between the two lines (Exh. PAC-AJF-S at 6, 7). PAC argued that this is the most logical arrangement, given that neither line has sufficient capacity to service all three turbines (id. at 7).

d. Analysis

Three project approaches have been identified which would allow delivery of additional gas to Stony Brook: the proposed project, the 5.6-mile alternative, and the 3-mile alternative. Each of these alternatives would increase the supply of gas to the intermediate unit by a significant amount, which in turn could lead to economic and environmental benefits and thus meet the identified need.

The Siting Board notes that there is some disagreement among the parties as to the delivery capacity that is needed to operate the three intermediate unit turbines, and the capacity that would be available under each project alternative. To address the evidence and argument presented concerning delivery requirements and delivery capabilities, the Siting Board compares project alternatives with respect to their ability to deliver gas and support gas-fired operation at Stony Brook, as part of its reliability comparison in Section II.B.3, below. However, we note that because MMWEC has made no case that the proposed project is needed for electric reliability purposes, our review of the relative ability of different alternatives to deliver gas and support gas-fired operation at Stony Brook is relevant only as a factor that bears on the review of economic and environmental benefits, in Sections II.B.4 and II.B.5, below.

With respect to the 3-mile alternative, no party has suggested that the new 3-mile line would have adequate capacity to provide significant economic or environmental benefits without continued use of the 275 psig line. Therefore, the Siting Board will review the 3-mile alternative used in conjunction with the 275 psig line.

Accordingly, in the following sections, the Siting Board compares the proposed project, the 5.6-mile alternative, and the 3-mile alternative with respect to reliability, economic benefits, and

environmental impacts.

3. Reliability Comparison

a. MMWEC's Minimum Requirements

As an initial matter, MMWEC presented a set of minimum engineering requirements for the proposed pipeline ("minimum requirements") (Exh. MMWEC-JOR/ARM at 14; Tr. 8, at 1030-1031). The Company asserted that these minimum requirements represent the physical operating characteristics necessary to ensure that the Stony Brook intermediate unit can operate at 100% capacity and can compete in the deregulated electricity market 24 hours a day, seven days a week, 365 days a year (Tr. 9, at 1302, 1307-1308, 1315; Company Initial Brief at 30). The Company stated that these minimum requirements include: (1) a flow rate of 3150 mcf/hr; (2) a delivery pressure of 360 psig; (3) a 25 minute spinning reserve start-up; and (4) availability of 365 day gas service (Exh. MMWEC-JOR/ARM at 14; Tr. 8, at 1030-1031). MMWEC asserted that neither the intervenors nor the Siting Board may dictate to the Company how much capacity and pressure increase MMWEC must accept as the minimum operational improvement that will justify construction of a pipeline to increase the gas supply to Stony Brook (Company Reply Brief at 27).

MMWEC explained the derivation of several of its minimum requirements. The Company stated that a flow rate of 3150 mcf/hr would allow all three intermediate unit turbines to operate at their full capacity throughout the year (Tr. 7, at 792). MMWEC explained that it used 1998 data from the intermediate unit's gas flow meters to establish a relationship between gas flow and ambient temperature (Exh. PAC-2-N-38; Tr. 9, at 1318-1319). MMWEC indicated that each of the three intermediate unit turbines requires approximately 1050 mcf/hr at 13.6 degrees F, a temperature which the Company believes reasonably reflects the conditions under which the ISO experiences peak winter electrical demand (Tr. 9, at 1323-1324). The Company noted that the intermediate unit may require more than 3150 mcf/hr when the ambient temperature is less than 13.6 degrees F, and following turbine upgrades which would increase the volume of gas consumed (Exh. PAC-2N-38; Tr. 9, at 1355-1358).

MMWEC explained that the 360 psig delivery requirement was based on a pressure requirement of 310 psig at the gas turbines and a pressure drop of 50 psig between the regulator and

the gas turbines (Exh. MMWEC-JOR/ARM at 15). MMWEC stated that, to allow the intermediate units to operate properly, gas pressure should be controlled at 310 psig in the gas supply header immediately upstream of the gas turbines (Exh. RMLD-2-41). The Company explained that there is a 25 psig pressure drop between the existing gas compressor house and the pressure control point, and a 25 psig pressure drop across the regulating control valve (Exh. HO-N-4).

The Company stated that Stony Brook currently has 25-minute startup capability for all three turbines on oil, which enables it to provide a 30-minute operating reserve ("TMOR") when requested by the ISO (Tr. 8, at 1156; Tr. 9, at 1304). MMWEC stated that, currently, when the intermediate unit is operating on gas delivered via the 275 psig line, it cannot bid into the 30-minute reserve market (Tr. 8, at 1177). MMWEC explained that it wants to have the ability to bid into the 30-minute reserve market using gas, since gas is usually the more economic fuel (id. at 1178; Tr. 9, at 1304, 1307; Exh. RMLD 3-13). MMWEC indicated that it would be subject to financial penalties imposed by the ISO if it is unable to provide a TMOR after having bid to do so (Tr. 8, at 1178-1179).

RMLD, Wilbraham, and PAC all argued that MMWEC's minimum requirements are not, in fact, the minimum operating conditions for a pipeline that would provide the types of economic and environmental benefits on which need for the proposed project is based. RMLD argued that the minimum requirements are not really requirements, but rather are operating goals for Stony Brook (RMLD Reply Brief at 29). RMLD also questioned the derivation of the minimum requirements, arguing that they are not reasonable based on actual Stony Brook operating conditions (id. at 25). First, RMLD noted that the flow rate of 3150 mcf/hr is necessary only when the ambient temperature is at or below 13.6 degrees F, and argued that gas is unlikely to be available to Stony Brook under such weather conditions (id.). Second, RMLD argued that a delivery pressure of 360 psig may not be attainable given restrictions on the Tennessee pipeline (id. at 26). Third, RMLD argued that the intermediate unit is capable of operating on oil to meet the 25-minute spinning reserve, and that MMWEC has not provided any analyses demonstrating its need for 365 days of availability on gas (id. at 27).

Wilbraham also asserted that the minimum requirements were arbitrary, and suggested that MMWEC established its minimum requirements in a manner intended to foreclose a meaningful

examination of project alternatives by focusing attention on engineering standards rather than on the economic benefits of a pipeline (Wilbraham Brief at 11-12). Wilbraham noted that, because Stony Brook is dual-fuel capable, the proposed pipeline is required in order to operate Stony Brook more efficiently, not in order to ensure that it operates at all (id. at 13). Wilbraham asserted that MMWEC has not estimated or evaluated the financial implications of its selected engineering standards (id.).

b. Proposed Project

MMWEC asserted that the proposed project would be able to provide 3150 mcf/hr to the three intermediate unit turbines at a delivery pressure of 360 psig under all operating conditions (Exh. MMWEC-ABM at 12). MMWEC explained that the proposed project would be able to accept gas at the full pressure available from Tennessee, thereby eliminating the upper pressure constraint of 500 psig on the Monson-Palmer line (id.). In light of these physical characteristics, MMWEC argued that the proposed project would have the following three reliability advantages: (1) sufficient gas supply would be available at Stony Brook for response to start-up and sustained running of the gas turbines at full power capability; (2) the full Tennessee gas line pressure would be available up to MMWEC's regulator at the Stony Brook site; and (3) MMWEC would have full control over its gas supply system, and therefore would be able to respond promptly to requests for additional power generation without any adverse effects on MassPower (id. at 25).

c. 5.6-Mile Alternative

MMWEC asserted that the 5.6-mile alternative would not meet its minimum requirements, and enumerated the following concerns regarding gas supply reliability under the 5.6-mile alternative: (1) this alternative would not be able to supply 3150 mcf/hr if the Tennessee system pressure drops below 510 psig at the Monson gate station;[59] (2) the delivery pressure to the site would be 350 psig rather than 360 psig, which would leave virtually no operating margin and reduce station reliability; (3) Bay

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[59] MMWEC submitted historical data compiled by Bay State detailing the pressure at the Monson gate station for January 1997 through December 1999, showing that the pressure fell below 510 psig on six days during this period (Exh. PAC-00N-13).

State may inform MMWEC of up to 45 reduced service days with no liquidated damages;[60] (4) the turbines might not be able to come on-line to full load within 25 minutes on gas; and (5) the Monson-Palmer line would be fully loaded; consequently, operations at Stony Brook could affect operations at MassPower, and vice versa, especially during transient conditions[61] (Tr. 8, at 999-1001).[62] MMWEC noted that the main problem with the 5.6- mile alternative is pressure drop in the Monson-Palmer line (Tr. 7, at 923). These issues are discussed in more detail below.

i. Capacity and Pressure on the 5.6-Mile Alternative

MMWEC argued that the 5.6-mile alternative would be inferior to the proposed project because: (1) it cannot reliably provide the 3150 mcf/hr needed to fuel all three turbines on a peak winter day; and (2) the delivery pressure to the site would be 350 psig, rather than the 360 psig provided by the proposed project (Tr. 8, at 999-1001). MMWEC acknowledged that its contract with Bay State requires Bay State to provide 3150 mcf/hr, but argued that its calculations cast doubt on Bay State's ability to meet its contractual obligations.

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60 With regard to the inclusion of the reduced service day language into the Bay State Contract, Bay State noted that it was understood by all parties that such provisions would not be used, since MMWEC assumed as part of its plan to buy gas on the spot market that it would use oil when gas prices were high, which would likely coincide with the reduced service days (Exh. HO-BSG-1, at 2).

61 In addition, MMWEC asserted that transient conditions could occur when Bay State is liquifying natural gas (Exhs. HO-A-23; EFSB-3, at 30). However, Bay State indicated that it liquifies gas only during the non-heating months, and that it has not liquified gas since the summer of 1996 (Exh. HO-BSG-3).

62 MMWEC also enumerated other "risks" which are related to the Bay State Contract terms: (1) under liquidated damages there is no provision with regard to oil burning that addresses the cost MMWEC would incur for NO_X allowances; (2) if MMWEC cannot burn oil, the liquidated damages would be limited to the cost of only 15% of the annual demand charge; (3) Bay State would be able to default on the Bay State Contract without any further obligation or consequential damages; and (4) a force majeure clause would apply (Tr. 8, at 999-1001). The Siting Board notes that these risks reflect contract terms negotiated between Bay State and MMWEC, and cannot be attributed to the physical differences between the proposed project and the 5.6-mile alternative.

MMWEC asserted that the capacity of the 5.6-mile alternative would be approximately 2730 mcf/hr (Exh. RR-HO-MM-25; Tr. 8, at 986, 1008). The Company stated that it calculated this capacity using the Fundamental Flow Equation, which takes into account inlet and outlet pressures, the length of the pipe, its diameter, pipeline roughness, and the effect of gas properties (Exh. MMWEC-ABM at 13). MMWEC explained that its calculations assume a pipeline roughness[63] of 1800 micro inches on the Monson-Palmer line (id. at 9; Tr. 8, at 1012).[64] MMWEC argued that this was an appropriate assumption, as the Monson-Palmer line would be in service for 20 years and there would be some deterioration in the pipe over time (Tr. 8, at 1012; 1051).[65] The Company also noted that the Monson-Palmer line is now nine years old (id. at 1012; 1051).[66] MMWEC also provided calculations indicating that the capacity of the 5.6-mile alternative would be 2991 mcf/hr if roughness were assumed to be 1100 micro inches, and 3317 mcf/hr if roughness were assumed to be 600 micro inches (Exh. HO-RR-MM-25).

Bay State asserted that it is committed to meeting the volume and pressure requirements set forth in the Bay State Contract (Exh. HO-BSG-1; Bay State Initial Brief at 7). Bay State noted that its customers generally accept its gas flow simulations and assume that Bay State will live up to its contractual agreements (Tr. 19, at 2962).

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63 The Company explained that as the roughness of the pipe increases, pressure drop increases and flow decreases; therefore capacity could vary significantly depending on the assumption used for pipe roughness (Exhs. MMWEC-ABM-9; HO-A-10; Tr. 8, at 1014).

64 MMWEC's witness, Mr. Murray, also assumed that the roughness of the 275 psig line would be approximately 1900 micro inches (Exh. MMWEC-ABM at 190).

65 The roughness of the Monson-Palmer line was measured at 1100 micro inches when it was installed in 1993 (Exh. HO-A-10, at Att. 3).

66 Mr. Murray noted that in general a pipeline's condition deteriorates quickly at the beginning of its life and then levels out (Tr. 8, at 1047-1048). Mr. Murray stated that it was his experience that the very best roughness factor was 600 micro inches based on a brand new pipe before it is installed (id. at 1023). He cited a number of factors that would cause a pipe to deteriorate after it is installed such as a small amounts of liquid in the line and lubricating oil from compressors (id.).

Bay State indicated that it modeled the capacity of the 5.6-mile alternative using the Panhandle B Equation (Tr. 15, at 2230-2231). Bay State asserted that the Panhandle B Equation provides a more accurate prediction of the expected performance of its Monson-Palmer line because it uses actual operating data as input, while the Fundamental Flow Equation does not (Exh. HO-BSG-1). Bay State reported that it validated the use of the Panhandle B Equation by comparing actual pressure and flow data to calculated values; Bay State asserted that this comparison clearly demonstrated that Bay State's computer model accurately simulated field conditions (Exh. HO-BSG-9; Tr. 15, at 2233, 2289). Bay State noted that it has used the Panhandle B Equation to model performance of its Granite State Transmission pipeline and that it adequately predicted performance for system planning purposes (Tr. 19, at 2892-2893). Bay State also asserted that the Fundamental Flow Equation tends to overestimate pressure drop due to pipe wall friction, particularly in larger diameter pipes (Exh. HO-BSG-4).

With regard to the measurement of pipeline roughness, Bay State asserted that a pipeline that it installs today will perform almost identically 20 years from now (Tr. 19, at 2960). Bay State indicated that it had used a 95% efficiency factor in its modeling, and asserted that this factor has held constant over the life of the Monson-Palmer line (id. at 2894). Bay State argued that internal pipeline corrosion is not an issue in the northeast since the pipelines are located a significant distance from the producing wells and the gas producing regions, where the impurities tend to settle (Tr. 21, at 3163-3164; Tr. 19, at 2959-2960). Bay State acknowledged that use of a lower efficiency factor would result in lower calculated capacity (Tr. 19, at 2894). However, Bay State asserted that since the Monson-Palmer line was measured at 1100 micro inches in 1993, MMWEC's assumption that the pipeline roughness has increased 60% since the pipeline is far greater than what actual data shows (id. at 2960; Bay State Reply Brief at 12).

MMWEC argued that the Panhandle B Equation was developed for large diameter pipelines, and therefore is not appropriate for smaller diameter pipelines, such as the 16-inch Monson-Palmer line (Tr. 9, at 1284-1285). The Company also asserted that the Panhandle B Equation likely would overestimate the performance of the pipeline because it does not recognize roughness, but instead uses

an efficiency factor that approximates roughness (Tr. 8, at 1022).[67] The Company suggested that if Bay State used an approximately 79% efficiency factor, it would arrive at the Company's calculated delivery rate of 2730 mcf/hr (Exh. PAC-00N-48; Tr. 8, at 1036-1037).

Finally, Bay State noted that there is no physical impediment that would prevent Bay State from operating the Monson-Palmer line at over 500 psig, as it was tested at a maximum operating pressure of 750 psig (Tr. 19, at 2972-2973). Bay State therefore asserted that it would be possible to increase the pressure on the Monson-Palmer line, which would address MMWEC's pressure and flow concerns associated with deliverability capability (Tr. 21, at 3090; Bay State Reply Brief at 15).

ii. Connection with the Monson-Palmer Line

MMWEC expressed concern about the use of the Monson-Palmer line to serve both Stony Brook and MassPower arguing that the transient conditions[68] created when a turbine starts up or shuts down could result in the tripping of, or damage to, other turbines (Exhs. MMWEC-JOR/ARM at 25; MMWEC-ABM at 8; Tr. 8, at 1064, 1077). MMWEC asserted that because the Monson-Palmer line has insufficient capacity to operate all three turbines in the winter months, the transient condition which would be created when any of the five turbines – two associated with MassPower and three associated with the intermediate unit – start-up or shut-down, could trip units already on-line (Exh. MMWEC-ABM at 24; Tr. 8, at 1157). MMWEC noted that Stony Brook would be particularly susceptible to transient conditions under the 5.6-mile alternative, because MMWEC would have to accept a lower pressure drop (20 psig rather than 25 psig) across its control valve in order to use gas at the 350 psig delivery pressure, MMWEC argued that this lower pressure drop reduces the ability of

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67 Mr. Murray noted that an efficiency factor, which is a variable used in calculating capacity, does not affect the capacity calculation when pipe roughness is the controlling factor, as is the case in the calculations used by MMWEC (Exh. MMWEC-ABM at 18; Tr. 9, at 1281-1282).

68 The Company explained that a transient condition consists of a pressure wave that could develop in the system, triggering an inadequate response of the control systems (Tr. 8, at 1059-1060)

the control valve to ride through transient situations (Tr. 8, at 1066-1067).[69]

MMWEC stated that it would have fewer concerns regarding the use of the Monson-Palmer line to supply both Stony Brook and MassPower if the full 3150 mcf/hr were available, and Stony Brook's internal plant header system were adequately sized (Exh. HO-N-50). The Company asserted that the proposed project, which would connect directly to the Tennessee system and therefore is not constrained, would be better able to withstand transients than the Monson-Palmer line, which is fully subscribed and cannot absorb transient situations (Tr. 8, at 1078).

Bay State concurred that with MassPower and MMWEC connecting to the Monson-Palmer line, the Monson-Palmer line would be essentially fully subscribed (Tr. 19, at 2910). However, Bay State argued that tripping and transient issues occur primarily when multiple units come on-line simultaneously; it asserted that, if a number of units are already on, the addition of another unit would not disrupt the system (id. at 2916).[70] Bay State noted that it would be very unusual for all five turbines to come on-line at the same time (Tr. 19, at 2915-2916). Bay State acknowledged that an unexpected or short-notice simultaneous start-up of all three MMWEC turbines under the 5.6-mile alternative could cause operational problems if Bay State was not maintaining 500 psig on the inlet (Exh. HO-BSG-2). However, Bay State noted that if there was insufficient pressure at the inlet to the Monson Gate Station, or another type of failure, it is likely that any alternative that ties into the Tennessee system would be affected (id.; Tr. 19, at 2922).

d. 3-Mile Alternative

MMWEC acknowledged that the 3-mile alternative, used in conjunction with the 275 psig line, could provide delivery pressures of 360 psig, and that the combined capacity of the 3-mile pipeline and the 275 psig line would be between 4000 to 4300 mcf/hr (Exhs. RR-HO-MM-25; EFSB-3, at 30; Tr.

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69 To use gas delivered at 350 psig, MMWEC would also have to make modifications to internal piping by replacing the existing 8-inch plant gas piping with 12-inch piping at a cost of approximately $64,000 (Exhs. HO-N-4-S; HO-A-36; EFSB-3, at 39).

70 Bay State indicated that to its knowledge, the two MassPower units come on line simultaneously without incident (Tr. 19, at 2914-2915).

