COMMONWEALTH OF MASSACHUSETTS

Energy Facilities Siting Board

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In the Matter of the Petition of Commonwealth)

Electric Company for Approval to Construct a)

New, Underground 115 kV Transmission Line in) EFSB 96-6

New Bedford, Massachusetts and)

Acushnet, Massachusetts)

_____)

FINAL DECISION

Robert P. Rasmussen

Hearing Officer

September 16, 1997

On the Decision:

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FOR: Commonwealth Electric Company

Petitioner

TABLE OF CONTENTS

ii.Analysis

c.Contingency Analysis

d.Accelerated Conservation and Load Management

e.Conclusions on Reliability of Supply

B.Comparison of the Proposed Project and Alternative Approaches

1.Standard of Review

2.Project Approaches

3.Ability to Meet the Identified Need

a.Proposed Project

b.Reconductoring Alternative

c.Alternative Transmission Facilities

d.Distribution and Substation Alternatives

e.Generation Alternative

f.Distributed Generation

g.Conditions on Ability to Meet Identified Need

4.Reliability

a.Transmission Alternatives

b.Generation Alternative

5.Environmental Impacts

a.Facility Construction Impacts

b.Permanent Land Use Impacts

c.Magnetic Field Levels

d.Conclusions on Environmental Impacts

6.Cost

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

III.ANALYSIS OF THE PROPOSED AND ALTERNATIVE FACILITIES

A.Description of the Proposed Facilities and Alternative Facilities

1.Proposed Facilities

2.Alternative Facilities

B.Site Selection Process

1.Standard of Review

2.Development of Siting Criteria

a.Description

b.Analysis

3.Application of Siting Criteria

a.Description

b.Analysis

4.Geographic Diversity

5,Conclusions on the Site Selection Process

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

1.Standard of Review

2.Analysis of the Proposed Facilities Along the Primary Route

a. Environmental Impacts of the Proposed Facilities Along the Primary Route

i.River Crossing Impacts

ii.Impacts Outside the River Crossing

The Energy Facilities Siting Board hereby APPROVES the petition of Commonwealth Electric Company for approval to construct a new underground 115 kilovolt electric transmission line, using Commonwealth's proposed route in the City of New Bedford and the Town of Acushnet, Massachusetts.

I. INTRODUCTION

A. Summary of the Proposed Project

Commonwealth Electric Company ("Commonwealth" or "Company") is an investor-owned electric utility engaged in the generation, distribution and retail sale of electricity in forty communities in southeastern Massachusetts, including the City of New Bedford and the Town of Acushnet (Commonwealth Brief at 1). Commonwealth is a wholly-owned subsidiary of Commonwealth Energy System (id.).

Commonwealth has proposed to construct a new 115 kilovolt ("kV") underground transmission line, approximately 3.3 miles in length, that would extend from Commonwealth's Acushnet substation, located in Acushnet, Massachusetts, to its Pine

Street substation, located in New Bedford, Massachusetts (Exh. C-1, at exhibit I-1). For its primary route, Commonwealth has proposed a transmission line that wold exit the Acushnet substation, proceed westerly toward the Acushnet River, cross the Acushnet River into New Bedford, proceed to the intersection of Belleville Road and Belleville Avenue, and then follow city streets to the south and to the immediate west of the river, until reaching the Pine Street substation (id.) (see Figure 1). Commonwealth also identified a number of other route alternatives and route segments that could be employed in combination between the Acushnet substation and the Pine Street substation, as well as several points of interconnection between Commonwealth's primary route and the various noticed alternatives. A total of 20 specific route segments were identified in Commonwealth's petition (id. at V-5 to V-11, exhibit I-2) (see Figure 2).

In addition to the proposed 115 kV transmission line, Commonwealth has indicated that, depending upon the results of final engineering analyses, it may also install shunt reactors, circuit breakers, a 115 kV bus extension and related structures, relaying and control equipment and switches at either the Acushnet substation or the Pine Street substation (Exh. HO-A-11) ("proposed project").

B. Procedural History

Commonwealth filed its petition for approval of the proposed project with the Energy Facilities Siting Board ("Siting Board") on October 31, 1996. The petition was docketed as EFSB 96-6. On January 8, 1997, the Siting Board conducted a public hearing on the petition in the City of New Bedford. In accordance with the direction of the Hearing Officer, Commonwealth provided notice of the public hearing and adjudication. No petitions to intervene or to participate as an interested person were submitted to the Siting Board.

The Siting Board conducted an adjudicatory hearing on April 14, 1997. Commonwealth presented 6 witnesses: Harold W. Eklund, senior principal engineer of Commonwealth, who testified regarding the need for the project, the project alternative analysis and Commonwealth's route selection process; Keith L. Jones, a design engineer in Commonwealth's Transmission and Distribution Planning Group, who testified regarding the need for the project and the evaluation of project alternatives in terms of reliability and cost; Sara A. Brumbaugh, senior engineer-forecasting for Commonwealth, who testified regarding Commonwealth's long-range forecast and the continuing need for the project; Scott G. Hutchins, senior engineer and formerly commonwealth's group leader of Demand Planning and Evaluation, who testified regarding Commonwealth's analysis of targeted demand-side management ("DSM") strategies that might be employed to address or defer the identified need for a new energy facility in the Pine Street Substation load center; Dennis M. Perry, an engineer in Commonwealth's System Engineering Department, who testified regarding the project alternative analysis, the route selection process and the cost comparison analysis of the various route segment alternatives analyzed by Commonwealth; and W. Stephen Collings, principal environmental engineer

in Commonwealth's Environmental Programs Group, who testified regarding environmental aspects of Commonwealth's project alternative analysis and route selection process.

The Hearing Officer entered 81 exhibits into the record, consisting of Commonwealth's responses to information and record requests. Commonwealth entered eight exhibits into the record. Commonwealth filed its brief on May 12, 1997.

C. Jurisdiction

Commonwealth's Petition is filed in accordance with G.L. c. 164, § 69H, which requires the Siting Board "to implement the energy policies … to provide a necessary 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 electric companies to obtain Siting Board approval for construction of proposed "facilities" at a proposed site before a construction permit may be issued by another state agency.

Two definitions of "facility," both set forth in G.L. c. 164, § 69G, are relevant in determining which components of Commonwealth's proposed project are subject to Siting Board review and approval in this proceeding. Siting Board jurisdiction over Commonwealth's proposed transmission line is governed by the second definition of "facility" set forth in G.L c. 164, § 69G. That section states, in part, that a facility is:

(2) any new electric transmission line having a design rating of sixty-nine kilovolts or more and which is one mile or more in length except reconductoring or rebuilding of existing transmission lines at the same voltage.

The Company's proposal to construct a new 3.3 mile, 115 kV electric transmission line falls squarely within this definition. Accordingly, the Siting Board finds that the proposed transmission line is a jurisdictional facility within the meaning of G.L. c. 164, § 69G(2).

With respect to the shunt reactors, circuit breakers, 115 kV bus extension, relaying and control equipment and switches that may become components of the project, the third definition of facility set forth in G.L. c.164, § 69G is the pertinent provision. This definition provides that a "facility" includes:

(3) any ancillary structure including fuel storage facilities which is an integrated part of the operation of any electric generating unit or transmission line which is a facility.

The Siting Board has interpreted the term "ancillary structure" in its prior decisions, and has stated that such a structure is a "facility" within the meaning of G.L. c. 164, § 69G if (1) structure is subordinate or supplementary to a jurisdictional facility, and (2) the structure provides no benefit outside of its relationship to the jurisdictional facility. See New England Power Company, EFSB 95-2, at 5 (1996) ("1996 NEPCo Decision"); New

England Power Company, 4 DOMSB 109, 117 (1995) (“1995 NEPCo Decision”); Commonwealth Electric Company, 17DOMSC 249, 263 (1988) (“1988 ComElec Decision”). The reactors, circuit breakers, bus extension, relaying and control equipment and switches that may be installed at either the Acushnet Substation or the Pine Street Substation would be supplementary to the proposed transmission line, and would not provide a benefit outside of their relationship to it. Accordingly, the Siting Board finds that these project components constitute jurisdictional facilities within the meaning of G.L. c. 164, § 69G(3).

D. Scope of Review

In accordance with G.L. c. 164, § 69H, before approving an application to construct facilities, the Siting Board requires applicants to justify facility proposals 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 its project is superior to alternative approaches in terms of cost, environmental impact, reliability, and ability to address the previously identified need (see Section II.B, below). Finally, the Siting Board requires the applicant to show that its site selection process has not overlooked or eliminated clearly superior sites, 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). When a facility proposal is submitted to the Siting Board, the petitioner is required topresent: (1) its preferred facility site or route; and (2) at least one alternative facilitysite or route. These sites and routes often are described as the “noticed” alternativesbecause these are the only sites and routes described in the notice of adjudicationpublished at the commencement of the Siting Board’s review. In reaching a decision ina facility case, the Siting Board can approve a petitioner’s preferred site or route,approve and alternative site or route, or reject all sites and routes. The Siting Board,however, may not approve any site, route, or portion of a route which was not includedin the notice of adjudication published for purposes of the proceeding.

Close Additionally, in the case of an electric company which is required by G.L. c. 164, § 69I to file a long-range forecast with the Department of Public Utilities (“Department”), the applicant must show that the facility is consistent with the electric company’s most recently approved long-range forecast. G.L. c. 164, § 69J. Commonwealth is an electric company required to make such a filing and to make such a showing. Department’s most recent review of a long-range-forecast for Commonwealth was inD.P.U. 95-95, in which, consistent with 220 C.M.R. §§ 10.00 et seq., the Departmentaccepted the Company’s forecast pursuant to a comprehensive Settlement Agreement. Cambridge Electric Light Company/Commonwealth Electric Company, D.P.U. 95-95(Letter Order, December 15, 1995 at 2, 3).

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II. ANALYSIS OF THE PROPOSED PROJECT

A. Need Analysis

1. Standard of Review

In accordance with G.L. c. 164, § 69H, the Siting Board is charged with the responsibility for implementing energy policies to provide a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. In carrying out this statutory mandate with respect to proposals to construct energy facilities in the Commonwealth, the Siting Board evaluates whether there is a need for additional energy resources
In this discussion, the term “additional energy resources” is used generically toencompass both energy and capacity additions, including, but not limited to, electricgenerating facilities, electric transmission lines, energy or capacity associated withpower sales agreements, and energy or capacity associated with conservation and loadmanagement (“C&LM”).

Close to meet reliability, economic efficiency, or environmental objectives. The Siting Board must find that additional energy resources are needed as a prerequisite to approving proposed energy facilities.

2. Description of the Existing System

Commonwealth indicated that the Pine Street substation is currently served by two underground 115 kV transmission cables originating at the Acushnet substation (Exh. C-2, at 3). These cables are 250 kcmil pipe-type transmission cables separated along their entire length by approximately 18 inches; Commonwealth refers to these cables as the #112 and #114 cables, and each is approximately four miles in length (Exh. C-1, at II-3). The cables exit the Acushnet substation running westerly and cross beneath the Acushnet River. The cables then proceed westerly on Belleville Road beneath City of New Bedford streets to the intersection of Ashley Boulevard, and then generally southerly continuing beneath the city streets including significant sections of Ashley Boulevard and County Street, and then generally easterly along Russell Street to the Pine Street substation (id.). Each of these cables has a rating of 60 megavolt amperes (“MVA”), providing a total of 120 MVA of capacity at the Pine Street substation (id.). The #112 cable is high-pressure, nitrogen-filled, while the #114 cable is high-pressure, oil-filled. The cables are 48 and 46

years old, respectively (id.).

The Acushnet substation is served by two overhead 115 kV lines with nominal ratings of 386 MVA and 227 MVA, resulting in a normal supply capacity of 613 MVA and a firm capacity of 227 MVA (id. at II-3; Exhs. HO-N-1; HO-N-3). At the Acushnet substation, there are two bulk 115/13.2 kV transformers, each having a top nameplate rating of 62.5 MVA, providing a total of 125 MVA of capacity. The firm capacity of the Acushnet substation is therefore sufficient to serve the combined 1997 peak load of approximately 108.6 MW which consists of 73 MW at the Pine Street substation and 35.6 MW at the Acushnet substation (Exh. C-1, and II-3). The Acushnet substation serves twelve main 13.2 kV distribution feeder circuits, ten of which proceed beneath the Acushnet River to serve the north end of New Bedford. Of these ten circuits, five feeder circuits provide tie capability with the Pine Street substation, and can be used to transfer about 12.5 MW of load between these two substations (id.).

At the Pine Street substation there are three bulk 115/13.2 kV transformers, each having a 60 MVA top nameplate rating. The Pine Street substation serves thirty main underground 13.2 kV distribution feeder circuits. Five of these 13.2 kV circuits provide tie capability with the five Acushnet substation the circuits previously mentioned.

Commonwealth also stated that the two overhead 115 kV line systems that serve the Acushnet substation area from the east, split to help form a multiple source of transmission supply that essentially surrounds the City of New Bedford on three sides. Commonwealth indicated that this design has provided the Company with the ability to transfer load to adjacent substations in the event of contingencies involving certain elements of the New Bedford district's bulk system.

Commonwealth indicated that it had maintained its existing limited capability to serve the Pine Street substation load area by "switching" certain of Commonwealth's 13.2 kV distribution circuits, so that a portion of the Pine Street load center could be served by other, adjacent bulk substations (id. at II-4 to II-6; Exh. C-2, at 4). Commonwealth indicated that it has installed automated, remote-control switching on certain distribution "tie" circuits to decrease the amount of time necessary to effect switching between the Pine Street substation and the adjacent Acushnet substation, as well as between Commonwealth's Cross Road and Fisher Road substations, both of which are located in the Town of Dartmouth (Exh. C-1, at I-3, II-6).
Commonwealth stated that it had been able to defer the need for the proposedtransmission line by automating the switching of its 13.2 kV tie circuits. Commonwealth asserted that this ability to transfer load, together with ongoing C&LNprograms, enabled Commonwealth to defer the need for the proposed transmission line(Exhs. C-1, at I-3 - I- 4; C-2, at 4, 9; C-3, at 7-8; Tr. at 23).

Close Commonwealth's seven tie circuits permit the transfer of approximately 20.1 megawatts of the forecasted 1997 summer peak load from the Pine Street substation (id. at II-6).

3. Reliability of Supply

Commonwealth asserted that the proposed facility is needed in order to provide a reliable supply of electricity to the Pine Street substation load area (id. at III-1 to III-2; Exh. C-2, at 5; Tr. at 47). In support of this assertion, Commonwealth identified its concerns with the existing 115 kV transmission system that serves its Pine Street substation which result in reduced system reliability. Commonwealth stated that the present demand at the Pine Street substation exceeds the capability of existing equipment in the event of a reasonably foreseeable, single contingency outage (Exh. C-1, at III-1). Commonwealth indicated that one of its primary measures of system reliability is its ability to respond to such an outage, i.e., where a single transmission element, bulk substation transformer, or autotransformer serving load in a particular area is forced out of service (id. at exhibit III-A).
Commonwealth's reliability criteria further specify that system voltages, line loadingsand equipment loadings shall be within normal limits for predisturbance conditions andwithin applicable "emergency" limits for a single contingency outage (Exh. C-1, atexhibit III-A).

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Commonwealth indicated that in the event of a single contingency outage during peak conditions, the cable remaining in service would be exposed to potentially serious thermal overload until the 13.2 kV tie circuits linking Pine Street to surrounding substations could be transferred or switched to adjacent substations (id. at 1-2; Exh. C-3, at 6). Commonwealth further explained that, due to the age of the existing underground cables serving the Pine Street substation load center, the Company typically would shed the Pine Street substation load in response to a single contingency outage during peak conditions so as to avoid a thermal overload and potential damage to the second or remaining cable. Commonwealth stated that at present, in the event of a single contingency involving one of the 115 kV lines serving the Pine Street substation, existing 13.2 kV distribution tie lines would be switched by the system operator and field crews so that a portion of the Pine Street load could be served by adjacent substations. The Company estimated that such switching would require two to four hours, during which time the Pine Street substation load center would be without service (Exhs. C-1, at III-4; C-3, at 6).

In this section, the Siting Board first examines the reasonableness of Commonwealth's system reliability criteria. The Siting Board then evaluates: (1) whether Commonwealth uses reviewable and appropriate methods for assessing system reliability based on load flow analyses; (2) whether existing and projected loads under certain contingencies exceed Commonwealth's reliability criteria, thereby requiring additional energy resources; and (3) whether acceleration of C&LM programs could eliminate the need for

such additional energy resources.

a. Reliability Criteria

Commonwealth described several service reliability and system design criteria applicable to the existing transmission facilities that serve the Pine Street substation load center. In defining its reliability criteria, Commonwealth provided an excerpt of its Reliability Criteria for the Design of Transmission Lines and Bulk Power Substations (Exh. C-1, at exhibit III-A). First, Commonwealth's reliability standard requires that its transmission system be designed with sufficient capacity to serve area loads under certain reasonably foreseeable outage conditions, including the forced outage of certain transmission circuits, transformers, or generators (id.; Exh. C-3, at 5). Commonwealth indicated that its design standard requires that its contingency studies assume power flow conditions that "reasonably" stress the system and that voltages, line loadings and equipment loadings should be within normal limits for "pre-disturbance" conditions, and within applicable emergency limits for the system conditions that exist following the established contingency (Exh. C-1, at exhibit III-A).

Commonwealth indicated that its reliability criteria had been developed in accordance with New England Power Pool and Northeast Power Coordinating Council reliability criteria to ensure that the reliability and efficiency of Commonwealth's bulk transmission facilities remain within acceptable guidelines (id. at III-1; Exh. C-3, at 4-5).

The Siting Board has consistently found that if the loss of any single major component of a supply system would cause significant customer outages, unacceptable voltage levels, or thermal overload on system components, then there is justification for additional energy resources to maintain system reliability. Norwood Municipal Light Department, EFSB 96-2, at 11 (1997) ("Norwood Decision"); 1996 NEPCo Decision, EFSB 95-2, at 10; Holyoke Gas & Electric Department, 3 DOMSC 1, 7 (1978). Consequently, the Siting Board finds that Commonwealth's reliability criteria regarding firm service in the event of a single contingency outage is reasonable.

In addition to the Company's single contingency criterion, Commonwealth introduced two additional factors for consideration in its assessment of need for new facilities, and discussed their relationship to overall system reliability. First, Commonwealth suggested that it is appropriate to consider the addition of new energy resources if emergency plans developed to address a reasonably conceivable double contingency would require extensive or substantial efforts, or necessitate undue or extended customer outages (Exh. C-1, at I-3, n.2, III-4). Second, Commonwealth suggested that the need for new energy facilities could be further established if such new facilities would support or enhance the ability of the Company to address future planned construction (id. at III-2).

With respect to Commonwealth's criteria regarding the potential for a double contingency involving both the #112 and #114 underground cables, the Siting Board has

noted that concern about such a loss is warranted if the need for a two line supply is clear, e.g., if the two lines provide needed firm capability or if the combined capacity of the lines is needed to meet peak load under normal operations. 1995 NEPCo Decision, 4 DOMSB at 124. The Siting Board has also found that it may be appropriate to consider this factor in conjunction with other reliability criteria that relate to the need for two lines. Id. Commonwealth's reliability criteria do not explicitly require that its bulk supply system maintain firm supply in the event of a double contingency outage, but do analyze its ability to restore service in the event of a reasonably conceivable double contingency outage. The Siting Board therefore finds that Commonwealth's analysis of a double contingency in this case is reasonable, but is not required based on its reliability criteria. Therefore, Commonwealth's double contingency criterion will not be explicitly considered in the Siting Board's determination of need for new energy facilities.

Upon reviewing Commonwealth's contention that requirements relating to future system expansion should be considered as a determinant in showing need for additional energy facilities, the Siting Board agrees that future expansion plans may be an appropriate reliability consideration in weighing alternatives for meeting the identified need. However, as Commonwealth has stated that it has no near term plans to reconductor either of the existing #112 and #114 lines, this factor will not be considered as a determinant in showing need for new energy facilities.
Commonwealth indicated that for planning study purposes, it has identified years 2016and 2017 as the likely date for reconductoring operations involving these lines (Exh.HO-A-5).

