COMMONWEALTH OF MASSACHUSETTS
Energy Facilities Siting Board

In the Matter of the Petition of Norwood Municipal Light Department for Approval to Construct Two 115/13.8 kV Transmission Lines, a 115/13.8 kV Substation and Associated Equipment, and an Associated 13.8 kV Distribution Line in Norwood, Massachusetts	EFSB 96-2

FINAL DECISION

Jolette A. Westbrook
Hearing Officer
April 14, 1997

On the Decision:
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FOR: Norwood Municipal Light Department
Petitioner

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The Energy Facilities Siting Board hereby APPROVES the petition of Norwood Municipal Light Department to construct two 115/13.8 kilovolt ("kV") transmission lines, a 115/13.8 kV substation and associated equipment, and an associated 13.8 kV distribution line in the Town of Norwood, Massachusetts using the Light Department's proposed configuration and route.

I. INTRODUCTION

A. Summary of the Proposed Project and Facilities

Norwood Municipal Light Department ("NMLD" or "Light Department") is a municipal electric system that provides electric power to customers in the Town of Norwood ("Town" or "Norwood") (Exh. NM-1, at 1). NMLD's service territory, the Town of Norwood, is approximately ten square miles (id. at 2). The Light Department is an all-requirements power purchase customer of New England Power Company ("NEPCo") (Exhs. EFSB-N-3; EFSB-N-3-S; EFSB-N-3-S2; EFSB-N-3-S-C at 1).

NMLD has proposed to construct: (1) two underground parallel 115 kV transmission lines, located primarily within the layout of Route 1 in the Town; (2) a new 115/13.8 kV substation[1] to be built on a 0.5-acre site owned by the Norwood Water Department ("NWD") and located on the east side of Route 1, opposite Ellis Avenue ("Ellis Avenue substation");[2] and (3) a 0.7-mile 13.8 kV distribution line located within the layout of Route 1, to interconnect the proposed Ellis Avenue substation with the existing distribution system (id. at 51).[3]

For its primary configuration and route, NMLD has proposed to construct two parallel underground 115 kV transmission lines, each 2.2 miles in length, which will extend from the Dean Street substation to the Ellis Avenue substation site primarily traversing Route 1 (id. at 56).[4] The proposed route for the 13.8 kV underground distribution line will exit the

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[1] The new substation facilities will consist of a control house and an attached switchgear building, with all of the equipment except the transformers located indoors (Exh. NM-1, at 54).

[2] The area needed for the new substation, including cleared areas surrounding the fenceline to prevent damage from falling trees or vegetation, is 0.8 acres (Exh. NM-1, at 53-54; Tr. 2, at 140-141).

[3] All construction along Route 1 will occur outside of the traveled way (Exh. NM-1, at 85-86).

[4] The Light Department's proposal also states that modifications will be made to the

(continued…)

Ellis Avenue substation site, cross Route 1 and then run parallel to Route 1 for approximately 0.7 miles to Pleasant Street, where it will interconnect with the existing distribution system (id. at 52).[5]

NMLD has identified two alternative configurations. Under the first alternative ("Alternative One"), NMLD would construct two underground 115 kV transmission lines, each 2.6 miles in length, which would traverse predominately residential areas on Dean Street, Neponset Street and Pleasant Street (id. at 55). Alternative One would be identical to the Primary Configuration with respect to the proposed Ellis Avenue substation site, the upgrade to the existing Dean Street substation, and the 13.8 kV distribution system from the proposed substation to Pleasant Street (id.). Under the second alternative ("Alternative Two"), NMLD would use the same distribution and transmission line routes as the primary route with a 0.8-mile extension from the Ellis Avenue substation site to an alternative substation site on the north side of University Avenue ("University Avenue substation site" or "University Avenue site") (id. at 56).[6] The substation configuration at the University Avenue substation site would be the same as that proposed for the Ellis Avenue substation site (id. at 57). A map of the Light Department's Primary Configuration, Alternative One and Alternative Two is included as Figure 1.

Pursuant to G.L. c. 164, § 69J, no electric company shall commence construction of a jurisdictional energy facility (see Section I.C, below) unless a petition for approval of construction has been approved by the Massachusetts Energy Facilities Siting Board ("Siting Board") and, in the case of an electric or gas company which is required to file a long-range forecast pursuant to G.L. c.164, § 69I, that facility is consistent with the most recently approved long-range forecast for that company. NMLD asserted that it is not required to file a long-range forecast and supply plan pursuant to G.L. c. 164, § 69I in light of the Department's

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[4](…continued)
Dean Street substation within the existing fenceline in order to connect the new 115 kV lines to the 115 kV source of supply (Exh. NM-1, at 53; Tr. 1, at 49; Tr. 2, at 174).

[5] For purposes of this discussion, the proposed transmission and distribution line routes together constitute NMLD's primary route ("primary route"). The primary route, the proposed modifications to the existing Dean Street substation and the proposed Ellis Avenue substation comprise the primary configuration of NMLD's proposed project ("Primary Configuration").

[6] The University Avenue substation site is owned by the NWD and is within the control of members of the Board of Selectmen in their capacity as Water Department Commissioners of the Town (Exh. NM-1, at 56). The site is zoned for limited manufacturing and the land surrounding the site has not been developed (Brief at 92).

approval of NEPCo's forecast and supply plan by the Department of Public Utilities ("Department") in Massachusetts Electric Company, D.P.U. 94-112 (1994) ("D.P.U. 94-112 forecast") (Exh. NM-1, at 10).[7] Instead, to meet the requirements of G.L. c. 164, § 69J, NMLD filed with the Siting Board the D.P.U. 94-112 forecast, the most recently approved supply plan that incorporates NMLD's load. The Siting Board notes that the D.P.U. 94-112 forecast has served as a basis for findings of need in other transmission line cases and, in this case, has the advantage of providing an independent check on the internal demand forecast which NMLD has submitted in support of its petition (id.; Exhs. EFSB-N-3-S-C; EFSB-RR-4, EFSB-RR-4-S). Consequently, the Siting Board will evaluate the consistency of the proposed facility with the D.P.U. 94-112 forecast.

B. Procedural History

On May 10, 1996, NMLD filed a petition with the Siting Board for approval to construct two 115/13.8 kV transmission lines, a 115/13.8 kV substation and associated equipment, and an associated 13.8 kV distribution line as described herein. This petition was docketed as EFSB 96-2. On July 22, 1996, the Siting Board conducted a public hearing on the petition in the Town. In accordance with the direction of the Hearing Officer, NMLD provided notice of the public hearing and adjudication. No petitions to intervene or to participate as an interested person were submitted.

The Siting Board conducted evidentiary hearings on October 16 and October 24, 1996. NMLD presented six witnesses: Peter J. Thalmann, a principal with Power Line Models, Inc. ("PLM"), who provided testimony regarding need, project approach and electric and magnetic field impacts; Allan M. Rice, principal engineer with PLM, who provided testimony regarding project approach and cost issues; Mayhew D. Seavey, an engineer, who testified regarding demand forecast issues; Pamela M. Chan, an environmental consultant with EARTH TECH, who provided testimony regarding the site and route selection process; Daniel J. Stuart, a senior professional for EARTH TECH, who provided testimony regarding facility alternatives and the environmental comparison of the facility alternatives; and Douglas L. Sheadel, a senior scientist with EARTH TECH, who testified regarding noise issues. The Hearing Officer entered 105 exhibits into the record, consisting primarily of NMLD's responses to information and record requests. NMLD entered 6 exhibits into the record. On November 15, 1996, the Siting Board issued a supplemental record request and an additional briefing question. NMLD filed its brief on December 18, 1996.

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[7] Massachusetts Electric Company ("MECo") is a subsidiary of NEPCo.

C. Jurisdiction

The Light Department'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.

The Light Department's proposal to construct two 115 kV electric transmission lines falls squarely within 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 Light Department also proposes to construct a new substation and underground 13.8 kV distribution lines. The third definition of facility set forth in G.L. c. 164, § 69G is pertinent in determining whether the substation and distribution lines are jurisdictional facilities. In that third definition a facility is defined as:

> (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.

In Commonwealth Electric Company, 17 DOMSC 249, 263 (1988) ("1988 ComElectric Decision"), the Siting Board[8] established a two-part standard for determining whether a structure is a facility under the third definition of facility set forth in G.L. c. 164, § 69G. In that case, the Siting Board determined that a structure is a facility if (1) the structure is subordinate or supplementary to a jurisdictional facility, and (2) the structure provides no benefit outside of its relationship to the jurisdictional facility. Id.

With regard to the first part of the definition, both the substation and the distribution line are subordinate to the proposed transmission lines.

With regard to the second part of the definition, the record indicates that there are no existing 115 kV transmission lines in the vicinity of the proposed substation. Therefore, the proposed substation provides no benefit outside of its relationship to the proposed 115 kV transmission lines, which are jurisdictional. Further, there is no evidence on the record that the proposed distribution line would provide service connections or interconnections with other

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[8] Prior to 1992, the Siting Board was known as the Energy Facilities Siting Council. See St. 1992, c. 141.

distribution lines at intermediate locations along the proposed distribution line route. Therefore, the proposed 13.8 kV distribution line would not be capable of providing a benefit outside of its relationship to the proposed transmission lines.

Accordingly, pursuant to the definition of facility set forth in the 1988 ComElectric Decision, the Siting Board finds that the proposed 115/13.8 kV substation and 13.8 kV distribution line are facilities within the meaning of the third definition of facility in G.L. c. 164, § 69G.

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[9] in terms of cost, environmental impact, and reliability of supply (see Section III, below).

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[9] When a facility proposal is submitted to the Siting Board, the petitioner is required to present (1) its preferred facility site or route, and (2) at least one alternative facility site or route. These sites and routes often are described as the "noticed" alternatives because these are the only sites and routes described in the notice of adjudication published at the commencement of the Siting Board's review. In reaching a decision in a facility case, the Siting Board can approve a petitioner's preferred site or route, approve an 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 included in the notice of adjudication published for purposes of the proceeding.

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[10] 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

NMLD indicated that the existing NMLD power system consists of two 115 kV overhead transmission supply circuits, one 115/13.8 kV power delivery distribution substation, and 17 13.8 kV feeders (Exh. NM-1, at 6). The Light Department stated that all customer loads are supplied via the 17 13.8 kV feeders, but that some customers are served locally at 4.16 kV via 13.8/4.16 kV substations (id.).

The Light Department further stated that its single 115/13.8 kV Dean Street substation is supplied by two 115 kV aerial transmission lines owned by NMLD in Norwood and by Boston Edison Company ("BECo") beyond the Norwood border (id.). NMLD stated that each 115 kV circuit is on its own wooden structures (id.). The Light Department also indicated that the 115 kV circuits are supplied from the West Walpole and Holbrook substations on the BECo system, enter Norwood from the south, and terminate at the Dean Street substation in the southern portion of Norwood (id.). NMLD stated that its 115 kV taps connect BECo's 115 kV lines to the Dean Street substation (id. at 6-7).

NMLD stated that the Dean Street substation, constructed in 1970, consists of three 50/66/83/93 mega-volt amphere ("MVA") 115/13.8 kV transformers, one of which, a spare, is normally open (id. at 7). The Light Department stated that each of the two Dean Street

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[10] In this discussion, the term "additional energy resources" is used generically to encompass both energy and capacity additions, including, but not limited to, electric generating facilities, electric transmission lines, energy or capacity associated with power sales agreements, and energy or capacity associated with conservation and load management.

transformers in operation has two 13.8 kV secondary windings, resulting in four 13.8 kV buses which supply two 13.8 kV switchgear lineups (id.). NMLD indicated that the two switchgear lineups together have 18 feeder positions, with each switchgear lineup consisting of nine feeder positions (id.). NMLD stated that all of the 13.8 kV switchgear is contained in a control house which, NMLD asserted, has no room for expansion (id.). NMLD further indicated that 17 of the 18 feeder positions are already in service, connected to lines exiting the substation via underground ductbanks (id. at 8). The Light Department asserted that there is no room available at the substation for feeder expansion, and that its ductbank along Dean Street is full (id.).

NMLD stated that the Dean Street substation yard was created by diverting the Neponset River, culverting Meadow Brook, and filling local wetlands (id.). NMLD indicated that wetland areas and the 100-year floodplain currently border the Dean Street substation on three sides and that the remaining side is bordered by Dean Street and the access driveway to the substation (id.). The Light Department asserted that significant environmental constraints would make any expansion at the Dean Street substation infeasible (id.).

In addition, NMLD stated that it currently uses express 13.8 kV feeders which are up to four miles in length originating at the Dean Street substation to service significant load concentrations in northern Norwood (id.).

NMLD indicated that its distribution system could serve a maximum load of 83 MVA without system overloads (id.). The Light Department estimated that this 83 MVA level would be exceeded around the year 2000 (id.).

3. Reliability of Supply

NMLD asserted that the proposed project is needed in order to provide a reliable supply of electricity to its customers consistent with the Light Department's reliability planning and design standards (id. at 31). Specifically, the Light Department stated that: (1) the maximum system loading of 83 MVA would be exceeded within the Light Department's planning horizon, based on NMLD's projected load growth; (2) 17 of the 18 feeder positions exiting its single substation are in use and the last feeder position is expected to be required in the near term; (3) sixteen cables exit the substation in a single 16-way ductbank with no spare duct positions, and this 16-way ductbank supplies approximately 93 percent of the total NMLD system load; and (4) the load served by the single NMLD substation exceeds industry norms for a single substation and results in a less reliable supply of power to Norwood (id. at 31-32). The Light Department asserted that these conditions are a direct result of load growth in

Norwood since the initial construction of the Dean Street substation 25 years ago, and that as a result of such conditions, the NMLD system has the potential to fail to meet one or more of its fundamental reliability planning criteria (id.).

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

a. Reliability Criteria

The Light Department stated that the NMLD system does not currently meet, or, within the short-term forecast horizon, would no longer be in compliance with, NMLD's three basic reliability criteria, which are: (1) to maintain single contingency firm service at all load levels; (2) to avoid degradation in reliability; and (3) to prevent system overloads (Exh. EFSB-N-2).

The Light Department stated that, to maintain a single-contingency firm supply, its system planning calls for avoidance of substantial and sustained (greater than 5 minutes) loss of load in the event of an unscheduled loss of any single piece of supply system equipment such as a transmission circuit or substation transformer (Exh. NM-1, at 16). NMLD stated that its second criterion, avoiding degradation in reliability, pertained to balancing the number of system circuits, the number of customers on a circuit and the length of feeders (id.). NMLD indicated that increases in the number of customers on a circuit could compound reliability problems, even without a change in the rate of outages, because each single circuit outage would affect more customers (id.). With respect to its third criterion, the Light Department indicated that an unscheduled loss of equipment at any load level should not result in overloading of the remaining facilities, and that operations at above-normal ratings during a contingency should not exceed 24 hours (id. at 16, 32).

The Light Department stated that it also uses specific design criteria objectives to assess whether the NMLD system could meet its reliability requirements (Exh. EFSB-N-2). These are: to prevent loading of the NMLD system above 83 MVA; to maintain a distribution system with spare feeders for reliability and planning purposes; to avoid excessive dependence on a single, full ductbank; and to avoid excessive dependence on a single delivery substation (id.).

With respect to preventing loading of the NMLD system above 83 MVA, NMLD indicated that its consultant, PLM, recommended an 83 MVA loading limit for the existing NMLD system to meet the reliability criterion of preventing system overloads (Exh. NM-1, at 25-30). NMLD stated that its consultant's recommended loading limit was based on computer modelling of the existing system, assuming a maximum distribution system loading of 65 percent of the sum of the individual feeder line emergency ratings and other standards accepted elsewhere in the industry (id. at 25-27).

With respect to its second specific design criterion, NMLD indicated that a lack of spare feeder positions would allow insufficient flexibility to address unknowns associated with future load growth, spot loads and circuit routing constraints, and that over time projected system growth would result in increased load on existing feeders (id. at 17-18). NMLD indicated that increased load on existing feeders would in turn affect normal and emergency loading conditions, impact firm capacity, degrade voltage regulation and increase system losses (id.). With respect to its third design criterion, avoiding dependence on a single, full ductbank, NMLD indicated that cable life, ratings, and repair times would all improve if the Light Department were able to maintain 20-25 percent spare duct capacity in accordance with its long-range planning standard (id. at 18-21).