8, at 1067). However, MMWEC raised deliverability concerns related to the physical interconnection of the two pipelines, the future availability of gas over the 275 psig line, and the location of a transfer station for the 3-mile alternative.

i. Interaction of 3-Mile and 275 psig Pipelines

MMWEC asserted that it would be both unwise and unnecessary to mix a high pressure system such as the proposed 3-mile alternative with a low pressure distribution system such as the 275 psig line (Exh. HO-A-23).[71] MMWEC stated that its concern with connecting a high pressure source to a low pressure source is primarily one of safety, but there are also reliability issues (Exh. HO-N-79; Tr. 9, at 1189). The Company stated that in order to interconnect the 3-mile alternative and the 275 psig line so that gas from either line could be used to supply any of the three turbines, it would have to design, install, and maintain a redundant supply header scheme consisting of cross connects, suitable pressure regulating and metering facilities, and check valves and safety valves (Exhs. HO-A-35; HO-A-44). MMWEC asserted that in its experience, such complex systems exhibit inherently poor reliability and require high maintenance (Exh. EFSB-A-35). The Company estimated that the cost of the additional equipment, including installation, would be $250,000 above the capital costs of the 5.6-mile alternative (Exh. HO-A-44).

A second possible configuration for the 3-mile alternative would be to dedicate two turbines to the 3-mile alternative and one turbine to the 275 psig line (Exh. PAC-AJF at 7; Tr. 8, at 1119; Tr. 9, at 1214). MMWEC noted that this arrangement would reduce reliability and increase operating costs since, if one of the two turbines connected to the 3-mile alternative were out of service, MMWEC could not use the gas to run the third turbine (Exh. HO-A-44; Tr. 9, at 1215). The Company stated that, in this configuration, elements of the existing piping system could be salvaged and reused; it therefore estimated that the cost of the additional equipment for this configuration, including installation, would be less than $100,000 above the capital costs of the 5.6-mile alternative (Exh. HO-A-44).

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[71] Bay State noted that a 275 psig line is not technically considered a low pressure line under any definition of pipeline pressure designations (Exh. HO-BSG-10).

ii. Availability of Firm Service on the 275 Psig Line

As described in Section II.A.2. above, Bay State asserted it is not economically or operationally feasible to provide MMWEC with firm 365 day service over the 275 psig line (Exh. HO-BSG-4). Bay State noted that, due to demand from its existing firm customers, it currently cannot serve MMWEC over the 275 psig line on days colder than 40 EDD; these days typically occur between December 1 and March 15 (Exh. HO-BSG-8). Bay State indicated that, recently, it has met MMWEC's request for service at all times outside of this winter peak period; however, it projects growth in firm customer demand along the 275 psig line that would curtail gas availability to MMWEC over the long term (Tr. 19, at 2930; Tr. 21, at 3230; Bay State Reply Brief at 5).

iii. Transfer Station for 3-Mile Alternative

Bay State indicated that if MMWEC were to construct the 3-mile alternative, Bay State would require an interconnection valve capable of remote operation electronically connected to its Ludlow gas dispatch center (Exh. RR-HO-BSG-1). Bay State asserted that it would have difficulty siting the necessary custody transfer point in the area at the intersection of West Avenue and West Street in Ludlow (id.). Bay State explained that this is a difficult location because of the number of subsurface utility structures already in place (id.). PAC argued that there is sufficient land for a transfer station in the vicinity of West Street, which is less than 500 feet from the interconnection point (PAC Reply Brief at 7). Specifically, PAC described an open area east of West Street and north of the westbound lane of the Massachusetts Turnpike as an option for locating the transfer station (id.).

e. Analysis

In Section II.A.5 above, the Siting Board found that there is a need for additional energy resources serving Stony Brook to provide for a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. The Siting Board noted that its finding of need was based on potential economic and environmental benefits, and was not premised on reliability concerns, as MMWEC has the ability to operate the Stony Brook intermediate unit on oil whenever it chooses to do so.

Here, MMWEC has set forth four operating and engineering parameters that it asserts are necessary to allow the intermediate unit to operate most efficiently on natural gas. A new pipeline which provides MMWEC's stated "minimum requirements" would allow the intermediate unit to be dispatched on natural gas at 100% capacity at any time during the year. RMLD, Wilbraham, and PAC each has asserted that MMWEC has used the minimum requirements to focus attention on engineering standards rather than economic need, and has argued that the Siting Board should approve only the project alternative that best ensures a necessary energy supply with a minimum impact on the environment at the lowest cost. MMWEC, conversely, contends that neither the Siting Board nor the intervenors may dictate to the Company the minimum operating standards that would justify construction of a new gas pipeline.

The Siting Board notes that MMWEC's minimum requirements reflect the Company's judgment as to the optimal operating conditions for a gas pipeline serving Stony Brook. For example, MMWEC's minimum flow rate of 3150 mcf/hr is sufficient to allow all three intermediate unit turbines to operate on gas at 100% capacity at an ambient temperature of 13.6 degrees F. If the ambient temperature is higher than 13.6 degrees F, or if all three turbines are not operating at full capacity, a lower flow rate would be sufficient to meet Stony Brook's needs. Similarly, while MMWEC's minimum requirements call for a delivery pressure of 360 psig, the Company has entered into a contract with Bay State to receive gas at 350 psig, and intends to make compensating improvements to internal piping at Stony Brook. Thus, the minimum requirements do not appear to be threshold conditions without which no economic or environmental benefits can be achieved; rather, they reflect operating conditions which MMWEC finds desirable. The Siting Board therefore concludes that it should view MMWEC's minimum requirements, not as baseline performance standards, but as indicators of the extent to which each alternative is likely to provide the economic and environmental benefits which have been identified as forming the basis of the need for this project.

MMWEC's primary concerns with regard to the 5.6-mile alternative center on the volume of gas which can be delivered to Stony Brook, the pressure at which it can be delivered, and the potential for instability during transient situations. The record contains conflicting evidence with respect to the volume of gas which could be delivered to Stony Brook via the 5.6-mile alternative. Bay State asserts

that it can reliably supply Stony Brook at 3150 mcf/hr, while MMWEC calculates that the capacity of the 5.6-mile alternative is 2730 mcf/hr. The divergent estimates result from different assumptions regarding the capacity of Bay State's Monson-Palmer line, which provides a critical link between the Tennessee mainline and the 5.6-mile pipeline to Stony Brook.

The Siting Board notes that the Bay State and MMWEC capacity calculations both were developed by credible experts who used industry-standard equations – the Fundamental Flow Equation and the Panhandle B Equation – to model flow in the Monson-Palmer line. Since both models appear to be credible, the Siting Board focuses on the assumptions made regarding the internal roughness of the Monson-Palmer line. MMWEC's modeling assumes a pipeline roughness of 1800 micro inches, while Bay State's modeling uses an efficiency factor of 95%, which appears to be the equivalent of a much lower level of roughness. The record shows that in 1993, the pipeline roughness of the Monson-Palmer line was measured at 1100 micro inches. Given that degradation of pipelines correlates to the distance from the wellhead, and that pipelines located far from the source of gas experience minimal corrosion, the use of a roughness of 1800 micro inches to model the capacity of the Monson-Palmer line appears to be excessive. Further, the roughness of the 275 psig line, which is between 30 to 40 years old, was measured at 1900 micro inches, only 100 micro inches more than the 1800 figure used by MMWEC for the nine year old Monson-Palmer line. Therefore, the Siting Board concludes that the current roughness of the Monson-Palmer line likely is closer to 1100 micro inches than to 1800 micro inches. When a roughness of 1100 micro inches is used, the modeled capacity of the 5.6-mile alternative is closer to 3150 mcf/hr than to 2730 mcf/hr. Accordingly, the Siting Board concludes that the actual economic and environmental benefits of the 5.6-mile alternative are likely to be closer to those modeled based on a 3150 mcf/hr capacity than to those modeled based on a 2730 mcf/hr capacity.

MMWEC asserted that since its calculations confirm that the delivery rate would be less than 3150 mcf/hr, the Monson-Palmer line's ability to supply both MMWEC and MassPower, when each is operating at full capacity, is compromised. The Siting Board acknowledges that, while the exact delivery rate of the 5.6-mile alternative is unknown, and is dependent on the assumptions discussed above, the delivery rate of the proposed project, which would connect directly to Tennessee, would be

at least 3150 mcf/hr, making transient situations less of a concern. Further, the proposed project would operate at a delivery pressure of 360 psig; this higher pressure could allow MMWEC greater operational control during transient situations and therefore could reduce concerns regarding tripping and turbine damage. We note that these concerns are greatest in the winter when MMWEC would be less likely to be operating on gas. In addition, we note that Bay State has recognized the option of uprating the Monson-Palmer line which could resolve the capacity and pressure concerns associated with the 5.6-mile alternative.

With respect to the 3-mile alternative, the record shows that use of the 3-mile pipeline together with the existing 275 psig line would meet MMWEC's capacity and pressure requirements. The record also shows that connecting pipelines of differing pressures poses operational and mechanical difficulties. The operational difficulties associated with cross-connecting the 3-mile pipeline and the 275 psig line could be eliminated by dedicating two turbines to the 3-mile line and one turbine to the existing 275 psig line. However, the 275 psig line is subject to interruption during the December to March 15 time period, and the availability of the 275 psig line to service Stony Brook may decrease in the future due to increased demand from Bay State's firm customers. Therefore, if it were to build the 3-mile alternative, MMWEC would be required to choose between a complex interconnect that would provide it with the ability to operate in a flexible manner, and an operationally simpler system that would subject one of the three turbines to supply interruptions. Under either option, the availability of gas would decline over time as additional firm load is added to the 275 psig line. Consequently, the Siting Board concludes that the 3-mile alterative would provide a less reliable gas supply than the proposed project and the 5.6-mile alternative.

Accordingly, the Siting Board finds that the proposed project would be superior to the 5.6-mile alternative and the 3-mile alternative with respect to reliability. Further, the Siting Board finds that the 5.6-mile alternative would be superior to the 3-mile alternative with respect to reliability. As stated in Section II.B.2.d, above, the relative reliability of different project approaches is relevant to this review primarily to the extent that it is a factor bearing on the level of economic and environmental benefits each approach would provide. In Sections II.B.4 and II.B.5, below, the Siting Board examines the impact that variations in reliability have on the ability of each project approach to meet the identified

need by providing economic and environmental benefits.

4. Economic Comparison

As discussed in Section II.A.3, above, both MMWEC and RMLD presented economic analyses for the proposed project in its entirety and for Phase I. The Siting Board notes that, because Phase I and the 5.6-mile alternative are physically identical, the economic analyses of Phase I can serve as analyses of the 5.6-mile alternative. MMWEC and PAC also analyzed the economic benefits of the 3-mile alternative, and MMWEC provided an additional analysis of the economic benefits of the 5.6-mile alternative at a lower assumed flow rate. These analyses are described in Sections II.B.4.a and II.B.4.b, below. The relative economic benefits of the proposed project, the 5.6-mile alternative, and the 3-mile alternative, as calculated by various parties, are summarized in Table 5, below.

a. MMWEC's Modeling of Alternatives

MMWEC conducted economic analyses of the 3-mile alternative using the demand, supply and economic assumptions underlying the High Demand/HQ Dispatch and the Low Generation/HQ Firm cases, but with altered assumptions regarding capital costs, turbine use, and gas transportation costs. Specifically, MMWEC assumed that it could obtain natural gas for two of its turbines for 10 months each year, and that gas for the remaining turbine would be available only for 9 months each year (Exh. RR-HO-MM-2). MMWEC's analysis assumed that it would build and own the 3-mile line, that transportation over the Monson-Palmer line would be under a firm transportation contract with Bay State, structured similarly to the existing Bay State Contract, and that MMWEC would continue to pay interruptible transportation costs for the 275 psig line (Exh. EFSB-3, at 2 to 4; HO-A-47-S-2, Att. 1-S(2)).[72] At the Siting Board's request, the Company also provided an analysis which assumed that transportation on the 275 psig line would be charged at the volumetric rate set in the Bay State Contract, rather than on an interruptible basis (Exh. HO-A-47-S-2, Att. 2-S(2)). See Table 5, below,

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[72] Both the Company and Bay State acknowledged that MMWEC could own and operate the 3-mile alternative (Tr. 10, at 1049). The Company provided an analysis showing that the NPV of the 3-mile alternative would change by only 1% based on ownership (Exh. RR-HO-MM-33).

for MMWEC's costs.

MMWEC also provided economic analyses of the 5.6-mile alternative assuming that the gas flow rate would be 2730 mcf/hr, rather than 3150 mcf/hr (Exhs. HO-RR-MM-31-S; HO-RR-MM-31-S(2)). Using this assumption, the NPV of the 5.6-mile alternative would be $15.043 million under the High Generation/HQ Dispatch case, $18.614 under the Low Generation/HQ Firm case, and $3.134 million under the +2000 MW case (Exhs. HO-RR-MM-31-S; HO-RR-MM-31-S(2)).[73]

b. PAC's Calculations Regarding the 3-Mile Alternative

PAC estimated the costs of the 3-mile pipeline based on the estimates, assumptions, and factors that Stone and Webster used to calculate costs for the 5.6-mile alternative (Exh. PAC-AJF-S at 10). PAC explained that it used ratios to account for differences in line length and diameter, where applicable, and for special construction considerations such as road, aqueduct, or wetland crossings (id.). PAC estimated the total capital costs for the 3-mile alternative at $12.553 million (id. at 11).[74] PAC argued that MMWEC's estimates for the capital and operating cost of the 3-mile alternative are not accurate (Exh. AJF-S at 6). In addition, PAC assumed that transportation on the 275 psig line would be charged at the volumetric rate set in the Bay State Contract, rather than on an interruptible basis (Exh. PAC-AJF-S at 12; PAC Initial Brief at 19).

To determine the increase in energy value associated with the 3-mile alternative, PAC extrapolated from MMWEC's Low Generation/HQ Firm case (Exh. PAC-AJF-S at 10-11). Specifically, PAC assumed that the 3-mile alternative would allow the three intermediate unit turbines to operate on gas for 29 turbine-months, rather than the 30 turbine-months that would be possible if either the proposed project or the 5.6-mile alternative were constructed; consequently, PAC determined that

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73 MMWEC also indicated that under the High Generation/HQ Dispatch case, +2000 sensitivity, the NPV savings would be $3.134 million (Exh. HO-RR-MM-31-S(2)).

74 The capital cost estimate is based on the 3-mile alternative 1, which follows the WMECO ROW for much of the route (Exh. PAC-AJF-4R). PAC noted that it selected alternative 1 because its terrain characteristics are similar to the 5.6-mile alternative; and therefore, the Stone and Webster estimates would be more readily applicable to this route (id.).

the energy value of the 3-mile alternative should be 29/30 of the 5.6-mile alternative (id. at 7-8). PAC's recalculation resulted in a NPV savings of $25.07 million for the 3-mile alternative (id. at Att. AJF-4R; Exh. HO-RR-MM-36; PAC Initial Brief at 23).

TABLE 5
NPV OF THE SAVINGS (in millions $)

CASES	**14.7-Mile**	**5.6-Mile 3150 mcf/hr**	**5.6-Mile 2730 mcf/hr**	**3-Mile**
High Generation/HQ Dispatch Case	$16.481	$18.419	$15.043	$8.085[a] $16.163[b]
With Termination Penalty	$10.4[c]			
Low Generation/HQ Firm Case	$20.797	$22.532	$18.614	$15.416[a] $21.247[b]
PAC's Calculation				$25.07
With Termination Penalty	$14.6			
RMLD's Cases				
1) Low Cap./Optimistic ROW	$3.937	$6.673		
2) Low Cap./Less Optimistic ROW	$1.390	$5.861		
3) Intermediate Cap./Optimistic ROW	($5.284)	($2.062)		
4) Intermediate Cap./Less Optimistic ROW	($7.821)	($2.857)		

Sources: Exhs. HO-N-53R; MMWEC-JJB-S-2; PAC-AJF-S; HO-A-47-S(2); RR-MM-RMLD-2-2(b); HO-N-73; HO-N-73R; RR-HO-MM-36; RR-HO-MM-31.

a. Assuming interruptible transportation on the 275 psig line.

b. Assuming a $0.03/mmBtu charge for transportation on the 275 psig line, as part of a single contract covering transportation on the 3-mile line and on the Monson-Palmer line.

c. Since the record does not include an update of the cost of the 14.7-mile line for the High Generation/HQ Dispatch case with the termination penalty, the Siting Board calculated based on the earlier analyses that the addition of the early termination payment at five years decreases the NPV savings by approximately $6 million.

c. Positions of the Parties

Bay State asserted that the best record evidence in this case demonstrates that the 5.6-mile alternative would yield greater net economic benefits than the other project alternatives (Bay State Initial Brief at 13). Bay State challenged PAC's net benefit calculations for the 3-mile alternative on

several grounds (Bay State Reply Brief at 5-6). First, it challenged PAC's assumption that IT rates for the 275 psig line could be reduced to be comparable to the throughput charge on the Monson-Palmer line, arguing that Bay State's witness contradicted this assumption (id.). Bay State also argued that PAC's analysis omitted: (1) the costs of reconfiguring piping inside the Stony Brook plant to interconnect the 3-mile pipeline; (2) engineering costs associated with connecting the 3-mile alternative to the Monson-Palmer line; and (3) the societal costs of traffic disruptions associated with construction of the 3-mile alternative (id. at 6).

MMWEC also challenged PAC's analysis on several fronts. First, MMWEC challenged PAC's assumption that the energy value of the 3-mile alternative would be 29/30th of energy value of the 5.6-mile alternative (Company Reply Brief at 64). MMWEC noted that this calculation assumes that the energy production of a third turbine in February would be the same as the average energy production of all three turbines for the ten months between February and November (id. at 65). MMWEC argued that, in reality, generation is higher during the colder months (id.). Second, MMWEC challenged PAC's assumption that transportation pricing for the 3-mile alternative and the 275 psig line would be identical to the pricing in the Bay State Contract, noting that Bay State's witness had testified that its long-run marginal costs would be different under the two arrangements (id.). Finally, MMWEC argued that PAC's capital cost estimate for construction within West Street was inaccurate, both because PAC underestimated the length of the pipeline to be built in West Street, and because it relied on a 1989 Bay State estimate for construction of the MassPower line, which proved to be low (id. at 66).

Wilbraham asserted that the construction of the second phase of the proposed project would produce negative economic benefits, noting that the positive savings MMWEC projects for the proposed project lie entirely with Phase I (Wilbraham Initial Brief at 16). Wilbraham stated that the fundamental problem with MMWEC's economic analysis was its failure to provide an incremental analysis of the costs and benefits of the Phase II (id. at 17).

d. Analysis

MMWEC, RMLD, and PAC have provided a range of estimates of the NPV savings

associated with each of the three project alternatives, under a variety of assumptions. A comparison of the various estimates for the proposed project and the 5.6-mile alternative indicates that the NPV savings of the 5.6-mile alternative, including capital costs and operating and maintenance costs, would be higher than those of the proposed project, with one exception. In the case where the 5.6-mile alternative is assumed to operate at a flow rate of 2730 mcf/hr, rather than 3150 mcf/hr, the NPV savings of the proposed project exceeds that of the 5.6-mile alternative by approximately $1.4 to $2 million.