Close Instead, the Siting Board will consider the extent to which the proposed project would facilitate future construction or upgrades of related system components as part of its review of the reliability of alternative approaches to meeting the identified need (see Section II.B.4, below).

Accordingly, the Siting Board finds that Commonwealth's single contingency reliability criterion is reasonable for purposes of determining need in this review. The Siting Board also finds that Commonwealth's double contingency and future construction criteria are reasonable in this case for purposes of comparing the reliability of the proposed project to alternative approaches.

b. Load Forecast

i. Description

In connection with its analysis of the need for the proposed facility, Commonwealth presented its most recent load forecast for the Pine Street substation load center (Exh. C-1, App. A).

Commonwealth indicated that the Pine Street substation load center forecast was constructed using a "top down" approach, based on Commonwealth's most recent long-range forecast, which was reviewed and accepted by the Department in D.P.U. 95-95 (Exh. C-4, at 4). Commonwealth noted that this forecast reflected Commonwealth's total coincident peak load, i.e., the coincidence of peak load in each of Commonwealth's three districts: Cape Cod; New Bedford; and Plymouth (id. at 5). Commonwealth then developed specific projections of each district's peak load, non-coincident with Commonwealth's total or system peak. These non-coincident peaks ("NCP") reflect the maximum demand that is expected to be placed on each district within the summer season (id.). Commonwealth explained that its allocation of its system-wide forecast to its three districts included analysis of the weather responsiveness of each district, and each district's sensitivity to economic conditions and seasonal load patterns (Exh. C-1, App. A, at 4). Commonwealth then developed allocated load forecasts for each substation within a district based upon the expected timing of that particular district's NCP. The Company stated that these forecasts are developed annually for 41 substations in each of Commonwealth's three districts (id., App. A, at 1).

Commonwealth indicated that it developed its Pine Street substation forecast in the context of its annual review using a six-step econometric modelling process. First, Commonwealth ascertained the continuing validity of its D.P.U. 95-95 forecast, by weather-normalizing the actual 1995 summer peak and observing that it was nearly identical to the forecasted 1995 summer peak (id., at App. A at 2-3, 6-8; Exh. C-4, at 5). Second, Commonwealth weather-normalized the actual individual district NCP loads using techniques similar to those applied to Commonwealth's system forecast (Exh. C-4, at 5; Exh. C-1, App. A at 8). Through this process, Commonwealth established the particular patterns that, in isolation or in combination, drove Commonwealth's total load (Exh. C-4, at 7-8). Third, in order to account for forecast diversity between the weather-normalized system and district peak loads, normal peaking conditions were identified for each district, thus enabling the coincident peak forecast for the Commonwealth system as a whole to be transformed into the individual district NCP's (id. at 8-9; Exh. C-1, at App. A at 12-15). Fourth, loads for each substation in each district were modelled statistically, based on the pertinent district load, and on factors such as temperature, humidity, the day of the week, and the level of economic activity in the area as reflected, for example, by the level of manufacturing employment (Exh. C-4, at 10; C-1, App. A at 15-16). Fifth, Commonwealth identified and reflected expected step loads, or incremental load increases of 0.5 MW or more, based upon an analysis of district-specific information. In the case of the Pine Street load center, two expected step loads were identified andintroduced into the model: 1.5 MW in year 1996 corresponding to the New Bedfordwastewater treatment plant; and 0.66 MW in year 1997 corresponding to additionalload for the wastewater treatment plant.

Close Step loads were then reduced by a factor of 0.6 to reflect the possibility that such loads might not completely materialize (Exhs. C-1, App. A at 17; C-4, at 11). Sixth, an "extreme weather" case was formulated in order to further test the reliability of Commonwealth's transmission system under "reasonably expected extreme weather."

Commonwealth indicated that its extreme weather case assumed a one-in-five year probability of extreme conditions, based upon examination of the previous twenty-two years of available weather data (Exhs. C-1, App. A at 17-18; C-4, at 6, 11-12).

Commonwealth stated that its forecasted weather-normalized peak load at the Pine Street substation is expected to grow from 66 MW in 1995 to 75 MW in the year 2015, reflecting a compound annual growth rate ("CAGR") of 0.6% (Exh. C-4, at 13). In the extreme weather case, Pine Street substation load is expected to grow from 72 MW in 1995 to 81 MW in 2015, a CAGR of 0.6% (id. at 15).

ii. Analysis

In support of its petition, Commonwealth has submitted a detailed substation level forecast which was derived from its system-wide forecast submitted in D.P.U. 95-95 and accepted by the Department pursuant to an approved settlement agreement. Commonwealth validated its D.P.U. 95-95 forecast with actual data, and Commonwealth's analysis demonstrated that the D.P.U. 95-95 forecast continues to be appropriate for planning purposes. In addition, Commonwealth analyzed its district and substation forecast to ascertain the consistency of these disaggregated forecasts with the system-wide forecast prepared and submitted in D.P.U. 95-95.

In forecasting load for the Pine Street substation, Commonwealth prepared a New Bedford district forecast and then derived the Pine Street substation forecast from the district forecast. In presenting its New Bedford district forecast, the Company adequately explained its derivation of historic trends in order to prorate its system-wide forecast into separate district forecasts. Commonwealth also has provided reasonable explanations of its estimation of load growth at the substation level, based upon both Commonwealth's forecasts of system and district load, as well as historical measurements of increasing substation load.

In previous transmission line reviews, the Siting Board has stated that, in facility reviews where a company projects load growth for a portion of its service territory, the Siting Board will require such company to use quantitative techniques, where sufficient data is available, or other systematic techniques, and to document all pertinent assumptions to support the allocation of system-wide growth to service areas and to individual substations within the service areas. 1995 NEPCo Decision, 4 DOMSB at 127; New England Power Company, 21 DOMSC 325, 344 (1991)("1991 NEPCo Decision").

Here, the Siting Board finds that Commonwealth has relied on quantitative techniques with adjustments for forecasting load at the district level, and has provided a reasonable explanation for its estimation of load at the substation level, based on the district forecast. Accordingly, for purposes of this review, the Siting Board finds that Commonwealth's substation forecast is reasonable and acceptable.

c. Contingency Analysis

In this section, the Siting Board considers whether there is a need for additional energy resources based upon Commonwealth's reliability criteria.

Commonwealth stated that electrical facilities currently serving the Pine Street substation could not be operated at or above emergency capacity ratings in the event of a single contingency outage during peak periods (Exh. C-1, at III-4, exhibit III-B). In support of its assertion, Commonwealth provided the normal and emergency ratings of the existing #112 and #114 underground cables that serve the Pine Street substation load, which it indicated were based on manufacturers specifications and recommendations based on the manufactures' industry experience, and on the age of these facilities (id. at II-3, n.1). Commonwealth argued that any period of exposure of the existing #112 and #114 linesto load levels exceeding emergency ratings would not be prudent given the age of thesecables and the prospect that subjecting either of these cables to overload conditionscould lead to serious, permanent damage (Exh. C-1, at III-4 and III-8).

Close Commonwealth stated that the established emergency rating for each of these cables is 60 MVA (id. at II-3; Tr. at 31). The Company thus established a load threshold of 60 MW, above which, Pine Street substation load would be at risk under a single contingency.

Commonwealth next provided lad flow analyses showing power flows and voltage conditions on the facilities that currently serve the Pine Street substation (Exh. C-1, at exhibit III-B).
Commonwealth employed the Power System Simulator for Engineering ("PSS/E")model, an industry standard program to produce load flow analyses (Exh. C-3, at 5). Commonwealth explained that the PSS/E model used computerized mathematicalmodels of Commonwealth's power system in order to quantify voltages and powerflows under normal, peak, and contingency conditions (Exh. C-1, at III-3). Commonwealth applied the model to forecasted extreme weather peak load to analyzethe adequacy of its system under normal and contingency conditions (id.).

Close Commonwealth's load flow analyses, based on a forecasted year 2000 summer peak load under extreme weather conditions of 74.5 MVA, indicated that in the event of a loss of one of the existing #112 or #114 underground cables that now run between the Acushnet substation and the Pine Street substation, the remaining line would be subject to a 25 percent overload prior to the switching of maximum transferrable load to other adjacent substations (id. at III-4). Commonwealth stated that this condition constitutes a violation of the Company's single contingency reliability criterion (id. at III-4 and exhibit III-A). Additionally, Commonwealth indicated that by 2015 under extreme weather, a comparably timed contingency would result in an overload of the remaining cable by approximately 37 percent above that cable's 60 MVA emergency rating (id. at III-4).

Commonwealth stated that in order to restore reliability to the system under a single contingency outage of either the #112 or #114 line, it currently has to shift load to several

13.2 kV distribution level circuits which provide tie capability between the Pine Street substation and adjacent substations within Commonwealth's New Bedford district (id. at III-8) (see Section II.A.2, above). The Company argued that its reliance on distribution based capacity transfer capability is problematic for several reasons: (1) the transfer of load requires time for the Company's Supervisory control and Data Acquisition ("SCADA") operators and line crews to complete; (2) physical interconnection of adjacent substations provides no guarantee that the requisite capacity will be available for load transfer purposes; and (3) transfer capacity will diminish as native load increases at those adjacent substations having distribution level interconnection with the Pine Street substation (id. at III-4).

Taking these considerations into account, Commonwealth explained that while 13.2 kV distribution level switching theoretically gives Commonwealth the ability to maintain loading on a single remaining line to within its rated capacity, the Pine Street substation load must be shed during the time that such switching is being pursued in order to avoid thermal overload of the remaining cable. Commonwealth stated that this necessary interruption of Pine Street substation service is in violation of the Company's single contingency reliability criterion (Exh. C-3, at 6).

Commonwealth also explained that its ability to transfer Pine Street substation load to other substations in the event of a single contingency involving one of the existing lines was becoming further constrained by load growth within the district as a whole, and that the number of hours and amount of load being placed at risk in the event of a single contingency would therefore increase during the period examined in the Company's load forecast (Exh. C-1, at III-4).

The Siting Board finds that Commonwealth used reviewable and appropriate methods for assessing the reliability of supply based on actual load measurements and load flow analyses. The Siting Board accepts the Company's analysis which indicates that 60 MW is the threshold of risk that applies to its existing facilities. The record indicates that in 1995, weather-normalized peak load at the Pine Street substation exceeded firm capacity by 6 MW, and that by 2015, peak load wold exceed firm capacity by 15 MW. Under extreme weather assumptions, Pine Street substation load in 1995 exceeded firm capacity at the Pine Street substation by 12 MW, and would grow to exceed firm capacity by 21 MW in 2015. The Siting Board therefore finds that (1) Commonwealth's measurements and load flow analyses demonstrate that under a single contingency at both current and forecasted peak load conditions, transmission facilities supplying the Pine Street substation would be loaded above emergency capabilities in contravention of Commonwealth's reliability criteria, and (2) the ability of the current system to address a single contingency by effecting automated and manual switching of 13.2 kV distribution level circuits is not sufficient to maintain system reliability consistent with Commonwealth's stated reliability criteria. Consequently, the Siting Board finds that the current configuration of supply to the Pine Street substation does not meet Commonwealth's reliability criteria in the event of the single contingency loss of either the #112 or the #114 transmission cable.

Accordingly, the Siting Board finds that there is a need for additional energy resources based on Commonwealth's reliability criteria.

d. Accelerated Conservation and Load Management

G.L. c. 164, § 69J requires a petitioner to include a description of actions planned to be taken to meet future needs and requirements, including the possibility of reducing requirements through load management. Commonwealth asserted that, given the amount of load reduction necessary, accelerated C&LM
Load management is a measure or action designed to modify the time pattern ofcustomer electricity requirements, for the purpose of improving the efficiency or anelectric company's operating system. 220 C.M.R. § 10.02. For example, a utility mayreach an agreement with a manufacturer that uses electricity whereby that manufacturerwill curtail its use during peak times when the utility's system, as a whole, is facingincreased demand for electricity for cooling or heating purposes. During non-peaktimes the manufacturer may then resume its use of electricity. The utility providingelectricity has, therefore, managed its load, thereby decreasing its need for additionalpeak capacity. Conservation, on the other hand, is a technology, measure, or actiondesigned to decrease the kilowatt or kilowatt hour requirements of a particular electricend-use, thereby reducing the overall need for electricity (id.). Both conservation andload management are DSM measures.

Close efforts within the Pine Street substation load center would not address the identified need for additional energy resources (Exhs. C-1, at IV-14 to IV-15; C-5, at 9; Tr. at 174-175). The Company stated that it had been able to defer the construction of the proposed transmission line, in part, due to the implementation of its "Green Saver" programs and other DSM initiatives within the New Bedford load area. Commonwealth argued that such activities, in conjunction with the installation of additional distribution switching equipment, secured benefits for its customers, but that such actions could no longer be prudently implemented to further defer the construction of a new energy resource (Exh. C-2, at 9).

In support of its assertion, the Company provided a study, performed in conjunction with its consultant, XENERGY, Inc., of opportunities to address or defer the need for additional energy resources to serve the Pine Street substation area. The study considered whether a combination of targeted strategies including DSM, energy efficiency and load management, distributed generation ("DG"), and interruptible rates would be capable of supplying approximately 14 MW of load reduction in the area served by the Pine Street substation (Exh. C-1, App. B at 1).
Commonwealth indicated that this figure was based upon forecasts of 1998 peakrequirements at the Pine Street substation, which are expected to reach 73.6 MW underextreme weather, or approximately 14 MW over the 60 MW emergency thresholdidentified in Section II.A.3.c., above (Exh. C-1, App. A at 65, App. B at 15).

Close As a result of this study, Commonwealth concluded that even extraordinary levels of achievement in these areas could only defer, and not avoid, the need for a new energy resource to serve the Pine Street substation load area as Pine Street substation load is projected to reach 67.9 MW under base weather, and 73.6 MW under extreme weather, by 1998 (id. at III-6, n.4, App. A at 62, 65).

In performing its study, the Company conducted an analysis of Company data relating to technical potential, baseline energy and demand, and end-use measure impacts (id. at III-6). Commonwealth's staff also analyzed the particular characteristics of customers and customer classes within the Pine Street substation load center to determine whether any area-specific adjustments were required with respect to forecasting data and assumptions. The Company stated that Commonwealth's staff performed field investigations which served to further refine the Company's characterization of the Pine Street substation load area (id.). Commonwealth then developed particular demand and load characteristics for the Pine Street substation load center, disaggregated by customer class (id.). Customer class requirements were then analyzed and particular usage patterns for each class were developed (id.).

Next, Commonwealth examined a load duration curve for the Pine Street substation to determine the actual requirements DSM applications in terms of both time and duration of use. Commonwealth then applied mathematical models commonly in use within the industry to assess potential DSM, and to rank DSM technologies by market segment (id.; see also Exh. C-1, App. B at 15). This resulted in the determination of the load center's technical potential by end-use in terms of energy and demand during the periods of peak load (id. at III-6, App. B at 16). The study identified 17.1 MW of Pine Street substation load that would be technically amenable to accelerated DSM initiatives. Commonwealth asserted that the level of technical potential identified by the study would be overstated to the extent that the analysis did not account for customers that have already participated in one or more of Commonwealth's established DSM programs, or customers who have already expressed a reluctance to accept interruptible service (id. at III-6 to III-7). The Company indicated that 14 percent of the Pine Street substation load center'scustomer base has participated in ongoing Commonwealth DSM program (Exh. C-1, atIII-6).

Close With respect to applications for DG, the Company stated that the study assumed two potential applications for a total of 4 MW of DG (fuel cells), but projected a cost of $500 to $4000 per kilowatt for such resources, leading the Company to conclude that DG would be uneconomical, and that it should therefore be rejected (id. at IV-15, and App. B at 4, 26). The Company also expressed concerns as to the reliability of this emerging technology as further grounds for the rejection of DG (id.).

Commonwealth next determined "economic potential" and "market or achievable potential," the level of DSM considered to be available and economically feasible in the

Pine Street substation load area (Exh. C-5, at 7). The Company stated that, even using extremely optimistic assumptions,
Commonwealth's assumptions included, for example, that all residential refrigeratorswithin the City of New Bedford would be replaced with energy efficient refrigeratorswithin a three year period (Tr. at 185-186).

Close only10.3 MW of DSM could be achieved by 1998 (Exh. C-1, at III-7). Commonwealth's load forecast for the Pine Street substation indicates that under the base weather case, 1998 peak load (adjusted for DSM) would be 67.9 MW and that extreme weather 1998 peak load would be 73.6 MW (Exh. C-1, App. A, at 62-65, App. B at 15). The Company identified a need threshold of 60 MW in relation to the Pine Street substation load area (see Section II.A.3.c, above). Consequently, based on its study and analysis, Commonwealth concluded that the application of accelerated and targeted DSM resources would not be sufficient to enable Commonwealth to avoid the need for a new energy facility (Exh. C-5, at 7).

Commonwealth has undertaken an extensive and comprehensive effort to determine the ability of a targeted load reduction program, including distributed generation, to meet the identified need by 1998. The Siting Board notes that Commonwealth would have to rely on the successful implementation of a highly aggressive targeted load reduction program in order to meet the identified need by 1998 under the base weather case. The Siting Board recognized that achievement of 10.3 MW of load reduction would represent a reduction by approximately one-seventh of total load at the Pine Street substation, and agrees with Commonwealth's assessment that meeting this goal by 1998 likely is unrealistic given the aggressive assumptions included the Company's study, and the short time period available for implementation of such initiatives. Moreover, the record indicates that the Company would be unable to meet the identified need under extreme weather, even if the entire 10.3 MW of load reduction were to be achieved by 1998. In sum, the Company has reasonably demonstrated the likely inability of the Pine Street load area to achieve the magnitude of load reduction necessary to offset the present potential for thermal overload of existing transmission facilities.

Accordingly, the Siting Board finds that acceleration of C&LM programs, even when combined with other load reduction techniques, would not meet the identified need for additional energy resources based on Commonwealth's reliability criteria.

e. Conclusions on Reliability of Supply

The Siting Board has found that: Commonwealth's single contingency reliability criterion is reasonable for purposes of determining need in this review, and further that Commonwealth's double contingency and future construction criteria are reasonable in this case for purposes of comparing the reliability of the proposed project to alternative project approaches; Commonwealth has relied on quantitative techniques with adjustments for forecasting load at the district level, and has provided a reasonable explanation for its estimation of load at the substation level, based on the district forecast;

and for purposes of this review, Commonwealth's substation forecast is reasonable and acceptable. In addition, the Siting Board has found that Commonwealth used reviewable and appropriate methods for assessing the reliability of supply based on actual load measurements and load flow analyses. The Siting Board has also found that: Commonwealth's measurements and load flow analyses demonstrate that under a single contingency at both current and forecasted peak load conditions, transmission facilities supplying the Pine Street substation would be loaded above emergency capabilities in contravention of Commonwealth's reliability criteria; the ability of the current system to address a single contingency by effecting automated and manual switching of 13.2 kV distribution level circuits is not sufficient to maintain system reliability consistent with Commonwealth's stated reliability criteria; and consequently the current configuration of supply to the Pine Street substation does not meet Commonwealth's reliability criteria in the event of the single contingency loss of either the #112 or the #114 transmission cable. Accordingly, the Siting Board has found that there is a need for additional energy resources based on Commonwealth's reliability criteria. Finally, the Siting Board has found that acceleration of C&LM programs, even when combined with other load reduction techniques, would not meet the identified need for additional energy resources based on Commonwealth's reliability criteria.

Based on the foregoing, the Siting Board finds that Commonwealth has demonstrated that the existing supply system is inadequate to serve the Pine Street substation load center. Accordingly, the Siting Board finds that additional energy resources are need for reliability purposes in the area served by the Pine Street substation.

B. Comparison of the Proposed Project and Alternative Approaches

1. Standard of Review

G.L. c. 164, § 69H requires the Siting Board to evaluate proposed projects in terms of their consistency with providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. In addition, G.L. c. 164, § 69J requires a project proponent to present "alternatives to planned action" which may include: (a) other methods of generating, manufacturing, or storing; (b) other sources of electrical power or natural gas; and (c) no additional electric power or natural gas. G.L. c. 164, § 69J also requires a petitioner to provide a description of "other sitelocations." The Siting Board reviews Commonwealth's proposed route, as well asother routing alternatives, in Section III.B, below.