Finally, with respect to dependence on a single delivery substation, NMLD indicated that supplying all of its system from the Dean Street substation resulted in long feeder lines, creating voltage concerns and line losses. The Light Department further indicated that all other Massachusetts municipal electric systems with peak loads exceeding 65 MVA use more than one distribution delivery substation (id. at 21-22). NMLD also stated, however, that its existing transformers at the Dean Street substation are 56 MVA each, or approximately twice the normal 25-33 MVA of most distribution substation transformers (id. at 23-24).

As a general matter, the Siting Board consistently has found that if the loss of any single major component of a supply system would cause significant customer outages, unacceptable voltage levels, or thermal overloads on system components, then there is justification for additional energy resources to maintain system reliability. New England Power Company, EFSB 95-2, at 10 (1996); New England Power Company, 4 DOMSB 109, 202 (1995); New England Power Company, 21 DOMSC 325, 339 (1991).

With respect to the Light Department's reliability criteria requiring conformance to normal equipment capabilities under normal operations, i.e., maintenance of single contingency firm service at all load levels, no deterioration of reliability below the Light Department's specified standards and prevention of system overloads, the Siting Board agrees

that operation with such constraints is essential for providing a reliable, least-cost energy supply in Norwood.

With respect to NMLD's specific design criteria, the Siting Board agrees that NMLD has appropriately determined the use of a loading limit of 83 MVA as a measure of the reliability of the NMLD system. We note the loading limit is based on an analysis that focused on system overload.

In addition, the Siting Board agrees that the availability of spare distribution feeders and the level of dependence on a single, full ductbank are appropriate measures of the Light Department's ability to meet its reliability requirements. We note that the Light Department cites issues of both degradation in reliability and increased potential for overloads to support its design objectives.

However, the Siting Board is unpersuaded that NMLD's reliance on an industry norm relative to a single delivery substation is an appropriate standard for judging the ability of the NMLD system to provide a reliable, least-cost energy supply. NMLD argues that such a standard is justified by the voltage concerns and line losses that arise with reliance on extended feeder lines. The Siting Board concludes that dependence on a single delivery substation is not per se an obstacle to system reliability, since a single delivery substation may well serve a small municipal system reliably, depending on its location.[11] The Siting Board notes, however, that more direct indicators of voltage concerns, for example, a high average feeder line length coupled with outage and complaint records that show reduced reliability, might well be an appropriate reliability-based design criterion for a system such as NMLD's. Overall, however, NMLD has developed design criteria that adequately assess the ability of the NMLD system to meet the Light Department's reliability requirements.

Accordingly, the Siting Board finds that the Light Department's reliability criteria, excluding the single substation design criterion, are reasonable for purposes of this review.

b. Load Forecast

i. Description

In support of its position that the proposed facilities are needed, NMLD provided a load forecast and supply plan, including forecasts of total energy requirements and system peak demand, for the NMLD system developed as an integral part of NMLD's planning process (Exh. EFSB N-3-S-C). NMLD stated that it prepared its forecast and supply plan using the

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[11] The Siting Board notes that this general conclusion does not preclude the possibility that conditions specific to NMLD's existing substation may require construction of a second substation at this time as proposed.

methodology approved by the Siting Board and the Department for the municipal light plants in Taunton, Middleborough and Braintree (Exh. EFSB-RR-12). The Light Department also provided measurements of energy demand for fiscal years 1995 and 1996, the two intervening years since the development of NMLD's load forecast and supply plan. In addition, NMLD, an all-requirements customer of NEPCo, provided NEPCo's integrated least cost resource plan for 1994-2008, approved by the Department in the D.P.U. 94-112 forecast (Exh. EFSB-N-3-S-B).

NMLD indicated that it began its forecast of total energy requirements at the point of delivery to its system by forecasting energy sales for each of six distinct customer classes (Exh. NM-1, at 11). NMLD stated that its econometric forecast of sales predicted an average annual compound growth rate of 2.0 percent in energy usage over the period from 1995 through 2004, and that individual class growth rates varied from -2.5 percent to 2.4 percent (id. at 11-12).[12] The Light Department indicated that in forecasting each customer class, it used appropriate exogenous, independent variables and relied on independent data from its consultant, Data Resources, Inc. of Lexington, MA (id.). The Light Department also indicated that it evaluated several alternate forecast models for each customer class, in each case choosing the model which had the greatest explanatory power and statistical significance as measured by the adjusted R^2, F-test, t-statistic and Durbin-Watson statistic (id. at 13). NMLD then adjusted forecasted energy sales to reflect the impact of utility-sponsored C&LM measures, as well as distribution system losses and internal use (id. at 11). NMLD stated that it forecasted annual peak demand with a regression analysis of summer peak demand against total system energy requirements and average daily temperature for the month of the summer peak using historic data from the years 1981 to 1994 (id.).[13] The Light Department stated that the system peak demand was first forecast using energy requirements before adjustment for utility-sponsored C&LM and then adjusted for the impact of C&LM on NMLD's summer peak demand (id. at 12). NMLD indicated that, based on its forecast model, summer peak demand could exceed 83 MVA as early as 2001 under extreme weather

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[12] As noted above, NMLD also provided energy demand data for 1995 and 1996 (Exh. EFSB-RR-4). NMLD indicated that actual adjusted energy demand was approximately 18,000 megawatthours ("MWh") less than forecasted demand in 1995 and approximately 28,000 MWh less in 1996 (Exhs. NM-2, at exhibit 2-3; EFSB-RR-4). NMLD stated that the intent of econometric forecasts was not to determine growth in the short run, but to determine growth over the forecast period (Exh. EFSB-RR-4).

[13] NMLD is a summer peaking system (Exh. NM-1, at 12).

conditions and as early as 2002 under average weather conditions at an assumed equivalent power factor of 93 percent (id. at 12-13).

The Light Department also indicated that in the D.P.U. 94-112 forecast, NEPCo assumed that for each of the years 1994 to 2008, sales to NMLD would be 1.5 percent of sales to NEPCo's primary retail customers, MECo, Granite State Electric Company and the Narragansett Electric Company (Exhs. EFSB-N-3-S-A; EFSB-N-3-S-B).[14] Using this information and the no demand side management ("DSM") base case forecast for NEPCo's primary retail customers in the D.P.U. 94-112 forecast, the Siting Board calculated projected sales to NMLD for the years 1994 to 2008 as reflected in the DPU 94-112 forecast (Exh. EFSB-N-13). The Siting Board's calculations indicated that, with adjustments for NMLD's projected DSM and NYPA purchases, NEPCo's forecast of NMLD's energy requirements differed from NMLD's forecast by less than 3 percent for each year of the ten year period 1995 to 2004 (Exhs. EFSB-N-13; NM-2, at exhibit 2-3).

ii. Analysis

NMLD has submitted two forecasts of load in support of its petition, the D.P.U. 94-112 forecast, which has been reviewed by the Department, and an internal forecast, which has not been previously reviewed. The Siting Board statute requires that forecasts are based on substantially accurate historical information and reasonable statistical projection methods. See G.L. c. 164, §§ 69J and 69I. To ensure that this standard has been met, the Siting Board and the Department have consistently required forecasts to be reviewable, appropriate and reliable. Colonial Gas Company, D.P.U. 96-18, at 5 (1996); Bay State Gas Company, D.P.U. 93-129, at 5 (1996); Northeast Utilities, 17 DOMSC 1 (1988).

In preparing its internal forecast, NMLD has relied on quantitative techniques similar to those used in other municipal forecasts approved by the Siting Board and the Department, and has provided reasonable explanations of its estimation of load growth at the substation level, based on both NMLD's forecast of system load and measurements of increasing substation load. No additional subdivision of the load forecast for the NMLD system is necessary, as

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[14] NMLD's witness testified that NEPCo's sales to NMLD would not equal NMLD's total energy requirements because NEPCo's sales would not reflect purchases by NMLD from the New York Power Authority ("NYPA") (Tr. 2, at 181-182). The Light Department indicated that for the 12 months ending in June, 1996, NMLD purchased 18,000 MWh from NYPA, typical of annual NMLD purchases from NYPA for the last five-year period (id. at 182-183). The Light Department further indicated that 18,000 MWh was the order of magnitude of the difference between NMLD's forecasted energy requirements and NEPCo's forecast of NMLD's energy requirements (id.; Exhs. EFSB-N-13; EFSB-N-3-S-C at 62).

NMLD supplies its entire system via one substation. Consequently, the Siting Board finds that NMLD's internal forecast is reviewable and appropriate.

To validate its forecast, NMLD has compared it with the derivation of load for the NMLD system based on the D.P.U. 94-112 forecast. The Siting Board finds that there is reasonable consistency between the two forecasts. Based on this comparison and on its evaluation of NMLD's forecasting techniques, the Siting Board finds that, for the purposes of this review, NMLD's internal forecast is reliable.[15]

c. Equipment Loading and Configuration Analysis

In this Section the Siting Board considers whether there is a need for additional energy resources based on the Light Department's reliability and design criteria.

NMLD indicated that, under its high case scenario, peak load would exceed its previously identified maximum system loading of 83 MVA in the 2000-2001 timeframe (Exh. NM-2, at exhibit 2-12). NMLD also indicated that the number of feeders for backup was constrained at the existing Dean Street substation (Exh. NM-1, at 35). The Light Department stated that the one remaining spare feeder position would be in service by 1999, leaving NMLD without the flexibility to provide for new spot loads (id. at 27). Finally, NMLD stated that the 16-way ductbank contained no spare ducts, and added that the loading of the ductbank was approaching its limit (id. at 36; Tr. 1, at 62-71).

The Light Department indicated that the maintenance of firm service under a single contingency without overloading equipment was NMLD's primary reliability criterion (see Section II.A.3.a, above) (Exh. NM-1, at 32). The Light Department asserted that its existing exposure to contingencies was inconsistent with its system reliability planning and design criteria given the lack of spare ducts and ductbanks (id. at 36).

NMLD indicated that it first analyzed the contingency of an unscheduled loss of a single circuit within the 16-way ductbank (id.). The Light Department stated that to satisfy the system reliability criteria under such a single contingency, it currently had to shift load to backup circuits, also within the 16-way ductbank, without causing any overloading of other

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[15] The Siting Board notes that municipal gas and electric companies are no longer required to file long range forecast and supply plans with the Department pursuant to G.L. c. 164, § 69I. St. 1996, c. 97. In addition, pending legislation would allow the Department to exempt investor-owned utilities from this requirement. The Siting Board notes that, in the absence of regular Department review of long range forecasts, it may become necessary for the Siting Board to conduct more extensive reviews of utility load forecasts in the context of petitions to construct jurisdictional facilities such as electric transmission lines and gas pipelines.

circuits (id.). NMLD noted that, under its system reliability criteria, a faulted circuit should be repaired within 24 hours (id.).

The Light Department stated that its analysis showed the ductbank approaching its recommended limit of 65 percent of the sum of the emergency ratings, and that, due to unequal load splits, some feeders were already loaded at or beyond the 65 percent limit (id.). NMLD stated that heavy loading of these feeders had reduced their ability to provide backup for adjacent feeders (id.).

The Light Department stated that inadequate backup conditions were not confined to heavily loaded feeders (id.). The Light Department explained that some feeders loaded to less than 65 percent of their emergency ratings also could involve complex backup arrangements (id.). As a case in point, NMLD referred to the University Avenue 1 and 2 feeders which provide mutual backup (id. at 32-33). NMLD stated that the University Avenue 2 feeder is only tied to the University Avenue 1 feeder, and that both feeders are presently loaded to 60 percent of their emergency ratings (id.). NMLD stated that if the University Avenue 2 feeder were lost due to a cable fault, it would be necessary to switch load from the University Avenue 1 feeder to another adjacent feeder or feeders to avert an overload (id.). NMLD indicated that cascading switching procedures such as those required to back up loss of the University Avenue 2 feeder could become complicated and time consuming and, in addition, if occurring during the summer peak period, could significantly increase the potential for cable overload and a lengthy repair process (id. at 33-34).[16]

The Light Department further noted that the 16-way ductbank serves approximately 93 percent of its system load, and that it had no other source from which to supply the load of this ductbank (id. at 34). The Light Department indicated that it therefore also considered the contingency of a catastrophic failure in the ductbank involving more than one feeder (id.). NMLD stated that multiple feeder failures in the ductbank would most likely result from a manhole explosion or fire or from a partial dig-in caused by work unrelated to NMLD

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[16] The Light Department indicated that, in the event of a faulted cable, emergency service would likely be provided to the load in less than two hours (Exh. NM-1, at 33). NMLD indicated, however, that under certain fault conditions, removal and replacement of the faulted cable might be required (id.). NMLD indicated that, if spare ducts were available in a ductbank, a new cable could be pulled into an available duct within 24 hours and the failed cable could be removed at a later time under non-emergency conditions (id.). The Light Department stated that without spare ducts, the system would have to operate for more than 24 hours with emergency service, and possibly significantly longer, exceeding the cable's 24-hour emergency rating (id.). NMLD also indicated that extended operation with emergency service arrangements in place would increase the potential for loss of another strategic feeder and prolonged outages (id. at 33-34).

activities (id.).[17] With respect to a manhole explosion or fire, NMLD stated that the sixteen circuits in its ductbank were split into two manholes with eight circuits per manhole at four locations along the ductbank route, and that a serious manhole failure could therefore impact up to eight circuits at a time (id. at 35).

The Siting Board finds that the Light Department used reviewable and appropriate methods for assessing the reliability of its supply based on appropriate system reliability planning and design criteria. The Siting Board also finds that the Light Department's analysis demonstrates that: (1) under the current configuration, peak load would exceed a maximum system loading of 83 MVA in the 2000-2001 timeframe in contravention of NMLD's design criteria; (2) by 1999, feeder position capabilities would constrain NMLD's ability to meet load growth, particularly large customer growth, because the existing system would not have the flexibility to serve new spot loads; and (3) at present, the contingency of the loss of a single circuit in the 16-way ductbank could result in system operation at emergency levels for more than 24 hours, in contravention of system reliability criteria.

Accordingly, the Siting Board finds that there is a need for additional energy resources based on the Light Department'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. NMLD asserted that, given the amount of load reduction necessary, accelerated C&LM efforts would not address the identified reliability need (Exh. NM-1, at 37). The Light Department further asserted that its system was already out of compliance with certain of its design criteria and that C&LM could not address such system shortcomings as a lack of spare duct space and feeder positions or system reliance on a single distribution substation (id.).[18] See Section II.A.3, above.

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[17] The Light Department noted that Polaroid, its largest single customer with a peak load of 7000 kilowatts, is served by two physically adjacent feeders in NMLD's ductbank (Exh. NM-1, at 34-35). The Light Department stated that the loss of the feeders serving Polaroid would interrupt service to the Polaroid facility until the cables and/or ductbank could be repaired, resulting in an extended outage (id.).

[18] NMLD provided a list and description of the C&LM programs which it indicated were incorporated into its demand forecast (Exhs. NM-1, at 38; NM-2, at exhibit 2-10). In addition, the Light Department provided projections of coincident peak reductions due to utility-sponsored C&LM for the years 1995 through 2000 (Exh. NM-2, at exhibit 2-10). The Light Department indicated that reductions ranged from a total of

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NMLD stated that it expected its base unadjusted peak load to reach 79 megawatts ("MW") or 84.9 MVA in 2001, and that adjusted to account for NMLD's C&LM program, the base case load in 2001 would be 76.7 MW or 82.4 MVA (Exh. NM-2, at exhibit 2-11). The Light Department stated that under its high case forecast, peak load adjusted to account for NMLD's C&LM program would be 77.65 MW or 83.5 MVA in 2001 (id. at exhibit 2-12). NMLD asserted that while C&LM had slowed the growth of NMLD's peak load, and would continue to do so, C&LM alone would not prevent NMLD's load from exceeding its emergency rating of 83 MVA (Exh. NM-1, at 38). NMLD further asserted that C&LM would therefore fail to meet the reliability criterion of preventing system overloads (id.). NMLD also indicated that even a 50 percent increase in its C&LM program effective in 1996 would result in an adjusted base case peak load of approximately 83 MVA in 2002 (id.; Exh. NM-2, at exhibit 2-13). NMLD stated that, under its high case forecast, adjusted peak load would reach approximately 83 MVA a year earlier, in 2001 (Exh. NM-2, at exhibit 2-14).