In Section III.B.3.c, above, the Siting Board examined the probable flow rate of the 5.6-mile alternative, and determined that it likely would be closer to Bay State's projected rate of 3150 mcf/hr than to MMWEC's projected rate of 2730 mcf/hr. Consequently, the Siting Board places greater weight on the cases assuming a flow rate of 3150 mcf/hr, and concludes that the NPV savings of the 5.6-mile alternative likely would exceed that of the proposed project.

The Siting Board's conclusion in this regard is strengthened by the fact that MMWEC modeled the proposed project using single-phase construction costs, even though it currently intends to construct the proposed project using a phased approach. The construction of the pipeline in two phases likely would result in higher construction costs, due to the inherent inefficiencies of staggering construction. The Siting Board notes that, under the terms of the Bay State Contract, MMWEC could be liable for a termination fee if it cancels the contract in order to build Phase II. MMWEC has argued that the fee would not apply if Bay State cannot honor its contract obligations, and therefore has not included the termination fee in the cost of the proposed project. While this may be true, the Siting Board notes that, under certain circumstances, MMWEC would be contractually bound to pay the termination penalty if it chose to construct Phase II. As shown in Table 5, incorporating the termination penalty into the costs of the proposed project significantly reduces the NPV savings of the proposed project, and significantly increases the margin by which the 5.6-mile alternative is the more cost-effective.[75]

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[75] The Siting Board notes that any termination penalty resulting from a decision by MMWEC to extend the 5.6-mile alternative would properly be treated as a cost of that extension. Therefore, should MMWEC in the future seek approval to extend the 5.6-mile alternative, it

(continued...)

The record indicates that the NPV savings of the 3-mile alternative is sensitive to the assumptions used regarding the pricing of gas transportation service on the existing 275 psig line. MMWEC's modeling shows that assuming a fixed volumetric transportation charge, rather than the current interruptible pricing mechanism, would add between $5.5 and $8.0 million to the NPV of the 3-mile alternative. The Siting Board notes that the hypothetical volumetric pricing arrangement would provide firm and interruptible service over different pipelines under a single undifferentiated rate, with a demand charge that recovers the cost of only one of the two lines. Such an arrangement would not be typical under current ratemaking practice. Moreover, Bay State, which owns the 275 psig line, has expressed doubt that it would enter into a contract under such terms. Consequently, the Siting Board places greater weight on scenarios that assume continued interruptible pricing for the 275 psig line.

MMWEC has provided comparisons of the NPV savings of the proposed project, the 5.6-mile alternative, and the 3-mile alternative under two supply scenarios: the High Generation/HQ Dispatch case, and the Low Generation/HQ Firm case. In both cases, the NPV savings of the both the proposed project and the 5.6-mile alternative are significantly higher than those of the 3-mile alternative.[74] PAC has provided an alternate calculation of the NPV savings of the 3-mile alternative, assuming a volumetric charge for the 275 psig line. PAC's calculations suggest that the 3-mile alternative has NPV savings that are $2.5 million higher than those of the 5.6-mile alternative, and $4.3 million higher than those of the proposed project. However, these differences result in large part from PAC's assumptions regarding pricing of transportation on the 275 psig line. In addition, PAC's approach to developing capital costs and to estimating the economic value of the 3-mile line are based on extrapolation from MMWEC's 5.6-mile alternative analysis, and are therefore likely to be

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[75] (...continued)
must include estimated termination penalties in the project cost calculations presented to the Siting Board.

[74] From the record, it is unclear why under the High Generation/HQ Dispatch case, the 3-mile alternative has approximately $300,000 lower NPV savings than the proposed project, while under the Low Generation/HQ Firm case, the 3-mile alternative has approximately $500,000 higher NPV savings than the proposed project (See Table 5, above).

somewhat less accurate than MMWEC's direct cost estimates and modeling. Accordingly, the Siting Board finds that the 5.6-mile alternative would provide greater economic benefits than either the proposed project or the 3-mile alternative. Consequently, the Siting Board finds that the 5.6-mile alternative would be superior to both the proposed project and the 3-mile alternative with respect to meeting the identified economic need.

5. Environmental Comparison

In this section, the Siting Board compares the environmental impacts of facilities and potential mitigation for such impacts, among the three project approaches described in Section II.B.2 above: (1) the proposed project (the 14.7-mile direct interconnection with Tennessee's pipeline); (2) the 5.6-mile alternative (interconnection with the Monson-Palmer line at East Street);[75] and (3) the 3-mile alternative (interconnection with the Monson-Palmer line at West Street). Each of these three project approaches has its own route alternatives, so there may be a range of impacts for each alternative for some parameters. For purposes of this section, quantitative information on the first two project approaches is provided specifically for MMWEC's preferred route, unless otherwise noted. Environmental impacts are grouped as: (a) environmental impacts of pipeline installation (i.e., direct environmental impacts); and (b) indirect impacts and benefits of enhancing the gas supply to Stony Brook (e.g., regional air quality benefits).

a. Environmental Impacts of Pipeline Installation

Tables 6 and 7, below, quantitatively compare impacts of pipeline construction on wetlands, streams, wildlife habitat, agricultural land, and residential areas.

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75 Data presented for Phase I of the proposed project contribute to the characterization of the environmental impacts of the 5.6-mile alternative, since the two are considered functionally equivalent.

TABLE 6
COMPARISON OF WETLANDS, STREAM, AND HABITAT IMPACTS FROM PIPELINE INSTALLATION/CONSTRUCTION

	Proposed Project (by Western/Northern Corridor) [a]	**5.6-Mile Alternative** (by Western/Northern Corridor)	**3-Mile Alternative** (Route alternative 1 or 2)
Bordering Vegetated Wetland Area	32.3 acres	8.4 acres	1.7 acres
Total Number of Stream Crossings	22	11	0 - 2
Perennial Streams	14	5	0 - 1
Trout Streams	9	5	0 - 1
Vernal Pools [b]	4 [c]	1 [d]	1 to 5
Vegetative Cover Altered	35.4 acres	18.8 acres	4.2 - 8.2 acres
Permanent Forest Clearance	7.2 acres	2.3 acres	0.6 - 1.0 acres
Forest Cleared for Construction	26.9 acres	7.9 acres	1.4 - 2.2 acres
Rare Species Occurrences [d]	28	8	0
Number of Rare Plant Species [d]	6	0	0
Number of Rare Animal Species [d]	8	5	0
Total Agricultural Impact	18.2 acres	9.2 acres	1.1 - 3.9 acres
Linear Feet of Prime Farmland	6696 feet	2980 feet	0 - 1750 feet

Source: Exh. RR-HO-MM-10, Att. 1, except where noted.

a. MMWEC proposes to determine alignment of Phase II according to the same concepts used to select an alignment for the 5.6-mile alternative (Tr. 4, at 358).
b. Exh. EFSB-3, at 72, G-4, G-5.
c. MMWEC indicated that construction activities would avoid or go under vernal pools (Exh. EFSB-3, at 111).
d. Exh. EFSB-3, at 68.

TABLE 7
COMPARISON OF LAND USE IMPACTS FROM PIPELINE INSTALLATION/CONSTRUCTION

	Proposed Project (by Western/Northern Corridor)	**5.6-Mile Alternative** (by Western/Northern)	**3-Mile Alternative** (Route alternative 1 or 2)
Number of Road Crossings	22	10	1 - 8
Residential Properties Crossed	46	25	2 - 29
Houses Within 100 feet	16	4	21 - 94
Schools and Hospitals Within 200 feet	2	0	0
Aqueduct Crossings	3	3	1
Length of In-Street Construction [a]	0.2 miles [b]	0.1 miles	0.41-2.5 miles [c]

Source: Exh. RR-HO-MM-17, Att. 1.
a. Exhs. EFSB-3, at 32, 170, App. H; HO-EL-2 Att. 4; HO-A-47-S.
b. Distance estimated from maps for a road cut along East Street at Massachusetts Turnpike.
c. According to PAC, the distance listed as 0.41 miles is actually 0.3 miles (Tr. 5, at 567).

i. Permanent Impacts

Pipeline installation can be expected to have permanent environmental impacts including (1) changes to upland forest vegetation, changes to forested wetland vegetation, and visual impacts from loss of screening by trees; (2) limitation on future land development within the pipeline ROW; (3) possible changes in localized drainage patterns, and (4) changes in safety risks from possible future excavation within ROWs. As in other Siting Board cases, some of the potential impacts would be mitigated in accordance with stated plans of the applicant. Generally, construction of the proposed project or the 5.6-mile alternative along the western/northern corridor would follow existing ROWs (Exh. EFSB-3, at 172). In such locations, MMWEC stated that the permanent ROW would be 20

feet wide and that an additional 45 feet would generally be taken as temporary ROW (Tr. 4, at 369). Where the northern/western corridor route follows an oil transmission pipeline ROW in the vicinity of the oil tank farm east of West Street, MMWEC indicated that approximately 15 feet of new clearing would be required for a 20-foot wide permanent gas pipeline ROW (id., at 416-417). Construction of the 3-mile alternative would be predominantly either along an existing ROW (3-mile alternative 1) or along an existing street (3-mile alternative 2) (Exh. EFSB-3, at 32, Fig. 1).

MMWEC indicated that approximately 7.2 acres of forest would be permanently cut for the proposed project, approximately 2.28 acres of forest would be permanently cut for the 5.6-mile alternative, and approximately 0.6 to 1.0 acre(s) of forest would be permanently cut for the 3-mile alternative (Exh. RR-HO-MM-10, Att. 1; Tr. 4, at 357). In addition, MMWEC indicated that there may be some individual trees that WMECO has allowed to grow as exceptions to the general rule of keeping the WMECO ROW cleared, that would need to be permanently removed for installation of the gas pipeline (Tr. 3, at 368). The Company stated that there would be some permanent conversion of forested wetland to shrub and wet meadow communities along the permanent ROW, but did not estimate the affected acreage (Exh. EFSB-3, at 11).

Mr. Flood, a witness for MMWEC, stated that the safety of a pipeline is enhanced by placing it in an area that is not prone to future third-party work (Tr. 4, at 488). He added that a cross-country pipeline would normally be expected to have a better safety record than a line that is laid in streets or along the street frontage of residences, where periodic third-party subsurface work may be anticipated (id.).

Regarding cultural resources, MMWEC stated that it has extensively surveyed the 5.6-mile alternative on the western/northern corridor and that no further cultural resource survey would be required for the 5.6-mile alternative or 3-mile alternative 2 (Tr. 6, at 720-722). Phase II of the proposed project and other route alternatives would require additional field work to investigate cultural resources (id.).

ii. Temporary Construction Impacts

As in previous pipeline cases, pipeline construction is expected to have temporary impacts on

forest lands, wetlands, surface water quality, noise levels, and traffic patterns. Many of these temporary impacts can be mitigated. MMWEC estimated that construction of the proposed project would require approximately 17 to 22 weeks, while construction of either the 5.6-mile alternative or the 3-mile alternative would require approximately 8 to 12 weeks (Exh. HO-A-26).

The Company stated that most of the effects of the project on wetland resources would be temporary and related to construction (Exh. EFSB-3, at 103). The Company stated that the duration of construction work would be approximately 30 days at any one wetland location along the route, including vegetation clearing, pipeline installation, and initial wetland restoration; the Company indicated that full wetland recovery would take at least one year (id.).

The Company stated that it conducted wetland resource surveys along the proposed route, using both the approach specified by the U.S. Army Corps of Engineers' *Wetlands Delineation Manual* and the resource categories set forth in the Massachusetts Wetlands Protection Act (id.; Exh. HO-EW-22).[76] The Company indicated that 32.3 acres of Bordering Vegetated Wetlands ("BVW") would be affected by ROW clearing for the proposed project, 8.4 acres would be affected by the 5.6-mile alternative, and a minimum of 1.7 acres would be affected by the 3-mile alternative (Exhs. EFSB-3, at 104; RR-HO-MM-10, Att. 1). The Company indicated that there would be 22 stream crossings along the proposed project, of which 14 would be across perennial streams; 11 stream crossings along the 5.6-mile alternative, of which 5 would cross perennial streams; and depending on the route selected, either two stream crossings including one perennial stream crossing, or no stream crossings along the 3-mile alternative (Exh. RR-HO-MM-10, Att. 1).[77] Several of the streams crossed

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[76] The Company stated that wetlands along the proposed routes were delineated in 1996 and 1997, flagged, and mapped. Approximate wetland boundaries are depicted in aerial mosaic sheets provided in the Supplemental Draft Environmental Impact Report ("SDEIR") (Exh. EFSB-3, at App. H). The wetland delineations in Ludlow had not been presented to the Ludlow Conservation Commission, as of May 12, 2000, pending selection of a precise pipeline alignment (Exh. HO-EW-22).

[77] For the proposed project only, MMWEC indicated that significant stream crossings would include a major crossing of the Chicopee River and multiple crossings of the Mill River in

(continued...)

are identified as trout streams (id.).

MMWEC stated that there are 44 bank areas, 15 bordering and 3 isolated areas of land subject to flooding, and 14 riverfront areas along the proposed project route (Exh. EFSB-3, at 64). The Company also noted there are areas "that could be characterized as vernal pools" along each of the various alternative corridors (id. at 72; HO-EW-24). The Company stated it submitted its survey results to the Massachusetts Natural Heritage and Endangered Species Program ("MNHESP") (Exhs. EFSB-3, at 72; HO-EW-24). The Company stated that there is only one potential vernal pool along the 5.6-mile alternative, and noted that a narrowed construction corridor is proposed for this location due to the presence of a state-listed rare species; the Company stated that all construction vehicles and activity would be routed more than 100 feet from the rare species habitat, and that directional drilling would be performed if the MNHESP certifies the pool (Exhs. HO-EW-25; HO-EW-26). The Company noted three additional areas that could be characterized as vernal pools along the preferred route for Phase II of the proposed project (Exh. EFSB-3, at 67). The Company committed to avoid all known habitat of rare species found along the project corridor (Exh. EFSB-3, at 12).

In addition to permanent changes to forest area, discussed above, MMWEC indicated that construction would require temporary clearing of forest for equipment access, including: approximately 26.9 acres of forest for the proposed project; 7.9 acres for the 5.6-mile alternative; and 1.4 to 2.2 acres for the 3-mile alternative (Exh. RR-HO-MM-10, Att. 1; Tr. 4, at 357). A total of 6696 linear feet of prime farmland would be temporarily affected by the proposed project; 2990 linear feet along the 5.6-mile alternative, and up to 1750 linear feet for the 3-mile alternative (Exh. RR-HO-MM-10).

MMWEC indicated that the proposed project and 3-mile alternative 2 would have the greatest construction noise impact on neighbors (Tr. 4, at 457-459; Tr. 6, at 725-728). The Company stated that 3-mile alternative 2 would have obtrusive construction noise impacts due to the required slow-

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77 (...continued)
Wilbraham, which the project route generally follows for over a mile and a half (Exh. EFSB-3, at 143K, Fig. 1). MMWEC noted that directional drilling would be attempted for the Chicopee River crossing and considered for the Mill River wetlands (id. at 143H; Tr. 4, at 514).

moving stovepipe construction in the street, directly in front of houses (Tr. 4, at 457-459; Tr. 6, at 725-728). The Company stated that the proposed project would have extensive construction noise impact on neighbors, due to its longer length and overall construction duration (Tr. 4, at 457-459; Tr. 6, at 725-728). Mr. Downing, a witness for MMWEC, stated that the 5.6-mile alternative likely would have the least construction noise impact of the three approaches (Tr. 6, at 727).

MMWEC indicated that construction traffic impacts would be minor for either the proposed project or the 5.6-mile alternative, because MMWEC plans to avoid open cutting of roads by boring each road crossing from the side (Tr. 4, at 460-463). The Company indicated that traffic impacts would be most significant for 3-mile alternative 2 (id. at 467-468).

iii. Positions of the Parties

MMWEC acknowledged that both the 5.6-mile alternative and the 3-mile alternative would have fewer overall impacts to the natural environment than the proposed project (Company Initial Brief at 125). MMWEC contended, however, that impacts of construction on the built environment would be "much greater" for the 3-mile alternative than for either the 5.6-mile alternative or the proposed project (id.).

PAC contended that MMWEC's own numbers show that the 3-mile alternative would have fewer environmental impacts than the 5.6-mile alternative, and that the 5.6-mile alternative would have a significantly fewer environmental impacts than the proposed project (Tr. 5, at 556; PAC Initial Brief at 6, 16).[78]

RMLD argued that the 5.6-mile alternative would result in fewer impacts to the natural

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[78] PAC contended that the rank-order of six alternatives from least wetlands impacts to most wetlands impacts is: (1) 3-mile alternative 2, (2) 3-mile alternative 1, (3) the 5.6-mile alternative, (4) the western/eastern route for the proposed project, (5) the western/northern route for the proposed project, and (6) the eastern route for the proposed project (PAC Initial Brief at 27). PAC contended that the rank-order of six alternatives with respect to impacts to upland resources and the built environment is: (1) 3-mile alternative 2, (2) 3-mile alternative 1, (3) the 5.6-mile alternative, (4) the western/northern route for the proposed project, (5) the western/eastern route for the proposed project, and (6) the eastern route for the proposed project (id.).

environment than the proposed project, when air impacts are excluded (RMLD Reply Brief at 34).

Bay State contended that the 5.6-mile alternative is "reasonable in terms of environmental impacts compared to other alternatives and any potential advantages to other alternatives over the [5.6-mile alternative] are not definitive," (Bay State Initial Brief at 14). Bay State also noted that the proposed project has greater environmental impacts than the 5.6-mile alternative (Bay State Reply Brief at 17).

iv. Analysis

The record shows that the terrestrial, aquatic, and wetland impacts of the proposed project, the 5.6-mile alternative, and the 3-mile alternative are generally proportionate to their length, with the proposed project having the greatest impacts, and the 3-mile alternative having the least. Land use impacts of the project approaches are significantly affected by the type, as well as the length, of route, with the in-street construction of much of 3-mile alternative 2 presenting some distinct disadvantages relative to disruptions to residents during pipeline construction. The two versions of the 3-mile alternative include a broad range of potential impacts and there are clearly some trade-offs of dissimilar impacts in such a comparison. We focus on 3-mile alternative 1, principally due to its lower level of temporary impacts.