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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 previously identified need. Norwood Decision, EFSB 96-2, at 20; 1996 NEPCo Decision, EFSB 95-2 at 18; Boston Edison Company, 13 DOMSC 63, 67-68, 73-74 (1985).

In addition, the Siting Board requires a petitioner to consider reliability of supply as part of its showing that the proposed project is superior to alternative project approaches. Norwood Decision, EFSB 96-2, at 21; 1996 NEPCo Decision, EFSB 95-2, at 19; Massachusetts Electric Company, 18 DOMSC 383, 404-405 (1989).

2. Project Approaches

In its initial filing, Commonwealth identified sixteen potential approaches to meeting the identified need: (i) the proposed project – the construction of a new, underground, 115 kV transmission line between the Acushnet substation and the Pine Street substation, routed generally through the streets of the City of New Bedford (Exh. C-1, at exhibit I-1); (ii) an alternative involving the reconductoring of the existing #112 and #114 lines serving the Pine Street substation ("project alternative 2"); (iii) nine project alternatives involving the construction of additional transmission facilities that would provide another source of supply to the Pine Street substation from Commonwealth's bulk power system (project alternatives 3 through 11); (iv) three project alternatives involving the construction of additional distribution and substation facilities (project alternatives 12, 13, and 14); (v) a project alternative involving the repowering or resisting of Commonwealth's Canon Street generating station, which is located adjacent to the Pine Street substation ("project alternative 15" or "generation alternative"); and (vi) an alternative involving a combination of DSM and DG resources (id. at exhibit IV-B, and App. B). Commonwealth maintained that it was necessary to identify and evaluate a comprehensive list of project alternatives so as to ensure "that no practical economic alternative to serve the identified need was omitted" (id. at IV-1). The Siting Board's examination of project approaches will include an analysis of the proposed project and each of the identified alternative project approaches.
G.L. c. 164, §69J requires Commonwealth to consider the alternative of "no additionalelectrical power." Commonwealth indicated that project alternative 2 was akin to a no-build alternative, but stated that this alternative would seriously compromise systemreliability during the reconductoring period (Exhs. C-1, at IV-3 to IV-4; C-3, at 5 to 6). The Siting Board considers project alternative 2 in Section II.B.3.b, below.

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3. Ability to Meet the Identified Need

In its analysis of the ability of each of the sixteen project approaches to meet the identified need, the Siting Board evaluates whether each approach would provide a reliable supply to the Pine Street substation load center consistent with the Company's reliability criteria relating to unplanted single contingencies.

a. Proposed Project

Commonwealth asserted that the proposed facilities would fully address the identified need (id. at IV-3). In support thereof, Commonwealth provided load flow analyses showing equipment loadings under a contingency involving a loss of the existing #112 transmission line (id. at exhibit III-B).
The Siting Board notes that, from an operational standpoint, the effects on the systemof a single contingency involving the #114 line would be essentially identical to thoseresulting under the single contingency involving the #112 line that is represented inCommonwealth's load flow analysis. This is the case because both existing cablesperform the same function and have identical ratings.

Close Commonwealth's load flow analyses demonstrate that, with the addition of the proposed facilities, Commonwealth's existing system components would be loaded well within emergency summer capabilities under the identified single contingency (id.).

The record demonstrates that the proposed facilities would provide a reliable supply to the Pine Street substation load center in the event of a loss of either the #112 or #114 underground cables. Accordingly, the Siting Board finds that the proposed project would meet the identified need.

b. Reconductoring Alternative

Commonwealth asserted that project alternative 2, which involves reconductoring of the existing #112 and #114 lines, would not meet the identified need (id. at IV-4 to IV-11). The Company provided load flow analyses which demonstrated that project alternative 2 would, once complete, be sufficient to address the identified need (id. at exhibits IV-C, and IV-D). However, Commonwealth explained that, due to the substantial period of time required for the removal of the existing cable and subsequent reconductoring, system reliability would be substantially degraded during the construction period such that Commonwealth would be unable to satisfy its reliability standards given present load levels at the Pine Street substation (id. at IV-3 to IV-4; Exh. HO-A-3). Commonwealth stated that the construction of project alternative 2 would likely require two or more years to complete (Exh. HO-A-3). Therefore, Commonwealth indicated that it had rejected this alternative as being unable to meet the identified resource need consistent with its reliability standards (id.).

The Siting Board previously has found that Commonwealth has established that need exists under both current and forecasted load conditions (see Section II.A.3.c, above). While project alternative 2, once constructed, would meet the identified need, the process of constructing this alternative would further degrade already unacceptable reliability during a lengthy construction period. Accordingly, the Siting Board finds that the

reconductoring alternative, project alternative 2, would not meet the identified need.

c. Alternative Transmission Facilities

Commonwealth asserted that nine new transmission line project alternatives, project alternatives 3 through 11, would meet the identified need (id. at IV-4 to IV-11).

In order to assess these alternatives, Commonwealth developed specific design criteria which considered the likely configuration and equipment requirements of each alternative, and presented schematic representations of each alternative (id. at IV-1, IV-4 to IV-11, exhibit IV-A). Commonwealth developed load flow analyses for each alternative showing equipment loadings under both normal conditions (id. at exhibit IV-C), and the single contingency loss of the #112 line (id. at exhibit IV-D). Commonwealth stated that load flow and equipment loadings would be maintained to within rated limits for each of the transmission alternative s (id. at IV-15, and exhibit IV-D).

The record demonstrates that project alternatives 3 through 11 would provide a reliable supply to the Pine Street substation load center under normal system conditions, and in the event of a single contingency loss of either of the existing underground transmission cables. Accordingly, the Siting Board finds that the transmission level project alternatives, project alternatives 3 through 11, would meet the identified need.

d. Distribution and Substation Alternatives

Commonwealth stated that it analyzed three options for addressing the identified need by enhancing its distribution level “tie” capacity between the Pine Street substation and either the Acushnet substation or a new substation (project alternatives 12 through 14) (Exhs. C-1, at IV-11 to IV-14; C-3, at 7). Commonwealth indicated that, in concept, these alternatives would enable Commonwealth to switch an additional increment of load from the Pine Street substation in the event of a single contingency outage of either the #112 or #114 line (id.).

Project alternative 12 would involve the construction of six 13.2 kV express distribution feeders between the Acushnet and Pine Street substations (id. at IV-11). Commonwealth stated that these improvements would add about 60 MVA of capacity to the Pine Street substation load center (id. at IV-12). However, the Company noted that during normal operating conditions, these express feeders would be out-of-service, and that a complex series of switching operations would be required in order to provide support to the Pine Street substation in the event of a contingency (id.).
Commonwealth stated that the express tie circuits would normally be switched open inorder to prevent loop flow that would leave the remaining 115 kV line subject tothermal overload in the event of a single contingency (Exh. HO-A-6).

Close The Company's load flow analyses indicated that in order to maintain operation of existing system elements within acceptable thermal ratings, this distribution level switching would need to be accompanied by the electrical disconnection, or islanding, of two of the Pine Street substation load busses from the remaining

115 kV line in order to prevent loop flow (Exh. HO-A-6).
Commonwealth indicated that loop flow would result once tie circuits between PineStreet substation and Acushnet substation are switched in, forming a closed loop, i.e., aclosed electrical path with the 115 kV bulk supply system (Exh. HO-A-6).

Close Commonwealth explained that this alternative would actually increase the number and extent of switching operations that Commonwealth would have to accomplish in the event of a single contingency and therefore would exacerbate the Company's existing violation of its reliability standard (Exh. C-1, at IV-12).

Project alternatives 13 and 14 would involve tapping Commonwealth's existing #109 115 kV line at a point between the Cross Road and Fisher Road substations located in the Town of Dartmouth. A new overhead (alternative 13) or underground (alternative 14) 115 kV line would run from the tap point to feed a new substation to be located at the intersection of Hawthorne Street and Slocum Road in Dartmouth ("Hawthorne Street substation"). The new substation would feed the Pine Street substation by means of six new 13.2 kV underground feeder circuits (id. at IV-13). The Company provided load flow analyses which demonstrate that, in the event of a single contingency involving the #112 or #114 cable, load on the remaining cable would be 54.2 MW, or 90 percent of its 60 MVA rating (id. at existing IV-D). The Company stated that project alternatives 13 and 14 would perform identically with respect to load flow and reliability (id. at IV-12 to IV-14).

The Company stated that in order to maintain the ability of project alternatives 13 and 14 to support the Pine Street substation over the longer term, additional 13.2 kV express distribution feeders would be required, as would the addition of a new transformer bank at the Hawthorne Street substation (id. at IV-13). Commonwealth also noted that from an operational standpoint, project alternatives 13 and 14 would require the completion of switching operations before the Pine Street substation load could be effectively supported following a single contingency (id.). The Company stated that, as with alternative 12, Pine Street substation load would be interrupted until such time as switching could be completed, thus contravening Commonwealth's reliability standard (id.).

The record demonstrates that project alternative 12 would require that Commonwealth rely on distribution level switching to address capacity constraints at the Pine Street substation in the event of a single contingency. The record also demonstrates that service outages to the Pine Street substation load area would result, thus placing the Company in contravention of its system reliability criteria.

In its treatment of need for the proposed project under Section II.A.3.c, the SitingBoard has found that the Company's ability to address a single contingency by means ofautomated and manual switching of 13.2 kV distribution level circuits is not sufficientto maintain system reliability consistent with Commonwealth's reliability criteria. Tothe extent that reliability concerns associated with distribution level switchingoperations required under certain project alternatives are similar to, or in someinstances more pronounced than, those options currently available to the Company, theSiting Board notes that those project alternatives would not meet the identified need.

Close Accordingly, the Siting Board finds that the distribution level project alternative, project alternative 12, would not meet the identified need.

Similarly, project alternatives 13 and 14 would require outages pending the completion of switching of distribution level components in the event of a single contingency, thus subjecting the Pine Street substation load area to interruption of service during the period required to complete such switching. Accordingly, the Siting Board finds that the distribution level project alternatives, project alternatives 13 and 14, would not meet the identified need.

e. Generation Alternative

Project alternative 15 considered additional power generation as an alternative to meet the identified need. Commonwealth provided a load flow analysis assuming a 135 MW combined cycle facility located at its Cannon Street station, which demonstrated that equipment loadings would be maintained to well within acceptable levels both under normal conditions, and in the event of a single contingency involving the #112 cable (Exh. C-1, at exhibit IV-D).

The record demonstrates that the repowering or resisting of a generation facility at Cannon Street station would address the identified need in a manner consistent with Commonwealth's reliability criteria. Accordingly, the Siting Board finds that the repowering or resiting of a generation facility at the Cannon Street station, project alternative 15, would meet the identified need.

f. Distributed Generation

Commonwealth provided an analysis of the ability of DG to meet the identified need by including DG as one element of a comprehensive strategy of load reduction that would combine DSM, energy efficiency and load management, DG and interruptible rates (see Section II.A.3.d, above). Commonwealth stated that it identified several waterfront and industrial locations in the New Bedford area that potentially would be suitable for the siting of DG resources (Exh. C-1, at IV-15). The Company stated that its load reduction alternative assumed the siting of four MW of DG (fuel cells) within the Pine Street

substation load center (id.).

The Company identified two concerns as to the viability of DG as part of a strategy for meeting the identified need. First, Commonwealth stated that based on its analysis, DG resources would cost $500 to $4000 kilowatt, and as such would not be competitive with its proposed transmission project (id. at n.3). Second, the Company stated concerns as to the reliability of emerging fuel cell technology (id.). The Company indicated that it did recognize the potential for securing environmental benefits with the use of DG, and stated that it would continue to monitor developments in DG technology as an option for addressing future transmission and distribution needs (id.).

In Section II.A.3.d above, the Siting Board has reviewed the Company's study of a targeted load reduction strategy, and has found that acceleration of C&LM programs, even when combined with other load reduction techniques, would not meet the identified need. The Siting Board notes that the study assumed a range of load reduction initiatives, an integral component of which was four MW of DG resources. Based on the Siting Board's finding that such a strategy would not meet the identified need, the Siting Board finds that four MW of DG resources alone would not be sufficient to meet the identified need. Accordingly, the Siting Board finds that distributed generation would not meet the identified need.

g. Conditions on Ability to Meet Identified Need

The Siting Board has found that Commonwealth has demonstrated that the proposed project, the construction of a new 115 kV transmission line between the Acushnet substation and the Pine Street substation, would satisfy Commonwealth's reliability criteria and would meet the identified need. In addition, the Siting Board has found that: (1) the reconductoring alternative, project alternative 2, would not meet the identified need; (2) the transmission level project alternatives, project alternatives 3 through 11, would meet the identified need; (3) the distribution level project alternatives, project alternatives 12, 13, and 14, would not meet the identified need; (4) the repowering or resisting a generation facility at the Cannon Street station, project alternative 15, would meet the identified need; and (5) distributed generation would not meet the identified need.

Accordingly, the Siting Board next evaluates the reliability, environmental impacts and cost of the proposed project and those alternatives to the proposed project that have been found to meet the identified resource need.

4. Reliability

In this section, the Siting Board compares the proposed project with project alternatives 3 through 11 with respect to providing a reliable supply of electricity to the Pine Street substation. In so doing, the Siting Board addresses the two reliability criteria identified in Section II.A.3.a, above, namely the double-contingency and future construction criteria, and any other reliability arguments raised by the Company for specific project

alternatives.

a. Transmission Alternatives

Commonwealth argued that the proposed project would be more reliable than the transmission level project alternatives (Brief at 27). In support of its statement, Commonwealth identified a series of reliability issues for which the proposed project would provide reliability advantages as compared to the transmission level project alternatives. Specifically, the Company argued that: (1) the double source of bulk 115 kV supply to the Acushnet substation rendered the proposed project more reliable than those project alternatives that would tie into the existing bulk system at a points with only a single source of supply; (2) the proposed project would consist of a simple electrical connection between the Acushnet substation and the Pine Street substation and require no series reactive compensation or phase angle regulating equipment; (3) the proposed project would involve no construction of overhead lines and only a short submarine section; and (4) the proposed project generally follows a shorter and more direct route than many of the project alternatives (Exh. C-1, at IV-15 to IV-18).
In response to an information request, Commonwealth stated that there were no areaswithin its New Bedford district that would gain reliability benefits from construction ofone of the identified project alternatives (Exh. HO-A-1).

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With respect to Commonwealth's argument regarding the double source of 115 kV supply, the company explained that the Acushnet substation is supplied by two separate sources, each of which is able to satisfy the requirements of both the Acushnet substation and the Pine Street substation. The Company noted that alternative transmission configurations generally were inferior to the proposed facilities in this regard (id. at IV-15 to IV-16; Exh. C-3, at 10; Tr. at 14-15, 27-28, 39-41, 70-72). However, Commonwealth also recognized that project alternatives 3 through 10 would provide a source of 115 kV supply to the Pine Street substation independent of the Acushnet substation, an advantage which would partially offset the advantage of a two source supply for the proposed project. (Exh. C-1, at IV-4 to IV-11, IV-15).

With respect to the reliability of the identified project configurations and the associated system components, Commonwealth indicated that project alternatives 3, 4, 6, and 9 would require the application of load compensating equipment such as series reactive components, and that project alternatives 5, 7 and 10 would require mechanical equipment such as phase angle regulators in order to improve the balance of power flows between the new facilities and the existing cables (id. at IV-4). Commonwealth stated that, at a minimum, such equipment represents a complicating factor. The Company also asserted that there is little operational experience with phase angle regulating equipment in New England, and that such mechanical components have a higher probability of failure than do simple electrical connections (id. at IV-7; Exh. HO-A-7; Tr. at 39-41).

Commonwealth stated that project alternatives 4 through 10 each would involve some measure of overhead construction, and argued that those alternatives would be less reliable than the proposed project in that they would be subject to greater risk of outages resulting from storm damage or lightning strikes. In support of its assertion, Commonwealth provided data on unplanned transmission system outages occurring during the most recent ten year period in the New Bedford district. The data indicate that several recent transmission system incidents resulting in customer outages in the New Bedford district were attributed to lightning or tree damage (Exh. HO-N-4).

With respect to the overall length, Commonwealth stated that the proposed facility would be approximately 3.3 miles, all underground, with a 0.25 mile river crossing (Exh. C-1, at IV-2). Project alternatives 4 through 10 are significantly longer than the proposed project. Commonwealth noted that alternative 3, although shorter than the proposed project, would involve a nearly 1.0 mile submarine crossing of the Acushnet River (id. at IV-4). The Company asserted that project alternative 11, which follows the same route as the proposed project, possesses neither advantages nor disadvantages as compared to the proposed project with respect to overall length.

Finally, Commonwealth indicated that it expected that project alternatives 3 through 11 would enhance Commonwealth's ability to respond to a double contingency (id. at IV-4; Brief at 24). With respect to the future construction criterion, Commonwealth stated that project alternatives 3, 4, and 5 would provide benefits in terms of the future planned reconductoring of the existing #112 and #114 lines, and implied that the remaining transmission level alternatives would provide similar benefits to the extent that they, like the proposed project, introduced a third source of 115 kV supply to the Pine Street substation which would facilitate such construction (Exh. C0-1, at IV-4 to IV-11).

The record demonstrates that the proposed project provides reliability benefits above those offered by the other transmission level project approaches with respect to: (i) the relative simplicity of the proposed project's design and electrical functioning; (ii) the proposed project's lack of reliance on either overhead construction or long submarine sections; and (iii) the comparatively short overall length and directness of the proposed route.

The record is unclear as to whether the reliability advantage of a double source of bulk supply exceeds the reliability advantage provided by a source of transmission to the Pine Street substation that is independent of the Acushnet substation. Therefore, the Siting Board is unable to adequately compare the proposed project to the transmission level project alternatives with respect to this particular aspect of reliability.

Finally, the Siting Board finds no evidence to suggest that project alternatives 3 through 11 would differ significantly from the proposed project in providing benefits with respect to Commonwealth's double-contingency and future construction criteria.

Accordingly, the Siting Board finds that the proposed project would be preferable to project alternatives 3 through 11 with respect to reliability.

b. Generation Alternative

Commonwealth asserted that the repowering or resisting of the Cannon Street station would provide generally acceptable loadflow and performance under normal plant conditions, but would also maintain the Company's reliance on its two existing cables (Exh. C-1, at IV-16). Commonwealth explained that any such generating station would be subject to planned and unscheduled outages for maintenance and repair, during which time a single contingency involving the #112 or #114 lines would place Commonwealth in contravention of its reliability criteria (id. at IV-14). In addition, Commonwealth argued that the permitting and construction associated with the generation alternative could not be completed on a timely basis (id. at IV-14). Commonwealth therefore asserted that the proposed project was superior to the repowering or resisting of generating facilities at the Cannon Street station with respect to reliability (id.).

With respect to Commonwealth's future construction criterion, the Company indicated that, in the absence of an extended planned or forced outage, the generation alternative would facilitate the reconductoring of Commonwealth's existing #112 and #114 lines (id.). The Company did not discuss the reliability of the generation alternative in the event of the double-contingency loss of the existing lines.

The Siting Board notes that generating facilities, by their nature, are subject to planned and forced outages of considerably greater frequency and duration than the unplanned outages to which an underground transmission line is subject. During such outages, the Company would be reliant on its existing 115 kV cables to serve the Pine Street substation load, and would experience the same reliability concerns that led the Company initially to propose this project. While Commonwealth likely could schedule any future construction around the timing of its planned outages, it cannot similarly schedule double contingencies. Therefore, the Siting Board finds that the proposed project would be slightly preferable to project alternative 15 with respect to Commonwealth's future construction criteria, and preferable with respect to the Company's double-contingency criteria.

Accordingly, the Siting Board finds that the proposed project would be preferable to project alternative 15 with respect to reliability.