The record demonstrates that the existing NMLD system will not meet its reliability criterion of avoiding system overloads in the short-term forecast period even when load reductions due to accelerated C&LM are considered. Further, the record demonstrates that C&LM will not enable the Light Department to reduce its system load sufficiently to meet its specific design requirements with regard to spare ducts and feeders.

Accordingly, the Siting Board finds that acceleration of C&LM programs could not eliminate the identified need for additional energy resources based on the Light Department's reliability criteria.

e. Conclusions on Reliability of Supply

The Siting Board has found that the Light Department's reliability criteria, excluding the single substation design criterion, are reasonable for purposes of this review. The Siting Board has also found that NMLD's internal forecast is reviewable, appropriate and reliable for the purposes of this review.

The Siting Board has further found that the Light Department used reviewable and appropriate methods for assessing the reliability of its supply based on appropriate system reliability planning and design criteria. The Siting Board has also found that the Light

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1.4 MW in 1995 to 2.3 MW in the year 2000 (id.). NMLD stated that the Light Department had achieved additional significant reductions in MVA requirements with the installation of capacitors (Exh. NM-1, at 37, 38).

Department's analysis demonstrates that: (1) under the current configuration, peak load would exceed a maximum system loading of 83 MVA in the 2000-2001 timeframe in contravention of NMLD's design criteria; (2) by 1999, feeder position capabilities would constrain NMLD's ability to meet load growth, particularly large customer growth, because the existing system would not have the flexibility to serve new spot loads; and (3) at present, the contingency of the loss of a single circuit in the 16-way ductbank could result in system operation at emergency levels for more than 24 hours, in contravention of system reliability criteria. The Siting Board has therefore found that there is a need for additional energy resources based on the Light Department's reliability criteria.

Finally, the Siting Board has found that acceleration of C&LM programs could not eliminate the identified need for additional energy resources based on the Light Department's reliability criteria.

Accordingly, the Siting Board finds that additional energy resources currently are needed for reliability purposes in the area supplied by the NMLD system.

B. Comparison of the Proposed Project and Alternative Approaches

1. Standard of Review

G.L. c. 164, §69 H requires the Siting Board to evaluate proposed projects in terms of their consistency with providing a necessary energy supply to the Commonwealth with a minimum impact on the environment at the lowest possible cost. In addition, G.L. c. 164, § 69J requires a 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.[19]

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. New England Power Company, EFSB 95-2, at 18; New England Power Company, 4 DOMSB at 136; New England Power Company, 21 DOMSC at 359-375.[20]

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[19] G.L. c. 164, § 69J also requires a petitioner to provide a description of "other site locations." The Siting Board reviews the Petitioner's proposed site, as well as other site locations, in Section III.B, below.

[20] In New England Power Company, EFSB 95-2, the Siting Board stated that it expected applicants, when appropriate, to analyze the ability of distributed generation to meet the identified need. The submission in the instant case predates the Siting Board's requirement, which is therefore not applicable. Nonetheless, NMLD provided the

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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. New England Power Company, EFSB 95-2, at 19; New England Power Company, 4 DOMSB at 137; New England Power Company, 21 DOMSC at 374-375.

2. Project Approaches

In its petition, NMLD identified three possible approaches for meeting the identified need: (1) the proposed project; (2) the expansion of the existing Dean Street substation ("Dean Street Expansion Plan"); and (3) improvements to ductbanks on the low voltage distribution system ("Low Voltage Plan") (Exhs. NM-1, at 40-50; EFSB-RR-3; EFSB-RR-3-S; Tr. 1, at 12-18, 56, 57).[21]

NMLD stated that the proposed project, to be constructed in 2000, would consist of a new substation and associated 13.8 kV distribution facilities in northern Norwood, a new 2.2 mile 115 kV transmission line connecting the new substation to the existing Dean Street substation, and modifications to the Dean Street substation (Exh. NM-1, at 40). NMLD indicated that the Dean Street Expansion Plan, which also would be constructed in 2000, would consist of a new 115 kV/13.8 kV substation at the existing Dean Street site, together with modifications to the existing Dean Street substation, and new 13.8 kV distribution facilities, including lines extending into northern Norwood along portions of the transmission line route

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[20](…continued)
Siting Board with a discussion of why distributed generation could not meet the identified need. This is examined in Section II.B.3.d, below.

[21] Two other alternatives were presented that are not discussed here at length. The first of these was largely the same as the Low Voltage Plan, except that (1) construction of the new substation in the year 2011 would occur at the Dean Street substation site, and (2) a minimum of two 8-way, 13.8 kV ductbanks from Dean Street substation to Route 1 (with a total capacity of 12 cables) would be constructed in the year 2000 (Exhs. EFSB-RR-3; EFSB-RR-3S; Tr. 1, at 58-60). The conclusions in Section II.B.3.c, below, apply equally to this approach.

The second alternative presented, but ultimately dismissed, was the possibility of expanding the Dean Street substation to accommodate a three-transformer layout (Exh. EFSB-RR-3; Tr. 1, at 17, 22-25). The Light Department stated that a three-transformer layout would be constrained by the transformer windings: there would be an increased chance of multiple feeder outages with a resultant loss of reliability (Exh. EFSB-RR-3). The Light Department also indicated that a three-transformer scheme would not result in additional feeder positions at Dean Street and therefore would not meet NMLD's identified need and reliability criteria (id.).

associated with the proposed project (Exh. EFSB-RR-3-S at 3).[22] Finally, NMLD indicated that the Low Voltage Plan would consist of two stages: first, the construction in 2000 of a new 13.8 kV, four-circuit ductbank to interconnect the Dean Street substation with the existing distribution system at Route 1; and second, the construction in 2011 of a 115/13.8 kV substation and associated 13.8 kV distribution facilities in northern Norwood (id. at 2-3).

The Siting Board's examination of project approaches will include analysis of the proposed project, identified alternative approaches, and the ability of distributed generation to meet the identified need.[23]

3. Ability to Meet the Identified Need

In its analysis of the ability of the above approaches to meet the identified need, the Siting Board evaluates whether each approach would provide a reliable supply to the area served by the existing Dean Street substation and ancillary transmission and distribution equipment, consistent with the Light Department's criteria for equipment loadings.

a. Proposed Project

The Light Department asserted that the proposed project would meet the identified need (Exh. NM-1, at 45). NMLD indicated that the construction of a new substation in northern Norwood would relieve existing system overload, contingency and associated reliability problems (id. at 44). Specifically, NMLD indicated that the proposed new substation would: add approximately 55 MVA of firm system capacity; increase the system loading limitation above 83 MVA; make spare ducts or circuitry available in the existing 16-way ductbank; relieve many of the existing, heavily-loaded distribution feeders and circuits at the Dean Street substation and improve thermal ratings of the remaining circuits; and create new feeder positions to prevent system overloads and to provide service for future loads (id. at 43-45;

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[22] In its petition, NMLD discussed the Dean Street Expansion Plan primarily in terms of adding additional equipment to the existing substation (Exh. NM-1, at 45-47). However, during the course of the proceedings, at the request of the Siting Board, NMLD expanded its discussion to include the possibility of constructing a second substation and new feeder lines and ductbanks at the existing substation site (Exh. EFSB-RR-3-S at n.1).

[23] G.L. c. 164, § 69J requires the Light Department to consider the alternative of "no additional electrical power." However, the Siting Board has found that there is a need for additional energy resources based on the Light Department's reliability criteria (see Section II.A.3.c, above). Consequently, the Siting Board finds that the alternative of "no additional electric power" would be unable to meet the need identified in Section II.A.3.c, above. A more detailed analysis of this alternative is therefore unnecessary.

Exhs. NM-2, at 3-1; EFSB-N-8; EFSB-N-9; EFSB-N-10). The Light Department also stated that the proposed project would eliminate NMLD's dependence on a single delivery distribution substation (see Section II.A.2, above) (Exh. NM-1, at 44).

The record demonstrates that the proposed project would meet the Light Department's reliability and design criteria. Accordingly, the Siting Board finds that the proposed project would meet the identified need.

b. Dean Street Expansion Plan

The Light Department asserted that the Dean Street Expansion Plan would meet the identified need (Brief at 60). NMLD provided supporting documentation indicating that the addition of a new 115/13.8 kV substation at the existing Dean Street substation site would add spare ducts and feeders (Exh. EFSB-RR-3-S). NMLD also indicated that the new 115/13.8 kV substation at the Dean Street substation site would increase the loading limitation of the NMLD system above 83 MVA (id.; Tr. 1, at 33-34).[24]

The record demonstrates that the Dean Street Expansion Plan would meet the Light Department's criteria for reliability and design criteria. Accordingly, the Siting Board finds that the Dean Street Expansion Plan would meet the identified need.

c. Low Voltage Plan

NMLD asserted that the Low Voltage Plan would not meet the identified need (Exh. NM-1, at 48). The Light Department stated that the Low Voltage Plan would create some spare duct positions, meeting NMLD's design criteria regarding spare duct and ductbank capacity (id.). The Light Department indicated, however, that while ductbank improvements would increase the NMLD system's emergency rating to 93 MVA, this load level would be inadequate to meet system load between 2007 and 2011 (id.; Exhs. EFSB-A-1, EFSB-RR-3-S). The Light Department explained that because the Low Voltage Plan would initially rely on ductbank improvements, and would not add new feeders until 2011, NMLD would be left with limited options in the short run for handling and

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[24] The Light Department indicated that the Dean Street Expansion Plan, while theoretically able to meet the identified need, would be impractical from a construction engineering standpoint (see Section II.B.5.a, below) (Exh. EFSB-RR-3-S; Tr. 1, at 61).

accommodating spot loads (Exhs. NM-1, at 48-50; EFSB-A-1; EFSB-RR-3-S; EFSB-RR-11; Tr. 1, at 57-58).[25]

The record demonstrates that under the Low Voltage Plan, NMLD would face feeder constraints that would likely restrict the ability of the NMLD system to provide in the near term for new spot loads. Accordingly, the Siting Board finds that the Low Voltage Plan would not meet the identified need.

d. Distributed Generation

The Light Department also provided an analysis of the ability of distributed generation to meet the identified need alone or in combination with other modifications to the existing system (Exh. EFSB-RR-2). NMLD anticipated a number of operational problems associated with the use of distributed generation including, but not limited to the following: (1) distributed generation would not provide for more feeder positions at the existing Dean Street substation, and (2) with distributed generation, feeders at the Dean Street substation might improperly trip for faults on other feeders (id.).[26] The Light Department further indicated that larger generation would be most advantageous in terms of relieving its existing 16-way ductbank, but that smaller generation would be desirable to prevent islanding, i.e., the incidence of a feeder breaker staying "live" if the distributed generation exactly matched the feeder load (id.).[27]

The record demonstrates that distributed generation would not meet NMLD's design criteria with respect to spare feeders and avoiding excessive dependence on a single, full

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[25] NMLD also indicated that, because no new feeders would be added as part of the initial improvement, the Low Voltage Plan would merely defer to the year 2011, rather than eliminate, construction of a new 115/13.8 kV substation in northern Norwood (Exh. EFSB-RR-3-S). The Siting Board notes that to address the problem associated with the feeders the Light Department could choose to construct a new substation at an earlier date, essentially the approach of the proposed project and the Dean Street Expansion Plan.

[26] The Light Department indicated that improper tripping could result in the loss of feeders that were not faulted (Exh. EFSB-RR-2). NMLD explained that, in the case of such feeder loss, the feeder generators would backfeed fault current toward the Dean Street substation, requiring NMLD to plan for normal and emergency conditions, including ties to backup feeders (id.).

[27] In addition, the Light Department stated that, as a legal matter, it is not permitted to develop and operate distributed generation facilities because of its obligations as an all-requirements customer of NEPCo (Exh. EFSB-RR-2). NMLD stated that by operating generation it would violate agreements with NEPCo, including an antitrust settlement and its Tariff 1 agreement, filed with and approved by FERC (id.).

ductbank. Accordingly, the Siting Board finds that distributed generation would not meet the identified need.

e. Conclusions on Ability to Meet the Identified Need

The Siting Board has found that the Light Department has demonstrated that the proposed project and the Dean Street Expansion Plan would meet the identified need, but that the Low Voltage Plan and 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 the Dean Street Expansion Plan.

4. Reliability

The Light Department evaluated the proposed project and the Dean Street Expansion Plan based on its stated reliability criteria: (1) to maintain single contingency firm service at all load levels; (2) to avoid degradation in reliability; and (3) to prevent system overloads (Exh. EFSB-N-2).

The Light Department asserted that the proposed project would be more reliable than the Dean Street Expansion Plan (Brief at 64). NMLD noted that the new distribution lines associated with the Dean Street Expansion Plan would be 2.2 to 2.6 miles long, as compared to 0.7 to 1.5 miles long under the proposed project (Exhs. EFSB-RR-3(c); EFSB-RR-3S). NMLD stated that the longer distribution lines of the Dean Street Expansion Plan would result in increased line losses, poorer voltage conditions, increased outages and other reliability problems (Exh. EFSB-RR-3(c)). NMLD also stated that the Dean Street Expansion Plan, but not the proposed project, would require construction of a second substation and associated feeders at the Dean Street substation site (id.). The Light Department explained that 30 to 36 feeders, requiring many independent, underground routes, would eventually exit from a second substation and that tying the feeders into the NMLD system at the Dean Street location would create levels of congestion unacceptable under prudent engineering practice (id.).

The record demonstrates the potential for line losses, degraded voltage and other reliability problems associated with the length of the distribution lines required for the Dean Street Expansion Plan. The record also demonstrates the likelihood that construction of a second or expanded substation with associated feeders at the Dean Street substation site would involve congested underground feeder lines, with resultant reductions to reliability.

Accordingly, the Siting Board finds that the proposed project would be preferable to the Dean Street Expansion Plan with respect to reliability.

5. Environmental Impacts

In this Section, the Siting Board compares the proposed project to the Dean Street Expansion Plan with respect to environmental impacts resulting from: (1) facility construction; (2) magnetic field levels; and (3) permanent land use.

a. Facility Construction Impacts

NMLD asserted that impacts associated with construction of the proposed facility would be minimized for all environmental categories (Brief at 65). In support of its assertion, the Light Department provided documentation addressing impacts and mitigation with respect to water resources, land resources, land use and visual aspects of the proposed facility which are reviewed in more detail by the Siting Board in Section III.A, below.

The record demonstrates that along much of the proposed facility route, facility construction impacts would be limited by the combination of NMLD's planned mitigation and the fact that construction for the proposed transmission and distribution lines would take place in the grassed and paved shoulder of an existing state highway in an area predominantly commercial in use. With respect to the new substation at the Ellis Avenue site, the Light Department's planned mitigation would ensure that construction would not impact water resources, that any trees removed would be replaced on a one-to-one basis and that existing arboreal screening would prevent visual impacts during construction. Modifications of the Dean Street substation would have minor and temporary environmental impacts.

The Light Department asserted that the Dean Street Expansion Plan would be impossible to build without undue environmental impacts at the Dean Street substation site (Brief at 66). NMLD indicated that 0.8 acres would be required for construction of expanded facilities for the Dean Street Expansion Plan at the Dean Street substation site (Exh. NM-1, at 53-53). The Light Department also indicated that adequate space was not available at the Dean Street substation site for construction of additional transformers and ancillary equipment without adverse environmental impacts, including filling and construction impacts to wetlands and floodplains (Exh. EFSB-RR-3; Tr. 1, at 128-130). NMLD stated that, depending on the location of the substation expansion, such impacts would likely affect riverfront and bordering vegetated wetlands, and include filling of wetlands, filling of bordering land subject to flooding, increases to impervious surface area, elimination of flood storage and other indirect impacts (Exhs. EFSB-RR-3; Tr. 1, at 128-130). In addition, NMLD asserted that expansion of the Dean Street substation would not be permittable under current environmental regulations because of the existence of economically viable alternatives to such expansion (Exhs. EFSB-RR-3; EFSB-RR-3-S).