The record demonstrates that in virtually every respect, there are greater impacts directly related to pipeline installation for the full 14.7-mile proposed project, compared to the 5.6-mile alternative. The principal disadvantages of 3-mile alternative 1, compared to the 5.6-mile alternative, are the greater number of residences within 100 feet of a pipeline route, unspecified but likely greater land use impacts around a take station,[79] and greater impacts on traffic due to a length of in-street

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[79] MMWEC and Bay State indicated that there is no ideally situated parcel for a custody transfer station in the vicinity of the intersection of West Street and West Avenue in Ludlow. The transfer station likely would be placed in proximity to non-industrial land uses. Therefore, the Siting Board notes that both versions of the 3-mile alternative would likely have some land use impacts associated with installation of a transfer station, although the extent of such impacts cannot be specified. In contrast, the designated location for a transfer station for the 5.6-mile

(continued...)

construction. Although the number of residences is higher, the record does not show that significant visual impacts are likely since an existing cleared corridor would be used; land use impacts around a take station would presumably affect a small area; and the length of in-street construction is only several hundred yards. On balance, the greater impacts on natural resources of the 5.6-mile alternative slightly outweigh the limited number of community impacts for which 3-mile alternative 1 is inferior.

Consequently, the Siting Board finds that the 3-mile alternative would be slightly superior to the 5.6-mile alternative, and that the 3-mile alternative and the 5.6-mile alternative would be superior to the proposed project, with respect to the direct environmental impacts of pipeline installation.

b. Impacts and Benefits of Enhanced Gas Supply

i. Air Quality Impacts and Benefits

As described in Section II.B.5, above, MMWEC modeled the changes in Stony Brook, state, and regional air emissions that would result from construction of the proposed project and Phase I of the proposed project (i.e., the 5.6-mile alternative) and the resulting displacement of the dispatch of regional generation facilities by increased dispatch of the intermediate unit. MMWEC also modeled changes in emissions that would result from construction of the 3-mile alternative (Exhs. HO-N-75-S-2; RR-HO-MM-31-S-2; Tr. 2, at 164).

Differences in regional air quality benefits, and other impacts of enhancing the natural gas supply to Stony Brook are related to the increase in the number of hours that Stony Brook would operate on gas, which in turn is dependent on the economic factors discussed above in Section II.B.4. Table 8, below, shows MMWEC's projections for three selected years (2002, 2005, 2010) of (1) increases in the amount of power generated at Stony Brook; and (2) changes in emissions, under each of the three project approaches.

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79 (...continued)
alternative, next to the Massachusetts Turnpike near East Street in Ludlow, has been shown to be relatively distant from residential or recreational areas, and therefore would contribute to lesser land use impact.

TABLE 8
AIR EMISSIONS DIFFERENCES FROM NO-BUILD, FOR THREE SELECTED YEARS [a]

PROJECTED DIFFERENCE IN STONY BROOK OPERATIONS, MW-hrs									
	Reference Case: 14.7 mile [b]			Reference Case: 5.6-mile [c]			Reference Case: 3-mile [d]		
	2002	2005	2010	2002	2005	2010	2002	2005	2010
MW-hrs: gas	633,600	426,600	559,100	630,600/ 543,400	420,700/ 378,100	553,200/ 484,500	522,100	353,300	472,100
MW-hrs: oil	0	0	-200	0	0	-200	0	0	-200
PROJECTED DIFFERENCE IN ANNUAL EMISSIONS AT STONY BROOK, tons per year									
	Reference Case: 14.7 mile			Reference Case: 5.6-mile			Reference Case: 3-mile		
	2002	2005	2010	2002	2005	2010	2002	2005	2010
NO_X	281	189	248	280 / 241	187 / 168	246 / 215	232	157	210
SO_2	2	1	1	2 / 1	1 / 1	1 / 1	1	1	1
PM	53	36	47	53 / 46	35 / 32	47 / 41	44	30	40
CO	24	16	21	24 / 20	16 / 14	21 / 18	19	13	18
VOC	9	6	8	9 / 8	6 / 5	8 / 7	7	5	7

Source: Exh. HO-N-75-S-2 at Tables 4-2, 4-4 and Exh. RR-HO-MM-31-S-2 at Tables 4-2, 4-4.

a. A positive number indicates an increase in emissions; a negative number indicates a decrease.
b. "Case 23 - Reference Case - 14.7 mile" (Exh. HO-N-75-S-2).
c. In the middle three columns, the first value represents the availability of gas from Bay State as specified in the Bay State Contract, from Case 24 of Exh. HO-N-75-S-2 (December 1, 2000); the second value represents the availability of gas from Bay State as modeled by MMWEC, from Case 18 in Exh. RR-HO-MM-31-S-2 (February 13, 2001).
d. "Case 25 - Reference Case - Bay State Alternative w/ Low Pressure Line priced according to existing interruptible transportation (IT) contract" (Exh. HO-N-75-S-2, Case 25, Tables 4-2, 4-4).

Table 9, below, shows MMWEC's projections for three selected years (2002, 2005, 2010) of changes in emissions resulting from the three project approaches, for displaced facilities in Massachusetts. Table 10, below, shows MMWEC's projection of net statewide changes in Massachusetts emissions resulting from the proposed project; the net change combines projected changes at Stony Brook with changes at displaced facilities elsewhere in Massachusetts. Table 11,

below, shows MMWEC's projections, for three selected years (2002, 2005, 2010), of net future changes in emissions resulting from the three project approaches, including all northeast region generators.

TABLE 9
PROJECTED DIFFERENCE IN ANNUAL EMISSIONS AT OTHER MASSACHUSETTS PLANTS, tpy

	Reference Case: 14.7 mile [a]			Reference Case: 5.6-mile [b]			Reference Case: 3-mile [c]		
	2002	2005	2010	2002	2005	2010	2002	2005	2010
NO_X	-238	-75	-152	-237 / -208	-71 / -65	-148 / -128	-193	-58	-127
SO_2	-349	-220	-432	-348 / -308	-207 / -189	-421 / -360	-287	-169	-355
PM	-66	-38	-73	-65 / -58	-36 / -33	-71 / -61	-53	-29	-60
CO	-41	-17	-35	-40 / -36	-16 / -15	-34 / -29	-35	-13	-29
VOC	-4	-2	-5	-4 / -4	-2 / -2	-5 / -4	-3	-2	-4

Source: Exh. HO-N–75-S-2, at Tables 4-2a, 4-4, and Exh. RR-HO-MM-31-S-2, at Table 4-2a.

a. "Case 23 - Reference Case - 14.7 mile" (Exh. HO-N-75-S-2).

c. In the middle three columns, the first value represents the availability of gas from Bay State as specified in the Bay State Contract, from Case 24 of Exh. HO-N-75-S-2 (December 1, 2000); the second value represents the availability of gas from Bay State as modeled by MMWEC, from Case 18 in Exh. RR-HO-MM-31-S-2 (February 13, 2001).

c. "Case 25 - Reference Case - Bay State Alternative w/ Low Pressure Line priced according to existing interruptible transportation (IT) contract" (Exh. HO-N-75-S-2, Case 25, Tables 4-2a, 4-4).

TABLE 10
PROJECTED NET DIFFERENCE IN MASSACHUSETTS ANNUAL EMISSIONS, tpy

	Reference Case: 14.7 mile [a]			Reference Case: 5.6-mile [b]			Reference Case: 3-mile [c]		
	2002	2005	2010	2002	2005	2010	2002	2005	2010
NO_X	43	114	96	43 / 33	116 / 103	98 / 87	39	99	83
SO_2	-348	-219	-431	-346 / -307	-206 / -188	-419 / -359	-286	-168	-354
PM	-12	-2	-26	-12 / -13	0 / -1	-24 / -20	-9	1	-20
CO	-17	-1	-14	-17 / -15	0 / -1	-13 / -11	-15	0	-12
VOC	5	4	3	5 / 4	4 / 3	3 / 3	4	3	3

a. "Case 23 - Reference Case - 14.7 mile" (Exh. HO-N-75-S-2, Case 23, Tables 4-2a, 4-4).

b. In the middle three columns, the first value represents the availability of gas from Bay State as specified in the Bay State Contract, from Case 24 of Exh. HO-N-75-S-2 (December 1, 2000); the second value represents the availability of gas from Bay State as modeled by MMWEC, from Case 18 in Exh. RR-HO-MM-31-S-2 (February 13, 2001).

c. "Case 25 - Reference Case - Bay State Alternative w/ Low Pressure Line priced according to existing interruptible transportation (IT) contract" (Exh. HO-N-75-S-2, Case 25, Tables 4-2a, 4-4).

TABLE 11
PROJECTED NET DIFFERENCE IN NORTHEAST REGION ANNUAL EMISSIONS, tpy

	Reference Case: 14.7 mile [a]			Reference Case: 5.6-mile [b]			Reference Case: 3-mile [c]		
	2002	2005	2010	2002	2005	2010	2002	2005	2010
NO_X	-173	-66	-71	-173 / -157	-65 / -53	-69 / -60	-135	-35	-47
SO_2	-872	-775	-904	-870 / -768	-762 / -672	-890 / -773	-694	-572	-715
PM	-74	-55	-74	-74 /-67	-53 / -48	-72 /-61	-59	-38	-58
CO	-57	-33	-48	-57 /-51	-33 / -29	-47 /-41	-49	-25	-39
CO_2 [d]	-19,528	-22,776	-40,894	-20,540 / -23,789	-21,070/ -16,467	-38,988/ -32,161	-17,003	-4,552	-25,158
VOC	-9	-10	-8	-9 / -9	-10 / -8	-8 / -7	-8	-7	-6

Source: From Tables 4-2, 4-4 (Exh. HO-N-75-S-2); Table 4-2, 4-4 (Exh. RR-HO-MM-31-S-2).

c. "Case 23 - Reference Case - 14.7 mile" (Exh. HO-N-75-S-2).

b. The first value in the middle three columns represents the availability of gas from Bay State as specified in the Bay State Contract, from Case 24 of Exh. HO-N-75-S-2 (December 1, 2000); the second value represents the availability of gas from Bay State as modeled by MMWEC, from Case 18 in Exh. RR-HO-MM-31-S-2 (February 13, 2001).

c. "Case 25 - Reference Case - Bay State Alternative w/ Low Pressure Line priced according to existing interruptible transportation (IT) contract" (Exh. HO-N-75-S-2, Case 25, Tables 4-2, 4-4).

d. There would also be an annual increase of 280 to 370 tons of CO_2 released due to the loss of forest and disturbance of soils from pipeline installation (Exh. MMWEC-LMB at 15).

Projections and calculations provided by MMWEC indicate that the project would not cause either Massachusetts or northeast region total emissions of NO_X, SO_2, CO_2, or VOC to increase or decrease by more than 1% (Exh. RR-HO-MM-1). On the basis of the modeled regional decrease in CO_2 emissions, MMWEC argued that the increase in CO_2 emissions at Stony Brook would be fully mitigated (Exh. PAC ED-11-S).

ii. Noise and Water Consumption Impacts

MMWEC indicated that installation of a new pipeline would allow for more hours of facility operation, which could lengthen the time the facility would create noise; but asserted that the increase in hours would be offset by eliminating noise from the gas compressor station (Tr. 4, at 444-451).

MMWEC indicated that noise from the existing compressors would not be eliminated if the existing 275 psig line were maintained as a supplemental gas supply as part of the 3-mile alternative (Exh. HO-A-27). MMWEC provided historical data suggesting that the Stony Brook turbines do not increase ambient noise levels at the property boundaries by more than 5 decibels (A-weighted), but did not provide noise measurement data comparing noise from the existing gas compressors to overall plant noise (Exh. RR-HO-MM-21, Att. 1; Tr. 5, at 603, 668-672). MMWEC estimated distances from the existing gas compressors to other land uses as 1800 feet to a commercial structure (Bassett Boat), 2000 feet to vacant land, and 2300 feet to the closest residences (Tr. 4, at 446-551).

The Company estimated that additional water consumption at Stony Brook would be 142,136,874 to 226,383,404 gallons per year with the proposed project and 136,685,018 to 205,473,955 gallons per year with the 5.6-mile alternative, based on the additional intermediate unit generation predicted for the years 2000, 2005, and 2010 (Exh. HO-N-32(S)). MMWEC stated that the greatest water uses are for cooling and for NO_X emissions control (Tr. 3, at 343). MMWEC indicated that the source of water for Stony Brook is the Springfield Water and Sewer Commission (id., at 318).[80] MMWEC stated that it has a contract with the City of Springfield to supply water to Stony Brook at the rate of 1.8 million gallons per day (i.e., 657 million gallons per year); MMWEC stated that this rate is greater than the amount needed for the expected additional generation with the proposed project (Exhs. HO-N-68; RR-HO-MM-14; Tr. 3, at 318, 319).

iii. Positions of the Parties

MMWEC contended that the proposed project would result in a greater reduction in total air emissions than the alternatives (Company Initial Brief at 100). Further, MMWEC contended that,

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80 MMWEC provided information indicating the Springfield Water and Sewer Commission obtains water from Cobble Mountain Reservoir in Blandford, and that the system's water use did not increase during the 1990s (Exh. RR-HO-MM-15, Att. 1; Tr. 3, at 319). Water pumped from the West Parish Filters Treatment Plant, which treats water from Cobble Mountain Reservoir, was more than 14.6 billion gallons in 1990 and 1991, and between 12.5 billion and 13.5 billion gallons each year from 1992 to 1999, according to data from the Springfield Water and Sewer Commission (Exh. RR-HO-MM-15, Att. 1).

while the proposed project would consume the most water and the 3-mile alternative would consume the least water among the approaches, the impact of such increases would be "minimal to non-existent" (id.).

With respect to air emissions, PAC claimed that, if MMWEC could alter its internal accounting practices, it could bid as low, and run Stony Brook as frequently, with the 5.6-mile alternative as with the proposed project (PAC Initial Brief at 16).[81] PAC also contended, based on an expectation that Stony Brook would use oil rather than gas in two winter months each year, that Stony Brook would run on gas 83% of the time, or only slightly more than its historical rate of 77% on gas (id. at 31).

RMLD contended that, under the dispatch assumptions it considers most likely,[82] the proposed project would have little or no air emission advantage over the 5.6-mile alternative (RMLD Reply Brief at 33).

iv. Analysis

MMWEC has modeled both anticipated changes in emissions from the intermediate unit, and anticipated changes in statewide and regional power plant emissions, that would result from each of the three project approaches. The modeling results are set forth in Tables 8, 9, 10, and 11, above.

MMWEC's modeling shows that the proposed project would have both the greatest adverse impact on facility air emissions from Stony Brook and the greatest positive impact on regional air emissions. As shown in Table 8, the proposed project would result in more additional hours of gas-fired operation than the other two project approaches. The 5.6-mile alternative would result in 0.5% to

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81 PAC contended that MMWEC's goal "is to get as many generating hours as possible" (PAC Initial Brief at 16). PAC asserted further that MMWEC could, in its accounting, put all of the transportation costs charged by Bay State for the 5.6-mile alternative into MMWEC's "pipeline fixed cost account" (id.). PAC argued that the marginal cost of operating Stony Brook thus would be the same for the proposed project and the 5.6-mile alternative, and that MMWEC could then bid the same rate into the ISO (id.). PAC concluded that the air emissions should be considered identical between the 5.6-mile alternative and the proposed project (id.).

82 Specifically, RMLD stated its evaluation assumed Hydro-Québec is dispatched before Stony Brook (RMLD Reply Brief at 33).

1.4% fewer additional hours of gas-fired operation, compared to the proposed project, assuming gas pressure and volume are provided per the Bay State contract, or 11% to 14% fewer additional hours of gas-fired operation, assuming gas pressure and volume as modeled by MMWEC. Construction of the 3-mile alternative would result in 16% to 18% fewer additional hours of gas-fired operation, as compared to the proposed project.

Projected changes in emissions correlate closely with the projected increases in gas-fired operation of the intermediate unit. Table 8 shows that annual emissions of five criteria pollutants plus CO_2 are projected to increase at the Stony Brook facility under each approach, with the greatest increases occurring with the proposed project.[83] Table 10 shows that Massachusetts total annual emissions of NO_X, SO_2, and VOCs would increase under each alternative, while Massachusetts total emissions of SO_2, particulates, and CO would decrease under each approach; the greatest increases and reductions in emissions would occur with the proposed project while the smallest changes generally would occur with the 3-mile alternative. Table 11 shows that each approach would result in a reduction in the total regional emissions of each of five criteria pollutants and CO_2, with the greatest reductions occurring under the proposed project and the smallest reductions occurring under the 3-mile alternative.

MMWEC's modeling thus demonstrates that the 3-mile alternative would result in both lower additional facility emissions, and smaller reductions in net regional emissions, than either the proposed project or the 5.6-mile alternative. The modeling also shows that the 5.6-mile alternative would result in air emissions changes intermediate between those of the 3-mile alternative and the proposed project.[84] If pipeline performance is as projected by Bay State, the 5.6-mile alternative would have air

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83 As discussed in Section II.B.5.b, above, MMWEC's model appears to underestimate both current and future oil use at Stony Brook. Changes in emissions from Stony Brook, including emissions of SO_2, may be more advantageous than modeled, especially for the proposed project and the 5.6-mile alternative.

84 Ms. Carlson, a witness for MMWEC, stated that "[a] general understanding from reviewing all the results is that in the broad picture, the 15-mile alternative and the 5.6 tend to be fairly close to each other in results until you get to the outyears and tend to show significantly greater

(continued...)

emissions changes very similar to the proposed project; if pipeline performance is as projected by MMWEC, the 5.6-mile alternative would have smaller emissions changes.

MMWEC's claims about the regional air emissions impact of the project could be overstated, because the most effective pipeline to Stony Brook would have the greatest potential to produce price offsets that could inhibit other developers from building new generating facilities – facilities that could have emissions efficiencies equal to or better than Stony Brook operating on natural gas. The record also does not well support PAC's conclusion that the air quality benefits of the 5.6-mile alternative would be nearly identical to those of the proposed project.[85]

The Siting Board notes that ozone, which is considered a regional pollutant, is the one criteria pollutant that has recently exceeded National Ambient Air Quality Standards ("NAAQS") in Massachusetts. Therefore, the advantage of approaches that reduce emissions of regional ozone precursors such as NO_X and VOC warrants some additional weight, relative to any disadvantage in increasing local emissions. Again, however, the differences among project approaches in local and regional emissions are small. On balance, the proposed pipeline is slightly superior to the 5.6-mile alternative, and the 5.6-mile alternative slightly superior to the 3-mile alternative, with respect to air emissions.

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84 (...continued)
reductions than the [3-mile alternative]" (Tr. 1, at 72).

85 The Siting Board affords little credibility to PAC's assertion that changing MMWEC's internal accounting would cause MMWEC's bids to be indifferent as to gas transportation costs. PAC's assertion is inconsistent with the reality that MMWEC incurs gas transportation costs when it operates. The Siting Board notes that MMWEC would be expected to place bids at a higher price for the 5.6-mile alternative than it would for the full project, due to the additional cost for transportation on the Monson-Palmer line. Therefore, the 5.6-mile alternative would not have air quality benefits that match the proposed project. Also, the record indicates that there may be a physical limit where maximum gas flow through the 5.6-mile alternative could be substantially lower than flow through the proposed project, especially when temperatures are very low. Furthermore, the Siting Board notes PAC's assumption that Stony Brook would operate at a uniform frequency throughout the year is not supported by the record. As a result, there is no substantial support for PAC's contention that the fuel mix at Stony Brook would change only slightly with the project.