5. Environmental Impacts

In this section, the Siting Board compares the proposed project to those project alternatives that were found to meet the identified need with respect to the environmental impacts resulting from: (1) facility construction; (2) permanent land use; and (3) magnetic field levels.

a. Facility Construction Impacts

Commonwealth stated that it analyzed the facility construction impacts of the proposed project and the various project alternatives that would meet the identified need (Exhs. HO-RR-4; C-1, at IV-17). Commonwealth asserted that facility construction impacts of the proposed project would be significantly less than those of the project alternatives (Exh. HO-RR-4, at 6; Brief at 32). In support of its statement, Commonwealth provided a comparative analysis which was developed by its Environmental Programs Department (Exh. HO-RR-4).

Commonwealth explained that, because the various project alternatives would involve differing types of construction activity and would result in construction related impacts on various types of land resources, it developed a general set of preferences for specified comparative factors. For example, Commonwealth explained that, to the extent possible, construction of roughly linear facilities within established right-of-ways ("ROW's") was preferable to construction to pristine areas (Exhs. C-7, at 4; HO-RR-4, at 1). The Company also assumed that shorter, more direct route alternatives would be preferable as a means to reduce the total amount of construction activity associated with the proposed project as well as with each of the identified project alternatives.

Commonwealth indicated that it performed field work to further define the construction impacts of the various project alternatives (Exh. HO-RR-4, at 2; Tr. at 58). Commonwealth explained that a project team, the Environmental Programs Group, visited proposed sites for the various project alternatives, consulted with Commonwealth's engineers to ascertain construction requirements, and elicited comment from relevant public officials in order to identify permitting issues and any exogenously identified preferences (Exhs. C-1, at 1-5; C-2, 6-8).

Commonwealth asserted that project alternative 3, consisting of a 115 kV transmission line running from Commonwealth's Arsene Street substation to Fairhaven, would require a mile-long directional drill to cross the Acushnet River and therefore would involve significantly greater impacts than the proposed project relating to the handling and disposal of drilling slurry and mud generated during the drilling process. Commonwealth indicated that installation of the cable on the river bottom would not bepermitted in this location as the lower portion of the Acushnet River is navigable waterthat is within the "Designed Port Area" as delineated by the Massachusetts Departmentof Environmental Protection ("MDEP") and the Division of Coastal Zone Management(Exh. HO-A-8). A cable lying on the bottom in this vicinity would be subject todamage from anchors, and would impede future dredging operations (id.).

Close Such construction would also require a larger operations staging area in the vicinity of the Acushnet River and associated wetlands, due both to the length of the bore and more elaborate requirements associated with installation of the project's electrical components (Exh. HO-RR-4).

Commonwealth also indicated that construction of project alternative 3 would require the clearing of a new ROW and the excavation of pole foundations in an area that may contain hazardous waste (id. at 2; Exh. C-1, at IV-4 to IV-5; Tr. at 69-73). Commonwealth explained that such activities potentially would involve special handling and disposal requirements for contaminated soils as well as worker safety and exposure issues (Exh. HO-RR-4, at 3). In sum, Commonwealth concluded that the construction impact of project alternative 3 would be significantly greater than that of the proposed project (id.).

The record demonstrates that the extent of facility construction required for project alternative 3 would be greater than that required for the proposed project. Accordingly, the Siting Board finds that the proposed project would be preferable to project alternative 3 with respect to facility construction impacts.

Commonwealth asserted that construction of project alternatives 4 and 5 would involve significant operations adjacent to a railroad ROW, in addition to temporary impacts associated with underground construction comparable to those anticipated for the proposed project (Exh. C-1, at IV-5 to IV-7). Commonwealth stated that construction of these project alternatives also would necessitate the clearing of a 5.0-mile section of new easement through areas including a number of wetlands and a stream (Exh. C-1, at IV-6). Commonwealth asserted that construction activities conducted in the vicinity of active railroads, or within wetlands, would be more complex, and progress more slowly, and that such construction therefore would result in greater facility construction impacts (Exh. HO-RR-4, at 3). Commonwealth further argued that the greater length of project alternatives 4 and 5 – 4.2 miles of underground construction and 5.0 miles of overhead construction – would involve a more significant total construction impact than the proposed project (id. at 3-4; Exh. C-1, at IV-5).

The record demonstrates that the extent of facility construction for project alternatives 4 and 5 would be greater than that required for the proposed project. Accordingly, the Siting Board finds that the proposed project would be preferable to project alternatives 4 and 5 with respect to facility construction impacts.

The Company indicated that project alternatives 6, 7, 9 and 10, would follow a common route for significant portions of their length, and include an approximately 4.0-mile segment of underground cable, as well as overhead segments of various lengths. In the case of alternatives 6 and 7, the overhead portion would be 4.3 miles long, and in the case of alternatives 9 and 10, the overhead portion would be 9.3 miles long (Exhs. C-1, at IV-8 to IV-10). All four of these project alternatives also would involve the construction of a new overhead-underground transition station at the intersection of Allen Street and Tucker Road in the Town of Dartmouth (id.). Commonwealth asserted that each of these project alternatives would involve more significant environmental impacts than the proposed project (id. at IV-7 to IV-9, IV-10 to IV-11; Exh. HO-RR-4, at 4-5). Commonwealth explained that facility construction would require the permanent clearing of wetland vegetation along portions of a new overhead right-of-way, as well as clearing

and sideline trimming of vegetation along an existing ROW (Exh. HO-RR-4, at 4-5). Commonwealth explained that project alternative 9 would involve sideline trimmingand possible clearing of vegetation along an 8.0-mile section of existing transmissionline that would require reconductoring under this project alternative (Exh. HO-RR-4, at4). The existing #109 line runs generally southerly from Commonwealth's High Hillswitching station to its Cross Road substation, containing southerly to a point betweenthe Cross Road and Fisher Road substations in the Town of Dartmouth where the newline would tap the #109 line (id.).

Close Commonwealth also asserted that, while the underground portion of these project of these project alternatives would involve short-term construction impacts generally comparable to those anticipated for the proposed project, the length of these facility alternatives would be greater than that for the proposed project and, therefore, would affect a larger total area (id.).

The record demonstrates that the extent of facility construction for project alternatives 6, 7, 9 and 10 would be greater than that required for the proposed project, and would impact additional wetlands. Accordingly, the Siting Board finds that the proposed project would be preferable to project alternatives 6, 7, 9 and 10 with respect to facility construction impacts.

Project alternative 8 consists of a new underground cable that would follow the primary route between the Pine Street substation and the Acushnet substation, but would extend beyond the Acushnet substation and proceed overhead, parallel to the Company's existing #112 and #114 transmission lines' right-of way, to tap the #112 line at Commonwealth's Industrial Park Tap, for a total length of 6.2 miles (id.; Exh. C-1, at IV-9). Commonwealth explained that project alternative 8 would require extensive construction activity in wetland areas between the Acushnet substation and the Industrial Park Tap (Exh. HO-RR-4, at 4). Commonwealth also asserted that the construction impacts of project alternative 8 would be significantly greater than the proposed project, due primarily to the greater length of the facility (id.).

The record demonstrates that the extent of facility construction required for project alternative 8 would be greater than that required for the proposed project, and would impact additional wetlands. Accordingly, the Siting Board finds that the proposed project would be preferable to project alternative 8 with respect to facility construction impacts.

The Company stated that project alternative 11, consisting of two new 115 kV cables along the Company's primary route for its proposed project, would involve marginally greater facility construction impacts than would the proposed project (id. at 5). Commonwealth asserted that construction of two lines would involve greater impacts in terms of street construction as well as at the river crossing (id.).

The record demonstrates that the extent of facility construction required for project alternative 11 would be slightly greater than that required for the proposed project.

Accordingly, the Siting Board finds that the proposed project would be preferable to project alternative 11 with respect to facility construction impacts.

Finally, Commonwealth asserted that project alternative 15, the generation alternative, wold involve major air quality and siting issues that would affect land-use policies in the City of New Bedford (Exhs. C-1, at IV-14; HO-RR-4). Commonwealth explained that it believed that the construction impacts associated with project alternative 15 would be dramatically greater than those projected for Commonwealth's proposed project and that, as such, the generation alternative represented the least advantageous alternative with respect to environmental impacts (id. at 6; Exh. C-1, at IV-14).

The Siting Board acknowledges that the impacts of facility construction with respect to project alternative 15 would be considerably greater than for the proposed project. Accordingly, the Siting Board finds that the proposed project would be preferable to project alternative 15 with respect to facility construction impacts.

Thus, the Siting Board has found, above, that the proposed project would be preferable to project alternatives 3 through 11 and 15 with respect to construction impacts.

b. Permanent Land Use Impacts

Commonwealth asserted that the proposed project would involve "essentially no long-term impacts" (Exh. HO-RR-4, at 2; see also Exh. C-1, at IV-17). In support of this assertion, Commonwealth explained that the proposed use of roadway construction would mean that "the new cable would be installed in existing utility corridors with no change in terms of viability or land-use considerations" (Exh. HO-RR-4, at 2).

Commonwealth also provided a comparison of the proposed project to project alternatives with respect to permanent land use impacts (Exh. HO-RR-4). In assumed that the use of underground construction, particularly in the vicinity of existing utility facilities, tends to involve the least long-term environmental impact (Exh. C-7, at 4). Commonwealth also stated that the construction of permanent facilities that could affect the character or land use of a particular area following construction was disfavored (id. at 5). For example, construction of visible structures, such as overhead poles and supports or transition stations, particularly in proximity to residential areas, were met with reservation by the Company, as were requirements to place these or other structures within wetlands or pristine areas (Exh. HO-RR-4, at 1-2).

Commonwealth explained that it considered alternatives 3, 4, 5, 6, 7, 9 and 10 to be inferior to the proposed project with respect to land use impacts because they each would require the establishment of new, permanent ROWs and, in some instances, would require the construction of permanent ancillary facilities such as transition stations and overhead structures (id. at 3-6; Exhs. C-1, at IV-17; C-7, at 4). Commonwealth considered project alternative 8 to be inferior to the proposed project because, while it

would use an existing ROW, overhead construction would be required for a portion of the project's length and the project would result in significant land use impacts in wetland areas between the Acushnet substation and the Industrial Park tap (Exh. HO-RR-4, at 4). Commonwealth asserted that project alternative 11, which would involve the construction of two new 115 kV lines along the primary route for the proposed project, would involve permanent land use impacts comparable to those of the proposed project (id. at 5). Finally, Commonwealth noted that project alternative 15, the generation alternative, would involve significant, permanent land use impacts at a site that, according to the Company, has been targeted as a central parcel for redevelopment within the City of New Bedford (Exh. C-1, at IV-14).

The Siting Board has previously found that "in many cases, the use of an existing [ROW] as the site of new lines is the most appropriate way to achieve the proper statutory balance [among need, environmental impacts and cost]" and that the environmental impact of such use is "prima facie minimal." See 1996 NEPCo Decision, EFSB 95-2, at 30; 1988 ComElec Decision, 17 DOMSC 249 at 327; Boston Edison Company, 3 DOMSC 44, 53,-54, 61 (1978). Because the proposed project would be located primarily beneath existing roadbeds and within an existing ROW, the Siting Board expects that incremental permanent land use impacts would be minimal. 1996 NEPCo Decision, EFSB 95-2 at 30. The record demonstrates that the long-term environmental impacts associated with project alternatives 3 through 10 would involve the permanent clearing of new ROWs and/or the construction of ancillary structures such as towers and transition stations, and therefore would involve greater permanent land use impacts than the proposed project. With respect to the generation alternative, the Siting Board agrees that the permanent land use impacts associated with the repowering or resiting of generation facilities in New Bedford would be significantly greater than those associated with the proposed project.

Accordingly, the Siting Board finds that the proposed project would be comparable to project alternative 11 and preferable to project alternatives 3 through 10 and project alternative 15 with respect to permanent land use impacts.

c. Magnetic Field Levels

The Siting Board focuses on magnetic field levels rather than electric field levelsbecause perceived health impacts generally relate to magnetic field levels. see 1996NEPCo Decision, EFSB 95-2 at 26, n.22; 1995 NEPCo Decision, 4 DOMSB at 32,n.51.

Close

Commonwealth stated that it expected that only minor increases to ambient magnetic field levels would result from construction and operation of the proposed project, and that such increases would not constitute a significant environmental impact (Exh. HO-E-19). In support of its statement, Commonwealth provided a report produced by its consultant,

Enertech Consultants of Santa Clara, Inc. ("Enertech"), entitled "Calculated EMF Levels of 115 kV Cables and Existing Levels Along Two Proposed Alternative Routes" ("Enertech report") (id. Att.). In the Enertech report, calculations estimating magnetic field levels for the proposed project were compared to existing magnetic field levels as measured along Commonwealth's primary route, and along a noticed alternative route which is the route followed by the existing #112 and #114 cables (Exh. C-1, at IV-2) (see Section III.C.2.a.iii, below).

In comparing the magnetic field impacts of the proposed project to those associated with the various project approaches identified by Commonwealth, the Company first explained that all transmission level alternatives would involve relative low impacts that would be consistent with magnetic field levels that have been found to be acceptable in previous decisions of the Siting Board (Exh. HO-RR-4, at 1). 1995 NEPCo Decision, 4 DOMSB at 152; Massachusetts Electric Company/New England Power Company, 13 DOMSC 119, 228-242 (1985) ("1985 MECo/NEPCo Decision").

In lieu of presenting EMF measurement data for each of its project alternatives, Commonwealth presented a set of criteria relating to magnetic field impacts, which it used to compare the various project alternatives. Commonwealth asserted that underground construction, particularly within established ROWs, such as streets, and along shorter routes likely would result in lower magnetic field impacts (Exh. HO-RR-4, at 1). Commonwealth also stated that project alternatives that could be routed through primarily industrial areas should be considered preferable with respect to magnetic field impacts (id.).

Based on these criteria, Commonwealth argued that the proposed project was preferable to other project alternatives in terms of magnetic field levels (Exh. HO-RR-4, at 2). Commonwealth explained that the proposed project would involve underground construction along a short and relatively direct route. Commonwealth asserted that project alternatives 3 through 10 would either: (1) involve longer route segments including construction beneath city streets traversing greater numbers of residential areas within New Bedford, and that such alternatives would involve the siting of facilities in proximity to greater numbers of sensitive receptors such as schools and churches; or (2) include overhead lines, leading to more significant increases in magnetic field levels in those areas (id. at 5-6; C-1 at Section 5.C) (see Section II.B.5.b, above). The Company asserted that magnetic field impacts from project alternative 11 likely would be marginally inferior to the proposed project depending upon the disposition of the Company's existing cables (Exh. HO-RR-4, at 5).
The Company noted that, under project alternative 11, its existing 115 kV lines couldeither be abandoned, or relegated to 13.2 kV distribution service.

Close

With respect to ambient magnetic field levels along the primary route, Commonwealth stated that assuming peak load, existing average magnetic fields along the primary route

would be 5.2 mG (Exh. HO-E-19). The Company stated that, with the proposed facility, average magnetic field along the primary route under peak load would be between 5.22 mG and 7.35 mG (id.). The Company noted that existing magnetic fields along the primary route likely would be dominated by distribution circuits that serve the industrial and commercial loads in this area (Tr. at 119-120). With respect to the residential portions of the primary route, Commonwealth stated that magnetic field levels tend to be dominated by appliances and other electrical equipment already in use in homes and buildings along the route (Tr. at 119; Brief at 34).

The record demonstrates that under the proposed project, magnetic field levels within the ROW for the construction of the proposed transmission facilities would be at low levels, comparable to ambient conditions existing within the relevant New Bedford streets. While Commonwealth did not provide magnetic field management data relative to each of the alternatives to the proposed project, the Company's use of magnetic field criteria to compare project alternatives with respect to magnetic field levels demonstrates that the effect of magnetic fields would be somewhat greater along other project alternatives due to alternative configurations and the greater length of several alternatives to the proposed project. Accordingly, the Siting Board finds that the proposed project would be preferable to project alternatives 3 through 11 with respect to magnetic field impacts.

The Company has not provided criteria and data on magnetic fields that is suitable for an assessment of the performance of the generation alternative in terms of magnetic field impacts. Therefore, the Siting Board makes no finding on the preferability of the proposed project relative to the generation alternative, project alternative 15, with respect to magnetic field impacts. Below, the Siting Board balances overall environmental impacts for the generation alternative with those for the proposed project.

d. Conclusions on Environmental Impacts

In Section II.B.5.a, b, and c, above the Siting Board has found that the proposed project would be preferable to project alternatives 3 through 11 and 15 with respect to facility construction impacts, comparable to project alternative 11 and preferable to project alternatives 3 through 10 and project alternative 15 with respect to permanent land use impacts, and preferable to project alternatives 3 through111 with respect to magnetic field impacts. The Siting Board made no finding with respect to the magnetic field impacts of project alternative 15; however the Siting Board concludes that, on balance, the construction and long term impacts of siting a generating facility would significantly outweigh the impacts of the proposed project, and therefore finds that the proposed project would be preferable to project alternative 15 with respect to environmental impacts.

Accordingly, the Siting Board finds that the proposed project would be preferable to project alternatives 3 through 11 and 15 with respect to environmental impacts.

6. Cost

Commonwealth stated that the proposed project represents the least cost project alternative that meets the identified need (Exh. C-1, at IV-16). Commonwealth provided cost data showing that, for the proposed project, total project costs as derived from "as-installed" non-binding price quotations from vendors and calculation of the Company's internal and overhead costs would be $7,167,000 (id. at V-11, and exhibit V-A). Commonwealth stated that for the purpose of comparing the various project alternatives with respect to cost, it developed direct capital cost estimates for each of the project alternatives based upon detailed information provided by its Engineering Services Department (id. at V-16).
The Company's direct capital cost estimates presented in Exh. C-1, at exhibit V-Einclude capital (equipment) costs only. The Company stated that overhead andadministrative costs were excluded from the analysis because such costs would beapplied to various project alternatives at comparable rates, and would not addinformation useful to the cost comparison (Exh. C-1, at V-16, n.4).

Close Commonwealth estimated that the direct capital cost for the proposed project would be $5,989,000 (id., at exhibit IV-E). Estimates of capital costs for the transmission level project alternatives ranged from $6,561,000 to $15,878,000 (id.). Commonwealth estimated the direct capital cost for repowering or resiting generation resources at Cannon Street station at $85,761,000 and $102,375,000 respectively (id.). For each alternative, Commonwealth assumed that construction would begin in 1997 and would be completed at the end of year 1999, with capital expenditures occurring over a three year period (id. at IV-16).

In order to fully compare the cost of the proposed project to the alternative projects, Commonwealth provided the 1997 present value of revenue requirements ("PVRR") over a forty-year project life for each project alternative (id.; Exh. C-2, at 9). The Company's PVRR cost analysis included the present value of differential transmission line losses (again over a forty-year project life) resulting from the various project alternatives (id.). Commonwealth stated that it estimated a 1997 PVRR of $9,171,000 for the proposed project, and provided projected costs of the remaining transmission level project alternatives ranging from $10,295,000 to $24,425,000 (Exh. C-1, at exhibit IV-E). Commonwealth stated that project alternative 15, the repowering or resiting of the Cannon Street generating station had a projected 1997 PVRR (including line loss savings) of $345,414,000 and $412,875,000 respectively (id. at V-17, exhibit IV-E).

Commonwealth noted that transmission alternatives were clearly more cost-effective than the generation alternative (id. at IV-17; Exh. C-3, at 10). The Company also noted that the proposed project represented the least cost transmission option (Exh. C-1, at IV-17). Commonwealth explained that it believed that the proposed project was the least cost transmission alternative because it involved a shorter distance, included the most

advantageous option for crossing the Acushnet River, and avoided the need for expensive ancillary facilities and equipment such as series reactive components or phase angle regulators (id. at IV-18).

The record demonstrates that the proposed project would provide a significant long-term cost advantage relative to other project alternatives. Accordingly, the Siting Board finds that the proposed project would be preferable to project alternatives 3 through 11 and 15 with respect to cost.