The record demonstrates that construction of the Dean Street Expansion Plan would involve significant environmental impacts, and, in addition, that the expansion of the Dean Street substation might not be permittable due to associated environmental impacts. The record further demonstrates that the environmental impacts associated with construction of the proposed project would be relatively minor and temporary.

Accordingly, the Siting Board finds that the proposed project would be preferable to the Dean Street Expansion Plan with respect to facility construction impacts.

b. Magnetic Field Levels

NMLD asserted that construction and operation of the proposed project would result in minimal magnetic field impacts (Brief at 124). The Light Department also asserted that construction of the proposed project would permanently reduce magnetic field levels on existing feeders emanating from the Dean Street substation (id. at 125). NMLD explained that the magnetic field level reductions would occur due to shifting of load from certain Dean Street substation feeders to new feeders extending from the proposed Ellis Avenue substation (Tr. 2, at 167-170).

NMLD indicated that magnetic field levels ranged from 0 to 16 milliGaus ("mG") along its existing transmission lines and at the Dean Street substation (Exh. NM-1, at 101-102).[28] NMLD further indicated that modelled magnetic field levels for its proposed transmission lines ranged from 3.3 mG directly above the centerline of the proposed underground transmission cables to 0.7 mG and 0.1 mG at distances of ten and 20 feet from the centerline, respectively (Exhs. EFSB-E-8; EFSB-E-8B). The Light Department stated that, at the Route 1 crossing, magnetic field levels associated with the distribution lines for its proposed project would range from 2.8 mG initially to 18 mG 20 years after construction, assuming two cables at a 15 MVA load (Exh. EFSB-A-3). NMLD provided no magnetic field impact estimates for the remainder of the distribution line route, but indicated that land use along the identified portion of the route was primarily business and commercial (see Section III.C.2.v, below) (Exh. NM-1, at 100).

NMLD indicated that transmission line construction for the Dean Street Expansion Plan would be limited to two 115 kV transmission interconnects at the Dean Street substation site (Exh. EFSB-RR-3-S). NMLD indicated that distribution lines associated with the Dean Street Expansion Plan would also emanate from the Dean Street location and would continue along

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[28] NMLD indicated that existing magnetic field levels were highest at the Dean Street substation getaway cables (Exh. NM-1, at 102).

portions of the route of the 115 kV transmission lines for the proposed project (id.). In addition, the Light Department noted the generally residential character of Dean Street and indicated that residences were located to the east and west of the existing Dean Street substation site (Exh. EFSB-E-29).

While NMLD has not provided magnetic field data specific to the Dean Street Expansion Plan, the record indicates that any additional 115 kV magnetic fields would be limited to a short 115 kV transmission interconnection to be sited within the Dean Street substation site. We note, however, that the new distribution feeder lines required for the Dean Street Expansion Plan, like those in northern Norwood under the proposed project, may be expected to produce higher magnetic field levels than the proposed 115 kV transmission improvements under either approach. In addition, the proposed project should reduce magnetic fields from existing distribution lines exiting the Dean Street substation -- a benefit that would be foregone or diminished under the Dean Street Expansion Plan.

Accordingly, the Siting Board finds that the proposed project is preferable to the Dean Street Expansion Plan with respect to magnetic fields.

c. Permanent Land Use Impacts

NMLD indicated that the proposed project would avoid significant disruption of developed or open spaces by routing transmission and distribution lines underground,

primarily in the grassed and paved shoulder of the layout of Route 1 (Exh. NM-1, at 51-52, 59; Tr. 2, at 145). In addition, the Light Department indicated that the one-half acre site for the proposed new substation would be entirely shielded by existing trees and that other mitigation planned by NMLD, including one-to-one replacement of trees and measures to protect soil and water resources, would minimize permanent impacts on land resources and surrounding land use (Exh. NM-1, at 53-55). NMLD stated that it would undertake minimal construction within the existing Dean Street substation yard, and would regrade and stabilize with crushed stone any excavated areas in the yard (see Section II.B.5.a, above) (Tr. 2, at 136, 143).

NMLD indicated that the Dean Street Expansion Plan would involve the filling of wetlands and bordering lands subject to flooding (Exh. EFSB-RR-3; Tr. 1, at 128-130). NMLD also stated that the new substation facilities, which would be a part of the Dean Street Expansion plan, would be built in a residential area within 200 feet of homes, and that such construction would raise zoning issues (Exhs. EFSB-RR-3, EFSB-RR-3-S).

The record shows that the distribution lines for the Dean Street Expansion Plan would follow portions of the proposed project's transmission line route. In addition, the Dean Street Expansion Plan would not require development of a new substation site in northern Norwood. However, as discussed in Section II.B.5.a, above, the record also demonstrates not only the likelihood that the Dean Street Expansion Plan would involve significant permanent impacts to resources, and particularly to wetland resources, at the Dean Street substation site, but that the severity of the impacts involved could prevent NMLD from obtaining the necessary permits for construction. Further, the record demonstrates the potential for significant visual impacts associated with the Dean Street Expansion Plan, due to the proximity of abutters to the Dean Street substation and the lack of space to provide vegetative screening if substation facilities were enlarged.

The Siting Board therefore concludes that the permanent land use impacts of the Dean Street Expansion Plan would likely be greater than those of the proposed project. Accordingly, the Siting Board finds that the proposed project would be preferable to the Dean Street Expansion Plan with respect to permanent land use impacts.

d. Conclusions on Environmental Impacts

In Sections II.B.5.a, b and c, above, the Siting Board has found that the proposed project would be preferable to the Dean Street Expansion Plan with respect to facility construction impacts, magnetic field impacts and permanent land use impacts.

Accordingly, the Siting Board finds that the proposed project would be preferable to the Dean Street Expansion Plan with respect to environmental impacts.

6. Cost

NMLD asserted that the proposed project was, on balance, preferable to the Dean Street Expansion Plan in light of the cost advantages of the proposed project with respect to line losses (Brief at 73). In support of its assertion, the Light Department submitted estimates of installation costs for the proposed project, including costs related to 115 kV transmission, 13.8 kV distribution, a new 115/13.8 kV substation, Dean Street modifications, and future distribution improvements (Exhs. EFSB-RR-3-S; NM-1, at 135; NM-2, at exhibit 5-1). The Light Department also provided estimates of the net present value, in 1996 dollars, of the total project costs, including initial construction costs, anticipated distribution system additions and modifications, and differential line losses, over the 2001-2019 analysis period ("discounted total costs") (Exhs. EFSB-RR-3-S; NM-1, at 135; NM-2, at exhibit 5-1). NMLD stated that it estimated installation costs of $13,984,000 for the proposed project and of between $13,410,000 and $13,642,000 for the Dean Street Expansion Plan (Exhs. NM-2, at Exhibit 5-1; EFSB-RR-3-S).[29] In addition, NMLD estimated that the discounted total costs would be $23,720,000 for the proposed project and $24,063,000 for the Dean Street Expansion Plan, including differential line losses of $268,000 under the Dean Street Expansion Plan (Exh. EFSB-RR-3-S; NM-2, at exhibit 5-1).[30]

The record demonstrates that the cost of the proposed project and the Dean Street Expansion Plan would be comparable, considering NMLD's estimates of both installation costs and discounted total costs. The discounted total cost comparison shows that, in the long run, the proposed project would be the least expensive approach. Further, the Siting Board notes that the final installation cost of the Dean Street Expansion Plan could well be higher than estimated, given the environmental, space and zoning constraints present at the Dean Street substation site (see Section II.B.5, above).

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[29] The Light Department indicated that it calculated total installation costs for the Dean Street Expansion Plan without regard to the possibility of environmental, physical space, zoning or other constraints which might render the Dean Street Expansion Plan unbuildable (Exh. EFSB-RR-3-S at 5).

[30] NMLD estimated the cost of differential line losses for all alternative project approaches and alternative routes using the proposed project and route as a reference case, i.e., assuming a line loss cost of $0 for the proposed project and route (Exh. EFSB-RR-3-S).

Accordingly, the Siting Board finds that the proposed project would be preferable to the Dean Street Expansion Plan with respect to cost.

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

In comparing the proposed project to the Dean Street Expansion Plan, the Low Voltage Plan and distributed generation, the Siting Board has found that the proposed project and the Dean Street Expansion Plan would meet the identified need, and that the Low Voltage Plan and distributed generation would not meet the identified need.

With respect to the reliability, environmental impacts and cost of the proposed project and the Dean Street Expansion Plan, the Siting Board has found that: the proposed project would be preferable to the Dean Street Expansion Plan with respect to reliability; the proposed project would be preferable to the Dean Street Expansion Plan with respect to environmental impacts; and the proposed project would be preferable to the Dean Street Expansion Plan with respect to cost.

Accordingly, the Siting Board finds that the proposed project is preferable to the Dean Street Expansion Plan, the Low Voltage Plan and distributed generation.

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. New England Power Company, EFSB 95-2, at 35; New England Power Company, 4 DOMSB at 160; Cabot Power Corporation, 2 DOMSB 241, 371 (1994).

A. Description of the Proposed Facilities and Alternative Facilities

1. Proposed Facilities

NMLD proposes to construct two 2.2-mile underground parallel 115 kV transmission lines, to be located primarily within the layout of Route 1 in the Town of Norwood; a new substation and associated facilities on NWD property on the east side of Route 1 opposite Ellis Avenue;[31] and a 0.7-mile underground segment of 13.8 kV distribution line, also to be located within the layout of Route 1 in Norwood (Exh. NM-1, at 51).[32] The proposed 115 kV transmission lines would leave NMLD's existing Dean Street substation, proceed west along Dean Street and turn to the northeast along Route 1 (id. at 52). The transmission lines would thereafter continue generally northeast along Route 1, primarily in the grassed and paved shoulder, to the proposed substation site (id.).

In order to construct the two proposed 115 kV transmission lines along the primary route, NMLD proposes excavating a trench, five to six feet deep, outside the traveled way and breakdown lane of Route 1 to bury a concrete ductbank (id.). The proposed concrete ductbank would consist of a three-by-three matrix of 5-inch PVC pipes and would be buried a minimum of 30 inches below the ground surface within the shoulder of the roadway (id.). NMLD stated that at stream culverts the Light Department would use a "flatter" arrangement of ducts to avoid disturbing culverts while maintaining a minimum 24-inch cover over the proposed

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[31] The facilities associated with the new substation would consist of two 33/44/45 MVA transformers and 12 distribution feeder positions, and distribution circuitry to establish four new 13.8 kV distribution feeders (Exh. NM-1, at 1).

[32] The proposed underground 13.8 kV distribution line would run along Route 1 to Pleasant Street, Norwood (Exh. NM-1, at 53).

ductbank (id.). The Light Department indicated that nine pairs of manholes would be placed at 1,200-foot to 1,600-foot intervals along the proposed transmission line route to facilitate care and maintenance of the two 115 kV transmission lines (id. at 52-53).

NMLD stated that the proposed new Ellis Avenue substation would have a 72- by 36-foot control building and an attached 30- by 60-foot switchgear building; that all equipment except for the 115/13.8 kV power transformers would be indoors; and that the control building and the outdoor equipment would be enclosed by a fenced yard of approximately 130 by 150 feet (id. at 54). The Light Department stated it would clear the area immediately outside the fence for approximately 15 feet to allow for construction of slopes connecting the yard elevation to the surrounding existing grade and to facilitate construction generally (id.). NMLD indicated that to prevent damage from falling trees or vegetation it would maintain clearances of 35 feet, 40 feet and 15 feet from the rear, sides and front of the fenceline, respectively (id. at 54-55). The Light Department noted that the Ellis Avenue substation would be screened from Route 1 by existing trees (id.). NMLD also stated that a 70-foot access road would be constructed to the Ellis Avenue substation from an existing access road running to an inactive pumping station on the NWD property (id. at 55).

NMLD stated that the proposed new underground 13.8 kV distribution line would consist of 12, five-inch ducts encased in concrete and buried with a minimum of 30 inches of cover except at the crossing of the culvert at Plantingfield Brook where cover depth would be 24 inches (id. at 53).[33] To install the proposed 13.8 kV distribution line segment, the Light Department stated that a trench would be excavated within the grassed shoulder of Route 1 to a depth of five to six feet on the southbound side of the highway (id.). NMLD also indicated that nine distribution manholes would be placed at 450-foot intervals to facilitate cable pulling, splicing and maintenance (id.).

In addition, NMLD indicated that modification of the 115 kV bus structure at the existing Dean Street substation would be necessary to create terminal positions there for the proposed two new 115 kV transmission lines (id.). NMLD stated that each transmission cable would rise from the underground concrete ductbank to connect to an extension of the existing air insulated 115 kV overhead bus structure through a new 115 kV circuit breaker (id.). The Light Department stated that miscellaneous additional equipment such as isolation disconnects and surge arresters would also be required (id.). The Light Department noted that no new enclosed structures were proposed, that all work for the station upgrade would occur within the

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[33] The Light Department indicated that the location of the Plantingfield Brook culvert determined the depth of cover possible over the distribution line duct at the Plantingfield Brook crossing (Exh. NM-1, at 53).

existing substation fenceline and that the existing grade of the substation yard would not be altered (id.).

2. Alternative Facilities

The Light Department submitted detailed information for two alternative routes (id. at 55-57). NMLD stated that Alternative One would use the same new substation site and specifications, the same transmission/distribution line specifications, the same distribution line route, and the same modifications to the existing Dean Street substation as for the Primary Configuration (id. at 55-56). NMLD indicated that Alternative One and the Primary Configuration were distinguished by their respective transmission line routes (id.). The Light Department stated that the Alternative One transmission line route would be 2.6 miles long or 0.4 miles longer than the primary transmission line route, and that more than 70 percent of the route of the Alternative One transmission line would traverse a geographically different area than would the primary transmission line route (id. at 56). The Light Department stated that the Alternative One route would begin at the Dean Street substation, extend east on Dean Street to Neponset Street, continue along Neponset Street to Route 1, cross Route 1, continue along Neponset Street to Pleasant Street, continue on Pleasant Street for one block, re-cross Route 1 and then follow Route 1 parallel to the northbound side to the preferred substation site (id. at 55). NMLD noted that the Alternative One route would be in predominantly residential areas along Dean, Neponset and Pleasant Streets in contrast to the primary route which would for most of its distance traverse the right of way of a commercial highway (id. at 55-56). NMLD also stated that Alternative One would require ten sets of transmission line manholes (id. at 56).

NMLD stated that for Alternative Two, new substation and transmission/distribution line specifications as well as modifications to the existing Dean Street substation would be the same as for the Primary Configuration and Alternative One (id. at 56). In addition, NMLD stated that the transmission and distribution line routes for Alternative Two would be the same as for the Primary Configuration in all respects except that they would extend 0.8 miles further to an alternative substation site (id. at 56).[34] The Light Department also stated that Alternative Two would require twelve sets of transmission line manholes (id. at 57).

The Light Department stated that the Alternative Two substation site, i.e., the University Avenue site, was: located in the midst of undeveloped land to the northeast of the

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[34] NMLD indicated that the greater length of Alternative Two would also require an additional 4,000 feet of underground 13.8 kV distribution ductbank (Exh. NM-1, at 57).

Ellis Avenue substation site on the north side of University Avenue; owned by the Town of Norwood; zoned for limited manufacturing; and, surrounded by undeveloped land (id. at 56-57). In addition, NMLD stated that the University Avenue site was outside any Area of Critical Environmental Concern ("ACEC"), 100-year floodplain, and wetlands buffer zone (id.).

B. Site Selection Process

1. Standard of Review

In order to determine whether a facility proponent has shown that the siting plans of its proposed facilities are superior to alternatives, the Siting Board requires a facility proponent to demonstrate that it examined a reasonable range of practical facility siting alternatives. New England Power Company, EFSB 95-2 at 37; Berkshire Power Development, Inc., 4 DOMSB at 347 (1996); New England Power Company, 4 DOMSB 221, 347. 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. New England Power Company, EFSB 95-2, at 38; Berkshire Power Development, Inc., 4 DOMSB at 351-353; New England Power Company, 4 DOMSB at 167-168. Second, the facility proponent must establish that it identified at least two noticed sites or routes with some measure of geographic diversity. New England Power Company, EFSB 95-2, at 38; Berkshire Power Development, Inc., 4 DOMSB at 355-357; New England Power Company, 4 DOMSB at 170-172.