The Siting Board considers the net air pollution impacts of the three approaches to be generally similar, with each having benefits with respect to regional emissions but each having adverse impacts with respect to facility emissions, as modeled by MMWEC.[86] The proposed project would have the largest regional benefits but also the largest increase in facility emissions, compared to the 5.6-mile alternative, and the 3-mile alternative would have the smallest changes. Therefore, advantages and disadvantages of the three approaches are partially offsetting, with respect to air quality. The record shows that the magnitude of emissions changes from the 5.6-mile alternative depends on the physical ability of that pipeline to deliver gas to Stony Brook; the difference between the proposed project and the 5.6-mile alternative has not been definitively established but is likely to be modest, while the disadvantage of the 3-mile alternative would be more substantial.

For particulates and CO, criteria pollutants that may be of concern in close proximity to emitters, MMWEC's analysis shows offsetting changes consisting of increases at Stony Brook and decreases at various displaced facilities. For Massachusetts and the northeast region as a whole, MMWEC's analysis shows the reduction in particulates and CO, as well as SO_2, exceed in aggregate the added emissions of these pollutants at Stony Brook. Regional emissions of the criteria pollutants that are of regional concern would be reduced most with the approach modeled to provide the greatest increase in Stony Brook operations. These regional pollutants include SO_2, which is a factor in regional haze, smog, and acid rain; NO_X and VOCs, which are ozone precursors. Regional emissions of CO_2, considered a factor in global climate change, would also be most reduced by the approach modeled to provide the greatest increase in Stony Brook operations. As a result, the proposed project would provide the largest reductions in regional emissions of these pollutants; the 3-mile alternative would provide lower reductions; and the 5.6-mile alternative would provide an intermediate level. The Siting Board finds that both the proposed project and the 5.6-mile alternative would be superior to the 3-mile alternative and that the proposed project would slightly superior to the 5.6-mile alternative, with respect to air quality impacts. Consequently, the Siting Board finds that the proposed project would be slightly

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86 The Siting Board notes that the differences among project approaches in modeled emissions impacts are small compared to the sensitivity of the projections to other factors such as changes in regional generating capacity.

superior to the 5.6-mile alternative, and superior to the 3-mile alternative with respect to meeting the identified need.

The projected increase in operating hours resulting from the construction of a new gas pipeline also affects noise and water use. As noted by PAC, MMWEC did not provide quantitative data comparing compressor noise levels to noise levels from the rest of Stony Brook. Therefore, the overall change in facility noise from increasing gas supplies is not established. However, since Stony Brook is relatively isolated from residential areas, facility noise levels are only of minor concern.[87]

Water use impacts are expected to be highest for the proposed project and lowest for the 3-mile alternative. However, the record indicates that water usage would remain less than the 1.8 million gallons per day contracted from the Springfield Water and Sewer Commission.

Air quality, noise, and water use impacts have been identified as indirect environmental impacts of the proposed project and its alternatives. The Siting Board finds that noise and water use impacts of the proposed project, the 5.6-mile alternative, and the 3-mile alternative would be comparable. Therefore, the Siting Board finds that the proposed project and the 5.6-mile alternative would each be superior to the 3-mile alternative, and that the proposed project would be slightly superior to the 5.6-mile alternative, with respect to indirect environmental impacts.

c. Net Environmental Impacts

The Siting Board has found that the 3-mile alternative would be slightly superior to the 5.6-mile alternative, and the 3-mile alternative and the 5.6-mile alternative would be superior to the proposed project, with respect to the direct environmental impacts of pipeline installation. The Siting Board has also found that the proposed project and the 5.6-mile alternative would each be superior to the 3-mile alternative, and that the proposed project would be slightly superior to the 5.6-mile alternative, with respect to indirect environmental impacts.

Installation of a pipeline of over 5 miles in length would result in a range of clear environmental

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87 The record does not reveal differences in noise generation at Stony Brook among project approaches, except that use of the 3-mile alternative in combination with the existing 275 psig line would fail to eliminate noise generated by the existing compressors.

impacts. Many of the environmental impacts would be only temporary, or mitigated by use of existing ROWs. The projected air pollution benefits are more speculative, as well as being relatively modest. Also, to the extent there are modeled differences among the three approaches with respect to air emissions impacts, the record suggests that Bay State may be able to uprate the Monson-Palmer line, which likely would significantly lessen the differences. These factors make the construction impact disadvantages of the proposed project more compelling than the indirect air emissions impact disadvantages of the 3-mile alternative. The 5.6-mile alternative appears to deliver most of the air emissions benefits of the proposed project, while avoiding much of the construction impacts because it is less than half the length of the proposed project. The 3-mile alternative is, on balance, slightly superior to the 5.6-mile alternative with respect to construction impacts, but because this difference is slight it is offset by the smaller air emissions benefits of the 3-mile alternative, as modeled by MMWEC. On balance, the Siting Board finds that the 3-mile alternative and the 5.6-mile alternative would each be superior to the proposed project, and the 5.6-mile alternative and the 3-mile alternative would be comparable, with respect to overall environmental impact.

6. Balancing Cost and Environmental Impacts and Benefits

In Section II.B.3.d, above, the Siting Board found that the proposed project would be superior to the 5.6-mile alternative and the 3-mile alternative with respect to reliability. This finding was based on record evidence regarding projected gas availability, flow rates, and delivery pressures for each of the three project approaches. However, as discussed above, because the need for additional energy resources is based entirely on projected economic benefits to the Project Participants, and on projected reductions in regional air emissions, these measures of project reliability are relevant to this review primarily insofar as they affect the level of such economic and environmental benefits, or the certainty with which they would be provided.

In Section II.B.4.d, the Siting Board found that the 5.6-mile alternative would provide greater economic benefits than either the proposed project or the 3-mile alternative. Further, in Section II.B.5, above, the Siting Board found that the 3-mile alternative would be slightly superior to the 5.6-mile alternative, and that the 3-mile alternative and the 5.6-mile alternative would be superior to the

proposed project, with respect to the direct environmental impacts of pipeline installation. The Siting Board also found that the proposed project and the 5.6-mile alternative would each be superior to the 3-mile alternative, and that the proposed project would be slightly superior to the 5.6-mile alternative, with respect to indirect environmental impacts. Overall, the Siting Board found that the 3-mile alternative and the 5.6-mile alternative would each be superior to the proposed project, and the 5.6-mile alternative and the 3-mile alternative would be comparable, with respect to overall environmental impacts.

The evidence and argument in this proceeding has focused almost exclusively on the ability of each alternative to meet the currently identified need for economic and environmental benefits related to the more efficient use of the intermediate unit. However, the Siting Board cannot completely ignore the possibility of further expansion in the use of natural gas at Stony Brook, either in the existing peaking units or in a future generating project.[88] It is likely that hypothetical future needs for additional gas supplies could be met most readily, and with the lowest incremental environmental impact, if an option with extra capacity, such as the proposed project, were selected. The 5.6-mile alternative also provides some flexibility to meet future energy needs, since it could be continued along a direct route to the Tennessee pipeline at some later date, subject to economic and environmental review. The 3-mile alternative appears to be most restricted by its interconnection at the far end of the Monson-Palmer line and, by inspection of maps provided, the least readily extended to the Tennessee pipeline.

The proposed project allows the intermediate unit to be dispatched more frequently than either of the other project approaches, and therefore provides the highest level of regional emissions reductions. However, because of its higher construction costs, it provides lower economic benefits than the 5.6-mile alternative. The Siting Board notes that, because the difference in emissions reductions between the proposed project and the 5.6-mile alternative is small, particularly when

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88 The record indicates that MMWEC previously has considered the possibility of using an enhanced gas supply to power additional units at Stony Brook. The record indicates that additional uses which were considered were deemed uneconomic at the time by MMWEC. The record indicates that the 5.6-mile alternative by itself would not have sufficient capacity to supply the existing peakers as well as the intermediate unit.

compared to total regional emissions, the economic advantages of the 5.6-mile alternative outweigh the air quality advantages of the proposed project. The Siting Board therefore concludes that, overall, the 5.6-mile alternative would better meet the identified need for economic and environmental benefits than the proposed project. Moreover, because of its substantially greater length, the environmental impacts associated with the construction of the proposed project would be significantly higher than those of the 5.6-mile alternative. The proposed project does provide somewhat greater flexibility to meet future energy needs at Stony Brook; however, because such future needs are entirely hypothetical, the potential future advantages of the proposed project do not outweigh its current economic and environmental disadvantages. The Siting Board therefore finds that the 5.6-mile alternative would be superior to the proposed project with respect to providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In comparing the 5.6-mile alternative with the 3-mile alternative, the Siting Board notes that the 5.6-mile alternative would provide greater economic and air quality benefits than the 3-mile alternative, while the 3-mile alternative would result in slightly lower direct environmental impacts. The Siting Board notes that, although the 5.6-mile alternative has greater impacts on natural resources as a result of its greater route length, it has a somewhat lower level of community impact, including less in-street construction and less construction near residences. In addition, the 5.6-mile alternative offers significantly greater economic benefits – an NPV advantage of between $1.3 million and $10.3 million based on MMWEC's cases. Further, if demand for gas at Stony Brook increases in the future, the 5.6-mile alternative could be extended along the WMECO ROW to the Tennessee pipeline; extension of the 3-mile alternative would be considerably more difficult, as the area between East Street and the Tennessee pipeline is more densely developed. On balance, the Siting Board finds that the 5.6-mile alternative would be superior to the 3-mile alternative with respect to providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Accordingly, having compared the three project approaches, the Siting Board finds that, on balance, the 5.6-mile alternative would be superior to both the proposed project and the 3-mile alternative with respect to providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In making this finding, the Siting Board notes that, although the weight of the evidence suggests that the 5.6-mile alternative would operate substantially as projected by Bay State, the actual flow rate cannot be known with certainty until the pipeline is in place and operational. Should the capacity of the 5.6-mile alternative prove to be substantially lower than anticipated, MMWEC and Bay State have at least three possible options to improve delivery of gas to Stony Brook. First, the Company can pursue with Bay State the possibility of uprating the Monson-Palmer line to a higher pressure, which should allow for increased flow rates on the 5.6-mile alternative. Second, the Company could reconsider the use of the 275 psig line as a supplemental delivery route. Third, the Company can seek approval to continue the 5.6-mile line on out to the Tennessee main line. If the need arises, the Siting Board encourages MMWEC to pursue whichever option best provides for a reliable energy supply with a minimum impact on the environment at the lowest possible cost.

III. ANALYSIS OF THE PREFERRED AND ALTERNATE ROUTES

The Siting Board has a statutory mandate to implement the policies of G.L. c. 164, §§ 69J-69Q to provide a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G.L. c. 164, §§ 69H and J. Further, G.L. c. 164, § 69J requires the Siting Board to review alternatives to planned projects, including "other site locations." In implementing this statutory mandate, the Siting Board requires a petitioner to demonstrate that it examined a reasonable range of practical facility siting alternatives, and that its proposed facilities are sited at locations that minimize costs and environmental impacts while ensuring supply reliability. ANP Blackstone Decision, 8 DOMSB 1, 103; ANP Bellingham Decision, 7 DOMSB 39, 133; New England Power Company, 21 DOMSC 325, 376 (1991).

In Section II.B, above, the Siting Board found that the 5.6-mile alternative would be superior to both the proposed project and the 3-mile alternative with respect to providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Consequently, Section III.A, below, describes the two noticed routes for the 5.6-mile alternative.[89] In Section III.B, below, the Siting Board reviews MMWEC's site selection process to determine whether MMWEC examined a reasonable range of practical facility siting options. Finally, in Section III.C, below, the Siting Board evaluates the environmental impacts, cost and reliability of the 5.6-mile alternative along the northern and southern routes in order to determine whether environmental impacts would be minimized and whether an appropriate balance would be achieved among environmental impacts, cost, and reliability.

A. Description

The 5.6-mile alternative would be a 20-inch pipeline[90] connecting at one end to Stony Brook and connecting at the other to Bay State's Monson-Palmer line at a point where the Massachusetts Turnpike crosses over East Street (Exh. EFSB-3, at 9). MMWEC has identified its preferred route for the 5.6-mile alternative, which follows the western-northern corridor ("northern route") and an alternate route which departs from the preferred route along a more southerly course in the vicinity of Ludlow Center ("southern route"). Both routes would be located entirely within the town of Ludlow (id. at Fig. 1).

MMWEC stated that the permanent easement for the pipeline typically would be 20 feet wide along the existing WMECO ROW, with the pipeline alignment generally located 10 feet inside the WMECO ROW (id. at App. F 12; Exhs. HO-EL-19-S; Tr. 3, at 249; Tr. 4, at 367, 382-383).[91] During construction, the project would require a 45-foot temporary easement (Exh. EFSB-3, at App. F

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89 These two routes, known as the northern and southern routes, are shortened versions of two of the three noticed routes for the proposed project.

90 The original design of the 14.7-mile pipeline was for welded steel pipe with a fusion bonded epoxy coating and cathodic protection, designed for a maximum allowable operating pressure of 1000 psig (Exh. MMWEC-1, at 3-4). It is expected that the 5.6-mile alternative would also be constructed of welded steel pipe with a fusion bonded epoxy coating and cathodic protection, designed for a maximum allowable operating pressure of 1000 psig.

91 Where the route does not follow an existing ROW, 40 feet of permanent easement would be required (Tr. 4, at 434).

12; Tr. 4, at 369). A custody transfer station, consisting of an isolation valve, a blow-down valve, and an enclosure for communications and control equipment, all within a 25-foot by 36-foot fence, would be located next to East Street near the interconnection with the Monson-Palmer line (Exhs. EFSB-3, at 16, 17; HO-EL-2-S; PAC 00A-1). A metering and pressure regulating station would be located at Stony Brook (Exh. EFSB-3, at 16, 17).

The northern route for the 5.6-mile alternative primarily follows existing electric transmission ROWs held by WMECO (Tr. 4, at 364-365).[92] From the Stony Brook facility, the northern route proceeds south and then east, following along an existing oil pipeline across West Street to the WMECO Ludlow-Orchard line ROW near Tank Farm Road (Exh. EFSB-3, at 39, 41, 43, Fig. 1). The northern route then parallels this WMECO ROW, passing north of Ludlow Center, to a point next to the Ludlow substation, an electric substation just north of Route 21 (id.). Veering slightly south of the actual substation, the northern route then turns almost directly south, and parallels the WMECO Ludlow-Scitico line ROW to a point near the Massachusetts Turnpike (id). The northern route would deviate from the WMECO ROWs to avoid a row of large trees west of the Ludlow substation and the substation itself (Exh. HO-EL-28, Att. 1, at 2). The Route would exit the ROW at the Massachusetts Turnpike to interconnect with the Monson-Palmer line at the point where the Turnpike crosses over East Street in Ludlow (id.).

The southern route, unlike the northern route, passes south of Ludlow Center (Exh. EFSB-3, at Fig. 1).[93] The southern route follows the same route as the northern route from Stony Brook to a point 1400 feet west of Fuller Street, then diverts away from the existing WMECO ROW, angling to the

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92 MMWEC stated that WMECO owns 45% of the 14.7-mile corridor in fee simple and has easements to operate electric transmission lines over most of the remainder (Exh. MMWEC-RWF at 10).

93 The southern route is a part of the so-called "Western/Eastern Corridor" that lies between the Stony Brook facility and the connection to the Monson-Palmer line at the Massachusetts Turnpike. (See Fig. 1 of the SDEIR) (Exh. EFSB-3 at Fig. 1). MMWEC stated that the full western/eastern corridor is 14.4 miles long, which compares to a length of 14.7 miles for the proposed project (id., at 43). The southern route would thus be approximately 0.3 miles shorter than the northern route.

southeast across agricultural lands (id., at 41-43, Fig. 1). It crosses Fuller and Rood Streets, and then Center Street (Route 21) approximately 2000 feet southwest of Ludlow Center (id.). It then angles briefly to the north and then back to the east, crossing Miller Street approximately 1600 feet south of Route 21 (id.). Approximately 1000 feet east of Miller Street in Ludlow, the southern route rejoins the northern route on the WMECO ROW and turns south to interconnect with the Monson-Palmer line (id.). Maps provided by MMWEC show that the southern route deviates from the northern route for about half its length (id., at Fig. 1). The two routes are shown on Figure 2, at the end of this Decision.

B. Site Selection

1. Standard of Review

G.L. c. 164, § 69J provides that a petition to construct a proposed facility must include "a description of alternatives to [the applicant's] planned action" including "other site locations." In past reviews of alternative site locations identified by an applicant, the Siting Board has required the applicant to demonstrate that it examined a reasonable range of practical siting alternatives. ANP Blackstone Decision, 8 DOMSB 1, 199; Berkshire Gas Decision, 9 DOMSB 1, 38; 1998 NEPCo Decision, 7 DOMSB 333, 374. In order to determine whether an applicant has considered a reasonable range of practical alternatives, the Siting Board has required the applicant to meet a two-pronged test. First, the applicant must establish that it developed and applied a reasonable set of criteria for identifying and evaluating alternative sites in a manner which ensures that it has not overlooked or eliminated any sites which, on balance, are clearly superior to the proposed site. Second, the applicant must establish that it identified at least two noticed sites or routes with some measure of geographic diversity. ANP Blackstone Decision, 8 DOMSB 1, 199; Berkshire Gas Decision, 9 DOMSB 1, 38; 1998 NEPCo Decision, 7 DOMSB 333, 374.[94]

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[94] In this decision, the Siting Board has made minor modifications to the site selection standard of review as set forth in previous Siting Board decisions. These modifications reflect an effort to clarify application of the standard of review, and do not alter the standard of review substantively. In the future, the Siting Board intends to re-examine the substantive analysis required by the site selection standard of review.

2. Site Selection Process

a. Description

According to MMWEC, the first step in selecting a pipeline corridor was the establishment of a regional search area (Exhs. MMWEC-JOR/ARM at 32; EFSB-3, at 44). MMWEC stated that it considered several regional interstate gas pipelines as potential sources of gas for Stony Brook, including the Iroqouis Gas Transmission System in Connecticut, the Algonquin Gas Transmission Company pipelines in Connecticut, and the Tennessee system in Massachusetts (Exh. EFSB-3, at 43-44). Among these, the Tennessee system was selected as most practicable based on proximity to Stony Brook (id. at 44). MMWEC stated that existing laterals from the Tennessee pipeline, terminating in Westfield, Holyoke, Ludlow, and Springfield, were evaluated and determined to have inadequate capacities (id.). MMWEC stated that it therefore identified a search area extending from Stony Brook on the north to the existing Tennessee pipeline on the south (id. at 45; Exhs. MMWEC-1, at 40; MMWEC-JOR/ARM at 33). MMWEC identified the Connecticut River as the western boundary of the search area, noting that routes crossing the river would have been undesirable due to the presence of endangered species of fish (Exhs. MMWEC-1, at 40; HO-A-2; MMWEC-JOR/ARM at 33). MMWEC identified Route 32 in Monson as the eastern limit of its search area, because routes further east would have been unnecessarily long, with concomitant increases in environmental impacts and cost (Exhs. MMWEC-1, at 40; MMWEC-JOR/ARM at 33-34; EFSB-3, at 45-46).