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

In comparing the proposed project to the transmission, distribution and generation project alternatives identified by Commonwealth, the Siting Board has found that: (1) the proposed project would meet the identified need; (2) the reconductoring alternative, project alternative 2, would not meet the identified need; (3) the transmission level project alternatives, project alternatives 3 through 11, would meet the identified need; (4) the distribution level project alternatives, project alternatives 12, 13, and 14, would not meet the identified need; (5) the repowering or resiting of a generation facility at the Cannon Street station, project alternative 15, would meet the identified need; and (6) distributed generation would not meet the identified need.

With respect to environmental impacts, cost and reliability of the proposed project and alternatives to the proposed project, the Siting Board has found that: (1) the proposed project would be preferable to project alternatives 3 through 11 with respect to reliability; (2) the proposed project is preferable to project alternative 15 with respect to reliability; (3) the proposed project would be preferable to project alternatives 3 through 11 and 15 with respect to environmental impacts; and (4) the proposed project would be preferable to project alternatives 3 through 11 and 15 with respect to cost.

Accordingly, the Siting Board finds that the proposed project is preferable to all other project alternatives identified by the Commonwealth.

III. ANALYSIS OF THE PROPOSED AND ALTERNATIVE FACILITIES

The Siting Board has a statutory mandate to implement the policies of G.L. c. 164, §§ 69H-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 its review of other site locations, the Siting Board requires a petitioner to show that its proposed facilities’ siting plans are superior to alternatives and that its proposed facilities are sited at locations that minimize costs and environmental impacts while ensuring supply reliability. Norwood Decision, EFSB 96-2,

at 33; 1996 NEPCo Decision, EFSB 95-2, at 35; 1991 NEPCo Decision, 21 DOMSC at 376.

A. Description of the Proposed Facilities and Alternative Facilities

1. Proposed Facilities

Commonwealth proposes to construct a new, underground 115 kV transmission line in the Town of Acushnet and the City of New Bedford that will connect Commonwealth's Acushnet substation to its Pine Street substation. The Company noticed twenty individual segments (numbered 1 through 20) that may be used in different combinations to form a series of possible route configurations (see Figure 1). The primary route is identified as alternative 1A, and consists of segments 3, 7, 9, 11, 15, 16, 18 and 19 (Exh. C-1, at I-B, V-17) (see Figure 2).

The proposed transmission line would proceed westerly, underground, from the Acushnet substation, crossing beneath the Acushnet River and into the City of New Bedford

in the vicinity of Belleville Road. The proposed line would then proceed further westerly, beneath New Bedford streets, following Belleville Road to Front Street, then southerly on Front Street, Herman Melville Boulevard, and MacArthur Drive to the Pine Street substation ("primary route") (id. at I-1, exhibit I-A).

The proposed transmission line along the primary route would be constructed within public ROWs in New Bedford for most of its length (id. at exhibit I-A). Commonwealth proposes to excavate a trench, and construct a concrete encased duct bank approximately four to five and one half feet deep, in order to emplace a steel pipe or PVC conduit through which the cable will run (Exhs. HO-E-6; HO-E-19(att.) at Sec. 3; Tr. at 129). Commonwealth noted that the depth of the trench may be dependent on the cableconfiguration selected by the Company for the proposed facility. Commonwealth statedthat while a pipe type cable would be installed within a four foot deep trench, a soliddielectric cable would likely be constructed within a slightly deeper trench (on the orderof five and one half feet so as to minimize magnetic fields (Tr. at 129; see also Exh.HO-E-19(att.) at Sec. 3).

Close Commonwealth stated that at a depth of between four and six feet, the proposed facility would generally be above other existing utility facilities located within the street bed, but that engineering design would be such that existing facilities at shallower depths can be adequately avoided (id.). The Company indicated that manhole locations would be determined as part of the detailed engineering and design work following the approval of a final route (Exh. C-1, at V-2, V-12).

With regard to the portion of the proposed transmission line that would cross the

Acushnet River, Commonwealth stated that it would prefer to place the new cable on the bottom of the Acushnet River. However, the Company indicated that, depending upon final engineering analyses and the status of ongoing clean-up activities being conducted by the United States Environmental Protection Agency ("USEPA") in the Acushnet River, directional drilling techniques might be employed to order to place the facility beneath the river bed in a subsurface duct system (Exh. HO-E-13; Tr. at 49, 87).

Commonwealth also stated that certain ancillary components including relaying and control equipment, bus extensions, shunt reactors, and related equipment may be required at either the Pine Street substation or Acushnet substation to support the operation of the proposed transmission line. The Company stated that the need for, and exact location of, any such equipment would remain undermined until completion of final engineering design work (Exh. HO-A-11).

2. Alternative Facilities

Commonwealth developed combinations of route segment alternatives between the Acushnet substation and the Pine Street substation consistent with its segment-based route selection approach (see Section III.B.2, below). Commonwealth presented a total of 48 routing alternatives that employed various combinations of the twenty identified route segments (Exh. C-1, at exhibit I-B, exhibit V-D). For comparative purposes, Commonwealth presented an analysis of two route alternatives, one of which includes an alternative river crossing. Commonwealth asserted that the identified alternative routes reflected a measure of geographic diversity from the primary route (id. at V-19).

Commonwealth's first route alternative generally follows the route of the existing #112 and #114 cables to the west of the Central New Bedford Historic District ("westerly alternative")
The westerly alternative consists of route segments 1, 4, 5, 8, 10, 17, 18 and 19 (Exh.C-1, Sec. V.E.). The Siting Board notes that Commonwealth's identification of thecomposition of the westerly alternative in its description presented in Section V.E. ofits Petition (Exh. C-1, at V-17) and in Exh. HO-C-5(att.), is different from thatpresented in its Petition (Exh. C-1, exhibit V-D). The Siting Board has relied on theroute designations presented in the Petition at Section V.E. to identify the routealternatives.

Close (see Figure 2). Commonwealth noted that the westerly alternative would traverse predominantly residential and commercial areas along County Street, in contrast to the primary route which would traverse the primarily industrial areas of Herman Melville Boulevard, Front Street, and MacArthur Drive (id. at V-18). The westerly alternative would overlap the primary route in the vicinity of the of the Acushnet River crossing.

As its second alternative, Commonwealth presented a variation of the westerly alternative

with a different approach to the river crossing ("Acushnet alternative")
The Acushnet alternative consists of route segments 1, 2, 5, 8, 10, 17, 18 and 20 (Exh.C-1, at V-17).

Close (see Figure 2.). The Acushnet alternative would extend, underground, northeasterly from the Acushnet substation along Commonwealth's existing transmission ROW, and continue northerly, then westerly, beneath portions of South Main Street and Slocum Street in Acushnet, and across the Acushnet River on the Wood Street Bridge (id. at V-10, and exhibit I-B). It would then proceed westerly and southerly beneath portions of River Street, Sylvia Street, and Belleville Avenue in New Bedford, rejoining the westerly alternative at the western end of the 0.3-mile segment which defines the preferred river crossing (id. at V-10 to V-11). The Company indicated that its alternative river crossing ("segment 20") would cover approximately 2.0 miles and, as such, would be nearly six times the length of its preferred river crossing (id. at exhibit I-B).

Commonwealth indicated that ancillary facilities comparable to those identified in connection with the proposed facility may be needed at the Pine street substation or Acushnet substation to support a transmission facility involving any of the identified alternative route segment combinations (Exh. HO-A-11).

B. Site Selection Process

1. Standard of Review

In order to determine whether a facility proponent has shown that its proposed facilities' siting plans are superior to alternatives, the Siting Board requires a facility proponent to demonstrate that it examined a reasonable range of practical facility siting alternatives. Norwood Decision, EFSB 96-2, at 36; 1996 NEPCo Decision, EFSB 95-2, at 37; Northeast Energy Associates, 16 DOMSC 335, 381, 409 (1987) ("NEA Decision"). In order to determine that a facility proponent has considered a reasonable range of practical alternatives, the Siting Board requires the proponent to meet a two-pronged test. First, the facility proponent must establish that it developed and applied a reasonable set of criteria for identifying and evaluating alternatives in a manner which ensures that it has not overlooked or eliminated any alternatives which are clearly superior to the proposal. Norwood Decision, EFSB 96-2, at 38; 1996 NEPCo Decision, EFSB 95-2 at 37-38; Berkshire Gas Company (Phase II), 20 DOMSC 109, 148-149, 151-156 (1990). Second, the facility proponent must establish that it identified at least two noticed sites or routes with some measure of geographic diversity. Norwood Decision, EFSB 96-2, at 37; 1996 NEPCo Decision, EFSB 95-2, at 38;

NEA Decision, 16 DOMSC at 381-409.

In the sections below, the Siting Board reviews Commonwealth's site selection process,

including Commonwealth's development and application of its siting criteria as part of its site selection process.

2. Development of Siting Criteria

a. Description

Commonwealth stated that it developed siting criteria and implemented an extensive analytical process to identify and evaluate route alternatives for the proposed transmission line (Exhs. C-1, at V-1; C-2, at 10-11; C-6, at 2-3; C-7, at 5). Commonwealth indicated that its analytical process and related siting criteria sought to reflect engineering and construction requirements and costs associated with the proposed facilities, as well as existing land uses, land and water resources, relevant environmental policy, and regulatory precedent (Exh. C-2, at 10-14).

Commonwealth stated that, in order to investigate the potential routing operations for the proposed transmission line, it first determined a facility site study area (Exh. C-6, at 2-3). Based upon the outcome of its analysis of project alternatives (see Section II.B, above). Commonwealth determined that the facility site study area should encompass an area defined as the western side of the Acushnet River in the City of New Bedford, generally between the Acushnet substation and the Pine Street substation (Exhs. C-1, at V-1; C-6, at 2-3; C-7, at 5; Tr. at 47). Commonwealth indicated that it attempted not to impose strict limits on the study area until it had further developed its analysis of practicable route alternatives (Exhs. C-2, at 10; C-6 at 3).

Commonwealth identified three general categories of siting criteria to apply in its evaluation of routes within the study area: cost criteria; environmental criteria; and engineering and reliability criteria (Exh C-1, at exhibit V-B). Commonwealth indicated that, in defining its site selection criteria, it sought to identify particular constraints or impediments to the development of the proposed facility in terms of engineering, construction, economic, and environmental factors (id. at V-1; Exh. C-2, at 8, 11).

Commonwealth presented its analysis of cost criteria in the form of a matrix model designed to quantify costs associated with each of the identified route alternatives. Initially, Commonwealth used cost information provided by contractors in the form of turnkey cost estimates for installation of the proposed project along the primary route, and Commonwealth's estimated internal and overhead costs derived from the Company's internal budget procedures (Exhs. C-1, at V-11; C-6, at 5). From this information, Commonwealth derived an installed cost per linear foot which it then used to estimate the baseline installed cost for each route alternative.
Commonwealth stated that its estimate of installed cost per linear foot for the primaryroute was derived by dividing a projected cost of $7,167,000 by the total length of theproposed project, 19,218 feet. The resulting installed cost per linear foot is $373.00(Exh. C-1, at exhibit V-A).

Close Commonwealth next identified factors relating to specific engineering or construction requirements that would increase the cost of construction along various route segments (id. at V-14; Exh. HO-C-5(att.)). Construction cost multipliers were thus assigned to the relevant route alternatives, allowing the Company to define a comparative cost analysis matrix which incorporated information relating to both cost and engineering requirements (Exh. C-1, at exhibit V-A).

Commonwealth presented its environmental criteria in the form of a matrix model consisting of thirty-two environmental factors which were divided into three broad categories: natural resource factors; land use factors; and human environmental factors (id. at exhibit V-B). Natural resource factors included impacts to wetlands, surface water, rare or endangered species and their habitats, trees, vegetation, fisheries and scenic views (id.). Land use factors included impacts to residential dwellings, commercial and industrial structures, historic dwellings or structures, historic districts, recreational land, railroad crossings and traffic flow (id.). Human environmental factors included impacts to sensitive receptors such as hospitals, schools, churches and nursing homes, and factors such as noise, electric and magnetic fields ("EMF"), marine navigational requirements, and community acceptance (id.).

Commonwealth stated that, for each proposed route segment, it assigned a score of from zero to five for each of the identified environmental factors (id. at V-13). Commonwealth stated that it defined and applied scoring threshold characteristics that reflected quantitatively based information, while minimizing any potential for individual bias in assigning a score (id. and exhibit V-C). The relevant segment scores were summed to form an aggregate score for each route alternative. The route alternatives were than ranked by total score with a lower score being preferable to a higher one (id. at exhibit V-D).

Finally, Commonwealth indicated that it assessed the reliability of the proposed alternatives based on two criteria: overall length, and the ability to construct significant portions of the facility over continuous, straight segments (id. at V-2). The Company explained that straight segments would allow it to maximize the length of cable that could be installed without splicing, and noted that splice points are often identified as the origin of cable failure (id. at V-2, and V-18).

b. Analysis

Commonwealth has developed a set of criteria for evaluating alternative routes that include natural resource factors, land use factors, human environmental factors, cost and reliability – types of criteria that the Siting Board has found to be appropriate for the siting of transmission lines. See Norwood Decision, EFSB 96-2, at 38; 1996 NEPCo Decision, EFSB 95-2, at 41; 1995 NEPCo Decision, 4 DOMSB at 167. After defining a facility site study area that would encompass all viable route options, Commonwealth identified a comprehensive list of environmental features that might be present within the

study area in order to aid in identification and evaluation of potential routes. Commonwealth also assigned scores for each of the criteria which considered the relative impacts of various types of facility construction.

Commonwealth provided a separate analysis of the cost and reliability of each identified route segment and adequately explained the factors that were considered in preparing the cost and reliability analyses. Commonwealth's weighting method provides for a quantitative comparison among environmental criteria; however, Commonwealth did not provide overall weights that could be used to conduct a balancing of the cost, environmental impact, and reliability categories.

In previous cases, the Siting Board has emphasized the need for project proponents to explain fully how they balance cost, reliability and environmental impacts when analyzing siting alternatives. Here, Commonwealth has indicated that the reliability of all identified route segments, taken individually, is essentially the same, and further that the combination of route segments constituting the primary route are comparable or preferable to other route alternatives in terms of reliability. Commonwealth's environmental and cost matrix analyses show that the primary route has both the lowest environmental impact and lowest cost. The record demonstrates that the primary route is comparable or preferable to all other routing alternatives with respect to cost, environmental impacts, and reliability, so an extensive justification of weights is therefore unnecessary.

Consequently, the Siting Board finds that Commonwealth has developed a reasonable set of criteria for identifying and evaluating route alternatives. The Siting Board notes, however, that in future reviews where such balancing is necessary, applicants should provide clear justification for the weighting of these factors in order to fully explain how environmental impacts, cost and reliability are balanced.

3. Application of Siting Criteria

a. Description

Commonwealth evaluated and compared environmental impacts, cost and reliability for twenty specific route segments, which could be combined to form 48 route alternatives (Exh. C-1, at V-11 to V-19). Commonwealth selected three routes for more detailed evaluation, including the primary route, the westerly alternative and the Acushnet alternative. The Company stated that it based its choice of alternatives on the results of its initial route comparison and in order to present for consideration, geographically diverse alternatives to the primary route (id. at V-3 to V-4). Commonwealth personnel, and its consultants in the fields of wetlands and vegetation, engineering, historic and cultural resources, and magnetic fields, participated in this phase of the review (Exhs. HO-E-12; C-2, at 1-2; C-6, at 1). Commonwealth indicated that it continued to discuss the various siting options with City of New Bedford officials and, as the siting analysis progressed,

Commonwealth conducted a noticed public informational meeting with New Bedford residents and officials to identify and assess concerns of New Bedford residents and businesses relative to the construction and operation of the proposed facility (Exh. C-1, at V-14, exhibit V-E; Exh. C-2, at 12, App. A, App. B).

Commonwealth indicated that it collected and considered data relating to relevant engineering and environmental concerns (Exh. C-1, at 1-6, exhibit V-1, exhibit V-J, exhibit V-K, App. C, App. D). With regard to environmental factors, the Company conducted surveys of historic structures and properties, trees, wetlands, archaeological resources, traffic patterns and magnetic fields (id.; Exhs. HO-E-16; HO-E-19(att.); HO-E-20). The Company stated that it also assembled and evaluated engineering and cost data relating to such factors as the need to incorporate railroad crossings or to do directional drilling beneath the Acushnet River (Exh. C-7, at 5). The Company explained that it studied specific factors affecting construction cost for particular route segments and applied, within the cost matrix, multipliers for segments involving cost-sensitive construction operations (Exhs. C-1, at exhibit V-A; C-6, at 5; HO-C-5(att.)).

Commonwealth indicated that its environmental experts performed individual inspections and investigations of each route segment for each of the thirty-two environmental factors and assigned as independently derived score for each factor (Exh. C-1, at 1-6,

V-13). Commonwealth explained that the scores assigned to comparable alternative segments were often similar or identical and, as such, reflected the relatively minimal impacts expected to accompany the construction of the proposed facilities (id. at V-18).

Commonwealth stated that the aggregate environmental score for its primary route was 65, the lowest of all alternatives (Exh. C-1, at V-17 to V-18). The score for the westerly alternative was 104, and the score for the Acushnet alternative was 115 (id. at exhibit V-D). Routes consisting of alternative configurations of noticed segments were also scored. A route using the alternative Acushnet River crossing (segment 20) and following the primary route for the remainder of its length received a score of 77. Two other routes using variations of segments in northern New Bedford that are contained within the primary or alternative routes were scored at 73 and 96 respectively (id.). The majority of the routes scored between 90 and 120 pursuant to Commonwealth's environmental matrix model (id.). Commonwealth stated that its main objective in selecting segments for public notice, and hence for further study, was to identify and present route alternatives that would provide an appropriate measure of geographic diversity from the primary route (id. at V-1).

Commonwealth indicated that one alternative route received the same aggregate score as its primary route. This route involved two slightly different segments in the residential portion of northern New Bedford (see Exh. C-1, at exhibit V-D). The Company indicated that in the event of a "tie" resulting from its environmental scoring procedure, it deferred to the community acceptance score to determine the preferred route (id. at V-17, n.4; Tr. at 112-115).
The combined length of the segment pairs 11 and 15, and 12 and 14, is

approximately1,300 feet, and both of these pairs proceed through substantially similar areas (Exh. C-1, at exhibit I-B, V-9). In connection with its community acceptance criteria, theCompany also noted the expressed preference of the New Bedford Department ofPublic Works ("DPW") for Commonwealth's primary route (id. at exhibit V-G).

Close

Commonwealth explained that its primary route would generally follow roads that have low to moderate traffic flow, and that are of sufficient width for normal cable construction (Exh. C-1, at V-18). In addition, its primary route would be located within industrial areas for substantial portions of its length (id.; Exh. HO-E-11(att.1)). Commonwealth explained that industrial locations are generally preferable to residential or commercial areas where impacts of construction would be more significant given the greater number and proximity of sensitive receptors such as churches, schools, nursing homes or parks (id.).

Commonwealth next compared the identified route segments on the basis of as-installed cost. Commonwealth indicated that the primary route was the least-cost alternative with a total construction cost of approximately $7,167,000 (Exh. HO-C-5(att.)). Commonwealth also provided a cost calculation of the total cost for the primary routepursuant to Commonwealth's internal construction cost model. This model reflectsinternal costs, and overheads (see Exh. HO-C-1).

Close Commonwealth asserted that the cost advantage for the primary route was due to the shorter overall distance covered, the need for fewer manholes and cable splices, reduced restoration and paving costs given a projected degree of coordination with construction and road resurfacing projects being anticipated by the New Bedford DPW, and the anticipated avoidance of significant environmental mitigation costs (Exhs. C-1 at exhibit V-G; C-6, at 5).