In the sections below, the Siting Board reviews the Light Department's site selection process, including NMLD's development and application of siting criteria as part of its site selection process.

2. Development of Siting Criteria

a. Description

NMLD indicated that it identified site selection criteria to use in a comprehensive evaluation of alternative substation sites and related transmission and distribution routes (Exh. NM-1, at 63). NMLD stated that most of the criteria were related to the potential substation site because location of the substation was the driving force in the identification of possible facility siting alternatives (id.).

NMLD listed five siting criteria pertaining specifically to selection of a site for the proposed substation: ownership of land; zoning; impacts to sensitive receptors; wetland resources; and proximity to the load center (id. at 65-67).[35] NMLD stated that the identified criteria addressed planning, environmental and reliability issues (id. at 65). In addition to criteria for selecting a substation site, NMLD identified two criteria pertaining to potential impacts of constructing underground transmission and distribution lines: (1) the length of transmission line in residential areas; and (2) the length of distribution line in residential areas (id. at 67-68).[36] Finally, the Light Department identified project cost, including the cost to purchase property and materials and to construct facilities, as a siting criterion (id. at 68). The Light Department asserted that its comprehensive evaluation process reflected prudent planning standards and the Siting Board's standard of review (id. at 61).

NMLD stated that it assigned quantitative weights to the substation site criteria as follows: proximity to the load center (5); impact to sensitive receptors (4); ownership of land (3); wetland resources (2); and zoning (1) (id. at 65-67). NMLD stated that it assigned the highest weight to the criterion "proximity to load center" because it judged reliability to be essential (id. at 66-67). NMLD also stated that non-substation criteria, including cost and the potential impacts of underground transmission and distribution line construction, each received a weight of (2) (id. at 65-68). NMLD explained that the weight assigned to these criteria reflected their lesser importance relative to reliability and critical cultural and environmental impacts (id.). The Light Department stated that the number and total weight of the criteria for the substation site reflected the preeminent importance of the substation site in determining the configuration of the proposed facilities (id. at 65).

b. Analysis

The Light Department has developed a set of site selection criteria that include the general categories of land use compatibility, environmentally sensitive areas, site acquisition and construction constraints, cost and reliability -- general categories that the Siting Board has found to be appropriate for the siting of transmission lines. See New England Power

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[35] The Light Department stated that impacts were identified through site investigations, review of applicable regulations and resource data, evaluations by NMLD and its consultants, and public input solicited during the development of alternatives (Exh. NM-1, at 68).

[36] The Light Department stated that both the transmission and the distribution line routes were rated by measuring the length of the routes in residential areas based on the Town of Norwood zoning map (Exh NM-1, at 68).

Company, EFSB 95-2, at 41; New England Power Company, 4 DOMSB at 167; New England Power Company, 21 DOMSC at 386. After selecting an area that would encompass all viable siting options, NMLD identified a comprehensive list of the specific cultural/ environmental criteria that exist within this area in order to identify and evaluate potential routes and substation sites. NMLD's weighting of specific cultural/environmental factors appropriately reflects the relative significance of these criteria; in particular, the importance of siting transmission lines within existing corridors where possible is appropriately stressed. The Light Department's weighting method provides for a quantitative comparison among competing cultural/environmental criteria, and among cultural/environmental, cost and reliability criteria. NMLD also provided a separate analysis of the cost and reliability of each identified route and adequately explained the factors that were considered in preparing the cost and reliability analyses.

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, the Light Department has assigned weights which, it asserts, reflect the preeminent importance of reliability and certain types of environmental impacts, as well as the determinative nature of the substation site in route selection. Thus, NMLD has provided an explanation of how reliability, environmental impacts and cost were balanced. However, NMLD has not provided the level of justification for these weights that might be necessary, if for example, one siting alternative was preferable with regard to reliability, while another was preferable with regard to cost. In this instance, the record demonstrates that the Primary Configuration is comparable or preferable to all other identified routing alternatives with respect to reliability, environmental impacts and cost, so an extensive justification of the weights is unnecessary. Consequently, the Siting Board finds that NMLD has developed a reasonable set of criteria for identifying and evaluating alternatives to the Primary Configuration. The Siting Board notes, however, that in future reviews where no one alternative is comparable or preferable to all other alternatives with regard to reliability, environmental impacts and cost, applicants should provide clear justification for the weighting of these factors in their analysis of siting alternatives.

3. Application of Siting Criteria

a. Description

NMLD stated that, as a municipal light department, it has authority to construct facilities only within the Norwood municipal boundary; therefore, its site selection study area was limited to sites and routes within the Town (Exh. MN-1, at 2, 58-59). NMLD indicated

that, as a result of that limitation, its process was driven by locating a site for the proposed substation rather than by identifying a broad range of transmission line options that might depend on construction in neighboring towns (id. at 58-59). With respect to the transmission line route, NMLD stated that it sought to minimize environmental impacts (id. at 59). The Light Department stated that, therefore, after identifying a primary and an alternative substation site, it focused on routing the transmission lines along roadways to avoid disruption of developed or open space (id.).

NMLD indicated that its status as a municipal light department also impelled it to rely heavily on input from town officials, town boards, other town organizations, and citizens as well as from expert consultants (id. at 59).[37] The Light Department stated that from a list of 22 potential substation sites, it selected six as suitable for further evaluation (id. at 61). NMLD stated that each facility alternative was evaluated relative to all the other facility alternatives in a paired analysis of each criterion (id. at 68). The Light Department explained that, as a basis for comparison, each project alternative was assigned a rating of high, medium or low for each criterion (id. at 68-69). The Light Department stated that if a project alternative rated better than the alternative to which it was compared, it received a score of 1; if it was worse or tied, it received a score of 0 (id.).

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[37] NMLD listed the following sources of Norwood community input: the Future Electrical Power Needs Committee, a citizens advisory committee; an independent substation site analysis conducted by the Norwood Town Planner; a study by PLM which evaluated NMLD's system needs and identified potential substation sites; public meetings held by the Norwood Board of Selectmen regarding the siting, environmental impacts, costs and need for the proposed substation; zoning board and Conservation Commission meetings regarding potential substation sites and routes; and a public hearing and report on NMLD's planning process conducted by the Norwood League of Women Voters (Exh. NM-1, at 60).

To score and rank the facility alternatives, NMLD stated that it first compiled scores for each criterion, multiplied the results by the weight factor of between one and five assigned to each criterion, then totalled the weighted results to arrive at final scores (id. at 68). NMLD further indicated that the facilities alternatives were ranked from first to last based on the Light Department's weighted paired analysis and that these results in turn had determined NMLD's selection of facilities alternatives for further evaluation (id. at 69). NMLD stated that the Primary Configuration, Alternative One and Alternative Two were the three facilities alternatives selected for further evaluation on the basis of the weighted paired analyses conducted by the Light Department (id. at 70-71). The Primary Configuration received a combined score of 64, 12 points more than the combined score for Alternative One and 14 points more than the combined score for Alternative Two (Exh. NM-2, at exhibit 4-6).

b. Analysis

The record demonstrates that NMLD fully evaluated siting of its proposed transmission/distribution line routes and new substation for six of 22 identified substation sites. In addition, for one of the six potential substation sites the Light Department evaluated two alternatives for siting its proposed transmission/distribution line routes. The Siting Board notes that this represents an initial examination of a broadly inclusive range of siting possibilities, and a selection of a practical range of options for more complete evaluation. The Siting Board further notes the exceptional effort made by NMLD to solicit public, agency and professional input both in the preliminary and subsequent stages of its site selection process.

To evaluate its seven siting alternatives, NMLD considered quantitative reliability criteria, cultural/environmental impacts and cost data. With respect to cultural/environmental impacts, NMLD compared each facility alternative against all the other facility alternatives in a paired analysis for each cultural/environmental criterion and incorporated a quantitative method of scoring and weighting. NMLD performed a comprehensive quantitative comparison of the identified substation sites and transmission/distribution line routes based on weighted environmental criteria as well as quantitative cost data.

Based on its examination of the methods and results of NMLD's weighted pair analysis, the Siting Board determines that the Primary Configuration is comparable or superior to Alternatives One and Two with respect to reliability. The Siting Board further considers environmental impacts and quantitative cost data of the proposed facilities in Section III.C, below. Finally, the Siting Board determines that NMLD's selection of the Primary Configuration, Alternative One and Alternative Two for further evaluation is appropriate.

Accordingly, the Siting Board finds that NMLD 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 also found, above, that NMLD has developed a reasonable set of criteria for identifying and evaluating alternative routes. Accordingly, the Siting Board finds that the Light Department has 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.

4. Geographic Diversity

The Light Department considered six geographically diverse substation sites and two transmission/distribution line routes. The identified transmission/distribution line routes both start at the existing Dean Street substation and overlap for approximately 1/3 mile when entering the Light Department's preferred new substation site. However, the two routes are clearly distinct: one route is located primarily in residential roads; the second route is located primarily in the grassed and paved shoulder of a state highway.

Based on the foregoing, the Siting Board finds that the Light Department has identified a range of practical substation sites and transmission/distribution line routes with some measure of geographic diversity.

5. Conclusions on the Site Selection Process

The Siting Board has found that the Light Department 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. In addition, the Siting Board has found that the Light Department has identified a range of practical substation sites and transmission/distribution line routes with some measure of geographic diversity.

Accordingly, the Siting Board finds that NMLD 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. New England Power Company, EFSB 95-2, at 46; New England Power Company, 4 DOMSB at 173; Boston Edison Company (Phase II), 1 DOMSB 1, 37-38 (1993).

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. New England Power Company, EFSB 95-2, at 46; New England Power Company, 4 DOMSB at 173; Cabot Power Corporation, 2 DOMSB at 389. A facility which achieves that appropriate balance thereby meets the Siting Board's statutory requirement to minimize environmental impacts at the lowest possible cost. New England Power Company, EFSB 95-2, at 46-47; New England Power Company, 4 DOMSB at 173; Cabot Power Corporation, 2 DOMSB at 389.

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. New England Power Company, EFSB 95-2, at 47; New England Power Company, 4 DOMSB at 173; Cabot Power Corporation, 2 DOMSB at 389. 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. New England Power Company, EFSB 95-2, at 47; New England Power Company, 4 DOMSB at 173-174; Cabot Power Corporation, 2 DOMSB at 389.

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. New England Power Company, EFSB 95-2,

at 47; New England Power Company, 4 DOMSB at 174; Cabot Power Corporation, 2 DOMSB at 389-390. 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. New England Power Company, EFSB 95-2, at 47-48; New England Power Company, 4 DOMSB at 174; Cabot Power Corporation, 2 DOMSB at 390.

Accordingly, in the sections below, the Siting Board examines the environmental and cost-related impacts of the proposed facilities along the Light Department's primary and alternative configurations 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 between environmental impacts and cost.[38] In this examination, the Siting Board conducts a comparison of the primary and alternative configurations 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 Under the Primary Configuration

a. Environmental Impacts of the Proposed Facilities Under the Primary Configuration

In this section, the Siting Board evaluates the environmental impacts of the proposed facilities under the Primary Configuration and potential mitigation for such impacts, including the proposed mitigation and, as necessary, any identified 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 between environmental impacts and cost. The Siting Board then addresses whether the environmental impacts of the proposed facilities under the Primary Configuration would be minimized.

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[38] The Siting Board has previously determined that the reliability of the Primary Configuration is comparable or superior to the reliability of Alternatives One and Two (see Section III.B.3.b, above). In this case, the Siting Board further determines that additional analysis of the comparative reliability of the Primary Configuration, Alternative One and Alternative Two is unnecessary because such analysis would not alter the Siting Board's finding with respect to the preferability of the Primary Configuration relative to the two alternative configurations (see Section III.C.3.c, below).

i. Water Resources

(a) Wetlands and Surface Water

NMLD asserted that construction of the proposed facilities would avoid any direct impacts to water resources in the vicinity of the Primary Configuration and that appropriate mitigation measures would be installed to minimize any indirect impacts associated with construction (Exh. NM-1, at 73). The Light Department indicated that at the Dean Street substation and at the proposed Ellis Avenue substation site, NMLD would avoid impacts to water resources by constructing upland of any river, floodplain or wetland areas (id. at 74). The Light Department stated that there would likewise be no impacts to water resources -- including water resources associated with a bordering ACEC -- along the route of the proposed ductbank, transmission lines and distribution lines because the Light Department would install the ductbank and lines alongside or within existing paved roadways, and would incorporate a modified "flatter" ductbank configuration over culverts (id. at 74, 82; Exhs. NM-2, exhibit 4-13, Att. C; EFSB-A-5; EFSB-E-27).

With respect to indirect impacts to water resources, NMLD indicated that construction of portions of the proposed ductbank and electric lines and related modifications at the Dean Street substation would take place within the 100-foot buffer zone associated with bordering vegetated wetlands (Exh. NM-1, at 75). The Light Department indicated that a variety of mitigation measures would be used to minimize construction impacts in the buffer zone, including keeping the area of impact and the amount of trench spoil to a minimum and installing silt fences/hay bale barriers and other such erosion control measures (id.; Tr. 2, at 145).[39] The Light Department further stated that it would limit ongoing construction activities to 450-foot segments at any one location to minimize the duration of any impacts (Exh. NM-1, at 75; Tr. 2, at 145). The Light Department indicated that, upon completion of construction, grassed areas would be reseeded and steps would be taken to stabilize all disturbed areas and return them as much as possible to their original condition (Tr. 2, at 145).

Along the entire route of the proposed transmission and distribution lines, and at the Ellis Avenue substation site, NMLD stated that it would use hay bales and burlap basins in roadway catch basins, as necessary, to prevent washoff via drainage systems of sediments as a result of construction (id.). The Light Department also noted that dewatering of groundwater

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[39] At the Dean Street substation, NMLD stated that it would place hay bales within the fenceline of the substation yard, along the edge of the substation driveway out to Dean Street and around any stored excavated materials in order to prevent migration of any sediments excavated at the site (Tr. 2, at 142-143).

might be required during construction at manhole locations, where excavation depths would be nine to ten feet (Exh. NM-2, exhibit 4-7, Att. C at C-2). The Light Department stated that such dewatering would be controlled and filtered, as necessary, to prevent the introduction of silt in nearby drainage areas (id.).

The record demonstrates that construction of the proposed facilities under the Primary Configuration would require no construction within, and minimal potential impacts to, wetlands or surface water. Specifically, the record indicates that the Light Department would install the proposed ductbanks for electric lines within existing road layouts and would use appropriate mitigation measures during construction to avoid or minimize adverse water-related impacts. Accordingly, the Siting Board finds that, with the implementation of the proposed mitigation measures, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to wetlands and surface water.

(b) Groundwater and Wells

The Light Department asserted that construction of the proposed facilities would avoid direct impacts to groundwater along the primary route and that appropriate mitigation measures would be used to minimize any indirect impacts associated with construction (id. at 76-77; Exh. NM-2, exhibit 4-7, Att. C at C-2). The Light Department also asserted that such construction would not impact any future water supply development at the Ellis Avenue well-field, a now inactive well-field bordering the proposed site for the Ellis Avenue substation (Exh. NM-1, at 76-77).

The Light Department stated that it did not expect that installation of the proposed facilities would intrude below the groundwater table, except perhaps at manhole locations, which would require temporary dewatering during construction (Exh. NM-2, exhibit 4-7, Att. C at C-2) (see Section III.B.2.a.i.(a), above). With respect to impacts to the Ellis Avenue well-field, the Light Department indicated that NWD had no plans to reactivate any of the Ellis Avenue wells because (1) NWD had determined that the cost of reactivating wells and installing the required treatment system at this site would be prohibitive; and (2) contamination problems and incompatible land use at the site would make reactivating the Ellis Avenue well-field a high risk investment decision for the Town (id.). NMLD also stated that the Town presently receives an adequate supply of water from the Massachusetts Water Resources Authority ("MWRA") and was investigating the feasibility of using the Buckminster Pond well site in Westwood as a back-up water supply source (id.; Exh. NM-1, at 78). The Light Department indicated that it had nonetheless asked its consultant, Fay Spofford and Thorndike ("FST"), to review the potential for redevelopment of the Ellis Avenue well-field and that FST

had identified a location at the Ellis Avenue substation site that would not interfere with options for future water supply development (id.).