MMWEC indicated that it consulted with officials and residents of various municipalities in its search area to identify community priorities (Exh. MMWEC-1, at 41). Based on written comments and meetings with community representatives, MMWEC indicated that community preferences were: (1) to avoid population centers and town-owned open space and conservation lands; (2) to avoid disturbance to wetlands, wildlife habitat, and water and forest resources; (3) to avoid sites contaminated with hazardous wastes; and (4) to minimize bridge crossings, road and infrastructure disturbance, the diversion of town public safety personnel, and traffic impacts during construction (id. at 42; Exh. MMWEC-JOR/ARM at 35).

MMWEC stated that it identified 12 preliminary study corridors within the regional search area extending from the Tennessee pipeline to Stony Brook (Exhs. EFSB-3, at Fig. 2; MMWEC-

JOR/ARM at 35; MMWEC-JKD at 6). To evaluate these corridors, MMWEC developed siting criteria which reflected environmental impacts, cost, pipeline engineering, reliability, and safety concerns (Exhs. MMWEC-JOR/ARM at 37; MMWEC-JKD at 6). MMWEC stated that it developed the selection criteria with the idea that a cross-country pipeline would be constructed, in contrast to an in-road pipeline (Tr. 6, at 714-715). MMWEC indicated it developed site selection criteria to reflect the following: rare and endangered species, wetlands/vernal pools, population density, river crossings, parks and public lands, cultural resources, sensitive receptors, wildlife habitat, aesthetics, water supply resources, interruption to commerce, wooded versus cleared ROW, contaminated areas, noise, agriculture, recreation fishing, road/rail crossings, pipeline length, Chicopee River crossing, geology, parcels traversed, topography, wetlands/floodplain, cathodic protection, tie-in location, bridges, construction period, infrastructure, access, and vibration (Exh. MMWEC-JKD at Att. JKD-3). To evaluate alternatives with respect to the above concerns, MMWEC developed ratings based on specific indicators of potential impact, such as (1) the length of proposed pipeline that would be within specific types of resource areas (e.g., cropland), (2) the number of specific types of land uses (e.g., roads) or resources (e.g., streams) that would be crossed by the proposed pipeline; and (3) the number of specific types of land uses (e.g., schools), or the area of specific types of resource areas (e.g., wetlands), that would be within a set distance of the proposed pipeline (Exhs. MMWEC-JKD, Att. JKD-2; MMWEC-RWF at 12, 15).

MMWEC indicated that it developed weights ranging from 1.64 to 4.79 for each criterion, and then rated each corridor for each criterion on a scale of one to five (Exh. MMWEC-JKD at 7-9, Att. JKD-3). MMWEC explained that it calculated, aggregated, and ranked cumulative weighted scores for each study corridor by multiplying the indicator ratings by the weights (id. at 9).

MMWEC's original 12 corridors crossed the Chicopee River at one of three locations and terminated at the Tennessee pipeline at one of three locations, located several miles apart in Hampden and Monson (Exh. EFSB-3, at Fig. 2). The 12 corridors all crossed the Massachusetts Turnpike at one location (id. at Figs. 2, 3). After evaluating the 12 preliminary study corridors, as described below, MMWEC identified another means of crossing the Massachusetts Turnpike, and identified and evaluated an additional four corridors (Exhs. MMWEC-JKD at 10; EFSB-3, at 49; Tr. 6, at 705).

MMWEC indicated that it developed alternative routing for all portions of its project, except for the one-and-one-half miles of the project nearest Stony Brook (Exh. EFSB-3, at Figs. 1, 2, 3).

MMWEC indicated that it considered using the median of the Massachusetts Turnpike for a portion of the route as part of its original 12 alternatives, and also considered using the Massachusetts Turnpike corridor in supplemental evaluations (Exhs MMWEC-1, at 54; EFSB-3, at 49, 54-59).[95] MMWEC stated that disadvantages of using the Turnpike corridor included: (1) permitting constraints; (2) close proximity to densely populated residential and commercial areas; (3) preserving the integrity of existing gas pipelines and fiber optic cables in the corridor; (4) safety of construction personnel along the highway; and (5) safety of the traveling public during construction (Exhs. EFSB-3, at 48; MMWEC-RWF at 13-15).

Six of these 12 corridors, including the two with the highest cumulative weighting scores, were subsequently eliminated from consideration because of land use conflicts with the Massachusetts Turnpike and liquified natural gas storage facilities (Exh. MMWEC-JKD at 11). The remaining ten corridors were subjected to an additional round of evaluation, using a process requested by federal agencies including the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the U.S. Environmental Protection Agency (Exh. MMWEC-JKD at 11-13). Three routes emerged from this evaluation, including the western/eastern corridor and two routes that did not follow existing ROWs (id.). Subsequently, at the request of the federal agencies, the Company revised its selections, adding a route along existing ROWs that it had previously eliminated – the western/northern corridor – and eliminating one of the two routes not following existing ROWs (id. at 13; Tr. 5, at 687-691). The Company designated its three selected corridors as: Corridor A, the eastern corridor; Corridor B, the western/northern corridor; and Corridor C, the western/eastern corridor (Exhs. MMWEC-JKD at 12, 14; MMWEC-JOR/ARM at 31).

MMWEC stated that after further evaluating the three corridors, it selected the

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95 Requests that MMWEC consider routes running along the Massachusetts Turnpike were included among public comments on the DEIR for the project (Exh. EFSB-3, at App. B). Maps of the corridor area show that the Massachusetts Turnpike is roughly parallel to the Tennessee pipeline (id. at Fig. 3).

western/northern corridor as its preferred route for its proposed project (Exh. MMWEC-JOR/ARM at 32). MMWEC stated that the principal advantage of the western/northern corridor was the potential to use an alignment largely within existing ROWs (Exhs. EFSB-3, at 177; MMWEC-JKD at 27-28). MMWEC noted that using existing ROWs would reduce the amount of both temporary and permanent tree clearing, which would reduce visual impact and construction noise and would tend to reduce overall ecological change (Tr. 3, at 265-268; Tr. 4, at 431-434,459). However, the Company noted that the western/northern corridor would affect more scrub/shrub habitat than some of the other alternatives (Exh. EFSB-3, at 112). Table 6, in Section II.B.5, above summarizes quantitative environmental impacts of the western/northern corridor.

MMWEC stated that the primary advantages of the eastern corridor include the relatively low levels of expected wetland impacts and mapped threatened and endangered species,[96] and the relatively low number of adjacent residences (Exh. EFSB-3, at 53). However, MMWEC noted that use of the eastern corridor would require the creation of new ROW along most of its length, resulting in relatively large amounts of forest clearing and forest fragmentation, and affecting views at road crossings and in some cases along visible ridgelines (id.; Exh. HO-EL-26). The Company stated that, on the eastern corridor route to Tennessee, 17.3 acres of wetlands would be affected, 44.2 acres of forest would be permanently cleared, 40 streams would be crossed, and endangered species habitat would be encountered at 14 sites; also the Chicopee River would be crossed (Exh. PAC-ED-14(S)). MMWEC subsequently argued that the eastern corridor was inferior to the western/northern corridor, based partly or in whole on these environmental factors (Company Initial Brief at 148-149).

The western/eastern corridor overlaps the route of the western/northern corridor for much of its length between Stony Brook and the Tennessee mainline, but deviates from it for an approximately 2-mile segment between Stony Brook and the Massachusetts Turnpike (Exh. EFSB-3, at Fig. 1). MMWEC noted that, although slightly shorter in overall length, the western/eastern corridor does not

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96 MMWEC stated that, while available information initially indicated that species designated as rare were not present along the eastern corridor, MMWEC's field crews later determined that several of these species were present on the eastern corridor as well as other corridors (Tr. 3, at 271-272).

follow existing ROWs where it deviates from the western/northern corridor, and therefore would be less advantageous with respect to use of existing ROWs (Tr. 3, at 265). The advantages and disadvantages of the western/eastern corridor are discussed in more detail in Section III.C.2, below, where part of the corridor is treated as an alternative route for the 5.6-mile alternative.

MMWEC later identified routing options for an interconnection with the Monson-Palmer line, which traverses the regional search area and is intersected by MMWEC's identified study corridors at intermediate points between Stony Brook and the Tennessee main line (Exh. EFSB-3, at 8, 9, 32, 39, Fig.1). Specifically, MMWEC identified two routing alternatives that would interconnect with the Monson-Palmer line at East Street (the northern and southern routes for the 5.6-mile alternative), and two alternatives that would interconnect with the Monson-Palmer line at West Street, designated as the 3-mile alternatives 1 and 2 (id.; Exhs. MMWEC-JOR/ARM at 22-23; MMWEC-JOR-S at 5).[97]

MMWEC stated that, due to variations in pressure drop at different points along the Monson-Palmer line, the potential supply from an interconnection would vary among alternatives, and would be greatest for those corridors that intersected that line furthest to the east, towards the existing Tennessee gate station (Exh. HO-A-39). MMWEC stated that for this reason, the potential supply from the interconnection to the Monson-Palmer line would be greatest for the eastern corridor, next greatest for the 5.6-mile alternative, and smallest for the 3-mile alternative (id.).

b. Positions of the Parties

MMWEC contended that it examined a reasonable range of siting alternatives, developed a reasonable set of criteria for evaluating these alternatives, and applied the criteria in an appropriate manner so that it did not overlook or eliminate any routes that, on balance, were clearly superior to its proposed project along the western/northern corridor (Company Initial Brief at 126, 131). PAC

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97 Similarly, based on the identified corridors, there are two possible routes for interconnection to the Monson-Palmer line where it is intersected by the eastern corridor. While MMWEC considered the alternative of interconnection along the eastern corridor, MMWEC did not provide information on the availability of land for a custody transfer station at the intersection of the eastern corridor with the Monson-Palmer line (Exh. HO-A-39).

argued that MMWEC's site selection process failed to capture superior alternatives because of its false reliance on its "minimum requirements" as a basis for site selection (PAC Reply Brief at 3-6). For example, PAC pointed out that neither the 3-mile alternative nor the 5.6-mile alternative, which it asserted are the best alternatives, was considered in MMWEC's evaluation of siting alternatives (PAC Reply Brief at 4).

c. Analysis

MMWEC has developed a set of criteria for identifying and evaluating siting options that address environmental impacts, land use concerns, community issues, cost, and reliability – types of criteria that the Siting Board has found to be appropriate for the siting of public utility facilities. Berkshire Gas Decision, 9 DOMSB 1, 43-44; Boston Edison Company, 6 DOMSB 208, 283 (1997); New England Power Company, 4 DOMSB 109, 167 (1995).

The Company identified a search area for identification of pipeline corridors between Stony Brook and the Tennessee mainline to the south, encompassing a sufficient breadth extending from the Connecticut River on the west to western parts of Monson on the east. This search area is sufficiently broad to include all reasonable routes for an interconnection with Tennessee, as well as all reasonable routes to Bay State's Monson-Palmer line.[98]

The Siting Board notes that the Company performed several iterations of identifying, ranking, and eliminating facility alternatives. The Siting Board recognizes that these iterations reflected an on-going site selection process with input from other parties. Selection criteria thus changed as the process continued. The Siting Board recognizes that it can be, and in this instance was, reasonable and beneficial for an applicant to adapt its site selection process as it receives comments.

With respect to concerns that use of the Massachusetts Turnpike was overlooked as an

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[98] Although MMWEC's formal site-selection process focused on identifying routes that would connect to Tennessee, the Siting Board notes that a number of alternatives were evaluated in detail during this proceeding, including the alternative of connecting to the Monson-Palmer line at an intermediate point along identified corridors and the alternative of a more direct corridor extending to the Monson-Palmer line near West Street.

alternative to a cross-country route between Stony Brook and the Tennessee line, inspection of maps of the corridor area show that the Massachusetts Turnpike is roughly parallel to the Tennessee pipeline, and thus would not provide such an alternative. In addition, the Company identified conflicts with roadway safety and existing utilities along the Turnpike corridor. The Siting Board considers that the Company was not unreasonable in eliminating routes that include following part of the Massachusetts Turnpike.

Based on the foregoing, the Siting Board finds that MMWEC has developed a reasonable set of criteria for identifying and evaluating facility alternatives. The Siting Board also finds that the Company has applied its proposed facility site selection criteria consistently and appropriately, and in a manner which ensures that it has not overlooked or eliminated any siting options that are clearly superior to the noticed alternatives.

Accordingly, the Siting Board finds that the Company has developed and applied a reasonable set of criteria for identifying and evaluating alternatives to the proposed project in a manner which ensures that it has not overlooked or eliminated any siting options which, on balance, are clearly superior to the noticed alternatives.

3. Geographic Diversity

MMWEC described a site selection process that included alternatives crossing major obstacles of the route at multiple locations and terminating at multiple locations along the Tennessee gas pipeline. Of the entire 14.7-mile proposed project, alternatives were evaluated for all but a distance of one mile. Although each identified route overlaps a segment of at least one other route, each identified route is distinct, offering a different set of environmental and cost advantages and disadvantages. Consequently, the Siting Board finds that the Company has identified a range of practical pipeline route alternatives with some measure of geographic diversity.

4. Conclusions on the Site Selection Process

The Siting Board has found that the Company has developed and applied a reasonable set of

criteria for identifying and evaluating alternatives to the proposed project in a manner which ensures that it has not overlooked or eliminated any siting options which, on balance, are clearly superior to the noticed alternatives. In addition, the Siting Board has found that the Company has identified a range of practical pipeline route alternatives with some measure of geographic diversity. Consequently, the Siting Board finds that MMWEC has demonstrated that it examined a reasonable range of practical siting alternatives.

C. Environmental Impacts, Cost, and Reliability of the Proposed and Alternative Facilities

In this section, the Siting Board evaluates the environmental impacts of the 5.6-mile alternative along the northern route, discusses mitigation of impacts, and compares the southern route to the northern route. The Siting Board then compares the cost and reliability of the northern and southern routes. Finally, the Siting Board determines whether environmental impacts of the 5.6-mile alternative would be minimized, and evaluates whether an appropriate balance would be achieved among environmental impacts, cost, and reliability.

1. Standard of Review

In implementing its statutory mandate to ensure a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost, the Siting Board requires a petitioner to show that its proposed facility is sited at a location that minimizes costs and environmental impacts while ensuring a reliable energy supply. To determine whether such a showing is made, the Siting Board requires a petitioner to demonstrate that the proposed site for the facility is superior to the noticed alternatives on the basis of balancing cost, environmental impact, and reliability of supply. Berkshire Gas Decision, 9 DOMSB 1, 40; 1998 NEPCo Decision, 7 DOMSB 333, 383; Boston Edison Company, 6 DOMSB 208, 287 (1997) ("1997 BECo Decision").

An assessment of all impacts of a proposed facility is necessary to determine whether an appropriate balance is achieved both among conflicting environmental concerns as well as among environmental impacts, cost, and reliability. A facility which achieves that appropriate balance thereby meets the Siting Board's statutory requirement to minimize environmental impacts at the lowest possible

cost. Berkshire Gas Decision, 9 DOMSB 1, at 46; 1998 NEPCo Decision, 7 DOMSB 333, 383-384; 1997 BECo Decision, 6 DOMSB 208, 287.

The Siting Board recognizes that an evaluation of the environmental, cost and reliability trade-offs associated with a particular proposal must be clearly described and consistently applied from one case to the next. Therefore, in order to determine if a petitioner has achieved the proper balance among environmental impacts and among environmental impacts, cost and reliability, the Siting Board must first determine if the petitioner has provided sufficient information regarding environmental impacts and potential mitigation measures in order to make such a determination. The Siting Board then can determine whether environmental impacts would be minimized. Similarly, the Siting Board must find that the petitioner has provided sufficient cost information in order to determine if the appropriate balance among environmental impacts, cost, and reliability would be achieved. 1998 NEPCo Decision, 7 DOMSB 333, 384; 1997 BECo Decision, 6 DOMSB 208, 287-288; Commonwealth Electric Company, 5 DOMSB 273, 337 (1977).

Accordingly, in the sections below, the Siting Board examines the environmental impacts, cost and reliability of the 5.6-mile alternative along the northern and southern routes to determine: (1) whether environmental impacts would be minimized; and (2) whether an appropriate balance would be achieved among conflicting environmental impacts as well as among environmental impacts, cost and reliability. In this examination, the Siting Board compares the northern and southern routes to determine which is superior with respect to providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

2. Environmental Impacts

In this subsection, the Siting Board evaluates the environmental impacts of the northern route for the 5.6-mile alternative, discusses mitigation of impacts, and compares the northern and southern routes for the 5.6-mile alternative.[99] Water and land resources impacts are evaluated first, then land

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[99] In general, impacts of the southern route of the 5.6-mile alternative are not expressly described in the record. However, we note these can be calculated from impacts of three alternatives that

(continued...)

use and visual impacts, and lastly noise and traffic impacts.

a. Water Resources and Habitat

i. Wetlands

The Company stated that wetlands along the proposed routes were delineated in 1996 and 1997, flagged, and mapped (Exh. EFSB-3, at App. F 24). MMWEC presented aerial mosaic sheets depicting approximate wetland boundaries (id. at App. H). MMWEC indicated that a Notice of Intent including wetland boundaries would be filed with the Ludlow Conservation Commission once the precise pipeline alignment is determined (id. at 7, 63; Exh. HO-EW-22).

MMWEC indicated that the northern route would cross or be proximate to 20 banks, 10 lands under water bodies and waterways, 19 BVWs totaling 8.6 acres, 4 bordering lands subject to flooding, 2 isolated lands subject to flooding, 5 riverfront areas, and 22 buffer zones (Exh. EFSB-3, at 63-64, 104). MMWEC stated that, a vernal pool had been certified by the MNHESP at one location along the 5.6-mile alternative (Exh. HO-EW-24; Tr. 3, at 310).

The Company stated that project impacts on wetland resources would be mostly temporary and related to construction (Exh. EFSB-3, at 103). MMWEC indicated it expects increased erosion during the construction period (id. at 11). Also, the Company stated that there would be some permanent conversion of forested wetland to shrub and wet meadow communities along the permanent ROW, but did not quantify this conversion (id. at 11).

MMWEC indicated that construction of the 5.6-mile alternative would take 8 to 12 weeks (Exhs. EFSB-3, at 21; HO-A-26). The Company stated that the duration of construction work would be approximately 30 days at any one location along the route, starting with vegetation clearing and ending with initial wetland restoration (Exh. EFSB-3, at 103). MMWEC indicated that full wetland

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99 (...continued)
are presented by MMWEC. Since the 5.6-mile routes are each versions of full proposed project corridors, cut off at the same point, impacts of the southern route can be readily calculated by adjusting impacts listed for the northern route by the difference between listed impacts of the western/northern corridor and the western/eastern corridor. Impacts listed herein are based on matching computations from record data.

recovery would take at least one year (id. at 103). With respect to construction and environmental impacts, MMWEC stated that the optimal season for pipeline construction would be summer or early fall (Exh. HO-EW-34).