Commonwealth also compared the various route segment combinations with respect to reliability. Commonwealth concluded that the primary route would provide reliability benefits as compared to alternative routes due to its generally straight layout, relatively short overall length, and the fact that it would be geographically distinct from Commonwealth's existing 115 kV cables (Exh. C-1, at V-18; Tr. at 130-140).

b. Analysis

The record demonstrates that Commonwealth identified and evaluated twenty potential route segments that could be combined to form forty-eight route alternatives within a specified facility site study area. Commonwealth provided separate analyses of the environmental impacts, reliability and cost of each identified route segment combination and adequately explained the factors that were considered in preparing its environmental

impact, reliability and cost analyses. The Siting Board notes that Commonwealth's evaluation of forty-eight route alternatives represents an initial examination of a broadly inclusive range of siting alternatives. As a result of its initial siting analysis, Commonwealth identified two distinct alternatives to its primary route: the westerly alternative, and the Acushnet alternative. The record indicates that the Company's noticed alternative routes do not represent the next most advantageous alternatives to the primary route in terms of environmental impacts. However, Commonwealth presented aggregate access for all possible route alternatives, and has demonstrated that its primary route received the lowest aggregate score, and that its noticed alternative routes meet the objective of providing geographic diversity relative to the primary route. Therefore, the Siting Board finds that Commonwealth's selection of the primary route, the westerly alternative, and the Acushnet alternative for further evaluation is appropriate. The Siting Board further considers the environmental impacts and cost of the proposed facilities in Section III.C, below.

Based on the foregoing, the Siting Board finds that Commonwealth has applied its site selection criteria consistently and appropriately, and in a manner which ensures that it has not overlooked or eliminated any siting options which are clearly superior to the proposed project.

The Siting Board has found, above, that Commonwealth has developed a reasonable set of criteria for identifying and evaluating alternative routes. Accordingly, the Siting Board finds that Commonwealth has developed and applied a reasonable set of criteria for identifying and evaluating alternatives to the proposed project in a manner in which ensures that it has not overlooked or eliminated any siting options which are clearly superior to the proposed project.

4. Geographic Diversity

Commonwealth considered combinations of twenty different route segments for its proposed transmission line. The combinations of available route segments originate at the Acushnet substation and proceed across the Acushnet River and through New Bedford city streets to the Pine Street substation. Commonwealth's primary route proceeds generally to the immediate west of the Acushnet River through an industrial portion of New Bedford, covering a distance of approximately 3.3 miles.

Commonwealth presented two alternative routes that differ from the primary route over most or all of their length.
Commonwealth's westerly alternative differs from the primary route over 87 percent ofits length, and has only segments 18 and 19 in common with the primary route.
TheCompany's Acushnet alternative is 100 percent distinct from its primary route (Exh. C-1, at exhibit I-B).

Close The westerly alternative proceeds for a total length of 4.0 miles approximately 1,500 to 2,000 feet further to the west of the primary route, generally following the route

of Commonwealth's existing underground cables that serve the Pine Street substation (Exh. C-1, at exhibit I-B). The Acushnet alternative generally follows the westerly route for most of its distance but is distinct from the westerly route in that it involves a surface level crossing of the Acushnet River to the north of the primary river crossing, using the Wood Street Bridge and street beds in the Town of Acushnet. The Acushnet alternative results in an additional facility length of nearly two miles (id.).

Route segments were identified that provide alternative means through a given area, and several points of potential interconnection were identified. In considering the various routes, Commonwealth identified segments, and routes, having approximately distinct characteristics.

Based on the foregoing, the Siting Board finds that Commonwealth has identified a range of practical transmission line route alternatives with some measure of geographic diversity.

5, Conclusions on the Site Selection Process

The Siting Board has found that Commonwealth developed and applied a reasonable set of criteria for identifying and evaluating alternatives in a manner which ensures that it has not overlooked or eliminated any alternatives which are clearly superior to the proposed project. In addition, the Siting Board has found that Commonwealth has identified a practical range of transmission line routes with some measure of geographical diversity.

Accordingly, the Siting Board finds that Commonwealth has considered a reasonable range of practical siting alternatives.

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

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 project proponents to show that proposed facilities are sited at locations that minimize costs and environmental impacts, while ensuring a reliable energy supply. In order to determine whether such a showing is made, the Siting Board requires project proponents to demonstrate that the proposed project site for the facility is superior to the noticed alternatives on the basis of balancing cost, environmental impact, and reliability of supply. Norwood Decision, EFSB 96-2, at 43; 1996 NEPCo Decision, EFSB 95-2, at 46; Berkshire Gas Company, 23 DOMSC 294, 324 (1991).

An assessment of all impacts of a 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. Norwood Decision, EFSB 96-2, at 43; 1996 NEPCo Decision, EFSB 95-2, at 46; Eastern Energy Corporation, 22 DOMSC 188, 334, 336 (1991) ("EEC Decision"). A facility which achieves that appropriate balance thereby meets the Siting Board's statutory requirement to minimize environmental impacts at the lowest possible cost. Norwood Decision, EFSB 96-2, at 43; 1996 NEPCo Decision, EFSB 95-2, at 46-47; EEC Decision, 23 DOMSC at 334, 336.

An overall assessment of the impacts of a facility on the environment, rather than a mere checklist of a facility's compliance with regulatory standards of other government agencies, is consistent with the statutory mandate to ensure a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. Norwood Decision, EFSB 96-2, at 43-44; 1996 NEPCo Decision, EFSB 95-2, at 47; EEC Decision, 22 DOMSC at 334, 336. The Siting Board previously has found that compliance with other agencies' standards clearly does not establish that a proposed facility's environmental impacts have been minimized. Id. Furthermore, the levels of environmental control that the project proponent must achieve cannot be set forth in advance in terms of quantitative or other specific criteria, but instead, must depend on the particular environmental, cost and reliability trade-offs that arise in respective facility proposals. Norwood Decision, EFSB 96-2, at 44; 1996 NEPCo Decision, EFSB 95-2, at 47; EEC Decision, 22 DOMSC at 334-335.

The Siting Board recognizes that an evaluation of the environmental, cost and reliability trade-offs associated with a particular review must be clearly described and consistently applied from one case to the next. Therefore, in order to determine if a project proponent has achieved the appropriate 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. Norwood Decision, EFSB 96-2, at 44; 1996 NEPCo Decision, EFSB 95-2, at 47; Boston Edison Company (Phase II), 1 DOMSB 1, 39-40 (1993) ("1993 BECo Decision"). The Siting Board can then determine whether environmental impacts would be minimized. Similarly, the Siting Board must find that the project proponent has provided sufficient cost information in order to determine if the appropriate balance among environmental impacts, costs, and reliability would be achieved. Norwood Decision, EFSB 96-2, at 44; 1996 NEPCo Decision, EFSB 95-2, at 47; 1993 BECo Decision, 1 DOMSB at 40.

Accordingly, in the sections below, the Siting Board examines the environmental impacts, cost and reliability of the proposed facilities along Commonwealth's primary and alternative routes to determine: (1) whether the environmental impacts of the proposed facilities would be minimized; and (2) whether the proposed facilities would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, cost and reliability. In this examination, the Siting Board conducts a comparison of the primary and alternative routes to determine which is preferable with respect to providing a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

2. Analysis of the Proposed Facilities Along the Primary Route

a. Environmental Impacts of the Proposed Facilities Along the Primary Route

In this section, the Siting Board evaluates the environmental impacts of the proposed facilities along the primary route and the proposed mitigation for such impacts, and any options for additional mitigation. As part of its evaluation, the Siting Board first addresses whether the petitioner has provided sufficient information for the Siting Board to determine: (1) whether environmental impacts of the proposed facilities would be minimized; and (2) whether the proposed facilities achieve the appropriate balance among environmental impacts and among environmental impacts, cost and reliability. The Siting Board then addresses whether the environmental impacts of the proposed facilities along the primary route would be minimized.

i. River Crossing Impacts

In order to connect the Pine Street substation with the Acushnet substation, the proposed facilities must cross the Acushnet River. In this section, the Siting Board reviews the impact on natural resources of the construction of the proposed facilities using the Company's preferred river crossing. The Siting Board also reviews the impact of the proposed river crossing on the USEPA's ongoing cleanup of hazardous material contained in the sediments of the Acushnet River.

Commonwealth's preferred river crossing alternative, identified as segment 19 in the Company's petition, would proceed westerly from the Acushnet substation, cross on or beneath

the bed of the Acushnet River and extend to the intersection of Belleville Avenue and Belleville Road in New Bedford. The Company proposes to complete the river crossing by one of two methods: direct laying of the cable on the river bottom, or directional drilling beneath the river bed (Exh. C-1, at V-3). Commonwealth asserts that overall impacts associated with installation of the cable across the river would be minimized pursuant to either river crossing technique (Exhs. HO-E-13; HO-E-14; Tr. at 88, 104-105). Commonwealth explained that no excavation, filling, or other permanent impacts would be associated with the river crossing regardless of whether the cable is laid on the river bottom or installed using directional drilling beneath the river bottom (Exh. HO-E-13).

Commonwealth indicated that construction operations would include vehicle traffic between the Acushnet substation and the high water mark on the eastern shore of the Acushnet River which could impact trees and vegetation in that area (Tr. at 104-105). Mr. Collings and Mr. Perry of Commonwealth testified that when possible, the Company would minimize impacts to vegetation by using an existing roadbed in the area between

its Acushnet substation and the proposed river crossing (id. at 107). They noted that some clearing of overgrowth would be necessary in order to make use of the existing roadbed, but stated that upon completion of construction operations in this area, vegetated areas would be allowed to revert to their prior condition (id. at 111). Commonwealth also indicated that should any clearing of trees become necessary during reconditioning of the roadbed, the Company expected to leave tree root masses intact to prevent erosion and to promote subsequent regrowth (id. at 110).

Commonwealth stated that its preferred river crossing would result in temporary impacts to wetlands, flowing surface water, and fisheries (Exh. C-1, at exhibit V-B). In terms of impacts to wetlands, the Company indicated that construction activity would be required in wetland areas, but that no temporary or permanent filling of such areas would be necessary (id. at exhibit V-C).
Commonwealth indicated that the proposed facility would include the installation ofmanhole access to the duct bank on the Acushnet side of the river, but stated that suchmanhole would likely be sited within the upland area adjacent to the Acushnetsubstation, roughly 200 to 300 feet from the river bank (Tr. at 111, 142). TheCompany noted that it would not typically choose to locate a manhole in a wetland areabecause access to facility components at such locations would be compromised byflooding (id.).

Close The Company stated that construction equipment would need to travel over the uplands and wetlands between the Acushnet substation and the eastern shore of the Acushnet River in the course of installing the duct bank and other facility components (Tr. at 104-105). The Company stated that it planned to use a combination of interlocking oak matting and a “geo-tech style” fabric matting to minimize the impacts of necessary construction traffic (id.; Exh. HO-E-14).

Commonwealth also stated that it would develop a comprehensive, site-specific mitigation plan that would be reviewed by the Conservation Commissions of the Town of Acushnet and the City of New Bedford to mitigate wetland impacts (Exh. HO-E-14; Tr. at 104-105, 109-110). The Company stated that, as necessary, it would segregate wetland plant root mosses for replanting, or plant wetland vegetation in disturbed areas (Exh. HO-E-14; Tr. at 88-89). The Company stated that it had previously used similar techniques in constructing transmission lines through wetland areas, and that it would bring such experience to bear in formulating and executing construction operations for the proposed project (id.). Commonwealth also noted that it had successfully installed, and currently maintains, other transmission and distribution facilities in the immediate vicinity of the proposed river crossing (Exh. HO-C-3(att. a); Tr. at 105-110).

Commonwealth stated that it explored the possibility that protected eel grass beds may be located in the vicinity of route segment 19, and concluded, based on the results of its own investigation and consultation with officials at the MDEP Wetland Conservancy Program, that the proposed river crossing would not impact eel grass beds (Exhs. C-1, at V-15, App. D at 1; HO-E-15(att.)).

Commonwealth also assessed potential impacts of the proposed river crossing on fisheries (Exh. C-1, at V-14, App. D at 1). The Company notes that a herring run is present in the vicinity of the proposed crossing but asserted that its proposed facility would not impact the herring run (id. at exhibit V-C; Exh. HO-E-20). The Company noted that if directional drilling techniques are employed for the river crossing, there would be no physical disturbance to the river and hence no disturbance to the herring run (id.). Alternatively, Commonwealth stated that installation of the proposed cable on the river bottom could be completed in a relatively short time frame and would therefore have little or no impact on migrating fish populations (Exh. HO-E-20). Commonwealth confirmed this conclusion based upon consultations with the Massachusetts Division of Marine Fisheries (id.; Exh. C-1, at App. D).
Commonwealth indicated that, depending upon the construction technique employed, itwould investigate the prospect of scheduling construction of the river crossing portionof the proposed facility so as to avoid construction activity during the spawning season(Exh. HO-E-20).

Close

With respect to impacts involving hazardous materials or hazardous waste, Commonwealth stated that it intends to coordinate construction activity associated with its proposed project with USEPA's ongoing cleanup of hazardous materials in the sediments of the Acushnet River (id.; Exh. C-7, at 7). Commonwealth noted that construction of the river crossing would take place within, but would not materially impact, the hazardous waste area (Exh. C-1, at exhibit V-B, exhibit V-C). Commonwealth provided evidence that it has engaged in discussions with the USEPA regarding the development of a final cleanup plan to address hazardous wastes contained in the sediments of the Acushnet River (Exhs. HO-C-3, HO-C-3(att.); HO-E-13(supp.).

Commonwealth stated that its preferred installation method is to lay the cable directly on the river bottom, thereby adding a new line in a river crossing corridor where there already are existing transmission and distribution lines (Exh. C-1, at V-17). Commonwealth asserted that its new and existing cable could be relocated later to a new dredged area within the cleanup area, but outside of any USEPA designated confined sediment disposal facilities ("CDFs") (Exh. HO-C-3(att. a) at 3-5). Such a solution would allow the USEPA to complete dredging of contaminated areas while allowing the Company maintain its supply lines (id.). The Company stated that the alternative of directional drilling of the river crossing segment would add $250,000 to $500,000 to the cost of the project (id.).

While laying the cable on the river bottom is Commonwealth's preferred option, the USEPA, is written correspondence with the Company, has noted that its proposed cleanup plan is not complete with respect to the final disposition of Commonwealth's existing and proposed cables (id. at 1). Moreover, in comments submitted subsequent to its review of Commonwealth's Environmental Notification Form ("ENF") for the project,

the MDEP stated that it did not concur with Commonwealth's preferred option of placing the proposed cable on the river bottom as the installation would make the planned remediation more difficult (Exh. HO-RR-3). However, MDEP did not indicate a preference either for directional drilling or for the use of the Wood Street Bridge crossing proposed in the Company's Acushnet alternative (see Section III.A.2, below) (Exhs. HO-RR-3(att.); HO-RR-3(supp.)). The Siting Board also notes that the proposed project would be subject to MDEP review and licensing under the Waterways Act (G.L. c. 91), and through the issuance of a Water Quality Certificate (id.).
The Siting Board notes that the Executive Office of Environmental Affairs stated in itsCertificate on Commonwealth's ENF that the proposed project shall not require thepreparation of an Environmental Impact Report (Exh. HO-RR-3(supp.)(att.)).

Close

The record demonstrates that construction of the proposed facilities using the preferred river crossing would result in temporary impacts to vegetation and trees, temporary impacts within wetland areas, and minimal or no impact to fisheries resources. The Siting Board finds that, with implementation of the proposed mitigation measures, each of the identified impacts would be sufficiently mitigated.

With respect to hazardous materials, the record indicates that coordination of the USEPA's dredging program is ongoing, and that Commonwealth may be required to move some or all of its existing lines to accommodate the cleanup. The Siting Board notes that either of Commonwealth's proposed river crossing techniques has the potential to minimize the impacts of the river crossing on the dredging and remediation program, depending on the needs of the program. Further, the Siting Board finds that both the directional drilling and the direct lay options present acceptable balances between environmental impacts and costs.
In making this finding, the Siting Board acknowledges that: (1) the directional drillingoption would initially be more costly but have fewer potential environmental impacts;and (2) the direct lay option, with its greater potential for environmental impacts,although less costly initially, may have additional costs associated with later cablemoves to accommodate the USEPA's operations.

Close In the absence of additional information as to the timing and requirements of the USEPA dredging operations and the costs of moving the proposed facility if it interferes with the dredging operations, the Siting Board can make no finding with respect to which of Commonwealth's proposed river crossing techniques would represent the optimal solution to all concerns. The Siting Board therefore directs Commonwealth to work with the USEPA to develop a mutually agreeable solution to this issue, to inform the Siting Board as to the final configuration of the proposed facilities in the vicinity of the Acushnet River, and to report any significant changes in cost or design that justify the choice of configuration.

Accordingly, the Siting Board finds that, with the implementation of the proposed mitigation measures and continued coordination with the USEPA concerning the configuration of the river crossing, the environmental impacts of the proposed facilities along the primary route would be minimized with respect to impacts upon natural resources in the vicinity of the proposed river crossing.

ii. Impacts Outside the River Crossing

In this section, the Siting Board reviews the impact of the proposed facilities along the streetbed segments of the primary route with respect to existing land uses, natural resources, traffic, and construction noise and dust.

Construction stated that it assessed land use impacts by considering impacts on the following: residential dwellings, historic residential dwellings and historic districts, commercial uses, industrial uses, archaeological resources, and agricultural and recreational land (Exh. C-1, at exhibit V-B). The Company asserted that the construction of the proposed project along the primary route would have essentially no impact on the adjacent existing land uses, except for short-term impacts during construction, because construction would take place entirely within existing easements and ROWs (id. at V-18, and exhibit V-B; Exh. HO-E-3).

Commonwealth indicated that it preferred to minimize impacts to residential areas and determined that construction through commercial and industrial areas was therefore favored (Exh. C-1, at V-15). Commonwealth stated that the primary route would proceed mainly through commercial and industrial areas in the City of New Bedford and that, consequently, the primary route would minimize impacts to residentially zoned portions of the City of New Bedford (Exh. C-7, at 7). Commonwealth stated that its primary route would also minimize impacts to sensitive receptors such as churches, schools and nursing homes, and that these considerations favored routes, such as the primary route, that incorporated segment 3 (Exh. C-1, at V-15). The Company stated that construction of the proposed facility would involve temporary impacts to residential and commercial areas, resulting from the excavation of a trench and installation of a concrete duct bank, and other related activities that would be conducted within the public ROW (id. at V-12, n.3, and V-18). Commonwealth indicated that it would mitigate the impacts of construction through timely backfilling and patching of road surfaces and the use of steel plates to maintain access to residences and business across any open sections of trench (Exhs. C-6 at 5; C-7 at 8). The Company noted that construction along the primary route could be expected to progress at a rate of 150 to 200 feet per day, suggesting that construction-related inconvenience to individual residences or businesses would be of relatively short duration (Exh. HO-E-4).

With respect to impacts to historic districts and residences, Commonwealth explained that the primary route passes by the edge of the Merrill's Wharf Historic District along the New Bedford waterfront where historic ships and waterfront structures are located (Exh. C-1, at V-6) . The Company stated that no part of the historic district would be impacted by the proposed facility (id.) The Company noted that its primary route also

passes through a National Register district and that four structures along the route are identified as National Register properties (id. at exhibit V-K, App. C at 11). Commonwealth stated that construction of the proposed facilities would have no impact on these structures (id.).

With respect to impacts on agricultural or recreational land, the Company stated that no agricultural lands would be impacted and that a small park located adjacent to segment 7 at Earle Street would be temporarily impacted by construction activity (id. at V-8, exhibit V-B).

With respect to impacts on archaeological resources, Commonwealth indicated that construction along the primary route may impact the Lawson Cultural Site, which is located on the east bank of the Acushnet River in the Town of Acushnet (id. at V-10, App. C). Commonwealth explained that the Lawson Cultural Site has been identified as a potential location of prehistoric resources; however, it argued that extensive disturbance to this area from prior construction and river dredging activities "make it unlikely that any materials recovered from such area would be in good physical condition or appropriate context" (id.). Commonwealth's archaeological consultant supported this conclusion (id. App. C at 10).

Commonwealth stated that the construction of the proposed facilities along the primary route would result in limited and temporary impacts to existing natural resources, primarily trees (id. at V-15, exhibit V-B, and App. D; Exh. C-7, at 7-8). Commonwealth indicated that it conducted a comprehensive inventory of the various trees located along each of the identified route segments.
Commonwealth retained the BSC Group, Inc. of Worcester and Norwell, Massachusettsto perform a wetlands inventory and a tree enumeration and identification (Exh. C-1, atV-15, exhibit V-I, App. D).