NMLD indicated that it had discussed the proposed Ellis Avenue substation with both the MWRA and the Massachusetts Department of Environmental Protection ("MDEP") (Exh. NM-2, exhibit 4-7, Att. C at C-2). The Light Department indicated that the MWRA was aware of the contamination at the Ellis Avenue well-field and had concluded that the new substation had been sited to allow future development of a groundwater source in the area in the event that NWD pursued such development (id., exhibit 4-9). The Light Department stated that MDEP also concurred with NMLD's plan for siting the proposed new substation, but had recommended the abandonment of certain existing inactive wells at Ellis Avenue (id. at exhibits 4-7, Att. C at C-2, and 4-10).[40]

NMLD indicated that the abandonment process required a vote for abandonment by the Norwood Board of Selectmen and submission of a formal request for abandonment to MDEP by the Norwood Public Works Department (Exhs. EFSB E-2; EFSB E-2S; EFSB E-2R). The Light Department stated that the Norwood Board of Selectmen had voted to abandon the identified wells on April 11, 1995, and the Norwood Public Works Department had submitted a formal request for abandonment to MDEP on January 16, 1997 (Exhs. EFSB E-2; EFSB E-2R).[41] On February 26, 1997, MDEP approved NMLD's request for abandonment (Exh. EFSB-E-2R2).

NMLD also indicated that it would implement design, operation and maintenance measures to avoid potential releases of oils or contaminated materials that could affect the Ellis Avenue well-field (Exh. NM-1, at 80). Specifically, NMLD stated that it would install spill

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[40] MDEP recommended abandonment of existing inactive wells within 400 feet of the proposed new substation in the case of gravel-packed wells, and within 250 feet for tubular wells with a diameter of 2-1/2 inches or less (Exh. NM-2, exhibit 4-10). The Light Department noted that with abandonment of existing inactive wells in accordance with MDEP's recommendations, the proposed Ellis Avenue substation would be sited outside the protective radius for water supply wells under MDEP purview (Exhs. NM-1, at 79; NM-2, sec. 4-10). Abandonment of the identified wells would thus eliminate need for further MDEP review of the proposed new substation at the primary site (Exhs. NM-1, at 79; NM-2, exhibit 4-10).

[41] The Light Department also stated that it plans to lease from the Norwood Public Works Department the land necessary for construction for the Ellis Avenue substation (EFSB-E-2(a)). The Light Department stated that the MDEP has no objection to the conveyance but MDEP is of the opinion that such conveyance requires legislative approval by two-thirds vote of both branches of the State Legislature (id.). NMLD stated that it respectfully disagrees with MDEP's opinion that such legislative vote is necessary (id.).

containment vessels for the proposed transformers sized for over 100 percent of the transformer oil in use, prepare a Spill Prevention, Control and Countermeasure Plan, and install continuous monitoring devices connected to NMLD's offices (id.).

The record demonstrates that construction of the proposed transmission and distribution facilities, which would primarily be within existing paved roadways, would avoid direct impacts to groundwater along the primary route and that appropriate mitigation measures would be used to minimize any indirect impacts associated with construction. The record also demonstrates that, with the abandonment, as planned, of certain existing inactive wells in accordance with MDEP recommendations, the proposed new substation facilities can be sited without impacts to any future water supply development at the Ellis Avenue well-field. The record also demonstrates that NMLD has developed measures to avoid accidental release of oils or contaminated materials at the Ellis Avenue substation site.

Accordingly, the Siting Board finds that, (1) with the conveyance of land from the Norwood Public Works Department to NMLD, and (2) with the implementation of proposed mitigation measures, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to groundwater and wells.

(c) Conclusions

The Siting Board has found that with the implementation of the proposed mitigation measures in wetland areas and wetland buffer zones, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to wetlands and surface water. In addition, the Siting Board has found that (1) with the conveyance of land from the Norwood Public Works Department to NMLD, and (2) with the implementation of proposed mitigation measures the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to groundwater and wells.

Accordingly, the Siting Board finds that, with the implementation of the proposed mitigation measures, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to water resources.

ii. Land Resources

In this Section, the Siting Board reviews the impact of the proposed facilities under the Primary Configuration with respect to tree clearing and upland vegetation, potential soil erosion and wildlife habitat.

NMLD stated that it would limit construction at the Dean Street substation to the existing substation yard and that removal of vegetation would therefore be unnecessary at this location (Tr. 2, at 136). NMLD indicated that after construction in the Dean Street substation yard was completed, excavated areas would be backfilled and regraded (id.). The Light Department stated that the construction area would be covered with crushed stone to stabilize the area and prevent any subsequent erosion (id. at 143).

The Light Department indicated that the proposed underground transmission and distribution lines would extend for a distance of 2.2 and 0.7 miles respectively, primarily in the grassed and paved shoulder of the layout of Route 1 (Exh. NM-1, at 51-52). The Light Department stated that it focussed on routing its proposed facilities along roadways to avoid disruption of developed or open spaces (id. at 59). NMLD also indicated that, upon completion of construction, steps would be taken to stabilize all disturbed areas and to return them as much as possible to their original condition (Tr. 2, at 145).

The Light Department indicated that the one-half acre site for the Ellis Avenue substation is entirely shielded by existing trees (Exh. NM-1, at 53-54). NMLD stated that it would replace on a one-to-one basis the trees removed for construction and maintenance of the proposed new substation site (id. at 88; Tr. 2, at 147-148) (see Section 2.a.iv, below).

NMLD provided documentation from the Massachusetts Natural Heritage and Endangered Species Program in support of its assertion that no rare or endangered species or habitat would be affected by the proposed facilities (Exh. NM-2, exhibit 4-12).

The record demonstrates that the Light Department would take steps to restrict the land resource impacts of the proposed facilities. The record demonstrates that the proposed facilities would in large part be located in areas which are already paved. The record further demonstrates that NMLD plans to implement measures to limit erosion impacts, and is committed to implement measures to stabilize areas disturbed by construction and to return them as much as possible to their original condition. Such measures include, but are not limited to, reseeding grassed areas and replacing trees removed during construction on a one-to-one basis.

In addition, the record demonstrates that there are no known rare or endangered species in the vicinity of the proposed facilities that would be adversely affected by the proposed construction.

Accordingly, the Siting Board finds that, with the implementation of the proposed mitigation measures, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to land resources.

iii. Land Use

In this Section, the Siting Board reviews the impact of the construction and maintenance of the proposed facilities under the Primary Configuration with respect to land use, zoning, traffic, safety and noise.

NMLD stated that the zoning on both sides of Route 1 is non-residential except for a portion of NWD land along Route 1 near the Ellis Avenue substation site (Exh. NM-1, at 81). The Light Department stated that the areas of non-residential uses along Route 1 included areas zoned for business, manufacturing and limited manufacturing (id.). NMLD indicated that the remainder of the primary route, the short segment extending along Dean Street between the existing Dean Street substation and Route 1, was primarily residential (id.).

The Light Department stated that transmission and distribution line construction within public rights-of-way is not restricted under municipal zoning regulation in Norwood (id. at 83; Exh. EFSB E-3A). NMLD further indicated that the Town Building Inspector, the zoning officer for the Town, has determined that the new substation would be permitted as of right at the Ellis Avenue site (Exh. NM-1, at 84).

NMLD also stated that the proposed Ellis Avenue substation site was within the Water Protection Overlay District ("WPD") of the Ellis Avenue well-field (id. at 82). The Light Department stated that the WPD was established to regulate land uses potentially affecting the inactive Ellis Avenue well-field (id.). The Light Department indicated that it had cooperated with the NWD, MWRA, MDEP and the Norwood Board of Selectmen to address fully the potential impacts from the proposed facilities at the Ellis Avenue site on any future water supply uses at the well-field, and that it intended to file for a special permit with the Town of Norwood Zoning Board of Appeal ("ZBA") for approval of construction and operation of the substation within the WPD (see Section III.C.2.a.i, above) (id.; Exh. EFSB-E-4).[42]

Based on the Town Building Inspector's determination that the proposed substation would be permitted as a matter of right at the Ellis Avenue site, NMLD stated that no other special permit or variance would be required to authorize the land use under consideration for the proposed new substation site (Exh. NM-1, at 84). NMLD therefore indicated that receipt of the WPD special permit would allow for construction and operation of the proposed new substation consistent with Norwood zoning regulations (Exhs. NM-1, at 82; EFSB-E-4; EFSB-E-4, Att.).

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[42] NMLD stated that its special permit request would be filed with the Town's ZBA in November, 1997 on the basis of section 6552 of the Town's Zoning Bylaws (Exhs. EFSB-E-3A; EFSB-E-4).

NMLD also indicated that approximately 50 percent of the Primary Configuration along Route 1 was within an ACEC (the Fowl Meadow/Ponkapoag Bog), including the existing Dean Street substation and the proposed Ellis Avenue substation site (Exh. NM-1, at 81). The Light Department provided information to support its claim that the proposed facilities under the Primary Configuration would not interfere with or adversely impact the uses or resources that the ACEC was created to protect (see Section III.C.2.a.i, above) (id. at 82-83).

With respect to impacts on historic or archeological resources, NMLD submitted documentation to show that no known historic or archaeological resources were located along the primary route or at the Dean Street or Ellis Avenue substation sites (Exh. NM-2, exhibit 4-11).

NMLD asserted that traffic impacts associated with the proposed facilities along the primary route would be minimal and limited for the most part to periods of construction (id. at 85). The Light Department indicated that in response to recommendations from the Massachusetts Highway Department ("MHD"), it would undertake construction (1) in the grassed and paved shoulder of Route 1, outside both the traveled way and the break down lane, and (2) at hours other than those of peak traffic flow, i.e., outside of the morning and afternoon rush hours (Exhs. NM-2, sec. 4-15; EFSB-E-12).

The Light Department also indicated that it would institute all appropriate measures to mitigate impacts to local traffic, including traffic accessing driveways, from construction associated with installing the proposed facilities along the primary route (Exh. NM-1, at 85). NMLD's witness, Mr. Stuart, stated that paved areas disturbed by construction would be repaved (Tr. 2, at 145). NMLD noted that construction for the proposed facilities would impact 11 driveways on Dean Street, two business and nine residential, and 41 driveways, all business related, along Route 1 (Exh. NM-1, at 86). The Light Department indicated that disruption of business would be minimized by a variety of measures including avoiding construction during rush hours, using steel plates to maintain access to driveways at all times, covering trenches overnight, minimizing construction space requirements, applying a temporary patch after backfilling, having a community liaison on-site to address concerns, and holding weekly construction update meetings with town officials to provide information and identify complaints (id. at 85-86).

With respect to safety, the Light Department indicated that it would use snow fencing to restrict access to active construction areas and that police details would be assigned to direct traffic around construction activities and to ensure safe passage of emergency vehicles during construction (id. at 86; Exh. EFSB-E-13).

With respect to noise impacts of the proposed project, NMLD indicated that the proposed modifications at the Dean Street substation would not change the ambient noise level there after the completion of construction (Tr. 2, at 149). The Light Department provided estimated noise levels for sensitive receptors in the area of the Ellis Avenue substation site (Exh. NM-1, at 89-95). In addition, the Light Department provided a map marking the distance from the Ellis Avenue substation site within which the increase in the ambient noise level at L_{90} would be 8 dBA or greater under nighttime conditions (Exh. EFSB-RR-5). Based on its noise estimates and map, NMLD stated that increases in L_{90} ambient noise at the 8 dBA level or above would not be experienced at any existing commercial or residential structure (id.). NMLD further stated that, because of the extent of the property owned by NWD in the vicinity of the Ellis Avenue substation site, new commercial or residential structures would be precluded from locating where nighttime noise levels at L_{90} might increase by 8 dBA or more as a result of the proposed project (id.).

The Light Department indicated that all appropriate measures would be taken to mitigate the noise impacts of construction, including use of standard construction equipment sound muffling devices, limiting construction activities to daylight hours, and adhering to federal truck-noise regulations (Exh. NM-1, at 96-99).[43]

The record demonstrates that traffic, safety and noise impacts associated with the construction of the proposed facilities under the Primary Configuration would be temporary and acceptable, with implementation of mitigation measures proposed by the Light Department. Specifically, according to the record, the Light Department would repave streets and driveways disturbed by construction, take steps during construction to minimize impacts to Route 1 traffic as well as local businesses and residents, and maintain a community liaison during construction to address concerns of the public and town officials. The record also demonstrates that NMLD intends to file for a special permit from the Town's ZBA approving NMLD's construction and operation of the proposed new substation within the WPD in the Town. The record demonstrates that, assuming the receipt of this special permit, the Light Department will have shown that the construction of the proposed facilities under the Primary Configuration would not interfere with existing land uses. In addition, the record demonstrates

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[43] NMLD specified that construction activities would be planned for normal working hours, 9 a.m. to 5 p.m., and that in no instance would construction occur earlier than 6 a.m. or later than 7 p.m. (Exh. EFSB-E-20; Tr. 2, at 146-147).

that in the vicinity of the proposed facilities there are no known historic or archaeological resources that would be adversely affected by the proposed construction.

Accordingly, the Siting Board finds that, with the approval by the Town's ZBA of NMLD's application for a special permit to construct and operate the proposed new substation within the Water Protection Overlay District in Norwood, and with the implementation of all proposed mitigation including those in Sections III.C.2.a.i to III.C.2.a.ii, above, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to land use.

iv. Visual Impacts

NMLD asserted that constructing the proposed facilities under the Primary Configuration, including proposed modifications to the existing Dean Street substation, underground installation of transmission and distribution lines, and construction of a new substation, would result in very limited visual impacts (Exh. NM-1, at 87). The Light Department indicated that modifications to the existing Dean Street substation would be within the fenced area behind the existing substation building and lower in height than existing structures (id.). The Light Department stated that the overall size and visual appearance of the Dean Street substation after construction would therefore be similar to its appearance before construction (id.). The Light Department also indicated that no visual impacts would result from installation of the proposed transmission and distribution lines due to their placement underground (id. at 51, 87).

The Light Department stated that it would minimize visual impacts of the proposed substation at the Ellis Avenue site by selecting switchgear for which overhead bus structures would not be required and by locating the proposed substation in conformance with local zoning setback requirements and at some distance from residential and commercial buildings (id. at 87-88). The Light Department stated that NWD ownership of the property at and around the Ellis Avenue site had prevented residential and commercial development in the area and would continue to do so in the future (id.). NMLD indicated that the closest residence or sensitive receptor was a nursing center 550 feet from the Ellis Avenue site, on the opposite side of Route 1 (id.). NMLD indicated that in addition to distance, a buffer of mature existing trees between the Ellis Avenue substation site and Route 1 would mitigate potential visual impacts of the proposed facilities on the nursing center (id. at 87-88). NMLD also indicated that new trees would be planted between the proposed substation and Route 1 and to the north of the substation along the proposed driveway entrance (id.; Tr. 2, at 147-148). In addition, NMLD indicated that it would file with the Town's Planning Board a landscaping plan for the

Ellis Avenue site, and that said landscaping plan would incorporate one-to-one replacement of any trees removed for construction and maintenance of the identified site (Tr. 2, at 147-148).

The record demonstrates that, with the implementation of the proposed screening of the proposed new substation, the incremental visual impacts of the proposed facilities under the Primary Configuration would be minimal. Accordingly, the Siting Board finds that, with the mitigation proposed to screen the proposed facilities at the Ellis Avenue substation site, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to visual impacts.

v. Magnetic Field Levels

NMLD provided data on magnetic field levels for the existing and proposed transmission lines along the Primary Configuration and at the Dean Street and proposed new substation terminals (Exh. NM-1, at 101-102). Specifically, NMLD provided measurements of current magnetic field levels for the existing transmission lines and Dean Street substation, which ranged from 0 mG to a maximum of 16 mG (at the Dean Street getaway cables) (id. at 102). NMLD indicated that it took all measurements on the sidewalk or, where there was no sidewalk, just off the edge of the paved way (Exh. EFSB-E-8). The Light Department also modelled magnetic field levels for its proposed transmission lines both assuming a load of 15 MVA and assuming a peak substation capacity load of 55 MVA (id; Exh. EFSB-E-8B). According to the modelling undertaken at 55 MVA by NMLD, magnetic field levels would be 3.3 mG directly above the centerline of the proposed underground transmission cables, and would decrease to 0.7 mG and 0.1 mG at distances from the centerline of ten feet and 20 feet, respectively (Exhs. EFSB-E-8; EFSB-E-8B). NMLD stated that its use of close phase spacing would reduce magnetic field levels associated with its proposed 115 kV transmission system (Exh. NM-1, at 101).