The Company stated that construction in wet areas would be accomplished by placing timber riprap or construction mats in these areas, to limit the effect of construction equipment on wetland soils and vegetation (Exh. EFSB-3, at App. F 11). To mitigate erosion, silt fence or haybales would be used to trap sediments that might otherwise enter surface water bodies (id. at App. F 15). Temporary installation of flume pipes, slope breakers, ditch plugs, and catchment basins are proposed to limit erosion and sedimentation (id. at App. F 14-16). The Company also stated that it would use temporary ditch plugs, filter sediment-laden waters, contain spoils, and use catchbasins for dewatering flows (id. at 157). MMWEC indicated that a "push/pull" method of construction would be used in certain wetlands along the 5.6-mile alternative, so that a backhoe would be the only piece of major equipment routed through the wetland (id. at 145, App. F 29-30, App. H 8-11).

MMWEC stated that, as a general policy, pipeline construction would go around or under all vernal pools that the MNHESP certifies (Exhs. HO-EW-24; EFSB-3, at 111). Mr. Downing noted that MMWEC already plans to directionally drill under the one certified vernal pool on the northern route, because a rare species is located there (Tr. 3, at 310-311). MMWEC committed to directionally drill or otherwise avoid any additional vernal pools that gained certification (id. at 310, 315; Tr. 5, at 618).

MMWEC explained that, following installation of the pipeline, the pipeline trench would be backfilled and contours of the wetland areas would be restored, except that rock riprap placed to prevent stream bank erosion would be left in place (Exh. EFSB-3, at 105, 146-148, App. F 11). MMWEC stated that dormant seed stock in wetland soils would begin growing on its own following regrading but that wetland areas would be seeded with annual grass to stabilize the area until indigenous wetland species revegetate disturbed areas (id. at 106, 147; Exh. HO-EL-23).

With respect to a comparison between the northern and southern routes, Mr. Downing indicated that functional values of wetlands along existing ROWs typically are similar to those of undisturbed wetlands, but that aesthetic values might differ (Tr. 3, at 265). The southern route would

affect slightly less bordering vegetated wetland than would the northern route (Exh. RR-HO-MM-10). MMWEC indicated that the number of potential vernal pools is the same along both routes (Exh. EFSB-3, at 73).

ii. Streams

MMWEC indicated that along the northern route there are a total of ten stream crossings, five of which are perennial streams, and five of which are characterized by the Company as containing brook trout (Exhs. EFSB-3, at 73, 116, 143Q; HO-EW-28). Increased erosion is to be expected during the construction period (Exh. EFSB-3, at 11). MMWEC predicted temporary increases in turbidity due to land clearing activity and work at stream crossings, but no permanent effects on water quality (id. at 119-120). The Company indicated that "rock type" riprap would be placed along the banks of all stream crossings to be disturbed during construction, up as high as the "typical" water level for the stream (Exh. HO-EW-31). MMWEC stated it expected to use the flume method for crossings of trout streams (Exh. EFSB-3, at 113). The southern route requires four fewer stream crossings and one fewer brook trout stream crossing than the northern route (id. at 73).

The Company indicated that the 5.6-mile alternative would cross under the Chicopee Valley Aqueduct (id. at 5) and that the project would require an "(8m)" permit from the Massachusetts Water Resources Authority (id. at 5). The Company indicated there would be no adverse technical or structural impacts on the aqueduct (Tr. 3, at 293).

The Company indicated that it would use approximately 450,000 gallons of water from the Springfield Water and Sewer Commission in order to perform hydrostatic testing of the pipeline (Exh. HO-EW-39; Tr. 3, at 318; Tr. 4, at 505). MMWEC stated that it would minimize the short-term water supply impact of hydrostatic testing by using its existing 10 million gallon city water storage makeup tank (Tr. 4, at 506). MMWEC stated that particulate matter entrained in hydrostatic test water, from weld slag and other debris, would be captured in a catch basin and/or filtered through a barrier such as hay bales; no follow-up removal of this material from the environment was described (Exh. HO-EW-39). The Company indicated that it may need to obtain a National Pollutant Discharge Elimination System ("NPDES") permit from the U.S. Environmental Protection Agency, for storm

water discharges during construction (Exh. EFSB-3, at 5, 136).

iii. Habitat

MMWEC stated that the permanent easement for the pipeline typically would be 20 feet wide along the existing WMECO ROW, with the pipeline alignment generally located 10 feet inside the WMECO ROW (id. at App. F 12; Exh. HO-EL-19-S; Tr. 3, at 249; Tr. 4, at 367, 382-383). MMWEC indicated that almost all of the pipeline ROW would be aligned on the side of the WMECO ROW that already has been cleared for existing transmission lines (Exh. HO-EL-41). For purposes of calculating habitat impacts, and based on a walking survey and discussions between MMWEC and WMECO, MMWEC assumed that forest currently extends an average of 5 feet into the WMECO ROW (Exh. HO-EL-41; Tr. 4, at 356). Along existing ROWs, MMWEC has illustrated a preliminary design wherein an additional 30 feet of temporary working space would be needed within the existing WMECO ROW, and an additional 20 feet of temporary construction easement outside WMECO's ROW (Exhs. EFSB-3, at App. F 52; HO-EL-19, at 1, Att. 1 Figs. 1 and 2; HO-EL-19-S; Tr. 4, at 383). Forest outside WMECO's ROW would be allowed to revegetate after construction (Tr. 4, at 356). MMWEC stated that it would limit vegetation growth in the permanent pipeline ROW, allowing only scrub/shrub vegetation (Exh. EFSB-3, at 148).

MMWEC stated that it will support the backhoe used for excavation with riprap or construction mats in order to mitigate against soil compaction (id. at 145). MMWEC stated that it would leave stumps in place except along the trenchline, and that hardwoods in the temporary ROW would sprout from stumps, resulting in revegetation of these areas (id. at 109, 144).

The southern route would permanently affect approximately six more acres of forest, and three fewer acres of scrub/shrub habitat, than the northern route; temporary forest impacts would be similar between the two routes (Exh. RR-HO-MM-10).

MMWEC noted that oaks, red maple, and white pine are the predominant trees in forested areas along the northern route (Exh. EFSB-3, at 69). Other wildlife habitats include hay fields, shrub lands, and edge habitat between the forest and the ROWs (id. at 70-71). MMWEC anticipated the following wildlife and fisheries impacts for the northern route: (1) short-term construction impacts on

shrubs, agriculture and fisheries; (2) minor long-term impacts of forest clearing and ROW maintenance; and (3) negligible or no impacts on forest fragmentation and on vernal pools (id. at 114).

MMWEC stated that it consulted with MNHESP to determine the rare species for which surveys should be conducted on the northern route for the 5.6-mile alternative (Exh. HO-EL-14). Rare species surveys were conducted during 1997 and 1998 to determine the distribution of listed species from several taxonomic categories (Exh. EFSB-3, at 67). Rare species located along the northern route were spatterdock darner (a dragonfly), four-toed salamander, wood turtle, American bittern, and parula warbler (id. at 68). According to MMWEC, the MNHESP identified some additional species that might be found in the area crossed by the pipeline route alternatives (id. at 66).

MMWEC stated it would minimize impacts on fisheries and wildlife by constructing the pipeline during the late fall or winter, which are generally outside of high water flow periods and nesting seasons (Exh. EFSB-3, at 152).[100] MMWEC asserted that all rare species habitat would be avoided (Exh. HO-EL-17). The Company stated that in order to avoid disturbing rare species habitat, it would directionally drill at two locations along the 5.6-mile alternative (Exh. HO-EW-41).[101] At these locations, construction vehicles would be required to use road access points to exit and reenter the ROW, so as to avoid traversing rare species habitat (Exh. HO-EW-41). MMWEC asserted that "the project would avoid all direct impacts to threatened and endangered species" (Exh. EFSB-3, at 107).

The Company stated it would have an environmental inspector on-site during pipeline construction, and in the event that an unanticipated species of concern is encountered, the Company would immediately alert the Ludlow Conservation Commission and the MNHESP and prepare a plan to mitigate any impacts (Tr. 3, at 325-326, 328-330).

Comparative data indicated that the presence of rare species is generally similar between the northern and southern routes (Exhs. EFSB-3, at 68; PAC-ED-14(S)). Mr. Downing, a witness for

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100 MMWEC also identified summer or early fall as the optimal season for construction (Exh. HO-EW-34).

101 MMWEC indicated one of the two directional drills at rare species habitats is adjacent to a vernal pool and the other is adjacent to an aqueduct crossing, so each directional drill would be multipurpose (Tr. 3, at 311).

MMWEC, indicated the northern route would have lesser effects on upland habitats than the southern route (Tr. 3, at 268).

iv. Groundwater

MMWEC estimated that groundwater would be encountered along at least 20% of the length of the excavation for the northern route (Exh. HO-EW-35). MMWEC noted that the backfilled pipeline trench could create a conduit for groundwater flow along the pipeline (Exh. EFSB-3, at 120-121). MMWEC indicated that the dominant upland soils along the northern route are highly permeable, limiting surface runoff (id. at 80). MMWEC indicated further that any changes in runoff volumes would be relatively small, since the pipeline would occupy a small fraction of drainage areas it passes through (id. at 118-119).[102] MMWEC indicated that the southern route crosses bedrock aquifers to a slightly lesser extent than the northern route, but did not identify any differential effect on groundwater resources between the two routes (id. at 120-124).

MMWEC stated there is municipal water available on many streets in Ludlow, but provided no information on the locations of private wells on properties abutting the northern route (Exhs. HO-EW-37; HO-EW-38; EFSB-3, at 83-84; Tr. 3, at 297, 305). However, the Company stated that it would conduct a center line survey along the final alignment, to seek out indications of wells and septic systems (Tr. 3, at 299-302). The Company also committed to maintain water and septic service in the event of any disruption to private systems (Exh. EFSB-3, at 131). MMWEC asserted that it would prevent the pipeline from acting as a groundwater conduit by using the originally excavated material, stripped of large stones, as backfill (id. at 157-158). MMWEC stated that it would install sack breakers to perform as impermeable barriers if the blasting of surficial rock creates a channel for groundwater to follow the pipeline excavation (Exhs. MMWEC-JKD at 38; HO-EW-33; Tr. 4, at 526). MMWEC stated that it would evaluate and use techniques such as limiting the strength of the blast or putting in sack breakers to prevent a hydrologic effect on wells (Tr. 4, at 518).

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[102] MMWEC stated that the project would not meaningfully alter volumes of surface runoff (Exh. EFSB-3, at 176).

MMWEC prepared an SPCC plan to mitigate the potential for accidental release of contaminants to the environment during the construction period (Exh. EFSB-3, at App. F 80). The Company stated that brush would be left in long windrows, chipped, or disposed of offsite (id. at App. F 14); that other wastes including existing debris, construction materials packaging, and trash would be disposed of in accordance with applicable regulations (Exh. HO-EL-25); and that fuels, oils, and greases would be handled in accordance with applicable regulations (id.). Although MMWEC expects to share ROW maintenance responsibilities with WMECO, and did not determine whether WMECO uses herbicides on the ROW, MMWEC stated that it would not use herbicides, pesticides, fertilizer, or other chemicals to maintain the gas pipeline ROW (Exhs. EFSB-3, at 13; MMWEC-JKD at 37; HO-EL-24).

v. Positions of the Parties

MMWEC argued that permanent impacts to land resources and land use generally would be less along existing ROWs than along virgin ROWs (Company Initial Brief at 148). Mr. Downing, a witness for MMWEC, stated that in his opinion, the northern route is superior to the southern route with respect to wetland impacts, because a higher proportion of the route is already disturbed as existing ROW and undisturbed wetlands tend to be more valued by people than disturbed wetlands (Tr. 3, at 265-266).[103]

PAC contended that the western/eastern corridor (southern route) would be superior to the western/northern corridor (northern route) with respect to impacts to wetland resource areas but inferior with respect to impacts to upland resources and community impacts (PAC Initial Brief at 27, 30).

PAC also provided a number of suggestions regarding mitigation of wetland impacts. Jean Porwoll of PAC asserted that instead of using temporary bridges at a small fraction of stream crossings and, at the remainder, laying fill in the streams that subsequently would have to be removed from the

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[103] Mr. Downing expressed the idea that undisturbed wetlands are more highly valued aesthetically within a forested or semi-agricultural landscape than disturbed wetlands of the same size and quantity (Tr. 3, at 265).

streams, MMWEC should build temporary bridges at each stream crossing (Tr. 14, at 2153, 2154, 2172). Ms. Porwoll also recommended the use of cellulose fiber netting (i.e., jute) and willow cuttings instead of stone or rock riprap to stabilize banks (id. at 2168). PAC contended that the method described in MMWEC's Environmental Construction Plan for spreading topsoil across the ROW cannot be used in wetland areas (PAC Initial Brief at 28). Ms. Porwoll asserted that the root stocks of existing shrub vegetation along streams can be better preserved by cutting the brush four or five inches above the ground, combined with the use of temporary bridges over streams (Tr. 14, at 2153, 2154). Ms. Porwoll also asserted that it would be superior to spread wetland seed mix, rather than annual ryegrass, in a wetland (id. at 2168).

vi. Analysis

Construction of a pipeline along the northern route for the 5.6-mile alternative route would affect wetlands, streams, trees, and wildlife habitat. Most of the permanent ROW would be within the existing WMECO ROW, limiting permanent tree clearing. The record shows that creation of the 20-foot corridor for the project generally would require approximately five feet of additional clearing on a permanent basis, with a greater width of tree clearing on the less frequent occasions when the pipeline must occupy the uncleared northern and eastern sides of WMECO's ROW. The Company has identified means by which some of the effects of construction can be mitigated. The record shows, based on the Company's plans for mitigation, that impacts to wetlands and upland habitats would be either temporary or relatively minor. The northern route has the advantage of following existing transmission corridors to the greatest extent, so habitat effects would be minimized. This factor outweighs the slight difference in lengths between the northern and southern routes.[104] Accordingly, the Siting Board finds that the northern route would be superior to the southern route with respect to water resources and habitat impacts.

The record indicates that one of two materials – "rock type" riprap or cellulose fiber

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104 Based on reported lengths of 14.7 miles for the proposed project, 14.4 mile for the full western/eastern corridor, and 5.4 miles for the northern route of the 5.6-mile alternative (see Section III.A), the approximate length of the southern route is calculated as 5.1 miles.

mats/netting – would be used at individual stream-crossing to stabilize stream banks, following construction. However, the record does not include enough information to allow the Siting Board to determine whether one material is superior to the other. The record also does not include enough information to resolve whether installation of temporary bridges to support equipment trenching across streams would be necessary to minimize environmental impacts, or whether planting fast-growing annual grass or allowing revegetation by existing plants would be superior for particular disturbed wetland areas along the 5.6-mile alternative, following construction. Therefore, the Siting Board directs the Company to develop information regarding the advantages and disadvantages of: (1) using fiber netting rather than rock riprap to stabilize stream crossings; (2) installing temporary bridges at stream crossings; and (3) seeding annual grass for wetland revegetation, and to provide the information to the Ludlow Conservation Commission as part of its Notice of Intent for wetlands work. The Siting Board finds that, upon compliance with the above condition, the environmental impacts of the 5.6-mile alternative along the northern route would be minimized with respect to water resources and habitat impacts.

b. Land Use and Visual Impacts

i. Land Use

The WMECO ROW, which the northern route principally follows, is surrounded by lands of mixed use including forested land and low-density residential areas, with smaller amounts of agricultural land and commercial/industrial uses (Exh. EFSB-3, at App. H 8 to H 12; Tr. 4, at 387, 416). MMWEC stated that future development would be prohibited within the 20-foot permanent ROW; this would include a negotiable prohibition on the installation of wells and septic systems (Exh. HO-EL-43). MMWEC stated that land used as temporary workspace would be returned to landowners upon the completion of construction, and that all stone fences crossed by the project would be reconstructed (Exh. EFSB-3, at App. F 42; HO-EL-43). Table 7 in Section II.B.5, above, provides quantitative information on land use impacts of the 5.6-mile alternative along the northern route.

MMWEC asserted that installation of the pipeline along the northern route would have little impact on the siting of a future electrical transmission power line along the WMECO ROW, because

the majority of the proposed alignment is on the side opposite WMECO's planned expansions along the western edge of the Ludlow–Orchard line and the Ludlow–Scitico line (Exh. HO-EL-29). MMWEC asserted that the placement of the pipeline along the northern route should not change the accessibility of the ROW for maintenance purposes (Exh. HO-EL-30).

Mr. Flood, a witness for MMWEC, described three issues regarding the pipeline's compatibility with existing electrical transmission facilities: (1) preserving the structural integrity of towers and guy wires during construction; (2) protecting construction workers from shock hazards during construction; and (3) managing electrical interference with pipeline cathodic protection (Tr. 4, at 482-483). Mr. Flood indicated that each of these issues could be readily resolved by selecting and following appropriate construction procedures (id. at 484). MMWEC stated that MMWEC or WMECO would train the pipeline installation contractor in electrical safety requirements, and that compliance would be monitored by an MMWEC field safety representative (Exh. HO-ES-6). MMWEC also asserted that all potential conflicts with WMECO electrical facilities would be resolved (Exh. HO-EL-27).

To mitigate risk to future third-party excavators, Mr. Flood stated that on the road crossings, MMWEC would have a sleeve crossing on the road and the pipe itself would also be concrete-coated (Tr. 4, at 462, 490). In parts of the WMECO ROW, if MMWEC were crossing WMECO's working access road, MMWEC would either bury the pipeline at a slightly lower depth and with more cover, or would put concrete coating on the pipeline to provide added protection (id. at 489). MMWEC also stated it would inform contractors and the public about the location of the pipeline, in part through the use of markers and the Dig-Safe program (id. at 489).

Electrical interactions discussed by MMWEC include the potential for conductance hazards, for inductance hazards, and interruptions of cathodic protection (Exh. HO-ES-8). These issues are identified in a guideline written for the parent company of WMECO (Exh. HO-EL-28).[105] MMWEC

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[105] Northeast Utilities' guideline of January 10, 1991, entitled *General Guideline for Fossil Fuel Transmission Pipelines Within and Adjacent to Northeast Utilities Transmission Line Rights-of-Way* identifies the potential for "conductive and inductive pipeline voltages due to

(continued...)

stated it would address conductance and inductance hazards during construction by grounding the pipeline (Exh. HO-ES-8). MMWEC stated it did not anticipate that its cathodic protection system would be interrupted (id.). MMWEC did not specify differences between routes with respect to issues of electrical interactions.

MMWEC indicated that both the northern and southern routes pass along a potentially unstable slope along the edge of a gravel mining operation that is located just north of the Massachusetts Turnpike (Exh. EFSB-3, at Fig. 1; Tr. 4, at 439-442). Mr. Flood discussed engineering alternatives for this area that would create a stable slope, such as backfilling part of an excavated area (Tr. 4, at 439-442).