Close The primary route includes two roadbed segments with existing trees (Exh. C-1, at V-13, exhibit V-C). Commonwealth stated that it did not expect construction of the proposed transmission line to significantly affect any trees along city streets, since construction would be completely within existing roadways and, therefore, would be unlikely to encounter significant numbers of tree roots (id. at V-15; Exhs. C-7, at 8; HO-E-21). The Company explained that the majority of city streets previously have been disturbed in the course of installation of other utility facilities including telephone, gas, and electric facilities, as well as sewer and street drain systems, thereby reducing the likelihood of encountering tree roots in the course of constructing the proposed facility (Exh. HO-E-21). The Company indicated that should street-side trees be encountered in the course of construction, Commonwealth would consult with the Tree Warden of the City of New Bedford in order to mitigate the impacts of construction activity (id.). The Company stated that mitigation of impacts to trees, if necessary, would include hand excavating around root structures, treatment of damaged roots, and fertilizing and watering following construction (id.).

With respect to traffic impacts, Commonwealth stated that traffic flow along the primary route was primarily light to moderate (Exh. C-1, at exhibit V-B). The Company stated that it would use police details to promote to promote efficient traffic flow around construction activities, and provide temporary pedestrian walkways, as necessary, to maintain access to public transportation and ensure public safety (Exh. HO-E-16). Commonwealth indicated that steel plates would be used to maintain access to property located along the proposed route, and that representatives of the Company would consult with residents and businesses prior to construction so as to identify and resolve concerns regarding access (Exh. C-2, at App. C). The Company added that, to minimize inconvenience to area residences and businesses, it would backfill and patch road surfaces as construction progressed, and provide permanent resurfacing of roadways, consistent with New Bedford DPW standards, within approximately thirty days (Exh. C-6, at 5-6).

Commonwealth indicated that temporary noise impacts associated with construction would derive primarily from asphalt cutting, trenching, and backfilling operations (Exh. HO-E-9). Commonwealth stated that noise impacts would be mitigated by conducting construction activity during normal business hours when ambient noise levels are highest (id.). Commonwealth noted that noise impacts to residential receptors also would be minimized as a result of the choice of a route that traverses areas having industrial and commercial uses along significant portions of its length (Exh. C-1, at V-15).

Commonwealth stated that it would control airborne dust by sweeping or watering if necessary and noted that the relatively rapid backfilling of trenches would tend to minimize dust formation (Exhs. HO-E-9; C-7, at 8). Commonwealth also stated that it would remove excavated soil from the site of construction activity (Exh. HO-E-16).

The record indicates that the principal environmental impacts resulting from the construction of the proposed project along the primary route would occur during facility construction. The proposed project would have no impact on historic resources or agricultural land, and only temporary construction impacts on residential, commercial and industrial areas. Moreover, impacts on residential land uses have been minimized by routing the proposed project primarily through commercial and industrial areas.

With regard to natural resources, the construction of the proposed facility along the primary route would involve minimal impact to trees, and Commonwealth has identified appropriate mitigation techniques with respect to tree impacts for the construction of the proposed facilities. With regard to traffic, the primary route would be constructed entirely within existing easements and ROWs, and Commonwealth would repair all street surfaces affected by construction in accordance with New Bedford DPW standards. Finally, Commonwealth has identified, and would implement, appropriate mitigation for temporary impacts relating to construction noise and dust. In summary, the record demonstrates that Commonwealth has proposed appropriate steps to mitigate the identified impacts of construction activity along the primary route.

Accordingly, the Siting Board finds that, with the implementation of Commonwealth's

proposed mitigation measures, the environmental impacts of the proposed facilities along the street portions of the primary route would be minimized with respect to land use, natural resources, traffic and safety, and construction noise and dust.

iii. Magnetic Field Levels

Commonwealth asserted that the construction of the proposed facilities along the primary route would result in minimal impact in terms of magnetic fields (Exh. C-1, at exhibit V-B). In support of its assertion, Commonwealth provided data on magnetic field levels for the existing electric facilities and the proposed transmission line along the primary route. The Company indicated that, as a result of subsurface construction, there would be nosignificant impacts from electric fields (Exhs. HO-E-19, HO-E-19(att.)).

Close Measurements of existing magnetic fields were conducted along transects within existing roadways by Commonwealth's consultant, Enertech Consultants, Inc. The Company stated that existing magnetic fields ranged from 0.3 mG to 19.7 mG along the primary route (Exh. HO-E-19(att.) Sec. 1, at 4).

The Company modelled magnetic field levels for the proposed transmission line along the primary route under three load conditions: average load (110 amperes), peak load (180 amperes), and emergency load (450 amperes); and two possible cable configurations: pipe type and solid dielectric (Exh. HO-E-19(att.) Sec. 3, at 2, and Sec. 1, at 5). The model indicates that the maximum magnetic field for a pipe type cable, measured at one meter above the road surface on the cable axis, would be 0.75 mG under average load, 1.15 mG under peak load, and 2.55 mG under emergency load (id. Sec. 1, at 5). For a solid dielectric cable, projected maximum magnetic field would be 9.0 mG under average load, 15.0 mG under peak load, and 37.5 mG under emergency load (id.).

The Company also presented what it termed "street averages" for the proposed facility, which are spatially averaged magnetic fields within a seventy foot wide corridor bisected by the proposed cable. The Company asserted that street average magnetic field levels from the facility would range from 0.3 mG under average load to 0.9 mG under emergency load for the pipe type cable, and would range from 3.1 mG under average load to 13.0 mG under emergency load for the solid dielectric cable (id.).

Commonwealth noted that its estimates of magnetic fields attributable to the proposed facility did not account for pre-existing magnetic fields from distribution lines present along the primary route, and provided additional calculations of averaged magnetic fields, with and without the proposed facilities.
The Company derived these field levels by calculating the square root of the sum of thesquares for the existing and projected magnetic field levels (Exh. HO-E-19). The fieldlevels used in the calculation were themselves averaged in two dimensions: (1)longitudinally, i.e., along the path of the proposed line; and (2), laterally, i.e.,perpendicular to the proposed line within a seventy foot corridor for the projectedfields, and within an actual corridor, bounded by existing street curbs, for the

existingfields (Exh. HO-E-19(att.) at Sec.1, n.4). The Siting Board notes that while thismethod allows for a simplified comparison of the two proposed cable types with respectto magnetic field impacts, it ignores the variations in magnetic fields levels that arefrequently observed along electric utility corridors, and thus may not reflect actualworst-case impacts.

Close Commonwealth indicated that along the primary route, the existing average magnetic field is 3.2 mG under average load and 5.2 mG under peak load (id.). The Company calculated that the combined average magnetic field under average load conditions would be 3.21 mG for a pipe type cable, and 4.46 mG for a solid dielectric cable, and that the combined average magnetic field levels under peak load would be 5.22 mG for a pipe type cable and 7.35 mG for a solid dielectric cable (Exh. HO-E-19). Commonwealth did not provide estimates of magnetic fields in future years. TheCompany stated that it forecasted that average load levels in the Pine Street load areawould grow at a composed annual growth rate of 0.6 percent (Exh. C-1, at App. A). The Company's witness, Mr. Eklund, stated that average load would not reach thepresent level of peak load during Commonwealth's twenty year forecast period (Tr. at134-135).

Close

Commonwealth concluded that existing magnetic field levels would not be significantly affected by the construction of the proposed transmission line due to its underground construction and its location within an established ROW (Exhs. C-1, at V-16 to V-17; HO-RR-4, at 1; HO-E-19, HO-E-19(att.)). Commonwealth indicated that no special design configurations would be necessary to achieve acceptable magnetic field levels (id.). Commonwealth further asserted that its analysis showed no significant differences with respect to overall field levels regardless of whether a solid dielectric cable or a pipe type cable was selected for the proposed project (Exh. HO-E-19; Tr. at 124).

In a past review of proposed transmission line facilities which included 345 kV transmission lines, the Siting Board accepted edge-of-ROW levels of 85 mG for magnetic fields. 1985 MECo/NEPCo Decision, 13 DOMSC at 228-242. The Siting Board has also applied these edge-of-ROW levels in subsequent reviews of facilities which included 115 kV transmission lines. See Enron Power Enterprise Corporation, 23 DOMSC 1, 227 (1991); MASSPOWER, Inc., 20 DOMSC 301, 401-403 (1990). Here, Commonwealth's calculations suggest increases in average magnetic field levels due to the proposed transmission line would be minimal regardless of the type of construction used – less than 1.5 mG under average load and less than 2.5 mG under peak load. Moreover, even the projected maximum magnetic field level directly above the cable is well below levels previously accepted by the Siting Board for edge-of-ROW locations.

Accordingly, despite its concerns regarding the Company's use of "average" magnetic field levels, the Siting Board finds that the impacts of the proposed facilities along the primary route would be minimized with respect to magnetic fields.

iv. Conclusions on Environmental Impacts

In Section III.C.2.a, above, the Siting Board has reviewed the information provided by Commonwealth regarding environmental impacts of the proposed facilities along the primary route and the potential mitigation measures. The Siting Board finds that Commonwealth has provided sufficient information regarding environmental impacts of the proposed facilities along the primary route and potential mitigation measures for the Siting Board to determine whether environmental impacts would be minimized and whether the appropriate balance among environmental impacts and between environmental impacts and cost would be achieved.

In Section III.C.2.a, above, the Siting Board has found that: (1) with the implementation of the proposed mitigation measures and continued coordination with the USEPA concerning the configuration of the river crossing, the environmental impacts of the proposed facilities along the primary route would be minimized with respect to impacts upon natural resources in the vicinity of the proposed river crossing; (2) with the implementation of Commonwealth's proposed mitigation measures, the environmental impacts of the proposed facilities along the street portions of the primary route would be minimized with respect to land use, natural resources, traffic and safety, and construction noise and dust; and (3) the impacts of the proposed facilities along the primary route would be minimized with respect to magnetic fields.

Accordingly, the Siting Board finds that, with the implementation of proposed mitigation measures and the continued coordination with the USEPA concerning the configuration of the river crossing, the environmental impacts of the proposed facilities along the primary route would be minimized.

b. Cost of the Proposed Facilities Along the Primary Route

Commonwealth assert that the construction of the proposed transmission line along the primary route is the least cost alternative based on its analysis of construction costs (Exhs. C-1, at V-17; HO-C-5(att.)). Commonwealth estimated that construction costs, including material, labor, permitting, and substation costs, would total approximately $7,167,000 (Exh HO-C-5(att.)). Commonwealth estimated the 1997-2037 PVRR for the proposed project would be $9,171,000, including adjustment for line loss savings of $503,000 (Exh. C-1, at exhibit IV-E). Commonwealth stated that its analysis reflected annual operation s and maintenance ("O&M") costs of approximately $8,000 for the primary route (Exh. HO-C-2).

The Siting Board finds that Commonwealth has provided sufficient cost information for the Siting Board to determine whether an appropriate balance would be achieved between

environmental impacts and cost.

c. Reliability of the Proposed Facilities Along the Primary Route

Commonwealth asserted that the construction of the proposed transmission line along the primary route is the most reliable alternative (Exh. C-1, at V-18) (see Section II.B.4, above). Commonwealth stated that the primary route is most reliable because it was geographically distinct from Commonwealth's existing transmission cables, and because it followed a generally shorter and straighter route than the identified alternative routes (id.).

The Siting Board finds that Commonwealth has provided sufficient reliability information for the Siting Board to determine whether an appropriate balance would be achieved between environmental impacts, cost and reliability.

d. Conclusions

The Siting Board has found that Commonwealth has provided sufficient information regarding the environmental impacts of the proposed facilities along the primary route and potential mitigation measures for the Siting Board to determine whether environmental impacts would be minimized and whether the appropriate balance among environmental impacts and between environmental impacts, cost and reliability would be achieved. The Siting Board has also found that Commonwealth has provided sufficient cost and reliability information for the Siting Board to determine whether an appropriate balance would be achieved among environmental impacts, cost and reliability. In Section III.C.2.a, above, the Siting Board has found that, with the implementation of proposed mitigation measures and the continued coordination with the USEPA concerning the configuration of the river crossing, the environmental impacts of the proposed facilities along the primary route would be minimized.

Accordingly, the Siting Board finds that the proposed facilities along the primary route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, cost and reliability.

3. Analysis of the Proposed Facilities Along the Alternative Route Segment Combinations and Comparison

a. Environmental Impacts of the Proposed Facilities Along the Alternative Routes and Comparison

In this Section, the Siting Board evaluates the environmental impacts of the proposed facilities along the alternative routes identified by Commonwealth, and potential mitigation for such impacts, and compares the primary and alternative routes. First, as part of its evaluation, the Siting Board addresses whether the petitioner has provided sufficient information regarding alternative routes for the Siting Board to determine whether the environmental impacts of the proposed facilities would be minimized, and whether the proposed facilities wold achieve the appropriate balance among environmental impacts and among environmental impacts, cost and reliability. If necessary for its review, the Siting Board separately addresses whether the environmental impacts of the proposed facilities along the alternative routes would be minimized, with potential mitigation. Finally, the Siting Board compares the environmental impacts of the primary route to the environmental impacts of each of the alternative routes.

For purposes of this analysis, Commonwealth identified two route alternatives: the westerly alternative and the Acushnet alternative (see Section III.A.2, above).

i. River Crossing

In this section, the Siting Board reviews the impacts of the construction of the proposed facilities on natural resources in the vicinity of the river crossings for the alternative routes, and on the USEPA's on-going cleanup of hazardous materials contained in the sediments of the Acushnet River, and compares the primary and alternative routes.

(a) Westerly Alternatives

The Company's westerly alternative would use the same river crossing as the Company's primary route. The Siting Board notes that, in its detailed specification and estimation of cost of the various route alternatives, Commonwealth assumed directional drilling beneath the Acushnet River for its westerly alternative, and assumed a river bottom installation for its primary route. In Section III.A.2, above, the Siting Board considered the choice of river crossing technique as a design alternative.
The Siting Board has found that, with the implementation of the proposed mitigationmeasures, and continued coordination with the USEPA concerning the configuration ofthe river crossing, the environmental impacts of the proposed facilities along theprimary route would be minimized with respect to impacts upon natural resources in thevicinity of the proposed river crossing (see Section III.C.2.a.i, above). Furthermore,Commonwealth indicated that its choice of a river crossing technique with respect tosegment 19 is not contingent upon the Siting Board's approval of a particular route, butrather that it more likely would be influenced by the needs and requirements of theUSEPA and/or the Army Corps of Engineers (Exh. C-1, at V-3 to V-4, V-10) (seeSection III.C.2.a.i, above).

Close For purposes of comparison, here the Siting Board places the route alternatives on an equal footing with respect to the choice of river crossing technique, and assumes the same technique would be used for the westerly alternative as for the primary route.

The record therefore indicates that the westerly alternative wold be identical to the primary route in the river crossing segment. Accordingly, the Siting Board finds that the primary route and the westerly route would be comparable with respect to natural resource impacts in the vicinity of the river crossing.

(b) Acushnet Alternative

Commonwealth asserted that construction of the Acushnet alternative's river crossing, segment 20, would involve incremental impacts to natural resources, primarily in the area between South Main Street in the Town of Acushnet and Commonwealth's Acushnet substation. The Company stated that in this area, its alternative route would follow the Company's existing transmission ROW across approximately 2500 feet of land and water resources, including a mix of uplands and bordering vegetated wetlands, a salt marsh and a tidal creek (Exh. C-1, at V-10 to V-11, App. D, at 4). The proposed facility would then be routed beneath streets in the Town of Acushnet, and would cross the Acushnet River in a conduit that would be attached to the Wood Street bridge (id. at V-11). The Company stated that overall, the Acushnet alternative river crossing would be approximately 1.7 miles longer than the preferred crossing (Exh. HO-C-5(att.)).

Commonwealth argued that, in addition to environmental impacts similar to those identified for the primary river crossing, the Acushnet alternative would result in additional impacts to water resources, and increased impacts to trees and vegetation (Exh. C-1, at exhibit V-B). The Company indicated that the primary benefit of this alternative river crossing would be the avoidance of disturbance to the bottom of the Acushnet River (id. at V-4).

With respect to water resources, the Company indicated that the Acushnet alternative would involve temporary facility construction impacts across salt marsh and tidal creek areas (id. at App. D). The Company stated that the impacts of construction in other wetland areas under the Acushnet alternative would be similar to those under the primary route, and that such impacts would be mitigated by the use of interlocking oak matting to minimize the impact of vehicle traffic, and the preservation and replanting of affected wetland plants (Exh. HO-E-14; Tr. at 104-105). With respect to impacts to trees and vegetation, the Company stated that construction along the existing transmission ROW between the Acushnet substation and South Main Street would require the removal of up to twenty-five mature trees which currently screen views of the ROW from South Main Street (Exhs. C-1, at V-11; HO-E-1(supp.)). Commonwealth indicated that it would mitigate tree and vegetation impacts by tying back overhanging branches, hand excavating around root structures, treating damaged roots, and replacing plantings that

would be unavoidably damaged or removed in the course of facility construction (Exhs. HO-E-14, HO-E-21; Tr. at 88-89, 110).

The record indicated that impacts to trees and vegetation associated with the Acushnet alternative river crossing would be minimized with the appropriate mitigation measures. However, these impacts would be greater than those for the primary route due to the greater distance covered by the Acushnet alternative, and the need to clear trees and vegetation along the buffer between Commonwealth's ROW and South Main Street in Acushnet. The record indicates that with respect to water resources, use of the Acushnet alternative would involve impacts similar to those along the primary route, but that the greater distance of the alternative route would result in greater impacts to wetlands, including a salt marsh and a tidal creek.

The record indicates that the Acushnet alternative would avoid impacts to the Acushnet River bottom and wold not affect the USEPA's on-going dredging and remediation program. The Siting Board notes that the benefits of avoiding adverse impacts to the dredging and remediation program deserve significant weight in light of evidence which suggests difficulty in coordinating the dredging program with the construction of the proposed facilities along the primary route (see Section III.C.2.a.i, above). However, such impacts could be completely avoided along the primary route by using directional drilling to cross under the Acushnet River, rather than laying cable along the bottom of the river. This approach both would eliminate impacts to natural resources in the Town of Acushnet, with the exception of the relatively short distance between the Acushnet substation and the Acushnet River, and would involve lower incremental costs than the use of the alternative river crossing.
The Siting Board recognizes that the Acushnet alternative, in minimizing impacts at theriver crossing by using a bridge, results in impacts in the Town of Acushnet relating toland use, archaeological resources, traffic, construction noise and dust, and magneticfields. The Siting Board examines these categories of impacts under SectionIII.C.3.a.ii, and iii, below, and gives weight to these impacts in determining overallpreferability among the Company's river crossing alternatives.

Close

Accordingly, the Siting Board finds that the preferred river crossing, using directional drilling if necessary, would be preferable to the Acushnet alternative with respect to natural resource impacts in the vicinity of the river crossing.

ii. Impacts Outside the River Crossing

In this section, the Siting Board reviews the impact of construction of the proposed facilities along the remaining streetbed segments of the alternative routes with respect to existing land uses, natural resources, traffic and safety, and construction noise and dust,

and the potential mitigation for such impacts, and compares the primary and alternative routes.

(a) Westerly Alternative

Commonwealth stated that the westerly alternative would involve greater construction impacts that the primary route with respect to land use (Exh. C-1, at exhibit V-B). Specifically, Commonwealth indicated that the westerly alternative would traverse more residential and commercial areas than would the primary route, and argued that construction through industrial areas was preferred in order to minimize impacts to sensitive receptors such as churches, schools, nursing homes and parks (id. at V-18). With respect to impacts to residential areas and historic districts, Commonwealth stated that the westerly alternative would proceed to the immediate west of the Central New Bedford Historic District, continuing through the County Street National Register Historic District, the North New Bedford National Register Historic District and Acushnet Heights National Register Historic District, and past numerous historic residences (id. at V-7, App. D). Commonwealth stated that the westerly alternative would proceed past 188 National Historic Register Properties while the primary route would proceed past four such properties (id. at exhibit V-K). The Company indicated that the westerly alternative would also pass through a park and would impact residentially-zoned areas for substantial portions of its length (id. at V-6 to V-8, V-16, exhibit V-K, App. C, at 8; Exh. HO-E-11(a)(att.)).