With respect to the proposed distribution lines, NMLD indicated that the proposed distribution line route would extend initially across undeveloped Town-owned land from the proposed Ellis Avenue substation to a crossing of Route 1 and southward toward Plantingfield Brook along an approximately 1000-foot frontage of undeveloped Town-owned land on the west side of Route 1 (id., at 87; Exh. EFSB-E-1, EFSB-E-1A, Att.). NMLD provided estimates of the expected magnetic field levels associated with the distribution lines at the Route 1 crossing, which would range from 2.8 mG (at initial build, with two cables at a 15 MVA load) to 18 mG (twenty years after construction, with 6 cables at a 39.7 MVA load)

(Exh. EFSB-A-3).[44] In constructing the distribution lines under Route 1, the Light Department stated that it would locate the ductbank so as to maximize the distance from any receptor above (id.).[45] NMLD provided no magnetic field impact estimates for the remainder of the distribution line route, extending approximately 2500 feet along the west side of Route 1 from Plantingfield Brook to Pleasant Street, but indicated that commercial and business uses were located along that portion of the route.[46] The Light Department also noted that its overall proposal to transmit bulk power at 115 kV to meet load in the northern area of the Town would off-load some of the Dean Street distribution feeders, and thus reduce magnetic fields along those feeder routes (Exh. EFSB-E-24).

The record demonstrates that the proposed transmission and substation improvements to the NMLD system would result in minimal contributions to existing magnetic field levels. The record further indicates that the proposed distribution lines emanating from the proposed new substation, although projected to produce potentially higher magnetic field levels than the proposed transmission lines, would be routed initially in an area of undeveloped Town-owned land, and then along primarily commercial frontages on the west side of Route 1 with setbacks to occupied buildings. The record also demonstrates that any change in magnetic fields as a result of installation of the proposed facilities would be greatest directly over the centerlines of the proposed underground transmission and distribution cables, and would fall off rapidly with distance to the either side of the respective centerlines. Finally, the record demonstrates that the design of the transmission and distribution lines, including the underground alignment and the close phase spacing of cables in ductbanks, and the placement of the distribution line ductbank at the Route 1 crossing to maximize separation from receptors, would help minimize magnetic field impacts from the proposed facilities.

In a previous review of proposed transmission line facilities which included 345 kV transmission lines, the Siting Board accepted edge-of-right-of-way ("ROW") levels of

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[44] NMLD indicated that the crossing would be routed through an existing but sealed tunnel, historically used for passage of livestock, and also later as a route for other utilities (Exh. EFSB-A-3).

[45] NMLD provided maps showing developed uses on nearby Ellis Avenue, but indicated that such uses are either across the street from the proposed distribution line route, or separated by an approximately 200-foot width of undeveloped Town-owned land (Exhs. NM-1, exhibit 4-1; EFSB-E-1, EFSB-E-1A, Att.).

[46] Information provided by NMLD indicates that many of the existing uses are set back from Route 1, and at several locations within the route segment there are ditch-type wetlands on the abutting land closest to the Route 1 layout (Exh. NM-2, exhibit 4-7, Att. A at A-4 to A-8).

85 mG for magnetic fields. Massachusetts Electric Company/New England Power Company, 13 DOMSC 119, 228-242 (1985). The Siting Board has also applied these edge-of-ROW levels in subsequent reviews of facilities which included 115 kV transmission lines. See Enron, 23 DOMSC at 227 (1991); MASSPOWER, 20 at DOMSC 401-403.

Here the Siting Board notes that projected magnetic field levels for all facility elements would be well below the levels previously found acceptable by the Siting Board. In addition, the Light Department has developed proposed siting and design provisions, as discussed above, that would minimize the magnetic field impacts of the proposed facilities. Accordingly, the Siting Board finds that, with implementation of the proposed facility design and mitigation, the environmental impacts of the proposed facilities along the Primary Configuration would be minimized with respect to magnetic field impacts.

vi. Conclusions on Environmental Impacts

In Section III.C.2.a, above, the Siting Board has reviewed the information provided by the Light Department regarding environmental impacts of the proposed facilities under the Primary Configuration and the potential mitigation measures. The Siting Board finds that the Light Department has provided sufficient information regarding environmental impacts of the proposed facilities under the Primary Configuration 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 among environmental impacts, cost, and reliability 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, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to water resources; (2) with the implementation of the proposed mitigation measures, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to land resources; (3) with the approval by the Town's ZBA of the Light Department's application for a special permit to construct and operate the proposed new substation within the Water Protection Overlay District in Norwood, and with the implementation of all mitigation proposed in Sections III.C.2.a.i to III.C.2.a.ii, above, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to land use; (4) with the proposed mitigation to screen the proposed facilities at the proposed new substation site, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized with respect to visual impacts; and (5) with implementation of the proposed facility design and mitigation, the environmental impacts of the proposed

facilities under the Primary Configuration would be minimized with respect to magnetic field levels.

Accordingly, the Siting Board finds that with the implementation of proposed mitigation and planned compliance with applicable state and local requirements set forth above, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized. In Section III.C.2.c, below, the Siting Board addresses whether an appropriate balance among environmental impacts and among environmental impacts, cost and reliability would be achieved.

b. Cost of the Proposed Facilities Under the Primary Configuration

The Light Department asserted that it had provided sufficient cost information regarding the proposed facilities for the Siting Board to determine whether an appropriate balance would be achieved between environmental impacts and costs (Brief at 131).

In support of its assertion, the Light Department submitted estimates of both installation costs and discounted total costs for all three alternatives (Exhs. EFSB-RR-3-S; NM-2, at exhibits 5-1 to 5-3).[47] NMLD stated that it estimated the installation costs of the proposed project at $13,984,000, and the discounted total costs at $23,720,000 (Exhs. EFSB-RR-3-S; NM-1, at 135).[48]

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

c. Conclusions

The Siting Board has found that NMLD has provided sufficient information regarding the environmental impacts of the proposed facilities under the Primary Configuration 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

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47 As indicated in Section II.B.6, above, discounted total costs are the costs, in 1996 dollars, of initial construction, anticipated distribution system additions and modifications, and differential line losses over the 2001-2019 analysis period (Exh. NM-1, at 135). Installation costs include costs of 115 kV transmission, 13.8 kV distribution, a new 115/13.8 kV substation, Dean Street modifications and future distribution costs (Exhs. EFSB-RR-3-S; NM-2, at exhibit 5-1).

48 NMLD indicated that its 20-year analysis assumed construction of four distribution lines at the time of the initial build, and subsequent construction of two additional distribution circuits to the east and west of the new substation site, respectively (Exh. EFSB-C-1).

between environmental impacts and costs would be achieved. The Siting Board has also found that NMLD has provided sufficient cost information for the Siting Board to determine whether the appropriate balance would be achieved between environmental impacts and cost.

In Section III.C.2.a, above, the Siting Board reviewed the environmental impacts of the proposed facilities and proposed mitigation under the Primary Configuration with respect to water resources, land resources, land use, visual impacts, and magnetic field levels. For each category of environmental impacts, NMLD demonstrated that, with the mitigation discussed above, the impacts would be minimized.

Accordingly, the Siting Board finds that the proposed facilities under the Primary Configuration would achieve an appropriate balance among conflicting environmental concerns as well as between environmental impacts and cost.

3. Analysis of the Proposed Facilities along the Alternative Routes 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 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 would achieve the appropriate balance among environmental impacts and between environmental impacts and cost. 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, in order to determine a best route, the Siting Board compares the environmental impacts of the Primary Configuration to the environmental impacts of each of the alternative routes.

i. Water Resources

(A) Alternative One

NMLD indicated that wetland resource areas encountered in the vicinity of Alternative One would be essentially the same as those in the vicinity of the Primary Configuration (Exh. NM-1, at 103). NMLD noted that the Alternative One transmission line route would be located within existing roadways, avoiding direct disturbance of wetland resources adjacent to the roadway layout (id. at 103). NMLD stated that, like the primary route, the Alternative

One route would cross two culverted streams; further, the divergent route segment would not traverse any wetlands or result in additional impacts to floodplains or water supply (id. at 103-105). The Light Department indicated that potential impacts to water supply from construction and operation of the proposed facilities under Alternative One would be comparable to those under Alternative Two or the Primary Configuration (id. at 118).

The record demonstrates that impacts to existing and future water resources from the construction of the proposed facilities could be minimized under Alternative One. The record also demonstrates that the impacts to water resources of Alternative One and the Primary Configuration would be identical. Accordingly, the Siting Board finds that the Primary Configuration and Alternative One would be comparable with respect to water resources.

(B) Alternative Two

NMLD indicated that the Alternative Two transmission line route would extend 0.8 mile beyond the end of the primary route to reach the University Avenue site (id. at 115-116). NMLD stated that the longer transmission and distribution lines would result in additional impacts to wetland resources, as they would cross an additional 2100 square feet of wetland buffer zone (Exhs. NM-1, at 116-117; NM-2, exhibit 4-20; Tr. 2 at 144).[49]

The Light Department indicated that it would minimize impacts to wetland buffer zone under Alternative Two with mitigation of the same type and scope as is proposed for the Primary Configuration (Exh. NM-1, at 116-117). NMLD also stated that because the University Avenue site was in an upland area away from wetland resources, any impacts to wetlands, buffer zone, floodplains and surface water of constructing and operating the proposed new substation at that site would be comparable to those at the Ellis Avenue site (Exhs. NM-1, at 116-117; NM-2, exhibit 4-20). NMLD noted, however, that, due to the greater extent of construction in buffer zones associated with Alternative Two, the potential for impacts to wetlands from construction and operation of the proposed facilities under Alternative Two would be slightly greater than those under either Alternative One or the Primary Configuration (id. at 117).

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[49] NMLD also indicated that the Alternative Two transmission line route would pass through an additional 4,800 linear feet of the ACEC (Exh. NM-1, at 120). The Light Department stated, however, that potential impacts to the ACEC from Alternative Two would be comparable to those from the Primary Configuration since neither facilities configuration directly impacts resources protected by the ACEC (id.).

With respect to water supply impacts of Alternative Two, NMLD stated that the portion of the transmission line and 13.8 kV distribution line routes running from Route 1 along University Avenue to the University Avenue site would be adjacent to the WPD for the Ellis Avenue well-field (id. at 117-118). The Light Department indicated that the University Avenue site was on Town-owned land which could not be used for wells due to the proximity of land not controlled or owned by the NWD (id. at 118). NMLD stated that the University Avenue site was located outside of the area of any existing or potential future well sites and would therefore allow for potential, but unlikely, future development at the Ellis Avenue well-field (id.). The Light Department indicated that the University Avenue site was slightly further than the Ellis Avenue site from existing or potential future well sites (Exh. NM-2, exhibit 4-20).

NMLD stated that placement of the transmission and distribution lines along University Avenue would require construction adjacent to, but not in, wetlands that drain to water supply land. The Light Department indicated that it would prevent migration of sediments with appropriate mitigation measures, and that the potential impacts to water supply from construction and operation of the proposed facilities under Alternative Two would be comparable under those of Alternative One and the Primary Configuration (id.).

The record demonstrates that impacts to existing and future water resources from the construction of the proposed facilities could be minimized under Alternative Two. The record further shows that construction of transmission and distribution lines for Alternative Two may result in greater wetlands impacts than those associated with the Primary Configuration, but that such impacts would be temporary and minimized with the use of appropriate mitigation techniques. In addition, the record shows that use of the University Avenue substation site might result in slightly less impact to water resources because of its greater distance from the Ellis Avenue well-field. The record thus demonstrates that the Primary Configuration and Alternative Two would result in slight and offsetting advantages with respect to wetland resources and groundwater and well resources, respectively. Accordingly, the Siting Board finds that the Primary Configuration and Alternative Two would be comparable with respect to water resources.

ii. Land Resources

(A) Alternative One

NMLD indicated that the land resource impacts of the construction of the proposed facilities under Alternative One would be identical to those under the Primary Configuration, except where the Alternative One transmission line route deviates from the primary route (Exh.

NM-1, at 56, 103, 106) (see Section II.C.2.a.ii, above). NMLD stated that it would limit the tree-clearing, vegetation and soil erosion impacts of Alternative One by installing the transmission lines within roadway layouts of Dean Street, Neponset Street and Route 1 (id. at 103, 107).

The Light Department indicated that it would coordinate with the MHD and the Norwood DPW to ensure the use of appropriate mitigation to minimize erosion during construction and that it would replace any trees removed for construction of the proposed facilities on a one-to-one basis (id.; Tr. 2, at 148). NMLD further stated that no rare or endangered species or habitat would be adversely affected by the construction or operation of the proposed facilities under Alternative One (Exhs. NM-1, at 121; NM-2, exhibit 4-2; EFSB-Att.-E-11-C).

The record demonstrates that impacts of the construction of the proposed facilities under Alternative One with respect to tree clearing, upland vegetation and potential soil erosion would be minimized. The record also demonstrates that there are no known rare or endangered species that would be adversely affected by the proposed construction under Alternative One. The Siting Board notes, however, that the primary transmission line route would be shorter than the Alternative One route by 0.4 mile.

Accordingly, the Siting Board finds that the Primary Configuration would be slightly preferable to Alternative One with respect to land resource impacts.

(B) Alternative Two

NMLD indicated that the land resources impacts of Alternative Two would differ from those of the Primary Configuration due to the use of the University Avenue substation site and the longer transmission and distribution line routes, which extend 0.8 mile beyond the end of the primary route (id. at 56, 115). See Section II.C.2.a.ii, above. NMLD stated that it would limit the tree-clearing, vegetation and soil erosion impacts of the Alternative Two transmission and distribution lines by installing the extended portion of such lines within the layout of Route 1, Everett Street and University Avenue (id. at 120).

As with Alternative One, the Light Department indicated that it would coordinate with the MHD and the Norwood DPW to ensure the use of appropriate mitigation to minimize erosion during construction, and that it would replace any trees removed for construction of the proposed facilities on a one-to-one basis (id.; Tr. 2, at 148). NMLD further stated that no rare or endangered species or habitat would be adversely affected by the construction or operation of the proposed facilities under Alternative Two (Exhs. NM-1, at 121; NM-2, exhibit 4-2; EFSB-Att.-E-11-C).

The record demonstrates that impacts of the construction of the proposed facilities under Alternative Two with respect to tree clearing, upland vegetation and potential soil erosion would be minimized. The record also demonstrates that there are no known rare or endangered species that would be adversely affected by the proposed construction under Alternative Two. The Siting Board notes, however, that the primary transmission line route would be shorter than the Alternative Two route by 0.8 mile.

Accordingly, the Siting Board finds that the Primary Configuration would be slightly preferable to Alternative Two with respect to land resource impacts.

iii. Land Use

(A) Alternative One

NMLD indicated that differences between Alternative One and the Primary Configuration with respect to zoning and land use would be limited to the divergent routing for a portion of the 115 kV transmission lines (Exh. NM-1, at 106-109). The Light Department stated that 1.2 miles more of the Alternative One transmission line route than of the primary route would be located in residential areas, with correspondingly less commercial area traversed (id. at 108).[50] NMLD stated that construction and operation of the proposed facilities under Alternative One would not adversely impact historic or archaeological resources (id. at 106, 119).