MMWEC indicated that 10 parcels along the northern route were identified as in agricultural use, including 6 hayfields, 1 pasture, and 3 parcels of cultivated land (Exh. EFSB-3, at 88). The Company indicated that the construction corridor generally would widen to 80 feet in agricultural parcels within existing power line ROWs (id. at 130). MMWEC stated that construction activities could cause hay crops to lose one cutting within the construction corridor, while crops such as corn could lose a full growing season (id. at 136). The Company indicated that, on agricultural lands, it would: (1) construct only in the summer or fall, to minimize rutting and compaction of soil; (2) install ditch plugs for livestock and farm equipment crossings, as needed; (3) bury the cathodic protection system to specified depths; (4) strip 12 inches of topsoil during site preparation and use it for subsequent restoration; (5) flume or bridge drainage ditches, as warranted; and (6) leave specified depths (e.g., 36 inches) of soil cover over the pipeline, depending on circumstances (id. at 167-168; Exh. MMWEC-JKD at 38). The Company indicated that general agricultural use could continue after pipeline construction, although certain uses might be precluded by the pipeline, including construction of farm buildings, growing large orchard trees, or tree farming (Tr. 3, at 284-286, 291; Tr. 5, at 662-665). MMWEC provided information showing that the southern route would affect more linear feet of

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105 (...continued)
transmission line operation" and "[m]utual interference problems between cathodically protected [Northeast Utilities] systems and cathodically protected piping" (Exh. HO-EL-28, Att. 1, at 4-6).

farmland (4006 feet versus 2736 feet), but fewer Chapter 61A farmland preservation parcels than the northern route (Exh. RR-HO-MM-10).

MMWEC indicated that any archaeological sites that might be located within the construction area could be disturbed by grading, excavating, trenching, and similar activities (Exh. EFSB-3, at 114). However, MMWEC stated that a Phase 1B cultural resource survey has been completed for the northern route and indicated that there are no known prehistoric archaeological sites recorded on the northern route (id. at 78; Exh. HO-EL-22). The Company stated that only a Phase 1 survey had been completed along the southern route, and that no intelligible comparison could be made between the northern and southern routes on this point (Exh. HO-EL-22; Tr. 3, at 274-282; Tr. 6, at 723-724).

ii. Visual

MMWEC stated that trees, brush, or existing barriers would be removed at some locations along the northern route for pipeline construction and operation (Exh. HO-EL-26). MMWEC stated that long-term visual impacts along the northern route would result from removal of five feet of forest along the ROW on a permanent basis (Tr. 4, at 382-383). Specifically, the Company indicated that views of the existing WMECO transmission lines from road crossings would increase, due to the widening of the ROW (Exh. HO-EL-34). MMWEC stated that it would clear areas within 20 to 25 feet outside of the existing ROW for use as temporary workspace, but it would attempt to leave in place specimen and large trees that provide a visual buffer between residential properties and the transmission lines (Exh. HO-EL-19-S).

MMWEC stated that the overall route was selected to be away from residential developments in order to limit the visual impacts of removing trees for the pipeline (Exh. HO-EL-34). Within the western/northern corridor, MMWEC largely attempted to select an alignment within the existing WMECO easement in order to limit impacts to residential properties (Exh. MMWEC-RWF at 10). MMWEC indicated that it took visual impacts on abutting residences into account when it selected a specific alignment along the existing WMECO ROW (Tr. 4, at 384-416).

The Company specifically noted that, subject to negotiations with the landowners, it would seek to avoid removing trees in yards on Miller Street and that it would avoid removing hemlocks that screen

views of the Ludlow substation (Tr. 4, at 425). Mr. Downing also stated that MMWEC "would make plans in advance to discuss various trees and features . . . [that homeowners] would like to maintain" and that MMWEC "would try to return that property to the state that the landowner would like to see it in at the end of construction" (id.). Nevertheless, MMWEC stated that the extent of change to residents' views is undetermined because it does not have rights to access adjacent properties (Exhs. HO-EL-37; HO-EL-38).

MMWEC asserted that construction along the northern route would result in fewer visual impacts than construction along the southern route, because the majority of the northern route already has been cleared of trees (Tr. 6, at 724-725). The Company noted that construction along the southern route would open a new corridor, and that the southern route would pass in close proximity to houses in several areas, including residential areas adjacent to Booth Street and Rood Street (Tr. 4, at 434). The Company stated that a wider (40 foot) swath of tree-clearing would be needed along those portions of the southern route which departs from the WMECO ROW (id.). MMWEC indicated that, along this portion of the southern route, visual appearances would be affected at road crossings and in some cases along visible ridgelines (Exh. HO-EL-26).

iii. Positions of the Parties

MMWEC argued that a route which follows existing ROWs for nearly its full length would best avoid potential conflicts with existing developed land uses (Company Initial Brief at 148). PAC and MMWEC both concluded that the northern route is superior to the southern route from the point of view of visual impacts (Tr. 4, at 434; Tr. 5, at 572; Company Initial Brief at 148).

iv. Analysis

The record shows that construction of the 5.6-mile alternative would alter some views and could affect agricultural lands and historical resources. The record shows that MMWEC's proposed use of a route along existing ROWs would serve to minimize land use and visual impacts. Most of the changes that would cause increased views of the existing transmission lines likely would be temporary as trees grow back in the temporary ROW, while the new linear clearing along a pipeline off the

WMECO ROW would be permanent. The northern route generally avoids clearing along new corridors. Accordingly, the Siting Board finds that the northern route would be superior to the southern route with respect to land use and visual impacts.

The record shows that land use and visual impacts would be minimized, primarily through use of an existing ROW and through appropriate construction techniques. The Siting Board notes that use of the existing ROW raises several issues related to construction and operation of a pipeline along an electric transmission line. Among these issues are electrical interactions, which theoretically could affect pipeline reliability. The record shows that safety impacts would be minimized by monitoring for third-party activities, and by coordination with WMECO on pipeline/transmission line compatibility issues.

The record also indicates that removal of trees or wooded areas for temporary or permanent ROW's would increase views of the existing WMECO transmission lines. However, MMWEC has indicated its willingness to consult with owners of property over which the Company intends to seek easements, regarding the preservation of existing trees or wooded areas to maintain a visual buffer from the transmission lines. The Company also has indicated its willingness to consult with property owners regarding post-construction restoration of their properties.

In order to ensure that the visual impacts of tree clearing will be avoided, minimized, and mitigated to the maximum extent practicable, the Siting Board directs MMWEC to implement measures to preserve trees, wooded areas and other features, and, as necessary, to provide replacement plantings or other restoration, consistent with those commitments the Company has made in this proceeding. For each piece of property over which MMWEC intends to acquire either a permanent or temporary easement, MMWEC shall provide written notice to the property owner of an opportunity to meet with the Company, in advance of any construction activities, to identify trees, wooded areas or other features on the property which the owner wishes to preserve, and to discuss post-construction restoration measures that the owner may wish to have implemented. Consistent with the Company's stated commitment to maintain and restore existing trees on these properties, except in the permanent ROW, the Company shall make every reasonable effort to implement the wishes of the property owners relative to the preservation of trees and wooded areas. Prior to commencement of pipeline construction, MMWEC shall file with the Siting Board a copy of the notice prepared by the Company

regarding preservation and restoration of trees and wooded areas, and shall provide the names and addresses of those property owners to whom the notice has been provided.

The record shows that the Company will implement measures to minimize, and in some cases, mitigate, land use and visual impacts. Accordingly, the Siting Board finds that, with implementation of the above condition, the environmental impacts of the 5.6-mile alternative along the northern route would be minimized with respect to land use and visual impacts.

c. Noise and Traffic

i. Noise

MMWEC projected that nearby residents could be affected by noise and also possibly by dust during construction activities (Exh. EFSB-3, at 131). MMWEC indicated that most construction noise, including any blasting,[106] would occur only during daylight hours and would last only a few days in the vicinity of any residence, with the exception of some movement of vehicles along longer stretches of the ROW (Exh. HO-EL-39; Tr. 4, at 452-453). MMWEC stated that noise impacts would be mitigated by restricting construction activities to the period from 7 a.m. to 8 p.m. and by avoiding high-decibel operations during the first two morning hours of that period (Exh. EFSB-3, at 169). MMWEC indicated that construction access would generally be at public road crossings, but that additional temporary access points would be needed east of West Street and east of Munsing Street (Exh. HO-EL-44). MMWEC indicated that the primary staging area for the 5.6-mile alternative would be at Stony Brook (Exh. HO-EL-31). Mr. Flood argued that construction noise impacts would be greater along the southern route than along the northern route, because the southern route would require substantially more tree removal and grading (Tr. 4, at 459).

Operational noise would originate only from the metering and pressure regulating station at Stony Brook and periodic pipeline monitoring activities (Tr. 4, at 443). MMWEC indicated that it would install or improve barriers against unauthorized entry onto ROWs where appropriate, in

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[106] MMWEC did not anticipate a need for blasting along the northern route (Exh. EFSB-3, at 124).

consultation with town officials and abutters, in order to minimize noise from off-road vehicles (Exhs. HO-EL-26; HO-EL-42).

Also, MMWEC indicated that unauthorized recreational use could affect additional landowners along corridors which represent new ROW, such as part of the southern route (Exh. HO-EL-26).

ii. Traffic

MMWEC stated that it would bore underneath all roads, with the exception of construction on East Street at the interconnection to the existing Monson-Palmer line (Exhs. MMWEC-1, at 67; EFSB-3, at 132; HO-EW-38; HO-EL-33). Mr. Flood indicated that there would be no difference between the northern and southern routes with respect to traffic impacts (Tr. 4, at 467). MMWEC stated that, prior to construction, it would prepare a plan to minimize construction traffic impacts; this plan would include the use of police traffic details and restricting use of construction vehicles during high traffic periods (Exh. HO-EL-33).

iii. Analysis

The record shows that construction of the 5.6-mile alternative would create temporary noise and traffic impacts along either the northern or southern route. The record shows that construction noise impacts would be lower along the northern route, since the use of an existing ROW would minimize noisy site preparation work such as tree-cutting. The record also shows that construction traffic impacts would not differ between the two routes. Accordingly, the Siting Board finds that the northern route would be superior to the southern route with respect to noise and traffic impacts.

The record shows that MMWEC would minimize traffic impacts by boring under the pavement at all public road crossings. The record also shows that construction noise would generally be limited to daylight hours. Accordingly, the Siting Board finds that the environmental impacts of the 5.6-mile alternative along the northern route would be minimized with respect to noise and traffic impacts.

d. Conclusion on Environmental Impacts

In the sections above, the Siting Board has reviewed the evidence presented regarding the

environmental impacts of the 5.6-mile alternative along the northern and southern routes. The Siting Board finds that MMWEC has provided sufficient information on the environmental impacts of the 5.6-mile alternative, including information on the potential for mitigation, for the Siting Board to determine whether the environmental impacts of the 5.6-mile alternative would be minimized.

The Siting Board has found that the northern route would be superior to the southern route with respect to water resources and habitat impacts, land use and visual impacts, and noise and traffic impacts. The Siting Board also has found that, following provision of information to the Ludlow Conservation Commission and implementation of tree preservation and restorative measures, the environmental impacts of the 5.6-mile alternative along the northern route would be minimized with respect to water resources and habitat impacts, land use and visual impacts, and noise and traffic impacts. Accordingly, the Siting Board finds that the northern route would be superior to the southern route with respect to environmental impacts and that the environmental impacts of the 5.6-mile alternative would be minimized.

3. Facility Cost

MMWEC indicated that the capital cost of constructing the 5.6-mile alternative along the northern route would be $17,269,000 (Exh. HO-N-53, Att. 2). MMWEC defined direct construction costs as consisting of land costs, pipeline materials, pipeline installation, major facilities, permitting, engineering procurement, and contingency (Exh. HO-N-37). MMWEC did not provide a construction cost estimate for the southern route; however, it did provide cost estimates of $28,458,000 for the proposed project on the western/northern corridor, $28,435,000 for the proposed project on the western/eastern corridor, and $17,269,000 for the northern route of the 5.6-mile alternative (Exh. HO-N-53, Att. 2). Based on this information, the Siting Board calculates that the capital cost of the southern route would be approximately $17,246,000. The Siting Board finds that the northern and southern routes would be comparable with respect to cost.

4. Reliability

The Company identified issues related to the ability of the 5.6-mile alternative to deliver a given

volume and pressure of gas at Stony Brook, as discussed in Section II.B.3, above. As noted in Section III.C.2.b.i, above, the Company asserted that routes following the WMECO ROW were least likely to suffer third-party damage (Exh. MMWEC-RWF at 17), but otherwise did not distinguish between the northern and southern routes with respect to reliability issues.

MMWEC argued that its preferred and alternative routes generally avoid other pipelines and buried utilities, except at road crossings, and that siting pipelines away from such congestion is desirable (Company Initial Brief at 145). The Siting Board notes that both routes would be within a cleared ROW, rather than along streets, diminishing the risks of suffering third-party damage. The two routes appear to be comparable with respect to reliability. Accordingly, the Siting Board finds that the northern and southern routes would be comparable with respect to reliability.

5. Conclusions

The Siting Board has found that the northern route would be superior to the southern route with respect to environmental impacts and that the two routes would be comparable with respect to cost and reliability. Accordingly, the Siting Board finds that the 5.6-mile alternative along the northern route would be superior to the 5.6-mile alternative along the southern route with respect to providing a necessary energy supply to the Commonwealth with a minimum impact on the environment at the lowest possible cost.

IV. DECISION

The Siting Board's enabling statute directs the Siting Board to implement the energy policies contained in G.L. c. 164, §§ 69H to 69Q, to provide a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G.L. c. 164, § 69H. In addition, the statute requires that the Siting Board determine whether plans for the construction of energy facilities are consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth. G. L. c. 164, § 69J.

In Section II.A, above, the Siting Board found that there is a need for additional energy resources serving Stony Brook for economic efficiency purposes. In Section II.A, above, the Siting

Board also found that there is a need in Massachusetts for additional energy resources serving Stony Brook for environmental purposes. Therefore, the Siting Board found that there is a need for additional energy resources serving Stony Brook to provide for a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section II.B, the Siting Board found that, on balance, the 5.6-mile alternative is superior to both the proposed project and the 3-mile alternative with respect to providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

In Section III.B, above, the Siting Board found that the Company developed and applied a reasonable set of criteria for identifying and evaluating alternatives to the proposed project in a manner which ensures that it has not overlooked or eliminated any siting options which, on balance, are clearly superior to the noticed alternatives. The Siting Board also found that the Company identified a range of practical pipeline route alternatives with some measure of geographic diversity. Consequently, the Siting Board found that MMWEC has considered a reasonable range of practical siting alternatives.

In Section III.C, above, the Siting Board found that the 5.6-mile alternative along the northern route would be superior to the 5.6-mile alternative along the southern route with respect to providing a necessary energy supply to the Commonwealth with a minimum impact on the environment at the lowest possible cost. The Siting Board also found that following provision of information to the Ludlow Conservation Commission and implementation of tree preservation and restorative measures, the environmental impacts of the 5.6-mile alternative along the northern route would be minimized with respect to water resources and habitat impacts, land use and visual impacts, and noise and traffic impacts.

In Section III above, the Siting Board reviewed environmental impacts of the 5.6-mile alternative in light of related regulatory or other programs of the Commonwealth, including programs related to air quality, wetlands protection, and rare and endangered species. As evidenced by the above discussions and analyses, the proposed 5.6-mile alternative along the northern route would be generally consistent with the identified requirements of all such programs.

In Section II.A, above, we stated that since the finding of need for additional energy sources serving the Stony Brook power plant is based solely on economic and environmental benefits, and since

the identified benefits in both cases appear to be modest, the benefits of additional energy resources in this case could be outweighed by other environmental impacts. Therefore, we now consider whether the economic and environmental benefits of the 5.6-mile alternative could be outweighed by environmental impacts.

In Section III.C, above, we reviewed the environmental impacts of the 5.6-mile alternative and proposed mitigation measures. In making our finding that the northern route is superior to the southern route with respect to environmental impacts we placed considerable weight on the fact that the northern route runs along existing ROWs. Specifically, we cited the proximity of the pipeline to existing ROWs in making findings that water resources and habitat impacts, land use, and noise and traffic impacts would be minimized. The mitigation measures proposed by MMWEC include the use of directional drilling under state certified vernal pools to minimize habitat impacts; coordination with WMECO on pipeline/transmission line compatibility impacts to minimize noise impacts; implementation of tree preservation and restoration measures to minimize visual impacts; and boring under pavement at all public road crossings to minimize traffic impacts.

Overall, the record demonstrates that, based on the proposed use of existing ROWs and the proposed mitigation measures, MMWEC has effectively addressed the Siting Board's preliminary concern that the identified project benefits could be outweighed by impacts of project installation. We also note that environmental impact was a principal factor in our determination that the 5.6-mile alternative was the superior project approach, and that use of this project approach helps avoid the possibility that project benefits could be outweighed by project impacts.

Accordingly, the Siting Board finds that the economic and environmental benefits of the 5.6-mile alternative along the northern route are not outweighed by environmental impacts. The Siting Board also finds that construction of the 5.6-mile alternative along the northern route would be consistent with our mandate to minimize environmental impacts. The Siting Board therefore finds that the construction of the 5.6-mile alternative along the northern route would contribute to a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Accordingly, the Siting Board APPROVES the proposal of the Massachusetts Municipal

Wholesale Electric Company to construct a 5.6-mile gas pipeline along the northern route. MMWEC shall comply with the following conditions:

Prior to the commencement of construction:

(A) To minimize habitat impacts, the Siting Board directs MMWEC to develop information regarding the advantages and disadvantages of: (1) using fiber netting rather than rock riprap to stabilize stream crossings; (2) installing temporary bridges at stream crossings; and (3) seeding annual grass for wetland revegetation, and to provide the information to the Ludlow Conservation Commission as part of its Notice of Intent for wetlands work.

(B) To minimize visual impacts, the Siting Board directs MMWEC to implement measures to preserve trees, wooded areas and other features, and, as necessary, to provide replacement plantings or other restoration, consistent with those commitments the Company has made in this proceeding. For each piece of property over which MMWEC intends to acquire either a permanent or temporary easement, MMWEC shall provide written notice to the property owner of an opportunity to meet with the Company, in advance of any construction activities, to identify trees, wooded areas or other features on the property which the owner wishes to preserve, and to discuss post-construction restoration measures that the owner may wish to have implemented. Consistent with the Company's stated commitment to maintain and restore existing trees on these properties, except in the permanent ROW, the Company shall make every reasonable effort to implement the wishes of the property owners relative to the preservation of trees and wooded areas. Prior to commencement of pipeline construction, MMWEC shall file with the Siting Board a copy of the notice prepared by the Company regarding preservation and restoration of trees and wooded areas, and shall provide the names and addresses of those property owners to whom the notice has been provided.

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

In addition, the Siting Board 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 MMWEC 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. MMWEC 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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M. Kathryn Sedor
Hearing Officer

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Jolette A. Westbrook
Hearing Officer

Dated this 15th day of June, 2001