The record indicates that the westerly alternative would traverse a greater portion of land that is zoned for residential and commercial use and would require construction in close proximity to historic districts and properties. The Siting Board therefore finds that the primary route would be preferable to the westerly alternative with respect to land use impacts.

Commonwealth asserted that the construction of the proposed facilities along the westerly alternative would involve greater impacts to natural resources than would the primary route (Exh. C-1, at V-17, and exhibit V-B). In particular, Commonwealth stated that the westerly alternative would include more route segments with street trees, resulting in a slightly higher probability that tree roots would be encountered in the course of construction, although Commonwealth noted that, as with the primary route, no impacts to street trees were expected (id. at exhibit V-B, exhibit V-I, and App. D; Exh. C-7, at 8). Commonwealth indicated that mitigation of impacts to trees would be identical to that proposed for the primary route (see Section III.C.2.a.ii, above). Commonwealth also stated that route segment 5, a long segment of the westerly alternative that proceeds southerly approximately 1,500 to 2,000 feet to the west of the primary route, passes through an area noted for its scenic views and other aesthetic characteristics, but indicated that no permanent impacts to such scenic areas would result from facility construction (Exh. C-1, at exhibit V-8).

The record indicates that the impacts of facility construction along the westerly alternative with respect to natural resources would be temporary, and that, with the appropriate mitigation measures, impacts, impacts to trees and scenic areas along the westerly alternative would be minimized. The Siting Board therefore finds that the primary route would be slightly preferable to the westerly alternative with respect to impacts to natural resources.

The Company stated that traffic impacts would be significant for the westerly alternative since the westerly alternative runs along roads in commercial and residential portions of New Bedford where traffic flow is moderate to heavy (id.). The Company also noted that significant portions of segments 5 and 8 are used as bus routes by schools and other public carriers (id.; Exh. HO-E-16(atts. 1, 2, 3, 4)). Commonwealth stated that it would use the same measures developed to address traffic and safety impacts along the westerly alternative as were proposed for the primary route (see Section III.C.2.a.ii, above).

The record indicates that, as compared to the primary route, the westerly alternative would traverse areas where the impacts of facility construction would be greater with respect to traffic flow. The record demonstrates that, with the appropriate mitigation measures, traffic impacts along the westerly alternative would be minimized, but that such impacts would be greater along the westerly alternative than along the primary route. The Siting Board therefore finds that the primary route would be preferable to the westerly alternative with respect to traffic impacts.

Commonwealth stated that the impacts of construction noise and dust along the westerly alternative would be comparable to those along the primary route, but noted that, due to differences in zoning between the two routes, a greater number of sensitive receptors such as churches, schools, and parks would be affected by these impacts along the westerly alternative (Exh. C-1, at V-5 to V-11). Commonwealth indicated that its proposed mitigation for construction noise and dust would be identical to that proposed for the primary route (Exh. HO-E-9) (see Section III.C.2.a.ii, above).

The record indicates that, with the appropriate mitigation measures, impacts from construction noise and dust along the westerly alternative would be minimized. The record demonstrates that because there are fewer sensitive receptors located along the primary route, the primary route would be preferable to the westerly route with respect to construction noise and dust impacts.

Based on the foregoing, the Siting Board finds that the primary route would be preferable to the westerly alternative with respect to land use impacts, traffic and safety impacts, and noise and dust impacts, and would be slightly preferable to the westerly alternative with respect to natural resource impacts.

Accordingly, the Siting Board finds that the primary route would be preferable to the westerly alternative with respect to land use, natural resources, traffic and safety, and construction noise and dust impacts along street portions of the primary route.

(b) Acushnet Alternative

Commonwealth asserted that, because the Acushnet alternative wold follow a route comparable to that proposed for the westerly alternative for most of its length, the impacts of the Acushnet alternative would be essentially equivalent to those of the westerly alternative, except in the vicinity of segment 20, the Acushnet River crossing (Exh. C-1, at exhibit V-B). However, Commonwealth identified additional land use and traffic impacts associated with segment 20.

With respect to land use impacts, Commonwealth indicated that the Acushnet alternative would involve temporary impacts to residential and commercial land uses in the Town of Acushnet (id.). The Company stated that segment 20 would be located within portions of Slocum Road and South Main Street in Acushnet, and that these streets are characterized by a mix of residential and small commercial uses (id. at V-11). The Company noted that the Town of Acushnet Selectmen have expressed a strong preference for the Company's preferred river crossing (id. at V-14 to V-15, V-18, exhibit V-G). The Company also stated that the Acushnet alternative could involve impacts to archaeological resources in the vicinity of the Acushnet substation. In particular, the Company indicated that the proposed route would pass between the Swift and Lawson cultural sites, which are potential locations of prehistoric resources (id. at V-11). While the Company acknowledged that these sites likely would not be directly impacted, it stated that the use of segment 20 is such that there would be an increased potential to impact archaeological resources as compared to the preferred river crossing (id. at exhibit V-B).

Commonwealth stated that route segment 20 would involve significant traffic impacts because it would involve construction activity within high volume roadways in the Town of Acushnet (id. at V-11, exhibit V-B). The Company indicated that portions of Slocum Road and South Main Street see characterized by heavy traffic volume (id.).

The Siting Board notes that with the exception of impacts associated with segment 20, the environmental impacts associated with the construction of the Acushnet alternative are, in all respects, comparable to those of the westerly alternative (see Section II.C.3.ii.a, above). However, the use of segment 20 would result in construction impacts on residential and commercial land uses in Acushnet as well as increased traffic impacts along Slocum Road and South Main Street in Acushnet. Neither the primary route nor the westerly route would create these impacts. The Company has also asserted that the use of segment 20 would increase potential impacts on archaeological resources; however, given that the sites in question have been disturbed by previous construction and river dredging activities, the Siting Board concludes that impacts of facility construction on archaeological resources would be minor and indirect, and comparable in nature and extent to those identified in connection with the primary route.

Based on the foregoing, the Siting Board finds that the primary route would be preferable to the Acushnet alternative with respect to land use and traffic impacts in the Town of

Acushnet. Additionally, because construction impacts within the City of New Bedford relating to land use, traffic and safety, and noise and dust impacts for the Acushnet alternative would be comparable to those identified for the westerly alternative, the Siting Board finds that the primary route would be preferable to the Acushnet alternative with respect to these same categories of environmental impacts.

Accordingly, the Siting Board finds that the primary route would be preferable to the Acushnet alternative with respect to land use, natural resources, traffic and safety, and construction noise and dust impacts along street portions of the primary route.

iii. Magnetic Field Levels

In this section, the Siting Board reviews the impacts of magnetic fields for the proposed facilities along the alternative routes and potential mitigation for such impacts, and compares the primary and alternative routes.

(a) Westerly Alternative

Commonwealth provided measurements of existing magnetic fields along the westerly alternative at thirty-six locations along transects running perpendicular to existing roadways (Exh. HO-E-19(att.)). Commonwealth stated that these measurements ranged from a minimum of 0.2 mG to a maximum of 33.5 mG, with an average magnetic field value of 3.6 mG (id. Sec. 1, at 4).
The data indicate magnetic field levels of less than or equal to 10 mG for approximately83 percent of the individual data points.

Close The Company indicated that it applied a correcting factor to its field measurements to calculate the existing magnetic fields for average and peak Pine Street area load conditions (see Section III.B.5.b, above). The calculations indicated that the maximum existing magnetic field would be 23.5 mG under average load, and 38.5 mG under peak load (id. at 5). Average values, calculated within a corridor defined by the actual width of the existing streets, were 2.5 mG under average load and 4.1 mG under peak load (id.).

Commonwealth noted that, while the maximum magnetic field level identified along the westerly alternative is greater than the maximum field level along the primary route, average magnetic field levels along the westerly alternative are slightly less than those along the primary route. Commonwealth explained that the higher average magnetic field levels along the primary route are due to the presence of a greater number of distribution circuits in the vicinity of the primary route (Tr. at 119-120).

The Company also provided estimates of magnetic field impacts of the proposed facility

along the westerly alternative under three load conditions, average load, peak load, and emergency load (see Section III.C.2.a.iii, above). The Company explained that such estimates are indicative of expected field along all segments and routes because they reflect the performance of the proposed facilities with respect to magnetic field impacts, independent of ambient conditions (Exhs. HO-E-19; HO-E-19(app. 1); HO-E-19(app. 2)).

Commonwealth also provided an estimate of magnetic fields which combined existing levels with levels predicted for the proposed facility along the westerly alternative for two possible cable configurations – solid dielectric and pipe type – and two load conditions, average load and peak load (Exh. HO-E-19). The Company stated that average magnetic fields along the westerly alternative under average load would be 2.52 mG for the pipe type cable and a 3.98 mG for the solid dielectric cable (id.). Under peak load, magnetic fields would average 4.12 mG for the pipe type cable and 6.62 mG for the solid dielectric cable (id.).

The record indicates that increases in average magnetic field level along the westerly alternative and the primary route due to the proposed facilities would be comparable, and would be well below levels that previously have been accepted by the Siting Board. The record also demonstrates that the environmental impacts of the westerly alternative would be minimized with respect to magnetic fields. However, the westerly alternative would be longer, and would proceed through residential and commercial areas of New Bedford for greater portions of its length, thereby increasing potential exposure to magnetic fields from the proposed facility.

Accordingly, the Siting Board finds that the primary route would be slightly preferable to the westerly alternative with respect to magnetic field levels.

(b) Acushnet Alternatives

The Company asserted that the magnetic field impacts of the proposed facilities along the Acushnet alternative would be comparable to those of both the primary route and the westerly alternative (Exh. C-1, at exhibit V-B). The Company stated that the magnetic field levels of the proposed facilities along segment 20 would be comparable to those along other segments of the route (Exh. C-1, at exhibit V-B; HO-E-19(att.)). The Company did not provide measurements showing existing magnetic fields along segment 20 of the Acushnet alternative, that segment of the Acushnet alternative route which differs significantly from the primary route and the westerly alternative. However, the Company did provide information indicating segment 20 would extend through portions of Acushnet including both on-street and transmission ROW locations, with predominantly residential and small commercial abutting land uses (Exhs. C-1, at V-10; HO-E-11(a) at 2).

The Siting Board notes that, with the exception of impacts along segment 20, magnetic field impacts along the Acushnet alternative would be comparable to those along the

westerly alternative in that these two alternatives would follow a common route for the majority of their length.

The record indicates that where it deviates from the primary route river crossing, the Acushnet alternative would proceed through portions of the Town of Acushnet that are dominated by residential and small commercial uses. Although Commonwealth has asserted that the magnetic fields from the proposed facilities would be below levels that previously have been accepted by the Siting Board, the greater length of the Acushnet alternative, and associated differences in abutting land use, would result in greater potential for exposure to magnetic fields from the proposed facilities than with the primary route.

Accordingly, the Siting Board finds that the primary route would be preferable to the Acushnet alternative with respect to magnetic field levels.

iv. Conclusions on Environmental Impacts

In Section III.C.3.a.i to iii, above, the Siting Board has found that the primary route would be comparable to the westerly alternative and preferable to the Acushnet alternative with respect to impacts to natural resources in the vicinity of the river crossing, and preferable to both the westerly alternative and the Acushnet alternative with respect to land use, natural resources, traffic and safety, and construction noise and dust impacts along street portions of the primary route, and slightly preferable to the westerly alternative and preferable to the Acushnet alternative with respect to magnetic field levels.

The Siting Board notes that Commonwealth's effort to solicit input from a wide variety of sources during the early stages of its planning process and its subsequent segment-based analysis of route alternatives has produced a primary route and alternative routes, each of which would involve temporary, relatively minor and readily mitigated impacts. Nonetheless, Commonwealth's primary route clearly offers certain advantages over the two alternatives. These advantages are primarily due to: (1) the shorter overall length of the primary route, which would result in fewer environmental impacts during the construction period; (2) the fact that a substantial portion of the primary route would be constructed in streets within industrial areas rather than in areas that are mainly residential in character; (3) the primary route's use of streets with lower traffic volume and its avoidance of established historic districts; and (4) the fact that the primary route would employ a more direct crossing of the Acushnet River.

Accordingly, the Siting finds that the primary route would be preferable to the westerly alternative and the Acushnet alternative with respect to environmental impacts.

b. Cost of the Proposed Facilities Along the Alternative Routes and Comparison

Commonwealth asserted that the construction of the proposed facilities along the primary route is the least-cost alternative based on its analysis of construction and other costs (Exh. HO-C-5(att.)).

Commonwealth provided a comparison of construction costs as follows:

Primary Route Westerly Alternative Acushnet Alternative

$7,167,000 to $10,347,080 to $14,873,651

$7,501,334 $10,681,414

(Exh. HO-C-5(att.)).
The Siting Board notes that in its estimation of cost for the westerly alternativepresented in Exhibit HO-C-5(att.), the Company assumed a more costly directional drill(i.e., segment 19B) for the river crossing. In order to accurately compare theconstruction costs of the three route alternatives, this cost comparison shows a range ofcosts for the primary route and the westerly alternative. In each case, the lower costfigure assumes the “direct lay” river crossing, while the higher cost figure assumesdirectional drilling.

Close

Commonwealth indicated that construction cost estimates were based upon pricing information obtained as “non-binding” price quotations from representative vendors and Commonwealth’s calculation of the Company’s internal and overhead costs (Exhs. C-1, at V-11; C-6, at 5).
Commonwealth noted that construction cost estimates included separate contingencyadjustment factors based on construction characteristics for particular route segments(Exh. C-1, V-11 to V-12, and n.2).

Close

Commonwealth indicated that the O&M costs and line losses associated with the primary and alternative routes would be comparable (Exhs. C-1, at exhibit IV-E; HO-C-2; HO-C-6).
Commonwealth estimated that O&M costs for the primary route would beapproximately $8000.00 per year (Exh. HO-C-2). The Company explained that themajority of O&M costs would be associated with the cable system terminal ends whichwould be located at

the Acushnet substation and the Pine Street substation for all routealternatives, and that therefore, O&M costs identified for the primary route would becomparable to those for the alternative routes (Exh. HO-C-6).

Close

The record demonstrates that Commonwealth has provided sufficient information regarding the construction costs and O&M costs of the proposed facilities along the alternative route segment combinations for the Siting Board to compare such costs with the cost of the proposed facilities along the primary route. In comparing the cost of the primary route to the westerly alternative and the Acushnet alternative, the record indicates that: (1) the construction costs of the westerly alternative would be 44 percent greater than for the primary route, and the construction cost of the Acushnet alternative would be 108 percent greater than for the primary route; and (2) O&M costs and line loss savings would be comparable for all route alternatives.

Accordingly, the Siting Board finds that the proposed facilities along the primary route would be preferable to the proposed facilities along the westerly alternative or the Acushnet alternative with respect to cost.

c. Reliability of the Proposed Facilities Along the Alternative Route Segment Combinations and Comparison

i. Description

Commonwealth stated that the construction of the proposed transmission line along the primary route is more reliable than along the two alternative routes because construction along the primary route would result in a shorter and straighter facility configuration with fewer cable splices (Exh. C-1, V-18). Commonwealth also noted the reliability advantage of constructing the proposed facility along a route that is geographically distinct from that of its existing #112 and #114 underground cables, thereby reducing the risk of third party damage to more than one necessary supply facility (id. at V-18).

ii. Analysis

The record demonstrates that Commonwealth has provided sufficient information regarding the reliability of the proposed facilities along the alternative route segment combinations for the Siting Board to compare the reliability of such facilities with the reliability of the facilities along the primary route.

In comparing the reliability of alternative routes to the reliability of the primary route, the

record indicates that the primary route is shorter, more direct and is geographically distinct from Commonwealth's existing transmission facilities that serve the Pine Street substation. These factors would provide a slightly higher degree of reliability as compared to the westerly alternative and the Acushnet alternative. Accordingly, the Siting Board finds that the proposed facilities along the primary route would be slightly preferable to the proposed facilities along the westerly alternative and the Acushnet alternative with respect to reliability.

d. Conclusions

In comparing the primary route to the westerly alternative and the Acushnet alternative, the Siting Board has found that the proposed facilities along the primary route would be preferable to both the westerly alternative and the Acushnet alternative with respect to environmental impacts and cost, and slightly preferable with respect to reliability.

Accordingly, the Siting Board finds that the primary route would be preferable to the westerly alternative and the Acushnet alternative with respect to providing a necessary energy supply for the Commonwealth with a minimum impact upon the environment at the lowest possible cost.

IV. DECISION

The Siting Board has found that Commonwealth has demonstrated that the existing supply system is inadequate to satisfy the Pine Street substation load center, and therefore that additional energy resources are needed for reliability purposes in the area served by the Pine Street substation.

The Siting Board also has found that proposed project is preferable to all other project alternatives identified by Commonwealth.

The Siting Board further has found that Commonwealth has considered a reasonable range of practical siting alternatives.

The Siting Board further has found that, with the implementation of proposed mitigation measures and the continued coordination with the USEPA concerning the configuration of the river crossing, the environmental impacts of the proposed facilities along the primary route would be minimized.

The Siting Board further has found that the proposed facilities along the primary route would achieve an appropriate balance among conflicting environmental concerns as well

as among environmental impacts, cost and reliability.

Finally, the Siting Board has found that the primary route would be preferable to the westerly alternative and the Acushnet alternative with respect to providing a necessary energy supply for the Commonwealth with a minimum impact upon the environment at the lowest possible cost.

In addition, the Siting Board finds that the proposed project is consistent with the most recently approved long-range forecast of Commonwealth.

The Siting Board's enabling statute requires the Siting Board to determine whether plans for expansion or construction of energy facilities are consistent with the current health, environmental protection, and resource use and development policies as adopted by the Commonwealth. G.L. c. 164, § 69J. In its review and balancing overall environmental, cost and reliability considerations above, the Siting Board has found that the environmental impacts of the proposed facilities along the primary route would achieve an appropriate balance among conflicting environmental concerns as well as among environmental impacts, cost and reliability. The Siting Board therefore finds that the proposed project is likely to be consistent with various health, environmental protection and resource use and development policies of the Commonwealth which relate to the environmental impacts and cost of the Commonwealth's energy supply.

Accordingly, the Siting Board APPROVES Commonwealth's petition to construct a new 115-kV underground electric transmission line, using Commonwealth's proposed route in the City of New Bedford and the Town of Acushnet.

The Siting Board notes that the findings in this Decision are based on the record in this case. A project proponent has an absolute obligation to construct and operate its facility in conformance with all aspects of its project proposal as presented to the Siting Board. Therefore the Siting Board requires Commonwealth to notify the Siting Board of any changes other than minor variations to the project proposal so that the Siting Board may decide whether to inquire further into a particular issue. Commonwealth 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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Robert P. Rasmussen

Hearing Officer

Dated this 16th day of September, 1997.

Unanimously APPROVED by the Energy Facilities Siting Board at its meeting of September 16, 1997, by the members and designees present and voting. Voting for approval of the Tentative Decision as amended: Janet Gail Besser (Acting Chair, EFSB/DPU); John D. Patrone (Commissioner, DPU); Sonia Hamel (for Trudy Coxe, Secretary, Executive Office of Environmental Affairs); David L. O'Connor (for David A. Tibbetts, Director, Department of Economic Development); and Joseph Flaherty (Public Member).

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Janet Gail Besser

Acting Chair

Dated this 16th day of September, 1997.

[FIGURE 1]

[FIGURE 2]

Appeal as to matters of law from any final decision, order or ruling of the Siting Board may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the order of the Siting Board be modified or set aside in whole or in part.

Such petition for appeal shall be filed with the Siting Board within twenty days after the date of service of the decision, order or ruling of the Siting Board, or within such further time as the Siting Board may allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the clerk of said court. (Massachusetts General laws, Chapter 25, Sec. 5; Chapter 164, Sec. 69P).