NMLD stated that traffic impacts associated with Alternative One would be limited primarily to periods of construction, and that no construction would be undertaken in the travel lanes of Route 1 (id. at 109, 122). The Light Department indicated that, although construction for Alternative One would impact fewer commercial driveways along Route 1 than the Primary Configuration, other commercial and apartment complex driveways along Neponset Street would be affected, as would driveways in residential sections of Neponset and Pleasant Streets (id. at 109-111). NMLD stated that construction of the proposed facilities under Alternative One would also require two crossings of Route 1, one at Neponset Street and the other at Pleasant Street, which would likely result in additional traffic disruption (id. at 110).[51] NMLD indicated that it would coordinate the development of a traffic management

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[50] The Norwood League of Women Voters ("LWV") study documented the preference of the LWV -- and other Town residents attending public meetings held by the LWV -- for minimizing the residential areas traversed by the proposed facilities (Exh. EFSB-S-4A). (See Section III.B, above.)

[51] NMLD indicated that boring under Route 1 to avoid traffic disruption was possible but (continued…)

plan with the Town and the MHD, and that it would use the same measures developed to mitigate the traffic and safety impacts associated with construction of the proposed facilities along the Primary Configuration if Alternative One were selected instead (Exh. NM-1, at 110, 112, 123; Exh. EFSB-E-13). See Section III.C.2.iii, above.

NMLD indicated that construction of the proposed facilities under Alternative One would result in greater noise impacts than those for the Primary Configuration, because the Alternative One transmission line route would be longer and would pass through a higher proportion of residential streets (Exh. NM-1, at 113-114).

The record demonstrates that the Alternative One transmission line route would in large part traverse zoning districts comparable to those of the primary route, but would traverse more area zoned for residential use. Because significantly more of the Alternative One route would pass through residential streets, the traffic, safety and noise impacts of its construction would be greater than those for the Primary Configuration. The record demonstrates, however, that such impacts would be temporary.

Accordingly, the Siting Board finds that the Primary Configuration would be preferable to Alternative One with respect to land use impacts.

(B) Alternative Two

NMLD stated that the land use impacts of Alternative Two differ from those of the Primary Configuration primarily due to the different substation site, and the extension of the transmission and distribution lines from the endpoint of the primary route to the University Avenue site (id. at 119-122). NMLD noted that the transmission and distribution line extensions would traverse areas zoned for business and manufacturing, and that the University Avenue site would be in an area zoned for limited manufacturing, in contrast to the residentially zoned Ellis Avenue site (id. at 121). The Light Department indicated that the University Avenue site, like the Ellis Avenue site, would be located within the WPD and therefore would require the same permitting (id.). See Section III.C.2.iii, above. NMLD stated that construction and operation of the proposed facilities under Alternative Two would not adversely impact historic or archaeological resources (id. at 106, 119).

(…continued)
costly, and that the Light Department had based its cost estimates on less expensive open cut crossings (Exh. NM-1, at 110). NMLD indicated that the traffic impacts of open cut crossings could be limited by planning construction to avoid times when the roadway would be heavily travelled (id.).

NMLD stated that traffic impacts associated with Alternative Two would be limited primarily to periods of construction, and that no construction would be undertaken in the travel lanes of Route 1 (id. at 109, 122). NMLD stated that the extension of the transmission and distribution line routes along Route 1 and University Avenue to the University Avenue site would result in traffic disruption along University Avenue and additional traffic disruption along Route 1 beyond that associated with the Primary Configuration (id. at 122). NMLD indicated, however, that it would take appropriate steps to mitigate traffic impacts along University Avenue, including keeping open two lanes of traffic during construction, and that the same measures used to mitigate traffic impacts elsewhere along Route 1 would be used to minimize traffic impacts along the Route 1 extension (id.). In addition, NMLD indicated that it would coordinate the development of a traffic management plan with the Town and the MHD, and that it would use the same measures developed to mitigate the traffic and safety impacts associated with construction of the proposed facilities along the primary route if Alternative Two were selected instead (Exh. NM-1, at 110, 112, 123; Exh. EFSB-E-13). See Section III.C.2.iii, above.

NMLD indicated that construction of the proposed facilities under Alternative Two would result in a longer duration of construction noise impacts than under the Primary Configuration because of the greater length of its transmission and distribution lines (id. at 129). The Light Department stated that construction practices planned for the Primary Configuration would also be used to minimize potential construction noise impacts of Alternative Two (id.). The Light Department indicated that no long-term noise impacts were anticipated as a result of construction of the proposed transmission and distribution facilities under Alternative Two (id. at 113, 129).

The Light Department provided estimated noise levels for sensitive receptors in the area of the University Avenue site (id. at 124-128). In addition, the Light Department provided a map marking the distance from the University Avenue site within which the increase in the ambient noise level at L_{90} would be 8 dBA or greater under nighttime conditions (Exh. EFSB-RR-6). Based on its noise estimates and map, NMLD stated that increases in L_{90} ambient noise at the 8 dBA level or above would not be experienced at any existing commercial or residential structure (id.). The Light Department indicated that while most of the property in the vicinity of the University Avenue site was owned by NWD and would likely not be developed, development of a privately owned parcel to the southeast of the site might be possible (id.). NMLD noted, however, that the parcel was located in a limited manufacturing zone where noise sensitive uses such as residences would not be allowed under the Town zoning by-laws (id.).

The record demonstrates that the Alternative Two transmission line route would in large part traverse zoning districts comparable to those of the primary route, but would traverse less area zoned for residential use. The record also demonstrates that the traffic and safety impacts of Alternative Two would be slightly greater than for those of the Primary Configuration due to the longer transmission and distribution lines associated with Alternative Two. Further, due to the greater length of Alternative Two and the potential for future development in the vicinity of the University Avenue site, noise impacts associated with Alternative Two may be greater than those for the Primary Configuration.

Accordingly, the Siting Board finds that the Primary Configuration would be slightly preferable to Alternative Two with respect to land use impacts.

iv. Visual Impacts

(A) Alternative One

NMLD indicated that all modifications to existing equipment and construction of new facilities under Alternative One would be identical to those under the Primary Configuration and therefore would have identical visual impacts (Exh. NM-1, at 112-113). NMLD further indicated that, because the proposed transmission line would be built underground, the visual impacts of the transmission line would be identical under Alternative One and the Primary Configuration (id. at 112).

The record demonstrates that visual impacts of the proposed facility under Alternative One would be minimized and would be comparable to the impacts under the Primary Configuration. Accordingly, the Siting Board finds that Alternative One would be comparable to the Primary Configuration with respect to visual impacts.

(B) Alternative Two

The Light Department stated that visual impacts of Alternative Two and the Primary Configuration would be identical with respect to the existing Dean Street substation and along the route of the proposed underground transmission and distribution lines (id. at 123-124). NMLD also indicated that visual impacts of the proposed substation at the University Avenue site would be minimal and comparable to those at the Ellis Avenue substation site (Exh. EFSB-E-16). The Light Department indicated that it based its statement on the fact that the University Avenue site is surrounded by forested, undeveloped parcels which are zoned for limited manufacturing (id.). NMLD stated that the University Avenue site is large enough to allow for a buffer of vegetation outside the fence line of the substation that could screen the site from view of any development that might occur in surrounding areas in the future (id.).

The record demonstrates that visual impacts of the proposed facility under Alternative Two would be minimized and would be comparable to the impacts under the Primary Configuration. Accordingly, the Siting Board finds that Alternative Two would be comparable to the Primary Configuration with respect to visual impacts.

v. Magnetic Field Levels

(A) Alternative One

NMLD provided data on existing and anticipated magnetic field levels for that portion of the Alternative One transmission line route which diverges from the primary route (Exhs. NM-1, at 114, 130; NM-2, exhibits 4-19, 4-22; EFSB-E-24; EFSB-E-25). The Light Department stated that all measurements were taken on the sidewalk, or where there was no sidewalk, just off the edge of the paved way (Exhs. EFSB-E-24, EFSB-E-25). NMLD indicated that measured magnetic field levels ranged from 0 mG to 8 mG along the divergent part of the route (Exh. NM-2, exhibit 4-19). The Light Department asserted that its analysis of maximum magnetic field levels for the proposed transmission and distribution lines under the Primary Configuration would also apply to Alternative One (Exhs. EFSB-E-24, EFSB-E-25).

The record demonstrates that the magnetic field level impacts of Alternative One and the Primary Configuration would be comparable, and would be well below the level of 85 mG previously accepted by the Siting Board. The record also demonstrates that the Light Department would take steps to minimize the magnetic field impacts of operating the proposed underground transmission and distribution lines, including the use of close phase spacing, regardless of which route is chosen.

Accordingly, the Siting Board finds that Alternative One would be comparable to the Primary Configuration with respect to magnetic field levels.

(B) Alternative Two

NMLD also provided data on existing and anticipated magnetic field levels for those portions of the Alternative Two transmission and distribution line routes which do not overlap the primary route (Exhs. NM-1, at 114, 130; NM-2, exhibits 4-19, 4-22; EFSB-E-24; EFSB-E-25). The Light Department stated that all measurements were taken on the sidewalk, or where there was no sidewalk, just off the edge of the paved way (Exhs. EFSB-E-24, EFSB-E-25). NMLD indicated that measured magnetic field levels ranged from 0 mG to 4 mG along the divergent portion of the Alternative Two transmission and distribution

line routes (Exh. NM-2, exhibit 4-22). The Light Department asserted that its analysis of maximum magnetic field levels for the proposed transmission and distribution lines under the Primary Configuration would also apply to Alternative Two (Exhs. EFSB-E-24, EFSB-E-25).

The record demonstrates that the magnetic field level impacts of Alternative Two and the Primary Configuration would be comparable, and would be well below the level of 85 mG previously accepted by the Siting Board. The record also demonstrates that the Light Department would take steps to minimize the magnetic field impacts of operating the proposed underground transmission and distribution lines, including the use of close phase spacing, regardless of which route is chosen.

Accordingly, the Siting Board finds that Alternative Two would be comparable to the Primary Configuration with respect to magnetic field levels.

vi. Conclusions on Environmental Impacts

In Sections III.C.3.a(i) to (v), above, the Siting Board has found that the Primary Configuration would be slightly preferable to both Alternative One and Alternative Two with respect to land resources, preferable to Alternative One and slightly preferable to Alternative Two with respect to land use impacts and comparable to both Alternative One and Alternative Two with respect to water resources, visual and magnetic field impacts.

The Siting Board notes that the Light Department's effort to solicit input from a wide variety of sources during the early stages of its planning process has produced a Primary Configuration and two alternatives, each of which would involve temporary, relatively minor and/or readily mitigated environmental impacts. Nonetheless, the Primary Configuration clearly offers certain advantages over the two alternatives. These advantages are primarily due to (1) the shorter transmission line route of the Primary Configuration, which results in fewer land use impacts over a shorter construction period, and (2) the fact that the primary route transmission line would be installed in the grassed and paved shoulder of an existing state highway rather than in residential streets.

Accordingly, the Siting Board finds that, on balance, the Primary Configuration would be preferable to Alternative One or Alternative Two with respect to environmental impacts.

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

NMLD asserted that the Primary Configuration would be more economical to construct and operate over the years 2001-2019 than either Alternative One or Alternative Two (Exh.

NM-1, at 139). NMLD submitted estimates of installation costs and discounted total costs (including differential line losses) for the years 2001-2019 for the two alternative configurations (Exhs. EFSB-RR-3-S; NM-2, at exhibits 5-2, 5-3). NMLD explained that its estimates of installation costs for the two alternative configurations included costs of 115 kV transmission, 13.8 kV distribution, a new 115/13.8 kV substation, Dean Street substation modifications and future distribution costs (Exhs. EFSB-RR-3-S; NM-2, at exhibits 5-2, 5-3).

i. Alternative One

NMLD stated that it estimated installation costs at $14,421,000 for Alternative One, as compared to $13,984,000 for the Primary Configuration (Exh. EFSB-RR-3-S). NMLD further stated that discounted total costs for Alternative One would be $24,502,000, as compared to $23,720,000 for the Primary Configuration (Exhs. NM-1, at 137; NM-2, at exhibit 5-2). The Light Department indicated that discounted total cost included differential line losses of $6,000 over the line losses expected under the Primary Configuration (Exh. EFSB-RR-3-S).

NMLD indicated that costs of the Primary Configuration would be lower than those of Alternative One due primarily to the lower transmission and distribution costs of the Primary Configuration (Exh. NM-1, at 138). NMLD explained that initial 115 kV transmission costs would be lower for the Primary Configuration than for Alternative One because the route of the proposed transmission lines would be shorter (id.).

The record demonstrates that both the installation and discounted total costs of Alternative One would be 3 percent more than corresponding costs for the Primary Configuration. According, the Siting Board finds that the Primary Configuration would be preferable to Alternative One with respect to cost.

ii. Alternative Two

NMLD stated that it estimated total installation costs at $17,004,000 for Alternative Two (Exh. EFSB-RR-3-S). NMLD further stated that discounted total costs for Alternative Two would be $29,546,000 (Exhs. NM-1, at 138; NM-2, at exhibit 5-3). The Light Department indicated that the discounted total cost included differential line losses of $116,000 over the line losses expected under the Primary Configuration (Exh. EFSB-RR-3-S).

NMLD indicated that transmission and distribution costs would be lower for both the Primary Configuration and Alternative One than for Alternative Two (Exh. NM-1, at 138). NMLD also indicated that future distribution costs for Alternative Two would be higher than

for the Primary Configuration and Alternative One due to the greater distance from the load center of the University Avenue substation site (id.). NMLD explained that longer ductbanks and cable circuits would be needed to reach the load from the University Avenue site than from the Ellis Avenue site (id.).

The record demonstrates that installation and discounted total costs of Alternative Two are 22 and 25 percent greater, respectively, than those of the Primary Configuration.[52] Accordingly, the Siting Board finds that the Primary Configuration would be preferable to Alternative Two with respect to cost.

c. Conclusions

In comparing the Primary Configuration to Alternative One and Alternative Two, the Siting Board has found that the proposed facilities under the Primary Configuration would be preferable to both Alternative One and Alternative Two with respect to (1) environmental impacts, and (2) costs.

Accordingly, the Siting Board finds that the Primary Configuration would be preferable to Alternative One and Alternative Two with respect to providing a necessary energy supply to the Commonwealth with a minimum impact on the environment at the lowest possible cost.

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[52] The record also demonstrates that installation and discounted total costs of Alternative Two are 18 and 21 percent greater, respectively, than those of Alternative One.

4. DECISION

The Siting Board has found that the Light Department's analysis demonstrates that (1) under the current configuration, peak load would exceed a maximum system loading of 83 MVA in the 2000-2001 timeframe in contravention of NMLD's design criteria; (2) by 1999, feeder position capabilities would constrain NMLD's ability to meet load growth, particularly large customer growth, because the existing system would not have the flexibility to serve new spot loads; and (3) at present, the contingency of the loss of a single circuit in the 16-way ductbank could result in system operation at emergency levels for more than 24 hours, in contravention of system reliability criteria. The Siting Board therefore has found that there is a need for additional energy resources based on the Light Department's reliability criteria.

The Siting Board also has found that there is reasonable consistency between the D.P.U. 94-112 forecast and NMLD's internal forecast, which supports the Siting Board's finding of need for additional energy resources. Consequently, the Siting Board finds that the proposed project is consistent with the most recently approved long-range forecast that encompasses NMLD's load, namely, the D.P.U. 94-112 forecast.

The Siting Board further has found that the proposed project is preferable to the Dean Street Expansion Plan, the Low Voltage Plan and distributed generation.

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

The Siting Board further has found that with the implementation of proposed mitigation and planned compliance with applicable state and local requirements set forth above, the environmental impacts of the proposed facilities under the Primary Configuration would be minimized.

The Siting Board further has found that the proposed facilities under the Primary Configuration would achieve an appropriate balance among conflicting environmental concerns as well as between environmental impacts and cost.

The Siting Board further has found that the Primary Configuration would be preferable to Alternative One and Alternative Two with respect to providing a necessary energy supply to the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Accordingly, the Siting Board APPROVES the Light Department's petition to construct (1) two underground parallel 115 kV transmission lines, (2) a new 115/13.8 kV substation, and (3) a 0.7-mile 13.8 kV distribution line using the Petitioner's proposed configuration in the Town of Norwood.

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 proposal as presented to the Siting Board. Therefore, the Siting Board requires the Light Department to notify the Siting Board of any changes other than minor variations to the proposal so that the Siting Board may decide whether to inquire further into a particular issue. The Light Department 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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Jolette A. Westbrook
Hearing Officer

Dated this 14th day of April, 1997